

Seroprevalence of SARS-CoV-2 antibodies among children in the Greater Toronto Area

Presenter: Mary Aglipay, MSc CITF Scientific Meeting, Vancouver BC March 8, 2023

Co-authors: Miriam Woldu,² Charles Keown-Stoneman,⁴ Catherine S. Birken,² Jeff Kwong,¹ Ashleigh Tuite,¹ Muhammad Mamdani,⁵ Jonathon L. Maguire⁶

¹Division of Epidemiology, Dalla Lana School of Public Health; ²SickKids Research Institute; ³Institute for Clinical and Evaluative Sciences; ⁴Applied Health Research Centre, St. Michael's Hospital, Unity Health Toronto;

⁵Advanced Analytics and Data Sciences, St. Michael's Hospital, Unity Health Toronto; ⁶Li Ka Shing Research Centre, St. Michael's Hospital, Unity Health Toronto

TARGet Kids!





I have no conflicts of interest to disclose.



COVID-19 in the GTA

- The Greater Toronto Area (GTA) is a Covid-19 hotspot in Canada
- ▶ 1,070,635 children live in the GTA¹
- Children are an important source of community transmission
- 123,873 confirmed cases of COVID-19 among children <12 years in the Ontario²
 - 2000 children with COVID-19 have required hospitalization²



COVID-19 IMMUNITY TASK FORCE TARGet Kids! 1. Government of Canada SC. Census Profile, 2016 Census - Toronto [Census metropolitan area], Ontario and Ontario [Province]. Published February 8, 2017. Accessed February 27, 2023. https://www12.statcan.gc.ca/census-recensement/2016/dp-

pd/prof/details/page.cfm?Lang=E&Geo1=CMACA&Code1=535&Geo2=PR&Code2=35&Data=Count&SearchText=Caledon%20East&SearchType=Begins&SearchPR=01&B1=All 2. Ontario COVID-19 Data Tool. Public Health Ontario. Accessed February 27, 2023. https://www.publichealthontario.ca/en/data-and-analysis/infectious-disease/covid-19-data-surveillance/covid-19-data-tool

Objectives

- Describe the seroprevalence of infection-acquired antibodies among children recruited from TARGet Kids! in the Greater Toronto Area from January 2021 to November 2022
- Describe the seroprevalence of vaccination-acquired antibodies
- Examine heterogeneity by:
 - Age
 - Household income
 - Maternal education
 - Maternal ethnicity
 - Household density





TARGet Kids!

The largest primary care research network in Canada

Ongoing longitudinal data collection at well-child visits

Over 12,500 children and their parents enrolled since 2008

14 large practices across GTA, Montreal and Kingston

Methods

April 13, 2020: TARGet Kids! Covid-19 Study of Children and Families

- Comprehensive questionnaires on sociodemographics, school and childcare attendance, adherence to public health measures
- Inclusion: Healthy children from birth to 10 years
- January 4, 2021: Seroprevalence Substudy
 - Primary outcome of interest: SARS-CoV-2 infection acquired antibodies
 - Secondary outcome of interest: Vaccination-acquired antibodies
 - Dried blood spot tests—3 antigen ELISA assay
- Descriptive statistics





Timeline

2020-2030 2020	2021	2022	2023
Global Events			
INTERPORT OF STREET STR	id-19 pandemic • MARCH 11, 2020 - PRESENT		
• MARCH 17, 2020	of emergency		
Toronto declares state of	of emergency • MARCH 23, 2020 - MAY 9, 2022		
Study Events			
TARGet Kids! Covid-	19 Study of Children and Families • APRIL 13, 2020 - PRESENT		
	TARGet Kids! Covid-19 Serology Substudy 🕠	JANUARY 4, 2021 - PRESENT	
	First TARGet Kids! serological test returned • JANUARY 19, 2021		
			Send of analytic period NOVEMBER 7, 2022
accine Authorization			
	• 12 years and older rollou	it → MAY 18, 2021 - PRESENT	
		↑ 5 to 11 year old rollout → NOVEN	/BER 23, 2021 - PRESENT
COVID-19 IMMUNITY TASK FORCE TARGet Kids	; !		Y 2 to 4 year old rollout JULY 28, 2022 - PRESENT 7

