

Low SARS-CoV-2 sero-prevalence based on anonymized residual sero-survey before and after first wave measures in British Columbia, Canada, March-May 2020

Danuta

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Abstract

Background: The province of British Columbia (BC) has been recognized for successful SARS-CoV-2 control, with surveillance data showing amongst the lowest case and death rates in Canada. We estimate sero-prevalence for two periods flanking the start (March) and end (May) of first-wave mitigation measures in BC. Methods: Serial cross-sectional sampling was conducted using anonymized residual sera obtained from an outpatient laboratory network, including children and adults in the Greater Vancouver Area (population ~3 million) where community attack rates were expected to be highest. Screening used two chemiluminescent immuno-assays for spike (S1) and nucleocapsid antibodies. Samples sero-positive on either screening assay were assessed by a third assay targeting the S1 receptor binding domain plus a neutralization assay. Age-standardized sero-prevalence estimates were based on dual-assay positivity. The May sero-prevalence estimate was extrapolated to the source population to assess surveillance under-ascertainment, quantified as the ratio of estimated infections versus reported cases. Results: Serum collection dates spanned March 5-13 and May 15-27, 2020. In March, two of 869 specimens were dual-assay positive, with age-standardized sero-prevalence of 0.28% (95%CI=0.03-0.95). Neither specimen had detectable neutralizing antibodies. In May, four of 885 specimens were dual-assay positive, with age-standardized sero-prevalence of 0.55% (95%CI=0.15-1.37%). All four specimens had detectable neutralizing antibodies. We estimate ~8 times more infections than reported cases. Conclusions:

Less than 1% of British Columbians had been infected with SARS-CoV-2 when first-wave mitigation measures were relaxed in May 2020. **Our findings indicate** successful suppression of community transmission in BC, but also substantial residual susceptibility. **Further sero-survey snapshots are planned as the pandemic unfolds.**

Competing Interest Statement

DMS is Principal Investigator on grants from the Michael Smith Foundation for Health Research in support of this work. MK received grants/contracts paid to his institution from Roche, Hologic and Siemens. No other authors have conflicts of interest to disclose.

Funding Statement

Funding was provided in part by the Michael Smith Foundation for Health Research (Grant number 18934).

Author Declarations

I confirm all relevant ethical guidelines have been followed, and any necessary IRB and/or ethics committee approvals have been obtained.

Yes

The details of the IRB/oversight body that provided approval or exemption for the research described are given below:

The sero-survey was authorized by the Provincial Health Officer and approved by the Clinical Research Ethics Board of the University of British Columbia (H20-00653).

All necessary patient/participant consent has been obtained and the appropriate institutional forms have been archived.

Yes

I understand that all clinical trials and any other prospective interventional studies must be registered with an ICMJE-approved registry, such as ClinicalTrials.gov. I confirm that any such study reported in the manuscript has been registered and the trial registration ID is provided (note: if posting a prospective study registered retrospectively, please provide a statement in the trial ID field explaining why the study was not registered in advance).

Yes

I have followed all appropriate research reporting guidelines and uploaded the relevant EQUATOR Network research reporting checklist(s) and other pertinent material as supplementary files, if applicable.

Yes

Paper in collection [COVID-19 SARS-CoV-2 preprints from medRxiv and bioRxiv](#)

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Tweets referencing this article:

Elmer Wiens

@egwiens

[#BC](#): A month ago [@CDCofBC](#) posted their [#COVID19](#) antibody tests with prevalence at 0.55%; <https://t.co/epRk6eWDix> Adjusting for 30% false negatives: Overall [#COVID19](#) virus tests show prevalence at 2%; August 11 and 12 virus tests prevalence of 3.2% and 4.1

[13 Aug 2020](#)

n8han

[@n8han](#)

[@mathbernier](#) En CB ils estime 8 fois plus de cas que le nombre détecté, aussi basé sur une étude qui ne considère que les anticorps. 😊 <https://t.co/PoeDVVe7Tf>

[05 Aug 2020](#)

Anish Mitra

[@AnishRMitra](#)

[@BogochIsaac](#) We had similar results in BC: <https://t.co/FEq2HG812a> Do you know how confident we are about how long antibodies remain detectable after an infection?

