

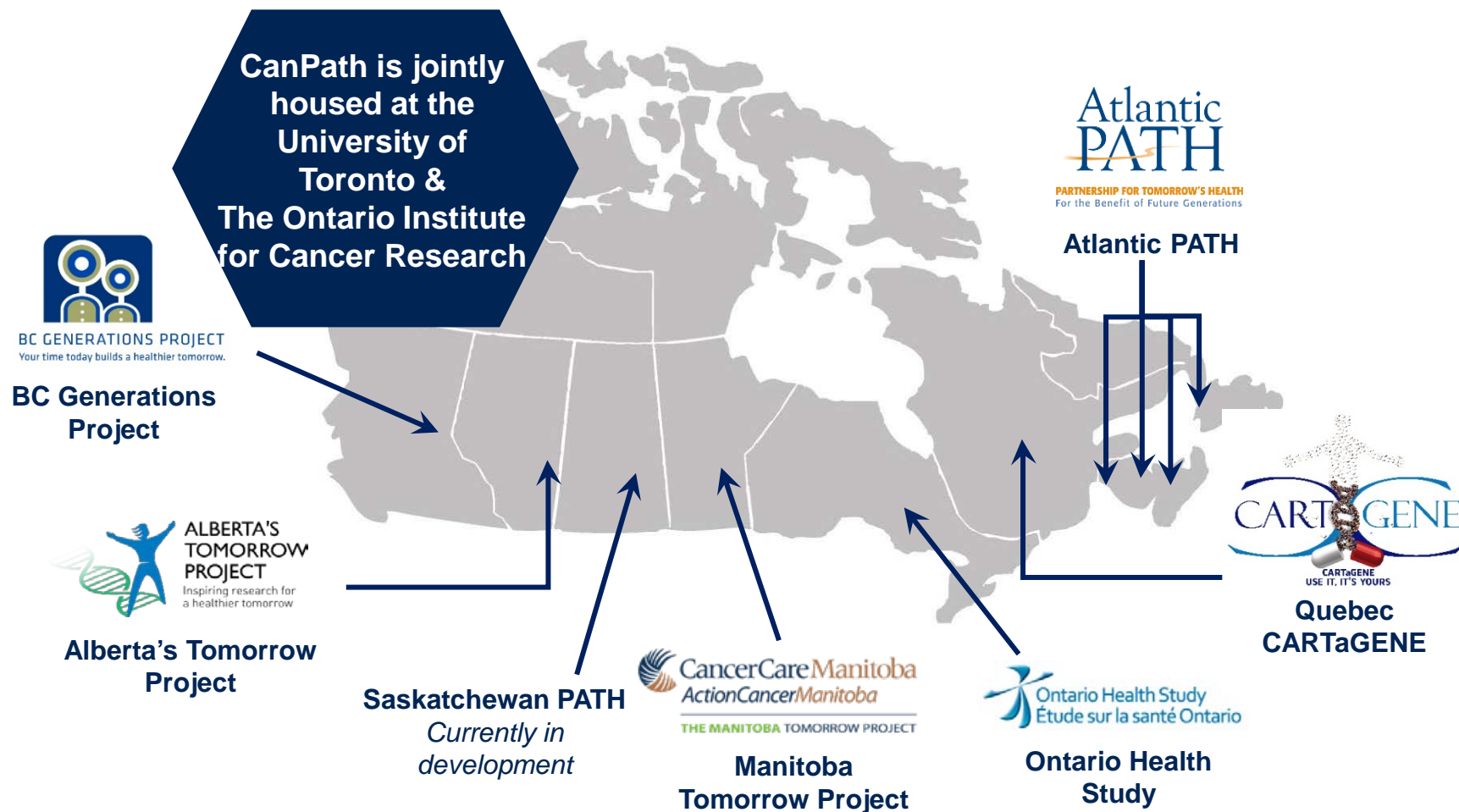


CanPath

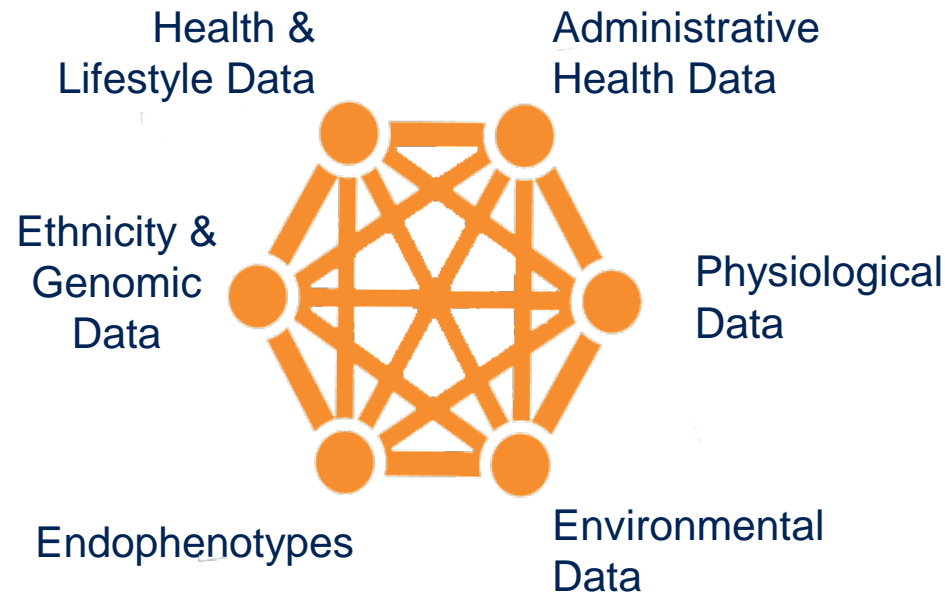
Canadian Partnership
for Tomorrow's Health

COVID-19 Initiative

CanPath brings together seven cohorts across ten provinces

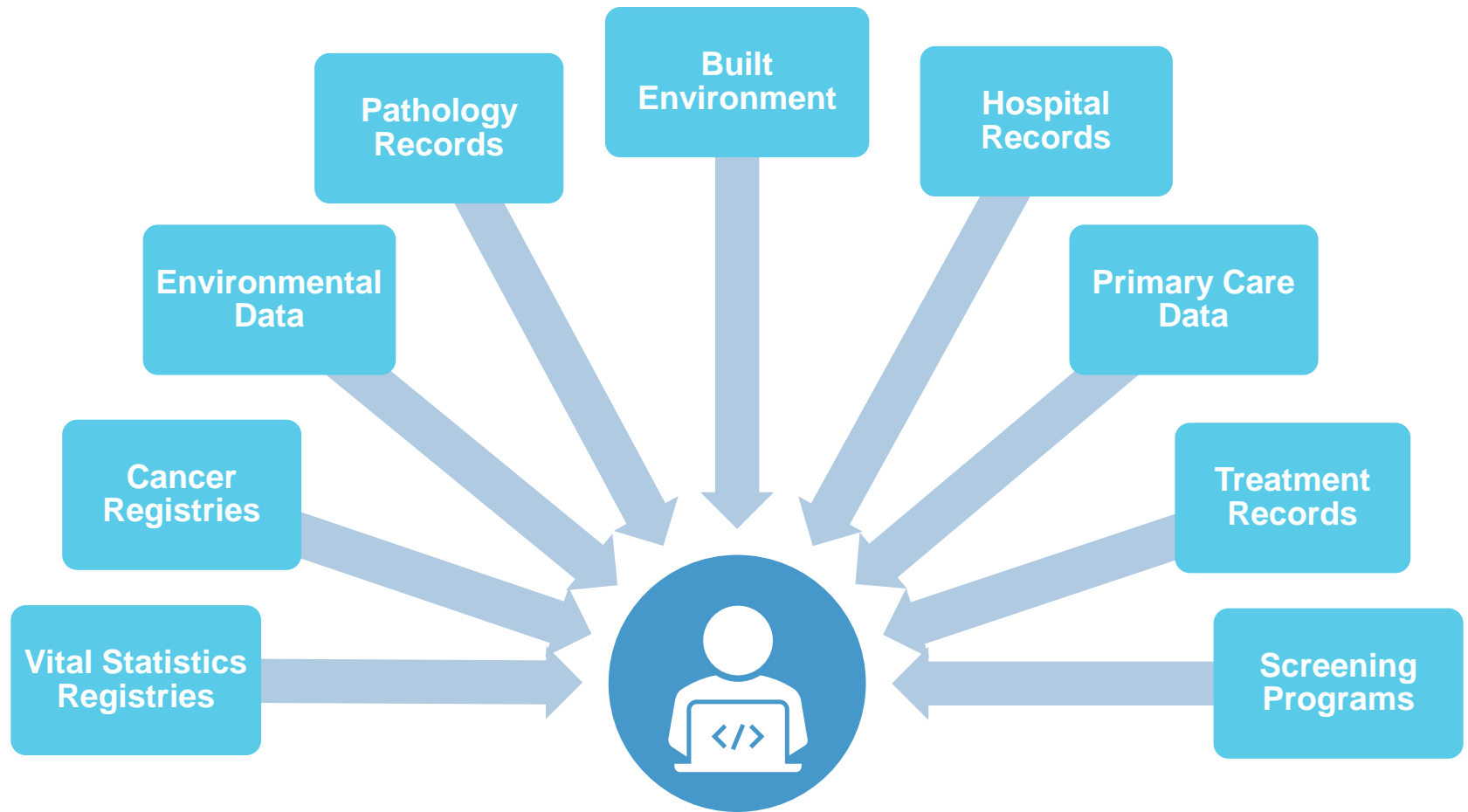


CanPath captures a broad range of data to enable the study of health and disease



CanPath is **linking personal, behavioural, environmental, health system and biological data** to investigate cancer and chronic disease causes and determinants.