Results

Sample characteristics (N=475)

	Overall	
n	475	
Age in years (mean (SD))	6.39 (3.17)	
Number of people in household (mean (SD))	4.01 (0.88)	
Child female sex, n (%)	227 (47.8)	
Parent essential worker, n (%)	20 (4.2)	
Mother's highest level of education, n (%)		
High school or less	10 (2.4)	
Apprenticeship/CEGEP/College	47 (11.3)	
University	358 (86.3)	
Household income, n (%)		
0 to \$49,999	16 (3.9)	
\$50,000 to \$99,999	64 (15.6)	
\$100,000 to \$149,999	192 (46.8)	
\$150,000+	138 (33.7)	
Childcare attendance, n (%)	137 (71.7)	
Mother European Ethnicity, n (%)	251 (67.1)	
Father European Ethnicity, n (%)	269 (71.9)	
House type dwelling, n (%)	327 (84.3)	
Parent vaccination status at initial test, n (%)	287 (65.4)	



Number of participants returning tests per bi-annual period (N=475)



Sample characteristics by bi-annual period

	Jan-Jun 2021	Jul-Dec 2021	Jan-Jun 2022	Jul -Nov 2022
n	342	181	216	73
Age in years (mean (SD))	6.35 (3.04)	6.88 (3.14)	7.19 (3.44)	6.95 (3.39)
Number of people in household (mean (SD))	3.95 (0.89)	4.12 (0.96)	4.16 (0.98)	4.07 (1.11)
Child female sex, n (%)	168 (49.1)	86 (47.5)	111 (51.4)	35 (47.9)
Parent essential worker, n (%)	13 (3.8)	13 (7.2)	7 (3.2)	2 (2.7)
Mother's highest level of education, n (%)				
High school or less	6 (1.9)	4 (2.5)	0 (0.0)	0 (0.0)
Apprenticeship/CEGEP/College	37 (11.8)	21 (13.0)	34 (18.4)	11 (17.7)
University	270 (86.3)	137 (84.6)	151 (81.6)	51 (82.3)
Household income, n (%)				
0 to \$49,999	9 (2.9)	8 (4.9)	9 (4.9)	3 (4.8)
\$50,000 to \$99,999	51 (16.5)	26 (16.0)	36 (19.5)	13 (21.0)
\$100,000 to \$149,999	152 (49.2)	75 (46.3)	77 (41.6)	22 (35.5)
\$150,000+	97 (31.4)	53 (32.7)	63 (34.1)	24 (38.7)
Childcare attendance, n (%)	109 (73.6)	48 (64.0)	61 (66.3)	20 (66.7)
Mother European Ethnicity, n (%)	198 (68.0)	95 (65.5)	109 (64.5)	35 (63.6)
Father European Ethnicity, n (%)	207 (71.4)	103 (71.5)	120 (72.7)	38 (70.4)
House type dwelling, n (%)	246 (83.4)	138 (90.8)	147 (83.5)	56 (90.3)
Parent vaccination status, n (%)	177 (56.9)	148 (84.6)	192 (90.1)	56 (78.9)



Seroprevalence of infection-acquired antibodies





Seroprevalence of vaccine-acquired antibodies



Overall seroprevalence, either infection or vaccine-acquired antibodies



Seroprevalence of infection-acquired antibodies by sociodemographic characteristics



Seroprevalence of infection-acquired antibodies by age

6



Seroprevalence of infection-acquired antibodies by sex



Seroprevalence of infection-acquired antibodies by income



Seroprevalence of infection-acquired antibodies by maternal education



Seroprevalence of infection-acquired antibodies by maternal ethnicity



Seroprevalence of infection-acquired antibodies by household density



Seroprevalence of vaccine-acquired antibodies by sociodemographic characteristics



Seroprevalence of vaccine-acquired antibodies by age



Seroprevalence of vaccine-acquired antibodies by sex



Seroprevalence of vaccine-acquired antibodies by income



Seroprevalence of vaccine-acquired antibodies by maternal education



Seroprevalence of vaccine-acquired antibodies by maternal ethnicity



Seroprevalence of vaccine-acquired antibodies by household density





TARGet Kids! infection-acquired seroprevalence was **44%** from Jul-Nov 2022

- Lower seroprevalence than Toronto adult blood donors (62.02% in Sept 2022)¹
- Lower seroprevalence than children in Montreal (58.1% from May-Sep 2022)²

