PRESENTATION FOR CANCOVID | JULY 12, 2021

Presenting final results from Canada's most representative seroprevalence study



COVID-19 IMMUNITY TASK FORCE GROUPE DE TRAVAIL SUR L'IMMUNITÉ FACE À LA COVID-19

#### **IN COLLABORATION WITH**



Statistics Statistique Canada



# **Speakers**

- **Dr. Timothy Evans** COVID-19 Immunity Task Force, Executive Director
- Jonathan Cabot Analyst, Canadian COVID-19 Antibody and Health Survey
- **Steven Earl** Lead Analyst, Canadian COVID-19 Antibody and Health Survey
- **Dr. David Buckeridge** COVID-19 Immunity Task Force, Scientific Lead, Data Management & Analysis
- Dr. Catherine Hankins COVID-19 Immunity Task Force, Co-Chair



## **Dr. Timothy Evans**

COVID-19 Immunity Task Force Executive Director

# **About the CITF structure**

Led by a **Leadership Group** of volunteers, experts from across Canada in:

- Serologic surveillance
- Immunology
- Virology
- Infectious diseases
- Public health
- Clinical medicine

#### **Co-Chairs**:

- Dr. David Naylor, Professor of Medicine and President Emeritus, University of Toronto
- Dr. Catherine Hankins, Professor of Public and Population Health, Faculty of Medicine, McGill University

#### Ex-officio members from:

- Public Health Agency of Canada (PHAC)
- Canadian Institutes of Health Research (CIHR)
- Office of the Chief Scientific Advisor to the Prime Minister
- Representatives of Provincial-Territorial Ministries of Health
- McGill University (host of the Secretariat)

#### Secretariat led by:

• Dr. Tim Evans, Professor, Director and Associate Dean of the School of Population and Global Health, Faculty of Medicine, McGill University

# **COVID-19 Immunity Task Force mandate**

Established by the Government of Canada in April 2020

#### Mandate:

- To support the **implementation of relevant research** projects
- Aligning studies across Canada
- Seeking to provide useful information to federal, provincial, and territorial decision-makers as they oversee responses to the COVID-19 pandemic to best protect Canadians.

# **Priority areas of research**



#### SEROPREVALENCE STUDIES

Assess the extent of SARS-CoV-2 infection across Canada



IMMUNE SCIENCE

Understand the nature of immunity arising from infection



IMMUNE TESTING

Develop improved antibody testing methods



#### VACCINE SURVEILLANCE

Help monitor the effectiveness and safety of vaccines

# Our funded research covers all of Canada





## StatCan's Canadian COVID-19 Antibody and Health Survey: most representative study to date

Who does this Statistics Canada study represent?

- Canadians 1 year of age and up
- From all 10 provinces and 3 territories
- From rural and urban areas
- Who may or may not be in good health

More than **11,000 Canadians** from across Canada participated in this Statistics Canada study



## Jonathan Cabot, Analyst Steven Earl, Lead Analyst

Statistics Canada, Canadian COVID-19 Antibody and Health Survey



### **Partners**







Public Health Agency of Canada

Agence de la santé publique du Canada







## **CCAHS scope review**

	Age	Frame		Field samp	le Focus	
Sample	1-14	CCB (Child be	nefit)	7,200	Proxy: Parent	or legal guardian
	15-24	CCB/Census		7,200	Focus: Self-ac	Focus: Self-administered
	25+	DUF (Dwelling Frame)	g Universe	33,600	Age-order sele administered	ection method: Self-
	WAVE <sup>-</sup>	1	WAVE 2		WAVE 3	WAVE 4
Collection	Field sa ~4,000	mple:	Field sampl ~22,000	e:	Field sample: ~22,000	Field sample: 550 (Iqaluit only)
	Start: N End: De	Nov 2 ec 24	Start: Jan 4 End: Feb 28	4 8	Start: Jan 25 End: March 26	Start: Mar 10 End: April 16





## **Dried Blood Spot (DBS) test**















### **Response rates by age**





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3

## **Response rates by territory and province**

Statistique



Geography	Questionnaire	Dry Blood Spot and Questionnaire
Newfoundland	34%	23%
P.E.I	32%	21%
Nova Scotia	38%	27%
New Brunswick	35%	24%
Quebec	40%	29%
Ontario	37%	25%
Manitoba	39%	27%
Saskatchewan	34%	23%
Alberta	38%	27%
British Columbia	41%	29%
Yukon	39%	27%
N.W.T	37%	23%
Nunavut	9%	4%
Canada	36%	25%