Data linkages enable us to evaluate our cohort in real-time



CanPath COVID-19 Initiative

- Leverages existing infrastructure to determine **population-level prevalence** of COVID-19;
- Determine **biological, societal and behavioural factors** that affect susceptibility to COVID-19;
- Capture the **socio-economic and mental health and long-term health outcomes** of COVID-19

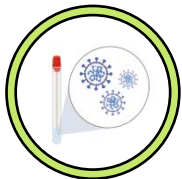
CanPath is a member of The COVID-19 Host Genetics Initiative



SUPPORT-Canada: A national COVID-19 serological surveillance study



Collection of COVID-19 related data and outcomes from over 100,000 Canadians



Longitudinal serological surveillance of SARS-CoV-2 antibodies in diagnosed, symptomatic, asymptomatic and susceptible Canadians



Deep sequencing to support functional immunogenomics studies

CanPath COVID-19 questionnaire was designed to align with international efforts



COVID-19 test result/ suspected infection



Symptoms experienced (if any)



Participant hospitalized or received medical care



Current health status and risk factors for COVID-19



Potential source of exposure

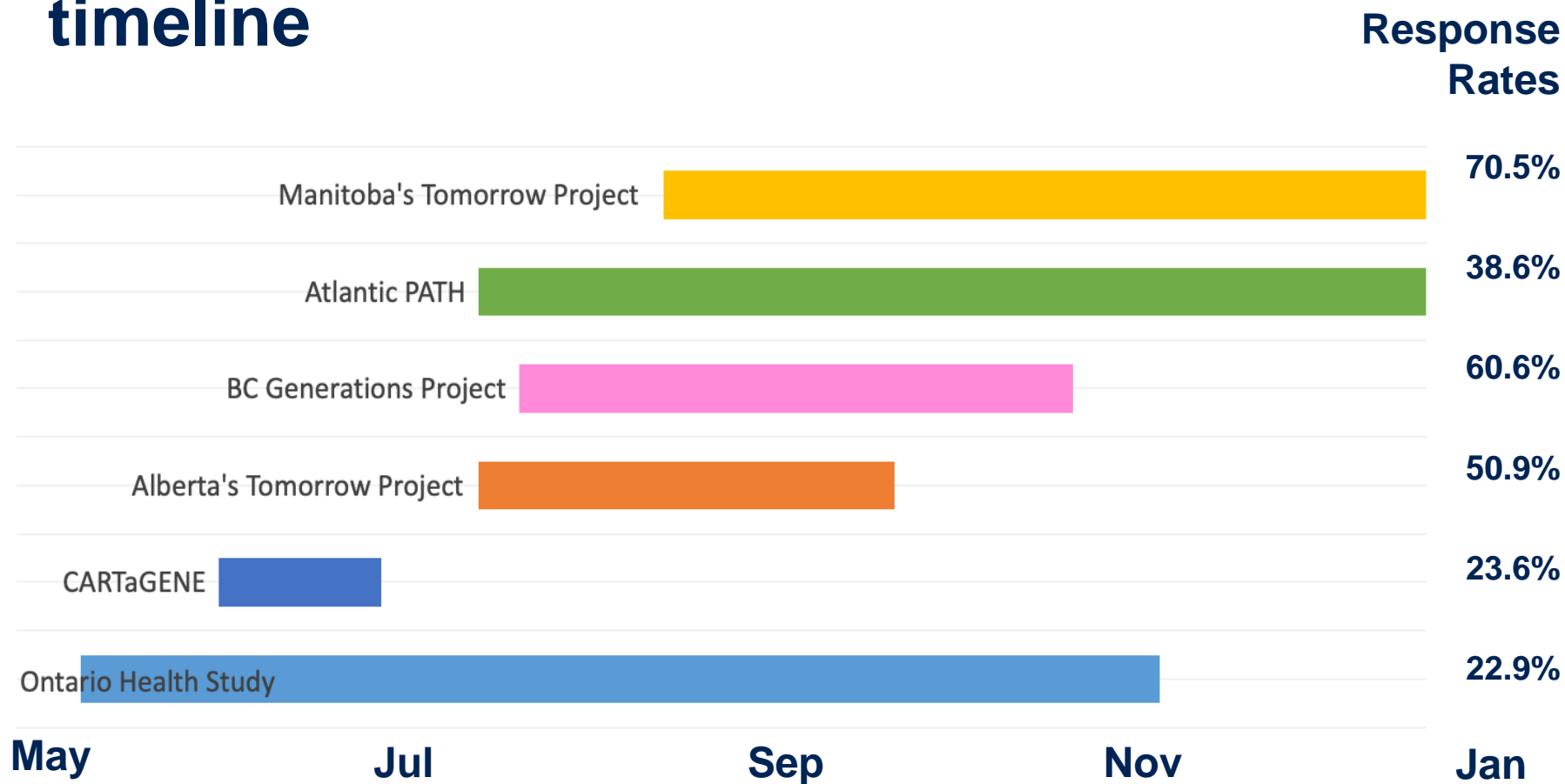


Impact of pandemic on job status



Impact of the pandemic on mental, emotional, social and financial wellbeing

CanPath COVID-19 questionnaire timeline



Over 95,000 questionnaires completed nationally

COVID-19 Questionnaires Completed
as of October 31, 2020:



95,505



15,560



19,117



774



41,766



7,779



10,518

Harmonized questionnaire data will be available for researchers
by the end of the calendar year.

Preliminary results from COVID-19 Qx

Harmonized Data from 93,119 CanPath participants

Median age:	63 years old
Percentage tested for COVID-19:	11.5% (<i>n</i> = 10,710)
Percentage testing positive for COVID-19:	0.21% (<i>n</i> = 195)
Percentage hospitalised from COVID-19:	0.02% (<i>n</i> = 21)
Suspected undiagnosed cases (self-reported):	2.66% (<i>n</i> = 2,479)
Percentage experiencing mild or severe symptoms:	52.2% (<i>n</i> = 48,570)
Percentage reporting a change in employment status:	25.4% (<i>n</i> = 23,623)



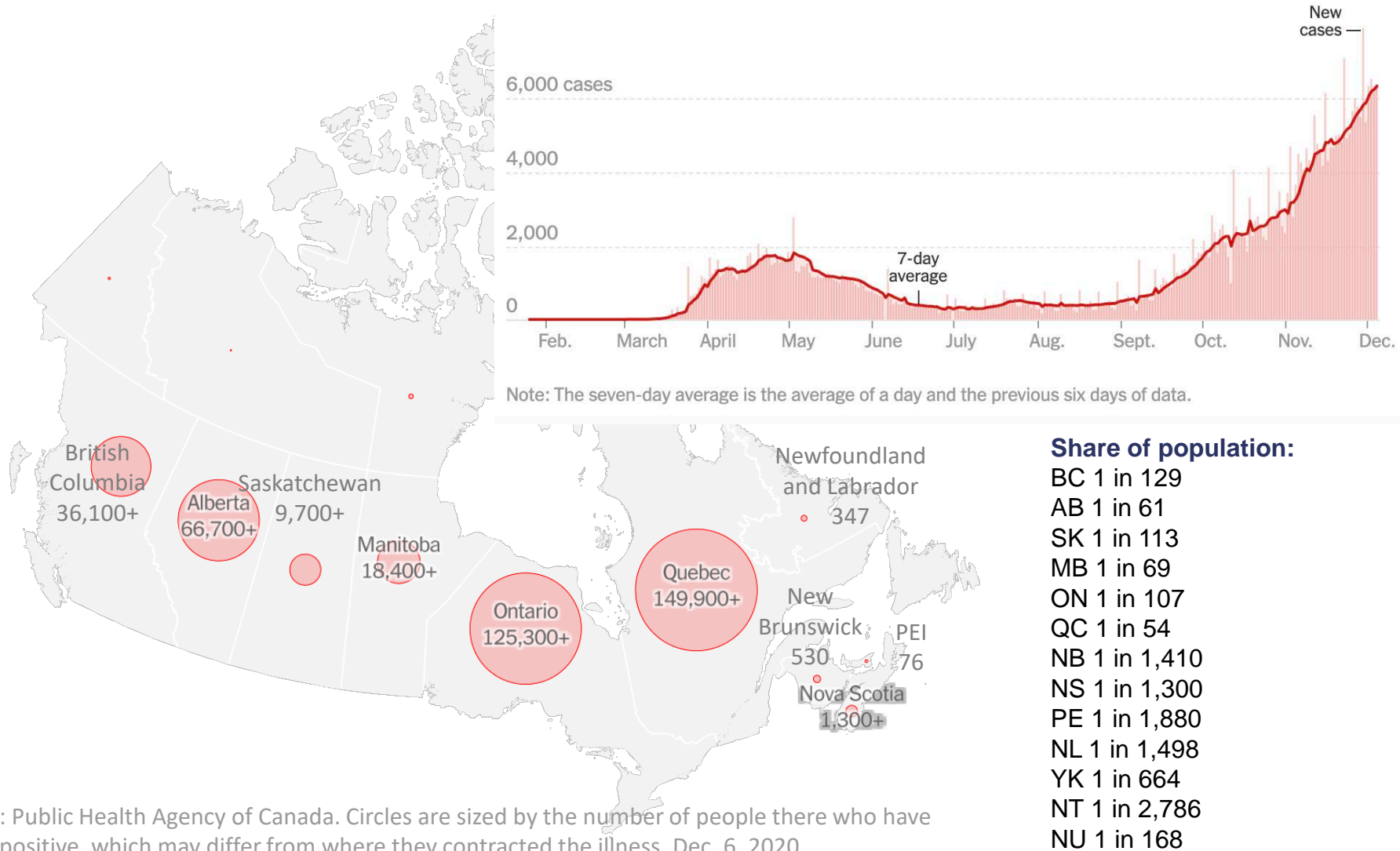
CARTaGENE published first summary article in [medRxiv](#) (Sept 1)

RESEARCH

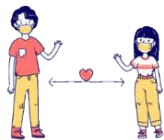
Epidemiological and socio-economic characteristics of the COVID-19 spring outbreak in Quebec, Canada: A population-based study

Rodolphe Jantzen^{1,2*}, Nolwenn Noisel^{1,2}, Sophie Camilleri-Broët³, Catherine Labbé¹, Thibault de Malliard¹, Yves Payette¹ and Philippe Broët^{1,2,4,5}

Canada Coronavirus Map and Case Count



Source: Public Health Agency of Canada. Circles are sized by the number of people there who have tested positive, which may differ from where they contracted the illness. Dec. 6, 2020



Used social distancing
when out in public

94%



Washed hands more
regularly

93%



Avoided crowds and
large gatherings

92%



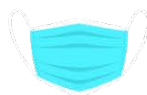
Avoided leaving the house
for non-essential reasons