[03 Aug 2020](#)

Larry Svenson

[@Larry_Svenson](#)

[@MrBigglz](#) BC has also released their serosurvey results (<https://t.co/kDlzhzzpww>) using a similar approach and with similar findings. Their full paper is here: <https://t.co/MXcn5LaeyE>

[31 Jul 2020](#)

Andrés Delgado-Ron 🍁

[@AndresDelgadoEC](#)

RT [@DavidPatrickMD](#): Covid-19 Seroprevalence before & after first wave measures in British Columbia, Canada, March-May 2020 [@ubcspph](#) [@CDCofB...](#)

[27 Jul 2020](#)

Zadz

[@Zadz74](#)

RT [@LeylaDAsadi](#): [@Zadz74](#) The BC seroprevalence study (<https://t.co/CdnDFIp5k3>) found 8X more infxns than confirmed cases. But we test more...

[23 Jul 2020](#)

Leyla Asadi

[@LeylaDAsadi](#)

[@Zadz74](#) The BC seroprevalence study (<https://t.co/CdnDFIp5k3>) found 8X more infxns than confirmed cases. But we test more broadly so I suspect we'd be missing less than that here in AB. For school opening "risk zones", I think we can reliably use our confi

[23 Jul 2020](#)

German Vega

[@gevageva31](#)

En un estudio de seroprevalencia, se estima que menos del 1% de la población (5 millones approx) se contagió hasta fines de Mayo, fecha en la que se empezaron a levantar las restricciones. Lo positivo: en Junio no se dispararon los contagios. 2/n <https://>

[23 Jul 2020](#)

Jeffrey Wong

@jeffreymhwong

B.C. seroprevalence of COVID-19 estimated at 0.55% in May 2020. This would be 8 times more infections than reported cases. [#COVID19Canada](#) <https://t.co/SSonOJsbyU>

[22 Jul 2020](#)

Marvin Durán Delgado

@MarvinDurnDelg1

Prevalencia de los anticuerpos en Canada. Este es un tremendo contra para la aplicación de determinaciones masivas de anticuerpos. Una prevalencia baja afecta la probabilidad pre test aún en los inmunoensayos de buena especificidad. [@msaludcr](#) excelente man

[22 Jul 2020](#)

Ryan Imgrund

@imgrund

[@sweatyrunner](#) It's the only Canadian seroprevalence data we have. <https://t.co/YsCrhIEOIB>

[21 Jul 2020](#)

Patrick Muncaster

@PatrikMuncaster

RT [@HelenBranswell](#): British Columbia's strong response to [#Covid19](#) has been rightly lauded. A new pre-print from there suggests <1% of Brit...

[20 Jul 2020](#)

Debra A. Barrath, MN, ACC CA

@dbarrath

RT [@HelenBranswell](#): British Columbia's strong response to [#Covid19](#) has been rightly lauded. A new pre-print from there suggests <1% of Brit...

[20 Jul 2020](#)

CA Siùsaidh 

@BellWhitworth

British Columbia's strong response to [#Covid19](#) has been rightly lauded. A new pre-print from there suggests <1% of British Columbians contracted the virus by May. <https://t.co/VgV9OfZIMG>

[19 Jul 2020](#)

shakes

@aurashakes

[@MiguelJohnson](#) [@EricTopol](#) <https://t.co/0q17yfba2d>

[18 Jul 2020](#)

SteveO

@seesthedanger

[@Vansanity1](#) What do you mean? They have the highest per capita Deaths so their approach was a failure. There is new research every day and now we know that the Herd Immunity approach does not work. We are learning much from BC's first serosurvey: <https://t>

[18 Jul 2020](#)

Hep Education Canada

@HepEduCan

RT [@CDCofBC](#): Fewer than 1% of people in British Columbia had [#COVID19](#) by the time public health measures to prevent the spread of the virus...

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Sophie Wells

@SophieW46502139

RT [@adriandix](#): Here's a link to the first study from our [#COVID19](#) serology survey in [#BC](#); showing outstanding work on the response by [@CDCo...](#)

[18 Jul 2020](#)

Shubhayan Sanatani

@DrSanatani

RT [@SilverSarah92](#): Rates in BC of [#COVID 19](#) infection <1% - impressed the [@CDCofBC](#) team has time to publish manuscripts while also leading...

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Dr. Emily Rempel

@Emsrem

RT [@CDCofBC](#): New research to look for [#COVID19](#) antibodies in random blood samples provides a 'snapshot' of the B.C. population in March and...