## NATIONAL RESULTS National, by sex, by age group







### SARS-CoV-2 antibody seroprevalence: national results



17

## SARS-CoV-2 Antibody Seroprevalence Nationally By Age and Sex









## **Regional and provincial results**





## SARS-CoV-2 antibody seroprevalence | Regional

#### **The Territories**

Overall immunity	21.1
Vaccine-induced	21.1
Infection-acquired	0

#### **British Columbia**

Overall immunity	2.4
Vaccine-induced	0.8
Infection-acquired	1.6

5.6

1.6 4.0

#### Saskatchewan

Overall immunity	4.1
Vaccine-induced	1.2
Infection-acquired	2.9

Μ	an	ito	ba	5

Overall immunity	3.1
Vaccine-induced	0.7
Infection-acquired	2.4

#### Atlantic Canada

Overall immunity	1.3
Vaccine-induced	0.9
Infection-acquired	0.5

#### Quebec

Overall immunity	4.4
Vaccine-induced	1.2
Infection-acquired	3.2

#### Ontario

Overall immunity	3.3
Vaccine-induced	0.8
Infection-acquired	2.5
	20



Alberta

Overall immunity

Vaccine-induced

## SARS-CoV-2 Antibody Seroprevalence Provincial and Regional, by Sex





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Canadä

23.5



#### Canadä

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Statistics Statistique Canada Canada



#### **RESULTS FOR OTHER SOCIO-DEMOGRAPHICS**

# Occupational risk, Indigenous and visible minority





### SARS-CoV-2 antibody seroprevalence: occupational risk



7

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24

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### SARS-CoV-2 antibody seroprevalence: by population group





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- About 1 in 3 (30.3%) with antibodies due to a past infection never got tested by PCR for an active infection
- Among those, 3 out of 4 (76.6%) never had symptoms

26



### **Topics to explore for additional analysis**

#### **Electronic Questionnaire**

- Demographics
- Self-reported health status
- COVID-related
  - Symptoms, tests, vaccination, preventative measures
- Occupation
- Type of household
- Household income

#### Dried Blood Spot Test (Self-administered)

• COVID-19 antibodies (S, RBD, N)

# Electronic Questionnaire & DBS (potentially)

- Asymptomatic infections by age
- Visible minority by public-facing work



27



## **Dr. David Buckeridge**

COVID-19 Immunity Task Force Scientific Lead, Data Management & Analysis,

# **Goal: Immunity monitoring**

Provide **regular estimates** of the cumulative proportion of Canadians with immunity to SARS-CoV-2

Current estimates are for immunity from **infection and vaccination** through **May 31, 2021** 

# **Team: Immunity monitoring**

Led by CITF Data Management and Analytics Group



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Support for Model Development and Implementation



**Precision Analytics** 





# Methods

- "Triangulate" data about immunity from multiple sources to obtain estimate of immunity that accounts for all available information
- A statistical regression model is used to combine information
  - Linked statistical models are fit to data from provinces and territories, including:
    - Daily deaths in each region
    - Cumulative deaths by age and sex
    - Seroprevalence results (e.g., the CCAHS study from Statistics Canada)
  - Immunity through vaccination is included using data on vaccines delivered

## **Results:** Canada, infection-induced immunity



# **5.3%** (95% CI: 4.1, 6.9)

Cumulative percent of Canadian population with immunity to SARS-CoV-2 from infection (**until May 31, 2021**)

## **Results:** Canada, infection and vaccination



# **44.9%** (95% CI: 44.2, 45.8)

Cumulative percent of Canadian population with immunity to SARS-CoV-2 from infection and vaccination (**until May 31, 2021**)

## **Results:** Alberta and Ontario



Vaccine immunity Infection-induced + vaccine immunity

Points (•) show estimates of seroprevalence from infection from individual serosurveys (anti-N or anti-S before Dec 2020, anti-N only for December 2020 +). Red points are Canadian Blood Services anti-N estimates