88%



Did not visit with people
outside household

75%



Wore a mask when going
out in public

73%



Avoided touching face

71%



Stocked up on essentials at
grocery store or pharmacy

66%



Worked from home where
that was an option

39%



Wore gloves when going
out in public

26%

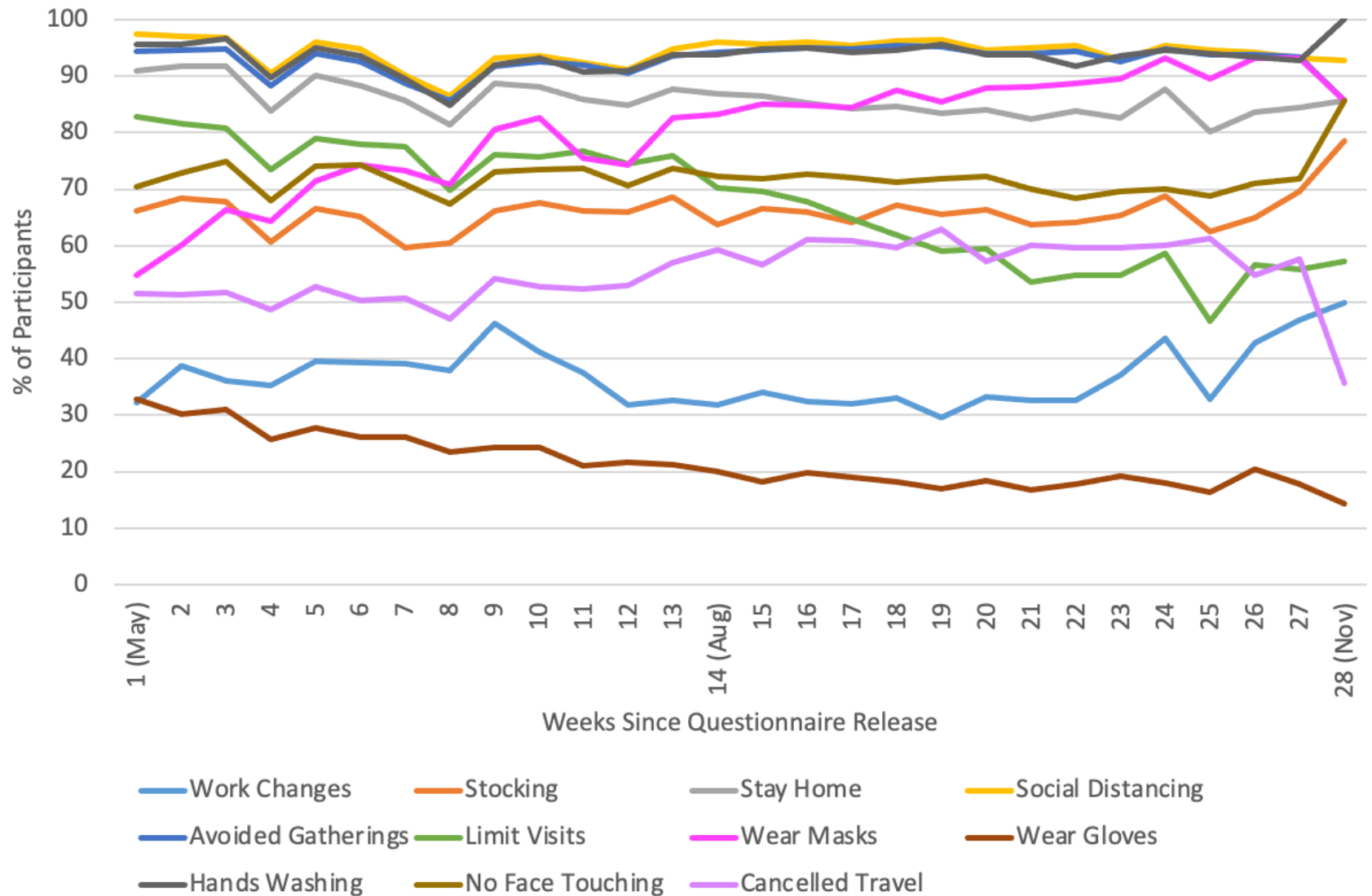
Precautions taken

Some precautions vary by
groups:

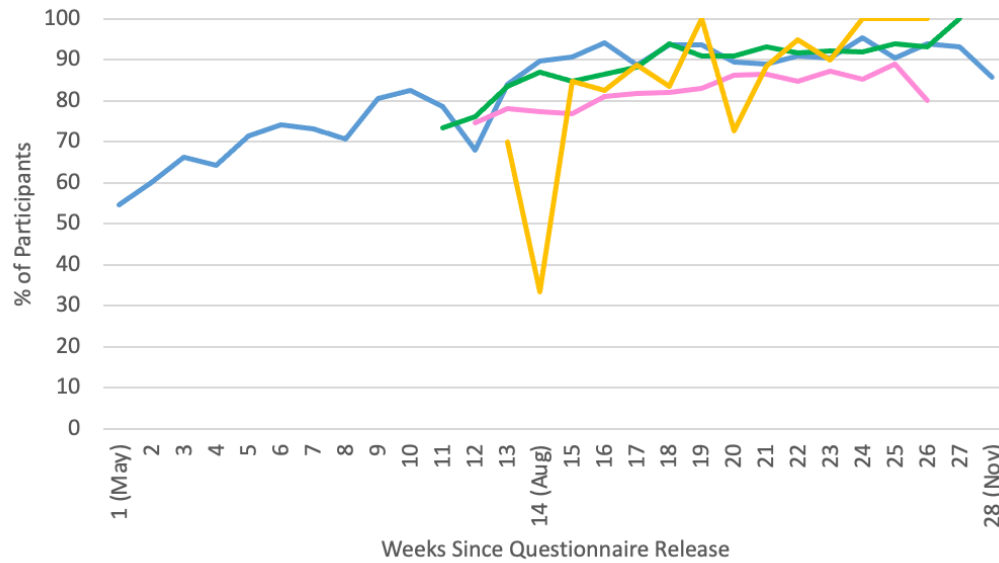
Women are more likely to:

- wear masks
(75% vs 69%)
- stay home
(90% vs 84%)
- stock-up on essentials
(69% vs 61%)
- avoid visiting with people
outside the home
(77% vs 71%)