[18 Jul 2020](#)

Karen S. Palmer

@karenpalmeryvr

RT [@BogochIsaac](#): The first [#COVID19](#) serology data from Canada: This is from the Vancouver area, where there continues to be excellent comm...

[17 Jul 2020](#)

Nori Bradley

@BradleyNori

RT [@AntibioticDoc](#): Excellent population seroprevalence survey in BC, Canada: 0.5% seroprevalence 5 million people 189 recorded deaths ENE...

[17 Jul 2020](#)

Kulvir Mann

@BeingKulvir

RT [@CDCofBC](#): New research to look for [#COVID19](#) antibodies in random blood samples provides a 'snapshot' of the B.C. population in March and...

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Chi sin Gweilo

@ChiSin_Gweilo

RT @CDCofBC: New research to look for #COVID19 antibodies in random blood samples provides a 'snapshot' of the B.C. population in March and...

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Shane Woodford

@WoodfordinDK

RT @CDCofBC: New research to look for #COVID19 antibodies in random blood samples provides a 'snapshot' of the B.C. population in March and...

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PHABC

@PHA_BC

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Prov Health Services

@PHSAofBC

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Reluctant Pancreas

@NadinePedersen4

RT @adriandix: Here's a link to the first study from our #COVID19 serology survey in #BC; showing outstanding work on the response by @CDCo...

[17 Jul 2020](#)

Sarah Silverberg

@SilverSarah92

Rates in BC of #COVID 19 infection <1% - impressed the @CDCofBC team has time to publish manuscripts while also leading a strong pub health response <https://t.co/iEZODnqHex>

[17 Jul 2020](#)

Centre for Excellence for Emergency Preparedness

@ceepcanada

BC data from random blood samples in March and May is a snapshot revealing that less than 1% of the population was infected by the COVID-19 virus in the first wave. Indicates good suppression of the infection but also many still susceptible. Study: <https://t.co/iEZODnqHex>

[17 Jul 2020](#)

monika_dutt

@Monika_Dutt

BC data from random blood samples in March and May is a snapshot revealing that less than 1% of the population was infected by the #COVID19 virus in the first wave. Indicates good suppression of the infection but also many still susceptible. Study: <https://t.co/iEZODnqHex>

17 Jul 2020

strangeattractor

@strangeattracto

RT [@DFisman](#): My God: we finally have Canadian seroprevalence data <https://t.co/m6K2iX40xL>

17 Jul 2020

Omineca Regional Response

@OminecaRR

RT [@CDCofBC](#): Fewer than 1% of people in British Columbia had [#COVID19](#) by the time public health measures to prevent the spread of the virus...

17 Jul 2020

Jamie Uhrig

@himmoderator

RT [@himmoderator](#): [#NYC](#) 20% [#Spain](#) 5% [#BC](#) 1% [#covid19](#) [#coronavirus](#) [#antibody](#) [#prevalence](#) <https://t.co/GPyBaKEEuS>

17 Jul 2020

SNINDP

@SNINDP1

RT [@CDCofBC](#): New research to look for [#COVID19](#) antibodies in random blood samples provides a 'snapshot' of the B.C. population in March and...

17 Jul 2020

Lloyd hart

@Lloydhart13

RT [@adriandix](#): Congrats to the teams [@CDCofBC](#) [@UBC](#) for their exceptional work on this study: "These sero-prevalence findings reinforce othe..."

17 Jul 2020

Quentin Durand-Moreau, MD

@qdurandmoreau

Séroprévalence COVID en Colombie Britannique estimée à 1 % de la population (mars - mai 2020), dans un secteur où on s'attendait à des taux élevés. Préprint: <https://t.co/k0ff1CeR40>

17 Jul 2020

Rich (in name only)

@RichSeviora

RT [@CDCofBC](#): New research to look for [#COVID19](#) antibodies in random blood samples provides a 'snapshot' of the B.C. population in March and...

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Joey Hansen

@joeydhansen

RT [@adriandix](#): Congrats to the teams [@CDCofBC](#) [@UBC](#) for their exceptional work on this study: "These sero-prevalence findings reinforce othe..."

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Adriaan de Jager

@mapleclog

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Adam Schubel

[@AdamSchubel](#)

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Suzanne Campbell

[@Shcampbell27](#)

RT [@CDCofBC](#): Fewer than 1% of people in British Columbia had [#COVID19](#) by the time public health measures to prevent the spread of the virus...

