

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

Seroprevalence in Canada: synthesis of seroprevalence estimates from CITF partners

Presented by Tanya Murphy, PhD Data manager and research associate, Data Management and Analysis Unit, CITF Secretariat

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Goal: Immunity monitoring

• 'Seroprevalence in Canada' webpage

https://www.covid19immunitytaskforce.ca/seroprevalence-in-canada/

- Synthesis of seroprevalence estimates from CITF partners and Canadian Blood Services reports
- Interactive graphics
- Monthly report to the Chief Public Health Office
 - Additional estimates
 - > Narrative synthesis for special populations such as long-term care home residents
- Scientific publication
 - The Evolution of Population Immunity to SARS-CoV-2 A Time-Series Study of Seroprevalence in Canada, 2020-2022 (under review @ CMAJ)
 - Collaboration with 7 large general population projects

Methods: Ecologic time series

- Data: Statistical aggregates of anti-N and anti-S seropositivity
 - Published Canadian estimates catalogued by SeroTracker
 - Shared seroprevalence estimates
 - Mostly provincial-level for repeated calendar periods
 - Often standardized to provincial population, adjusted for assay sensitivity and specificity
- Statistical model
 - Bayesian multi-level model assuming beta-binomial distribution
 - Number positive calculated from adjusted seroprevalence and original sample size
 - Regression splines for flexible time trend
 - Province-specific intercept and slopes, partial pooling

Infection acquired seroprevalence over time, Canada



Date

Each point represents a seroprevalence estimate from a project at the mid-point of a sample collection period. Infection-acquired seropositivity was measured as anti-nucleocapsid or anti-spike seropositivity prior to Jan 2021 but only anti-nucleocapsid seropositivity after Dec 2020. Provinces in region: Atlantic = NB, NS, PE, NL; Eastern = ON, QC; Western = BC, AB, SK, MB; insufficient data for Territories. Trendline represents the population-weighted mean of provincial seroprevalence Bayesian model estimates. Grey bands represent 95% credible interval.

Infection-acquired seroprevalence over time, by province



Date

Each point represents a seroprevalence estimate from a project at the mid-point of a sample collection period. Infection-acquired seropositivity was measured as anti-nucleocapsid or anti-spike seropositivity prior to Jan 2021 but only anti-nucleocapsid seropositivity after Dec 2020. Trendline represents the population-weighted mean of provincial seroprevalence Bayesian model estimates. Grey bands represent 95% credible interval.

Infection-acquired seroprevalence over time by age, Canada



Date

Each point represents a seroprevalence estimate from a project at the mid-point of a sample collection period and the mid-point of the age range of the participants. Infection-acquired seropositivity was measured as anti-nucleocapsid or anti-spike seropositivity prior to Jan 2021 but only anti-nucleocapsid seropositivity after Dec 2020.

Summary

Achievements and lessons learned

- Immunity monitoring
 - Regular estimates of seroprevalence in Canada communicated to decision-makers and the public
- Leading role in data aggregation and statistical analysis
 - Metadata and harmonization
 - Modelling meetings with experts and trainees

Limitations

- Serology as correlate of immunity
- Data sources
 - Few probabilistic, representative surveys or low response rates
 - Few estimates for children
- Capacity

Next steps

In progress

- Model-based age group estimates
- Anti-S model with explanatory variables (anti-N + vaccination)
- Latent 'true' infections model
 - See Nathan Duarte's poster
 - Methods article in progress (Judy Chen and Rahul Arora)

Opportunities

- Understanding data source differences
- Optimizing sampling
- Spatial-temporal

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CITF secretariat

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Projects contributing estimates

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- Prospective Evaluation of Immunity after COVID-19 vaccines in Seniors (PREVENT: M. Sadarangani and A. Jassem)

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The CITF Databank

Come talk data in the foyer!