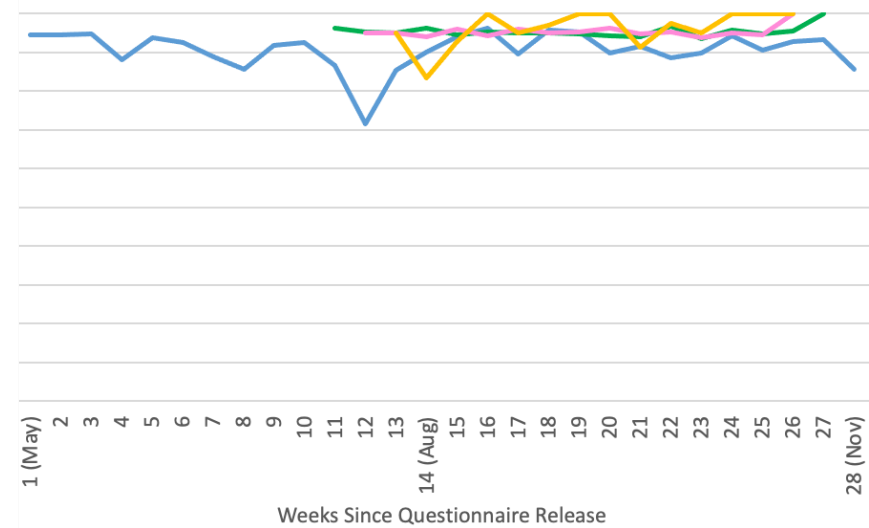
Precautions taken by all cohorts



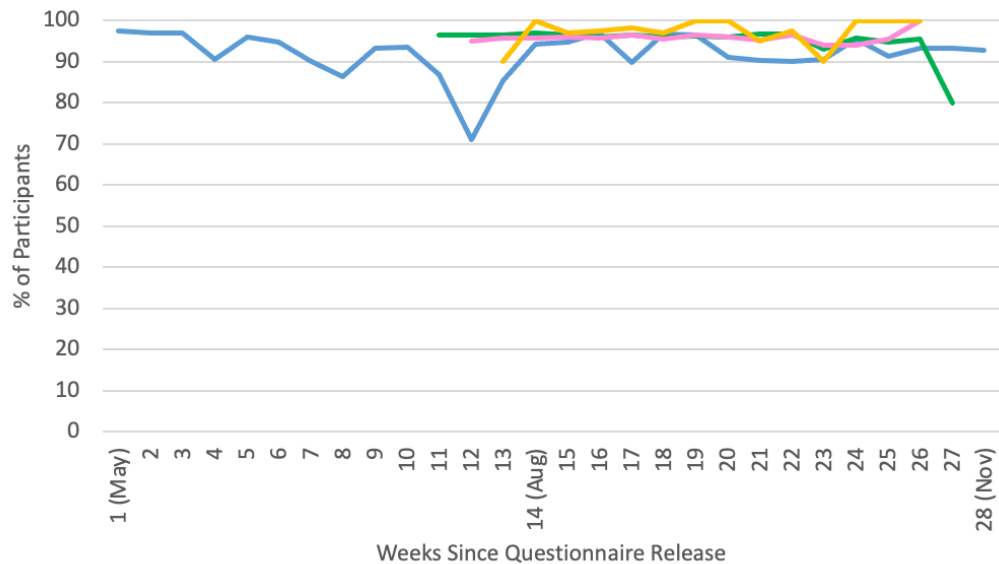
Wearing Masks



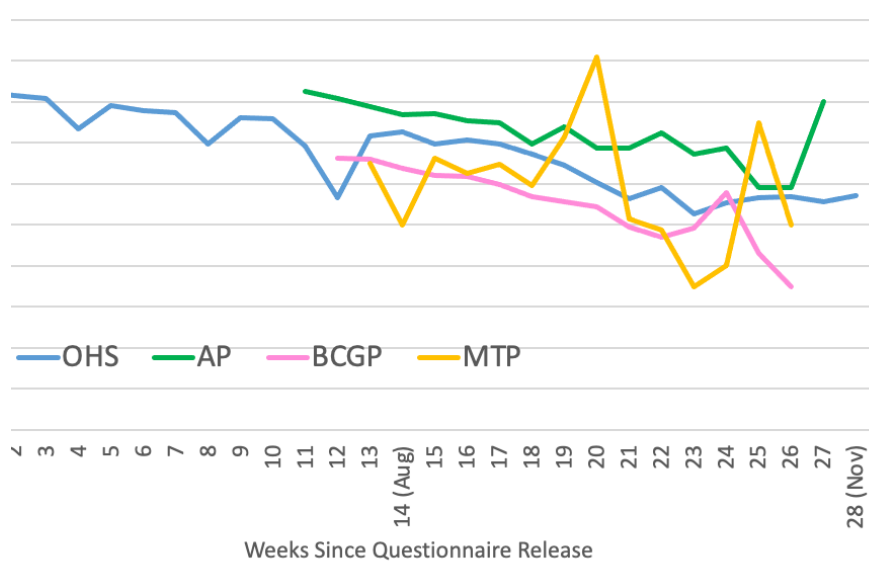
Avoiding Gatherings and Crowds



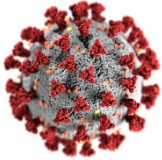
Socially Distancing



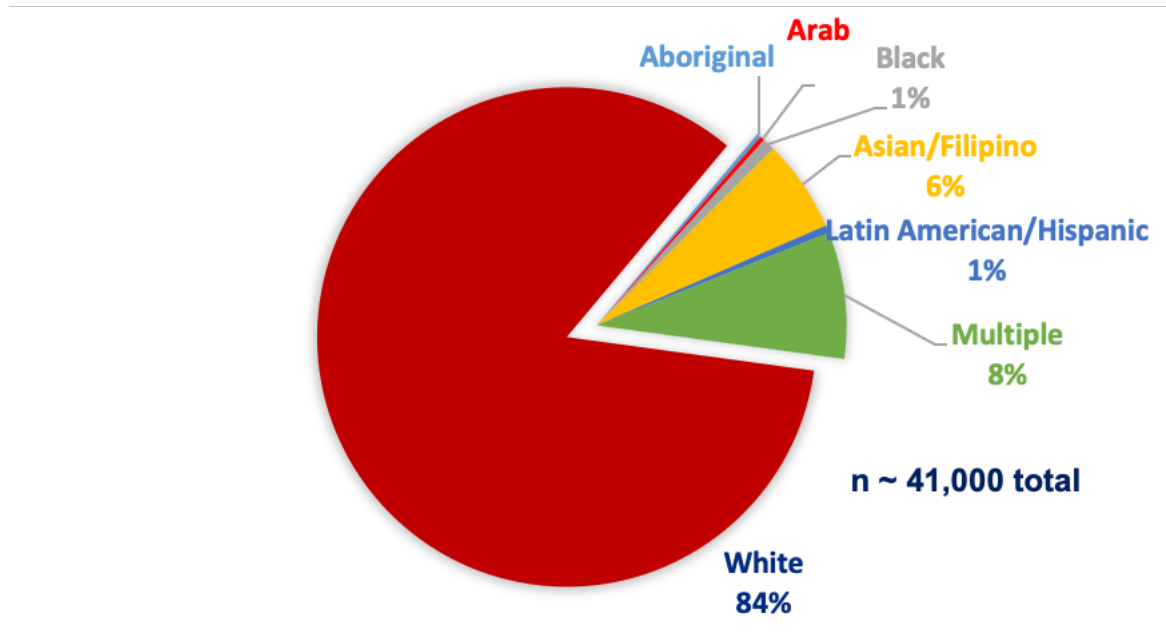
Limiting Visits Outside Household



Racial inequities of COVID-19

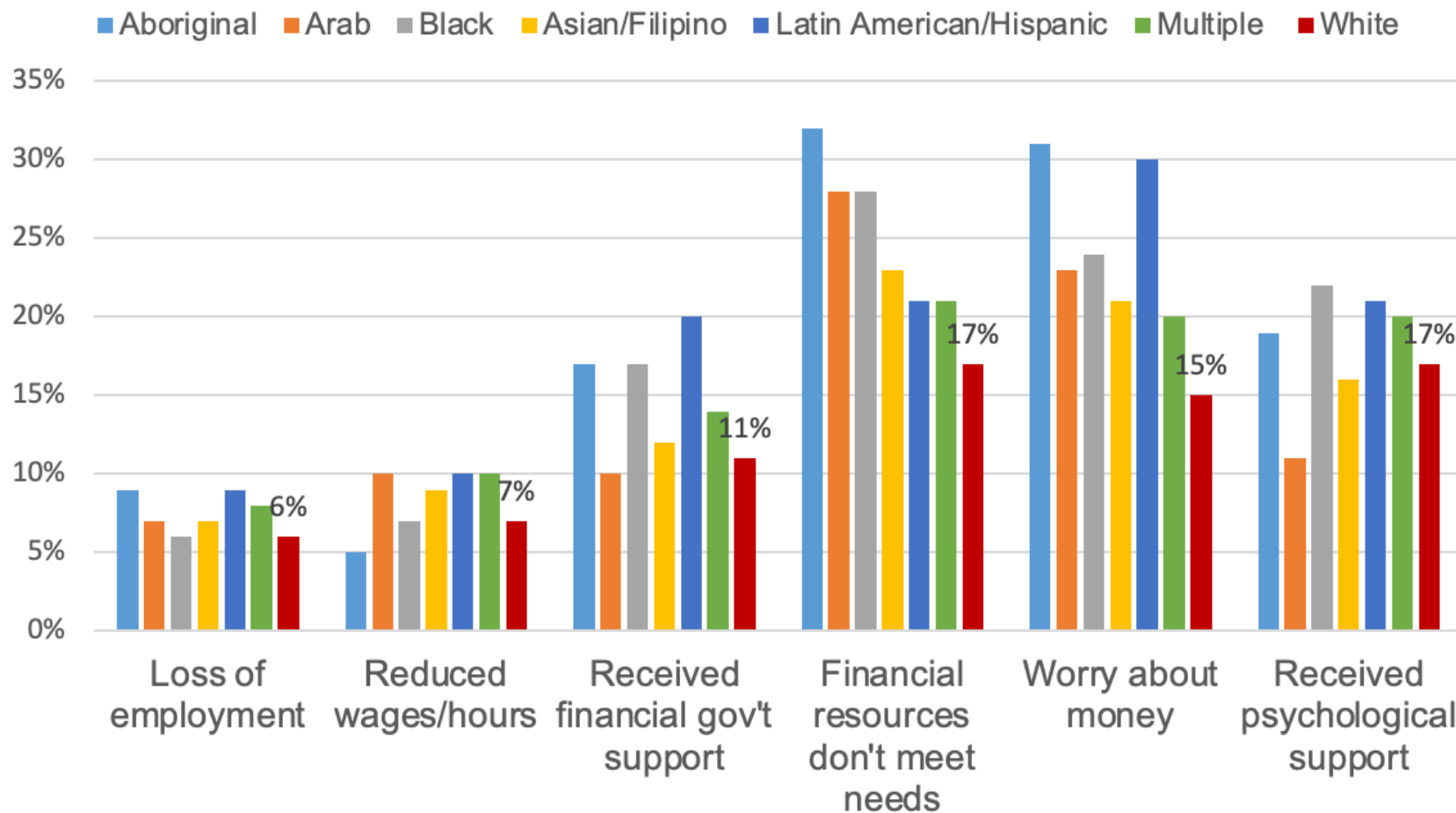


- Ethnic minorities were **2.1x** more likely to be infected (95% CI: 1.34 – 3.14)

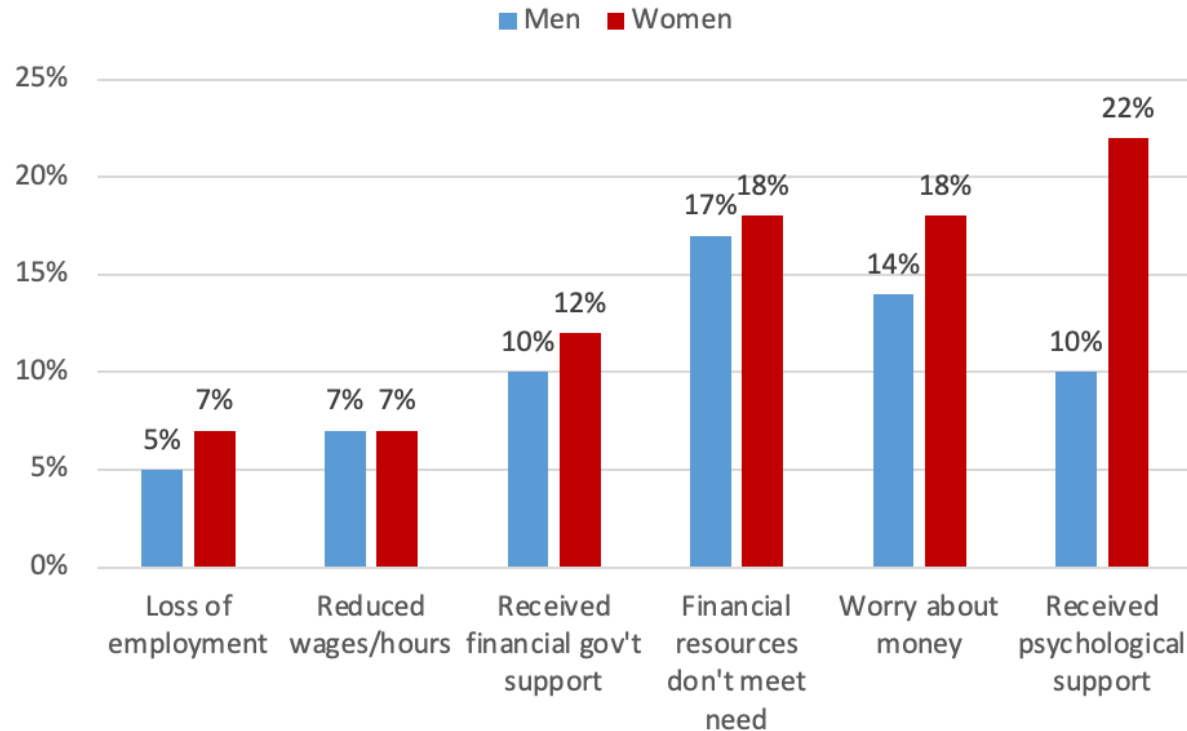


Racial inequities of COVID-19

Socio-economic factors

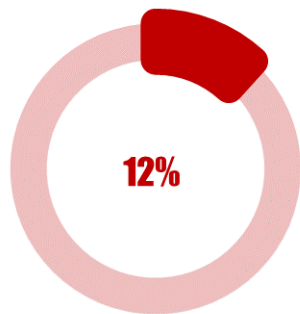


Gender Gaps

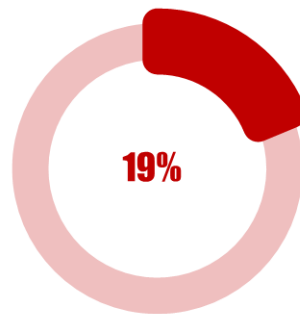


- Nationwide women are overrepresented in industries — hospitality and food services, retail trade, educational services, health care and social assistance — most affected by closures, earnings losses and layoffs
- 61% of the essential workers are women
- Men and women have similar odds of contracting the virus: $OR_{\text{women vs. men}} = 1.2$ (95% CI: 0.82 – 1.85) but men face a higher risk of death, across the globe