## **Results: Manitoba and Atlantic Provinces**



Infection-induced immunity Vaccine immunity Infection-induced + vaccine immunity

Points (•) show estimates of seroprevalence from infection from individual serosurveys (anti-N or anti-S before Dec 2020, anti-N only for December 2020 +). Red points are Canadian Blood Services anti-N estimates

# Summary

- Immunity modelling triangulates data from multiple sources to provide overall estimates of immunity in Canada and by regions
- Initial estimates indicate
  - Low levels of immunity from infection
  - Variation in immunity from infection across geographical regions
  - Vaccination is now the main source of immunity in all regions
- Updated estimates will be released on a monthly basis incorporating new data and ongoing refinements to the model



## **Dr. Catherine Hankins**

COVID-19 Immunity Task Force Co-Chair

# Conclusions

- Statistics Canada's Canadian COVID-19 Antibody and Health Survey (C-CAHS) shows **antibody levels were very low** going into the 3rd wave
- **Children and adolescents** were more likely to have infection-acquired immunity than Canadians 60 years and over living outside long-term care
- **Public-facing workers** had more infection-acquired immunity and vaccine-induced immunity than others
- Canadians belonging to **visible minorities** were:
  - Twice as likely to have infection-acquired immunity
  - ► Half as likely to have vaccine-induced immunity than others

# Conclusions

- One in three (30.3%) Canadians with infection-induced antibodies had **never taken a PCR test** for active infection
  - Three out of four (76.6%) didn't take a test because they had no symptoms
- Asymptomatic infections are real
  - About 25% of Canadians who tested positive for antibodies due to a previous infection had no symptoms and could have spread SARS-CoV-2 unknowingly to others

Reinforces that **physical distancing measures** and mask wearing have been the best ways to control the virus, especially prior to vaccine rollout



# Statistics Canada results help understand those from other CITF-funded studies

# SeroTracker: mapping global seroprevalence data

**SeroTracker** is a knowledge hub that **tracks and synthesizes** findings from SARS-CoV-2 serosurveillance efforts worldwide.

 Serves the CITF's need for global serological testing data and is supported by the Task Force.

**Key finding:** In 2020, national seroprevalence estimates globally are low!

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Median seroprevalence = 4.6% [IQR 1.9-7.7%] (968 studies, 74 countries, 9.3 million people)
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Bobrovitz, Arora, Cao et al. Global seroprevalence of SARS-CoV-2 antibodies: A systematic review and meta-analysis. PLOS ONE June 23, 2021 <a href="https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0252617">https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0252617</a>

# Seroprevalence results from CITF-supported studies\*

- Immunity from infection will not be enough! Vaccines are critical, especially faced with variants such as Delta
- SARS-CoV-2 infection more commonly found in:
  - Visible minority communities
  - Poorer neighbourhoods
  - Public facing occupational groups
  - Younger age groups
- Efforts must continue to increase vaccination rates in these populations
- \* Statistics Canada, Canadian Blood Services, Héma-Québec, CANPaTH, ABC, ENCORE

# Serosurveys continue to be important to measure waning immunity

- Serosurveys detect antibodies due to infection and vaccination
- Can measure waning immunity by age group
  - Inform as to timing of booster



# Dried Blood Spot antibody testing

# DBS for SARS-CoV-2 antibody testing

- Dried blood spot (DBS) great to avoid traditional blood draws
- Validation initiated and funded by CITF, coordinated by National Microbiology Laboratory (NML)
  - Used DBS specimens to compare antibody tests for accuracy and reliability
- Participating sites: Vancouver (BC Children's, BCCDC), Toronto (U. Toronto sites), Ottawa (CHEO), Montreal (MUHC), Winnipeg (NML)
- Made-in-Canada 'bespoke' assays using NRC antigens performed best:
  - Anne-Claude Gingras laboratory (U. Toronto)
  - Marc-André Langlois laboratory (U. Ottawa)
- Permits studies StatCan, pediatric, Indigenous peoples, CanPath, correctional settings, many others to obtain representative samples & increase participation



# **Questions?**

# Discover the COVID-19 Immunity Task Force





@COVIDimmunitytaskforce





COVID-19 Immunity Task Force | Groupe de travail sur l'immunité face à la COVID-19

## covid19immunitytaskforce.ca