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Hope Walker

[@hope_alayne](#)

RT [@adriandix](#): Here's a link to the first study from our [#COVID19](#) serology survey in [#BC](#); showing outstanding work on the response by [@CDCo...](#)

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Ken Kuhn

[@consult_ken](#)

RT [@CDCofBC](#): New research to look for [#COVID19](#) antibodies in random blood samples provides a 'snapshot' of the B.C. population in March and...

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Conconi Family Foundation

[@ConconiFndn](#)

Here are the results from the first study from the [#COVID19](#) serology survey in [#BC](#). <https://t.co/O5MfWRfH8e> <https://t.co/uA1yKs4x20>

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Hope Walker

[@hope_alayne](#)

RT [@CDCofBC](#): New research to look for [#COVID19](#) antibodies in random blood samples provides a 'snapshot' of the B.C. population in March and...

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Naman Paul

[@virtualnaman](#)

RT [@CDCofBC](#): Fewer than 1% of people in British Columbia had [#COVID19](#) by the time public health measures to prevent the spread of the virus...

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Leslie Spencer 

@FarthestShore

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ratfish (#BlackLivesMatter)

[@girlyratfish](#)

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Anas Manouzi, MD

[@AnasVancouver](#)

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Amélie Mel

[@MeliMalisss](#)

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Sue Stroud 🍷❤️🐦

[@suestroud](#)

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Livingvancouverloca

[@KasanConsulting](#)

RT [@CDCofBC](#): New research to look for [#COVID19](#) antibodies in random blood samples provides a 'snapshot' of the B.C. population in March and...

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Mustafa

[@Mustafa84896191](#)

Low SARS-CoV-2 sero-prevalence based on anonymized residual sero-survey before and after first wave measures in British Columbia, Canada, March-May 2020 | medRxiv <https://t.co/JVCCXAZ36m>

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What happens next?

[@hicsumus](#)

“Conclusions: Less than 1% of British Columbians had been infected with SARS-CoV-2 when first-wave mitigation measures were relaxed in May 2020.” The odds are therefore favourable for school reopening full-time. For k6 or all grades? <https://t.co/n0UAINd9>

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BC Wildfire Weekly - Now Covering #COVID19

@BCWildfireWkly

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NNPBC

@nnp_bc

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NNPBC

@nnp_bc

RT [@CDCofBC](#): New research to look for [#COVID19](#) antibodies in random blood samples provides a 'snapshot' of the B.C. population in March and...

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SexSafetyandSecurity

@SexSafetySecure

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City of Vancouver

@CityofVancouver

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Greg Mah

@greg_mah

RT [@CDCofBC](#): New research to look for [#COVID19](#) antibodies in random blood samples provides a 'snapshot' of the B.C. population in March and...

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#StayHome

@NaattuVarthakal

RT [@BogochIsaac](#): The first [#COVID19](#) serology data from Canada: This is from the Vancouver area, where there continues to be excellent comm...

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H.D.Nels

@hdnels

RT [@BogochIsaac](#): The first [#COVID19](#) serology data from Canada: This is from the Vancouver area, where there continues to be excellent comm...

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J. Mendoza

@vandoza

"Most people in BC are still susceptible to COVID-19." [#FlattenTheCurve](#) [#StayHome](#) [#StayHomeCanada](#) [#QuarantineLife](#) [#BritishColumbia](#) [#Vancouver](#)

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Lakhbir Singh

@Lakhbir40842445

RT [@CDCofBC](#): New research to look for [#COVID19](#) antibodies in random blood samples provides a 'snapshot' of the B.C. population in March and...

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Lulu [ca#BeKindBeCalmBeSafe](#)   

@LuluTheCalm

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Jasper Clinaz

@jclinaz

RT [@adriandix](#): Here's a link to the first study from our [#COVID19](#) serology survey in [#BC](#); showing outstanding work on the response by [@CDCo...](#)

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CAJENNCA

@j9e9n9n9

RT [@CDCofBC](#): New research to look for [#COVID19](#) antibodies in random blood samples provides a 'snapshot' of the B.C. population in March and...

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BCCDC

@CDCofBC

New research to look for [#COVID19](#) antibodies in random blood samples provides a 'snapshot' of the B.C. population in March and again in May, revealing fewer than 1% of people had the new virus during the first wave of the pandemic <https://t.co/p7k0mpTxCv> h

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Jack Holmgren

@ZekeFan

RT [@gregminshall](#): this study studies, among other things, screening technologies and methodologies.

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