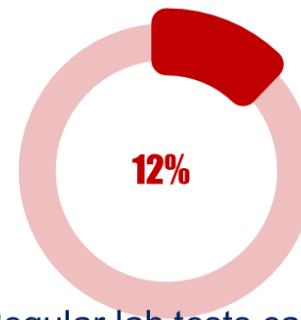
Impact on cancer patients' access to health care



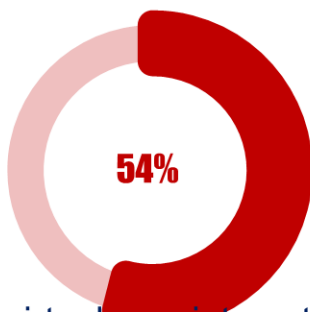
Surgery cancelled or deferred



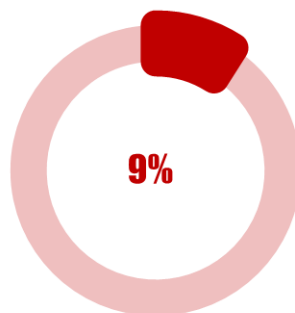
Treatment cancelled or deferred



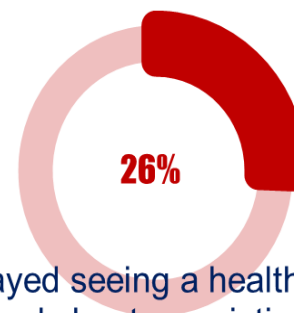
Regular lab tests cancelled or deferred



Use of virtual appointment with health care provider



Medication shortage



Delayed seeing a healthcare professional about an existing problem or concern

Symptoms, exposures and COVID-19 positivity

Covid +ve:

86% fatigue

83% shortness of breath

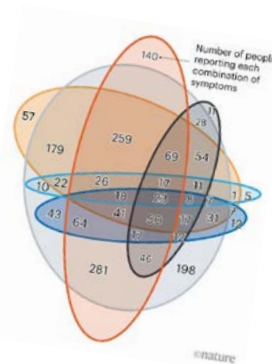
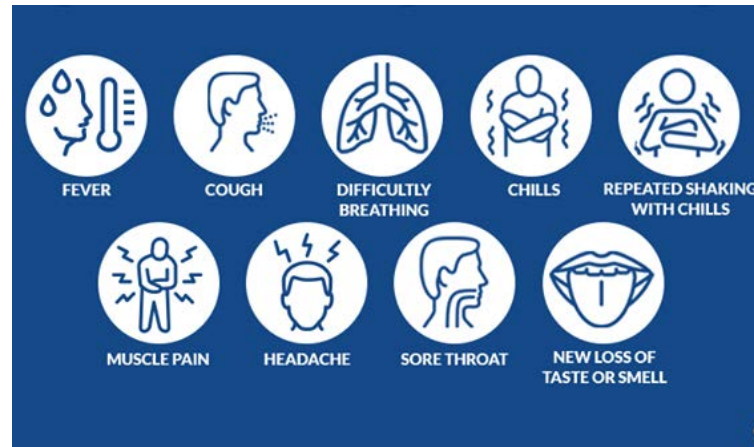
82% loss of taste

80% fever

80% headache

78% loss of smell

60% dry cough



Symptom or Exposure

n= 4,703 (11.2%) tested in OHS and 102 (2.2%) were positive

Odds Ratio (95% CI)

Infection (+ve test)

Loss of smell (ref: no loss of smell, no fever, no headache)

78.3 (42.20 - 145.10)

Loss of smell & headache (ref: no loss of smell, no fever)

101.80 (54.63 - 189.69)

Loss of taste

27.35 (3.5 - 212.92)

Fever (ref: no loss of smell, no headache)

12.0 (6.12 - 23.41)

Contact with a COVID-19 case

41.74 (27.81 - 62.67)

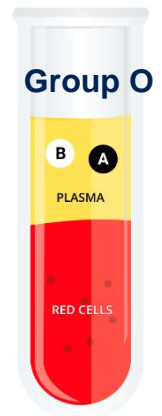
Medical worker

6.50 (4.20 - 10.0)

Blood type and COVID-19 susceptibility

- Current body of evidence suggests that O and Rh- blood types may protect against infection, and possibly, severe COVID-19 illness
- SARS-CoV-2 may be reacting differently to surface factors and antibodies

Blood type	N	%	Odds Ratio (95% CI)	
			Infection	Hospitalization
A	9651	35%	1.12 (0.66 - 1.92)	0.66 (0.14 - 3.07)
AB	1678	6%	0.48 (0.27 - 0.60)	-
B	3793	14%	1.60 (0.85 - 3.03)	0.39 (0.04 - 3.51)
O	12549	45%	Referent	Referent



- Effect size seen in other studies is small and shouldn't undermine importance of other public health and therapeutic measures

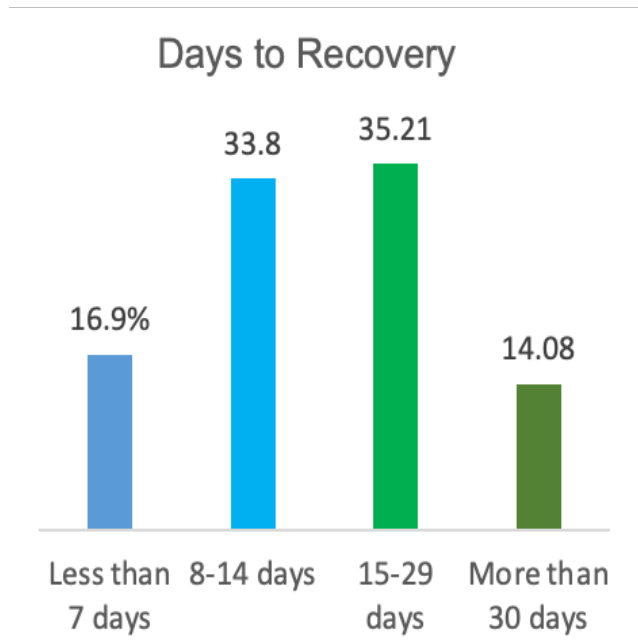
Risk factors for severe COVID-19

Risk factors	N	%	Odds Ratio (95% CI) Hospitalization
Older age (≥ 65 years)	18021	43%	2.19 (0.64 - 7.43)
CVD	11598	28%	3.66 (1.05 - 12.81)
Obesity (BMI ≥ 30.0)	9204	25%	3.50 (1.00 - 12.21)

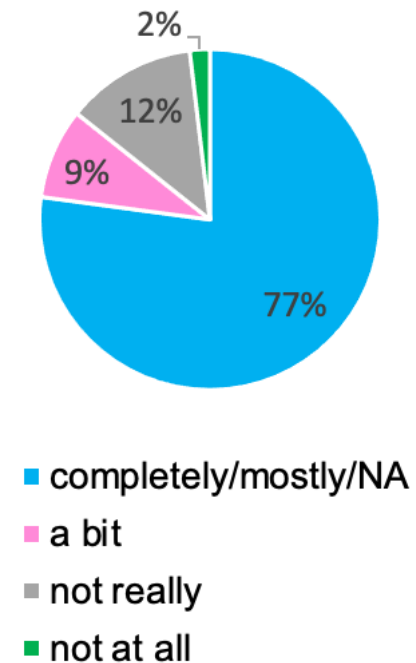
- **immune** response to the viral infection key and immune function declines with age
- **chronic health** conditions have been associated with increased risk
- **obesity** is the most significant risk factor, after only older age, for being hospitalized

Long-term effects of COVID-19 infection

- Most recover completely within a few weeks
 - 77% recovered mostly or completely
 - those not fully recovered reported persistent difficulties, some for more than 30 days, with 2-16 symptoms



Symptom Recovery



Long-term effects of COVID-19 infection

- **Long-term sequelae unknown**
- General: chronic fatigue, rashes
- Neurological: cognitive problems, brain fog, insomnia, persistent loss of smell and taste, possible ↑ risk of Parkinson's or Alzheimer's
- Cardiac: myocarditis, heart failure
- Lungs: long-term breathing difficulty
- Mental health: post-traumatic stress syndrome, anxiety and depression

Administrative health linkages can be completed within regional cohorts



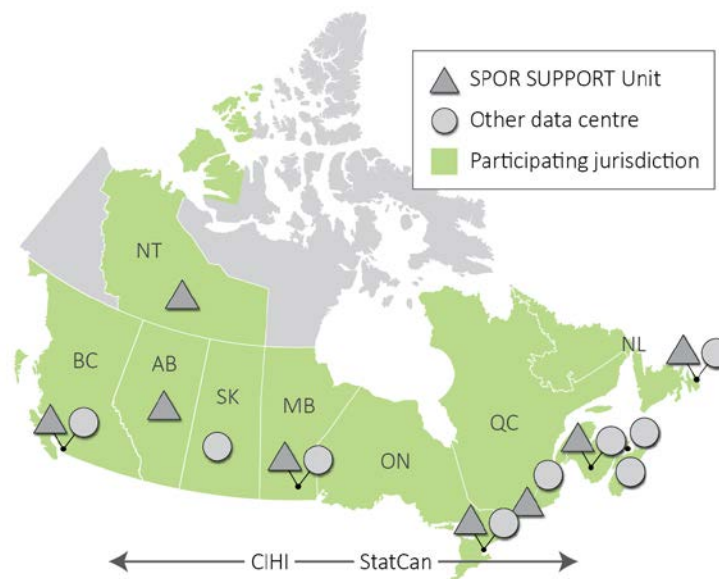
Multi-Region Data Linkage through HDRN

CanPath and **Health Data Research Network Canada (HDRN Canada)** are partnering to facilitate multi-jurisdictional linkage between CanPath cohorts and regional data holders through the Data Access Support Hub (DASH)

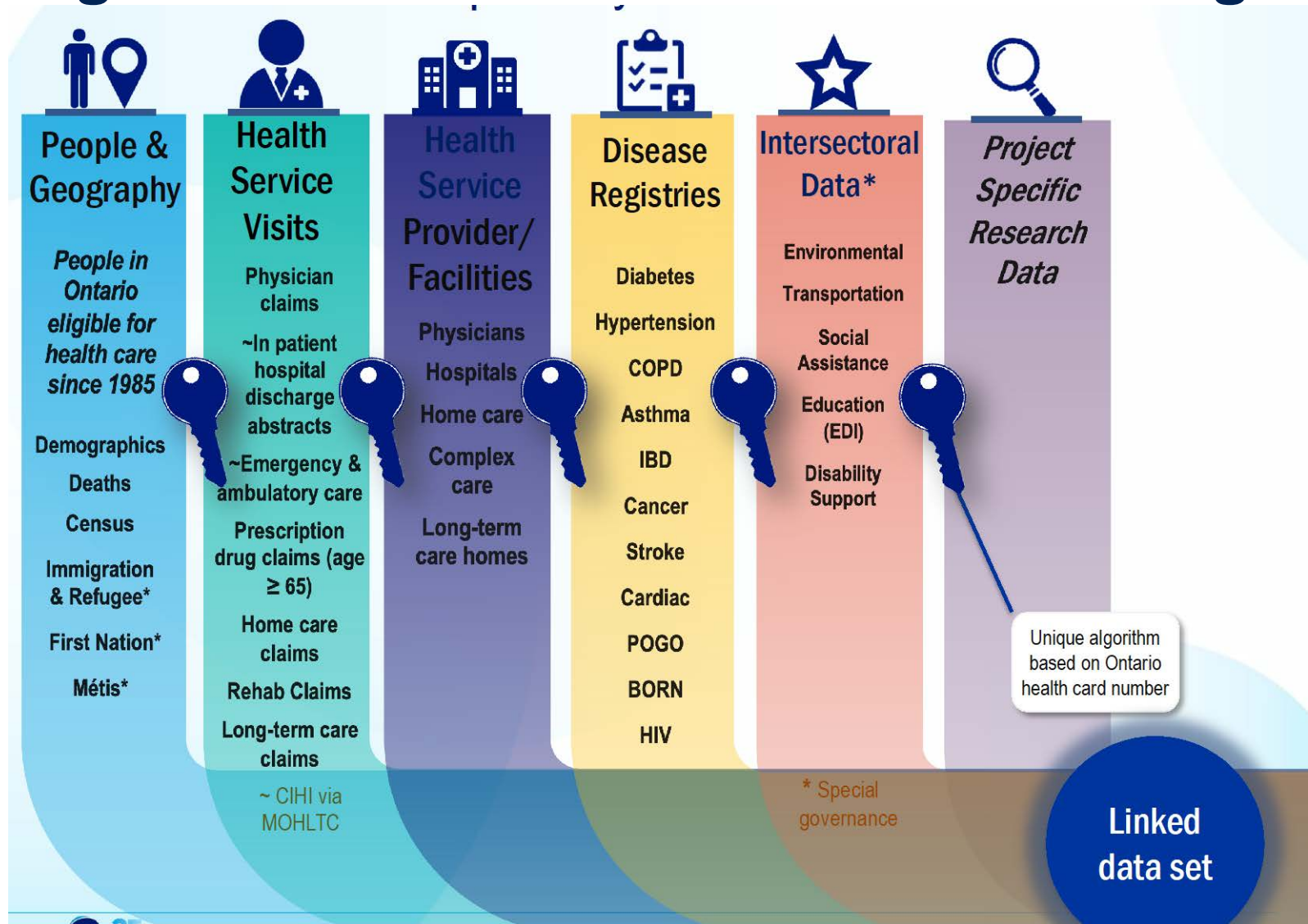
DASH is one of the first initiatives of HDRN Canada, which is made up of provincial, territorial and federal organizations which hold and manage data.

DASH is a single-stop online portal for requesting access to multi-jurisdictional Canadian data, and includes:

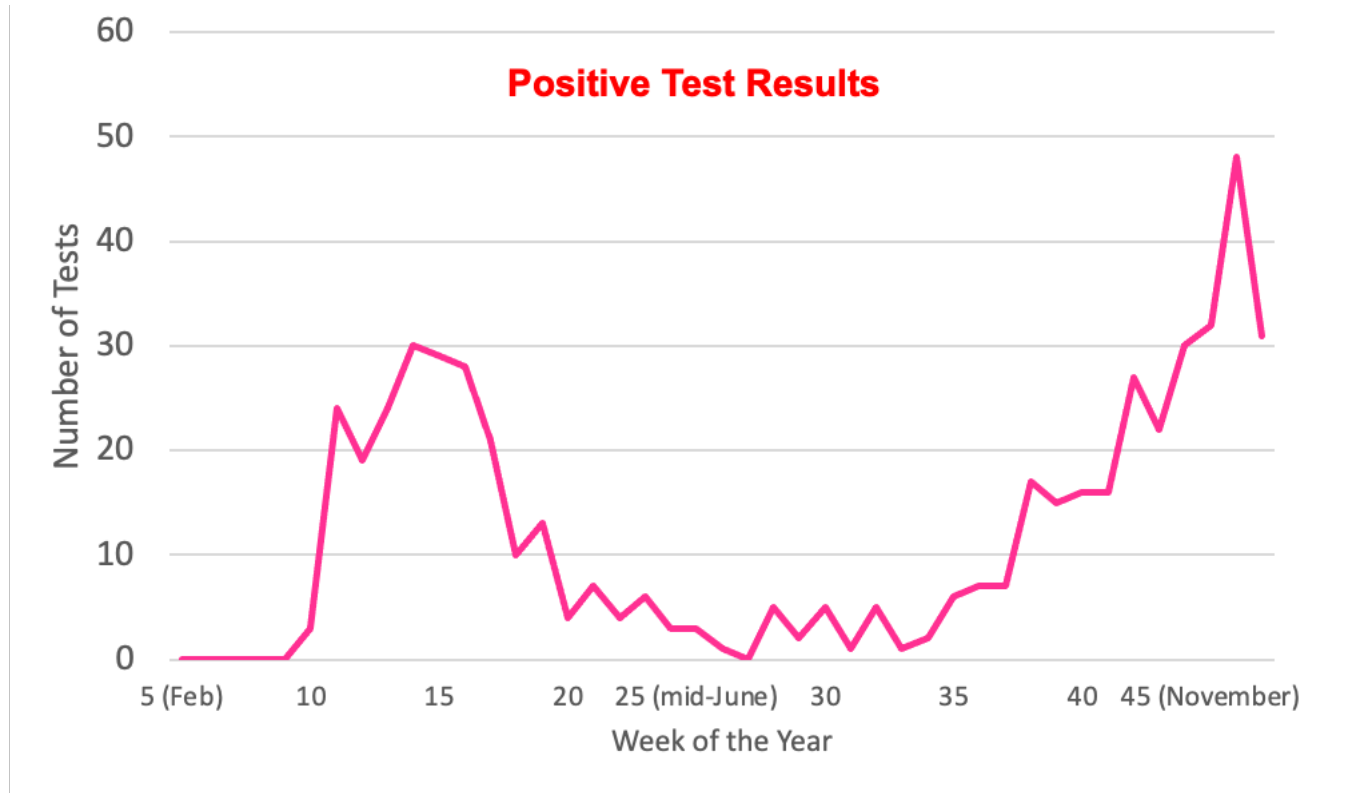
- An inventory of 380+ datasets available for request
- 140+ multi-jurisdictional algorithms
- An inventory of data access processes at HDRN Canada sites



Linkage of the OHS with ICES' data holdings



Linkage of the OHS to the Ontario Lab Information System (OLIS)

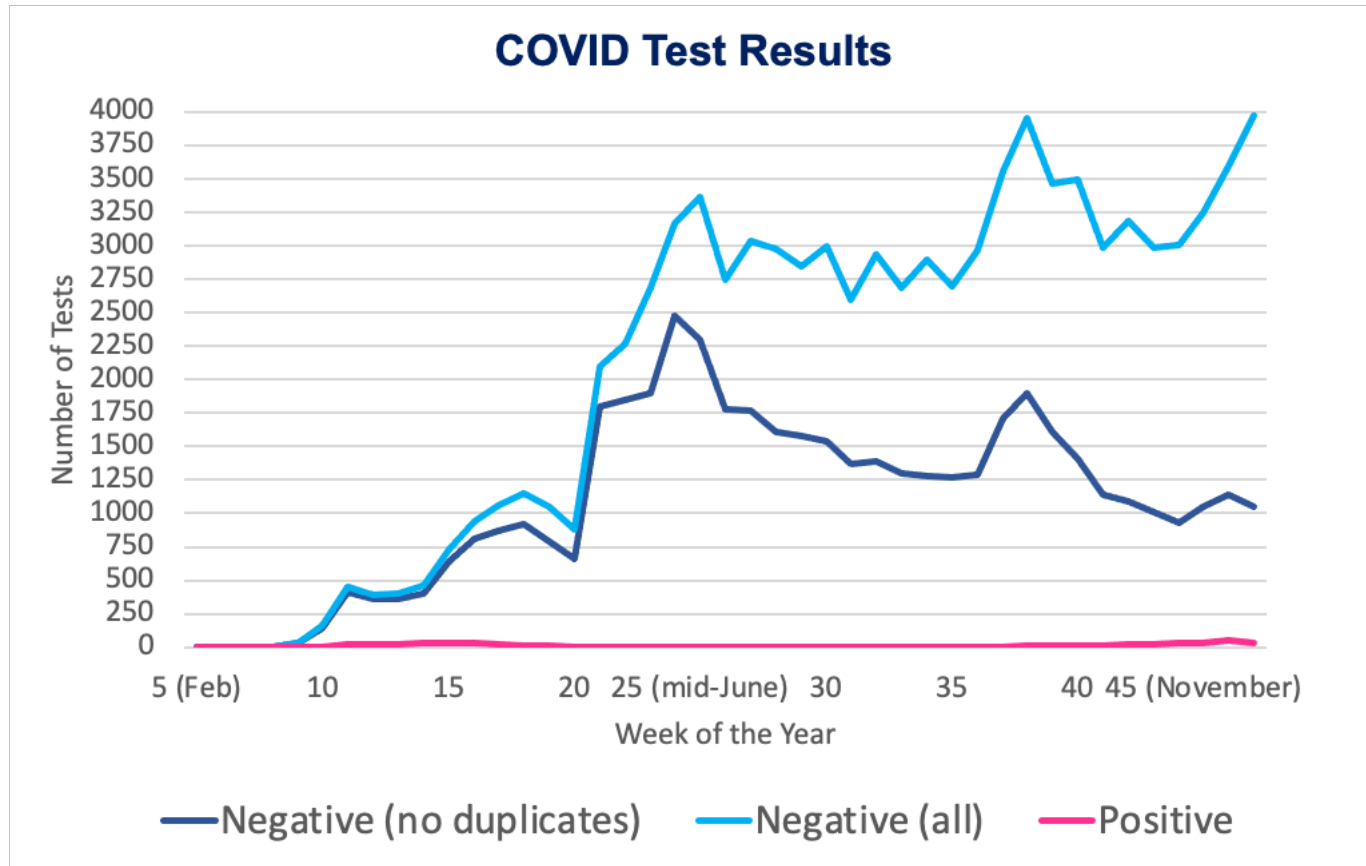


positive tests = 535

unique tests conducted = 47,993

% positive = 1.11%

Linkage of the OHS to the Ontario Lab Information System (OLIS)



tests conducted = 91, 938
unique tests conducted = 47,993

Mean # tests per participant = 1.9
Range in # tests = 1 - 32

CanPath COVID-19 Serological Studies

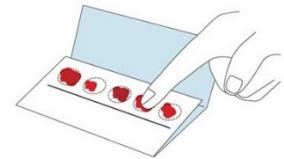
CIHR-funded study

- \$2.1 million plus an additional \$500k top-up from CITF
- Seroprevalence of SARS-CoV-2 antibodies in 3,000 randomly selected CanPath participants at 3 time points (500 per regional cohort)
- Developing capacity for immunogenomics through blood collection from 4,000 participants

COVID-19 Immunity Task Force-funded Study

- \$1.9 million in Phase 1 funding
- Seroprevalence of SARS-CoV-2 antibodies in 20,000 targeted CanPath participants
- Includes populations that are traditionally not included in studies or are among the highest risk of exposure to COVID-19, such as residents of long-term care homes and people living in under-served urban and rural communities with high prevalence of COVID-19

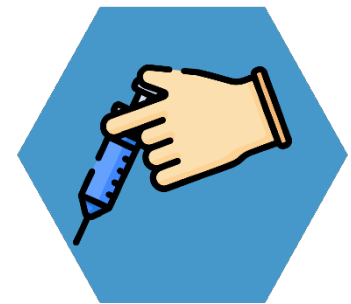
Both studies will collect dried blood spots using kits mailed to participants.



Serological Study Questionnaire

Unique variables not collected in initial COVID-19 Questionnaire

- More detailed job classifications for front-line workers likely to have occupational exposures:
 - Passenger and delivery drivers, including taxi/uber drivers, restaurant and package delivery drivers
 - Services requiring entry into private homes, including Personal Support Workers, nurses, community aid/shelter workers, tradespeople, movers and cleaners
- COVID-19 Vaccines:
 - Participant vaccination status (which one and date), vaccine availability, and willingness to receive COVID-19 vaccine



COVID-19 Host Genetics Initiative

Brings together the human genetics community to generate, share and analyze data to learn the genetic determinants of COVID-19 susceptibility, severity and outcomes

195 contributing studies from around the world are seeking to:

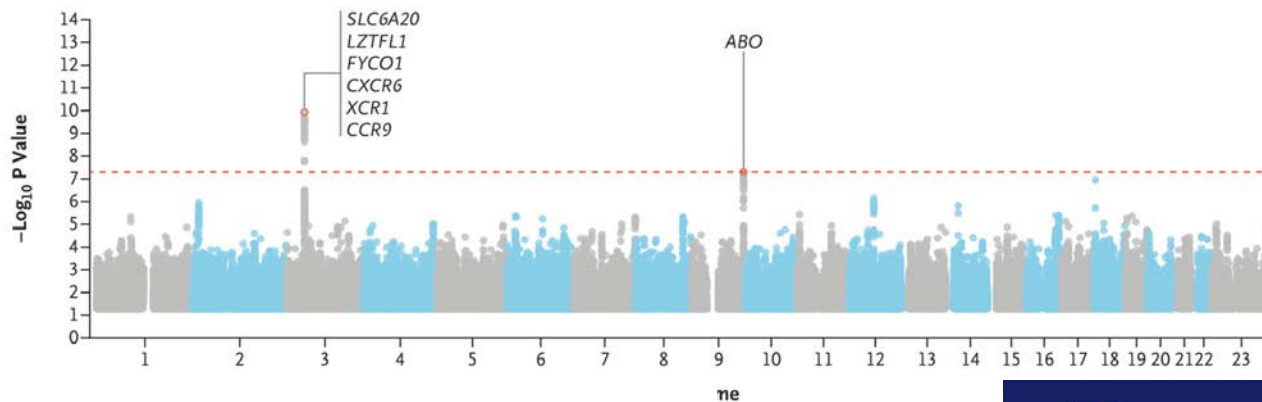
1. Provide an environment to foster the sharing of resources to facilitate COVID-19 host genetics research (e.g. protocols, questionnaires);
2. Organize analytical activities across studies to identify genetic determinants of COVID-19 susceptibility and severity;
3. Provide a platform to share the results from meta-analytical activities to benefit the broader scientific community.



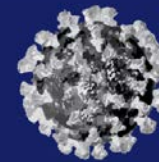
COVID-19 Host Genetics Initiative

Brings together the human genetics community to generate, share and analyze data to learn the genetic determinants of COVID-19 susceptibility, severity and outcomes

Genome-wide Association Study of Severe Covid-19 with Respiratory Failure (David Ellinghaus, D. et al. 2020. *NEMJ.*)



The NEW ENGLAND
JOURNAL of MEDICINE



The COVID-19
Host Genetics Initiative

Accessing CanPath Data

portal.canpath.ca

[English / Français](#) [News & Events](#) [Register | Login](#)

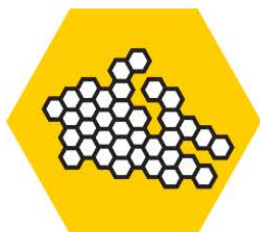
[Home](#) [Cohort](#) [Data](#) [Biosamples](#) [Access ▾](#) [Search](#) [Contact Us](#)

CanPath Portal



The Canadian Partnership for Tomorrow's Health (CanPath) Portal provides the research community with the necessary resources to identify epidemiological and biological data available from five participating cohorts to answer innovative research questions. A request for access to CanPath data is initiated directly through the CanPath Portal.

Cohort



Find out more about the five regional cohorts of the CanPath.

[Read More](#)

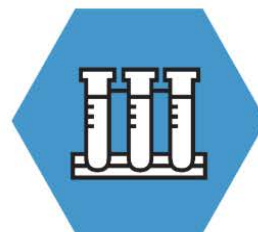
Data



Find out more about the CanPath datasets and data harmonization approach.

[Read More](#)

Biosamples



Find out more about CanPath's biological-sample collection and its upcoming availability.

[Read More](#)

Access



Find out more about CanPath Access Policy, the access process, and approved research projects.

[Read More](#)

CanPath

Accessing CanPath Data

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CORE DATA

The core harmonized data includes information related to health and risk factors, mental health, physical measures and biological samples collected by the British Columbia Generations Project, Alberta's Tomorrow Project, Ontario Health Study, CARTaGENE (Quebec), Atlantic Partnership for Tomorrow's Health Study and Manitoba Tomorrow Project as core CanPath data content. The Manitoba Tomorrow Project is currently in recruitment and participant data is not yet ready for research.

[Read more](#)

2,353 Harmonized Variables



GENOTYPE DATA

Genotype data on more than 4,800 CanPath participants is now available for access. The genotype data provides information on over 820,000 SNPs (Affymetrix UK Biobank Axiom® 2.0 gene chip). Marker categories include disease markers, pharmacogenomics, Human Leukocyte Antigen (HLA), inflammation and Expression quantitative trait loci (eQTL) variants. This work was completed with the assistance of:

- The Clinical Genomic Centre, Mount Sinai Hospital, Toronto, Canada (Genotyping and DNA preparation);
- Genome Quebec Biobank, Ecogene-21 Biocluster, Saguenay, Canada (DNA preparation); and,
- Ontario Institute for Cancer Research, Toronto, Canada (Data Analysis).

Funding was provided by the Canadian Partnership Against Cancer.

[Read more](#)



ENVIRONMENTAL EXPOSURE DATA

The CIHR-funded Canadian Urban Environmental Health Research Consortium ([CANUE](#)) collates and generates standardized area-level environmental data on air and noise pollution, land use, green/natural spaces, climate change/extreme weather, and socioeconomic conditions and links this data to existing Canadian cohort studies and administrative health databases. An initial batch of CANUE exposure datasets have been merged with the national harmonized CanPath dataset and are now available to researchers. These datasets include:

- Canadian Active Living Environments Database (Can-ALE)

• Montreal Social Participation Index

Accessing CanPath Data

My Access Requests

◀ New Access Request

Cancel Save Validate

SCHEDULE A

CanPath Data and Biosamples Access Application Form

This Access Application Form is to be used by all researchers seeking access to Research Data and/or Biosamples, referred to as Material in the Data and Material Sharing Agreement. Please refer to the CanPath Access Policy for the meaning of all capitalized terms used in this form, which is available on the CanPath portal.

Applicants should review the [Access Policy](#), [Publications Policy](#) and [Intellectual Property Policy](#) in the [CanPath Policies & Guidelines Section \(Access Process Page\)](#) before completing this Access Application Form.

Applicants must complete all mandatory sections and provide supporting documentation before the access request will be considered. Further information on CanPath's review and approval process can be found in the Access Policy.

Upon approval of an access request by the Access Committee, access to Research Data and/or Material will be granted for the timeframe set out in the approved Access Application Form and the Access Agreement. An Annual Progress Report must be completed to access and use Research Data and/or Material beyond a one-year period.

The title of the Approved Research Project, name(s) of the Approved User and Research Team involved, their status and credentials, name(s) of the Approved Institution(s), and a lay summary of the scientific abstract submitted by the Applicant will be added to the public CanPath Access Registry.

I – Contact and Research Project Information

A. Name, institution, and contact details of the Applicant (Principal Applicant)

Please include a full postal address and a valid institutional e-mail address. If you have more than one affiliation, only provide the contact information pertaining to the institution you are affiliated with for the purpose of the research project.

Name

Credentials (PhD, MD, etc.)

Position (Rank, Faculty, Department)

Institution

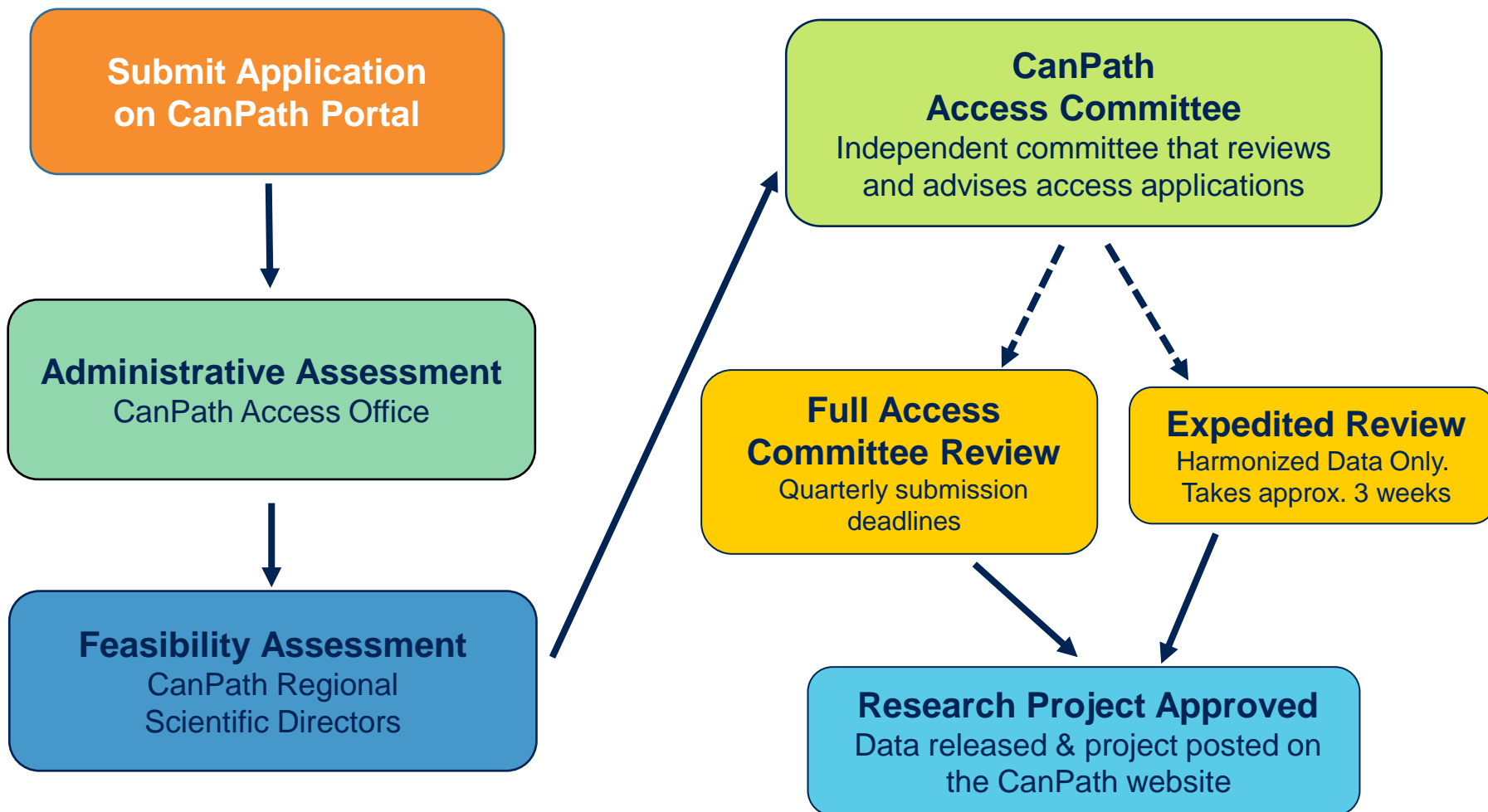
Institutional E-mail Address

Alternate E-mail Address

Telephone Number

Institutional Mailing Address

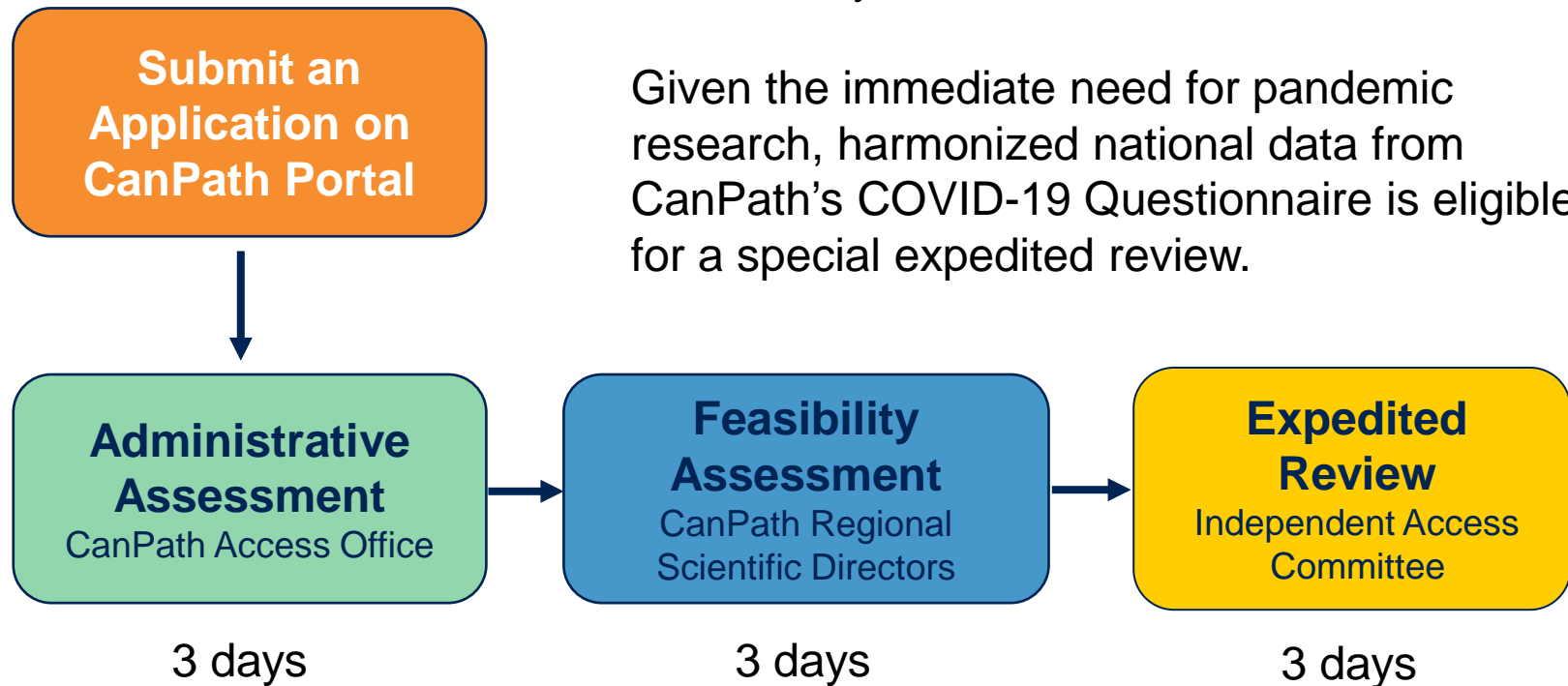
Access Process Overview



Expedited COVID-19 Data Access Process

Data from the COVID-19 Questionnaire will be available by the end of December 2020.

Given the immediate need for pandemic research, harmonized national data from CanPath's COVID-19 Questionnaire is eligible for a special expedited review.



*Conditional on complete application

National Leadership Team



Philip Awadalla
*National Scientific
Director, CanPath;*
Ontario Health Study



John McLaughlin
Executive Director,
CanPath



Trevor Dummer
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Co-Director,*
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BC Generations Project



Parveen Bhatti
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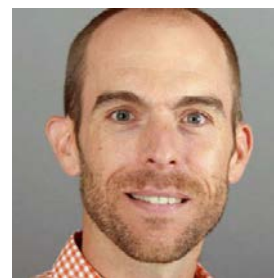
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The Manitoba
Tomorrow Project



Philippe Broët
CARTaGENE



Simon Gravel
CARTaGENE











Guillaume Lettre
CARTaGENE



Jason Hicks
Atlantic PATH

National Coordinating Centre

Based at the Dalla Lana School of Public Health, University of Toronto

 <p>Dr. Philip Awadalla National Scientific Director Profile</p>	 <p>Dr. John McLaughlin Executive Director Profile</p>	 <p>Tedd Konya Project Manager Profile</p>	 <p>Asha Mohamed Access Officer Profile</p>
 <p>Arlette Bax Communications and Knowledge Translation Officer Profile</p>	 <p>Mark Bhola Administrative Assistant Profile</p>	 <p>Kim Skead National Scientific Coordinator Profile</p>	 <p>Treena McDonald National Biosample Coordinator Profile</p>

Ontario Health Study Team

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Ayush Lall
Mason LeVon
Alexis Mantell

Abiola Oduwole
Helen Qu
Vali Radoi
Sarah Salih
Charles Zhu



Maelstrom Research

CanPath



Thank you to CanPath participants across the regional cohorts who generously donate their time, information and biological samples.
CanPath is a success because of the participants' ongoing commitment.

Thank you to CanPath's sponsors and hosts!



Everyone Counts.



CanPath.ca



CanPath

Canadian Partnership
for Tomorrow's Health

Partenariat canadien
pour la santé de demain