TARGet Kids! overall seroprevalence was 74% from Jul-Nov 2022

1. COVID-19 Seroprevalence Report, December 2, 2022. Canadian Blood Services; 2022. Accessed February 27, 2023. https://www.covid19immunitytaskforce.ca/wp-content/uploads/2022/12/covid-19-full-report-october-2022-december-2-2022.pdf 2. Results. Encore Study. Accessed February 27, 2023. https://www.encorestudy.ca/results



In the TARGet Kids! sample,

- No gradient in seroprevalence of infection-acquired antibodies for sociodemographic groups: age, income, maternal education, household density
 - Some differences observed for European versus racial minority
- Discernible gradients by sociodemographic characteristics observed for vaccine-acquired antibodies
 - Differences by age, income, education, ethnicity, household density



Points for interpretation

- TARGet Kids! participants are a healthy subset of the pediatric population in the GTA
- Loss to follow-up may have introduced selection bias
- Crude values presented



Acknowledgements

TARGet Kids! Leads:

Catherine Birken, MD MSc Jonathon Maguire, MD MSc

Executive Committee:

Christopher Allen, BSc Laura Anderson, PhD Danielle D'Annunzio, BA, LLM, PMP Pamela Ruth Flores, MD Mateenah Jaleel, BSc Charles Keown-Stoneman, PhD Natricha Levy McFarlane, MPhil Jessica Omand, RD, PhD Sharon Thadani, MLA/T

Investigators and Trainees:

Mary Aglipay, MSc Imaan Bayoumi, MD MSc Cornelia M. Borkhoff, PhD Sarah Carsley, PhD Alice Charach, MD Katherine Cost. PhD Curtis D'Hollander RD MSc Anne Fuller, MD Laura Kinlin, MD MPH Michaela Kucab RD. MSc Patricia Li, MD MSc Pat Parkin, MD Nav Persaud, MD MSc Sarah Rae, BHSc MSc Iza bela Socvnska, RD MSc Shelley Vanderhout, RD PhD Leigh Vanderloo, PhD Peter Wong, MD PhD

Jenny Liu, BHSc Michelle Mitchell, BA Yulika Yoshida-Montezuma, MPH

Trudy-Ann Buckley, BSc Kardelen Kurt, BSc Sangeetha Loganathan, BPT Tarandeep Mali, BSc

Parent Partners:

Jennifer Batten Jennifer Chan John Clark Amy Craig Kim De Castries-Garcia Sharon Dharman Sarah Kelleher Salimah Nasser Tammara Pabon Michelle Rhodes Rafael Salsa Julie Skelding Daniel Stern Kerry Stewart Erika Sendra Tavares Shannon Weir Maria Zaccaria-Cho Site Investigators: Emv Abraham, MD

Jillian Baker, MD Nusrat Zaffar, MBBS Gary Bloch, MD

Clinical Site Research Staff:

La uri e Thompson, MLT

Sara Ali, MD

Tony Barozzino, MD Sylvie Bergeron, MD

Joey Bonifacio, MD Ashna Bowry, MD Caroline Calpin, MD Douglas Campbell, MD Sohail Cheema, MD Elaine Cheng, MD Brian Chisamore, MD Evelyn Constantin, MD Karoon Danayan, MD

Paul Das, MD Viveka De Guerra, MD Mary Beth Derocher, MD Anh Do, MD Kathleen Doukas, MD Anne Egger, BScN Allison Farber, MD Amy Freedman, MD Sloane Freeman, MD Sharon Gazeley, MD Karen Grewal, MD Charlie Guiang, MD Dan Ha, MD Curtis Handford, MD Laura Hanson, BScN, RN Leah Harrington, MD Sheila Jacobson, MD Lukasz Jagiello, MD Gwen Jansz, MD Paul Kadar, MD Lukas Keiswetter, MD Tara Kiran, MD Holly Knowles, MD

Bruce Kwok, MD

Piya Lahiry, MD

Margarita Lam-Antoniades, MD Eddy Lau, MD Denis Leduc, MD Fok-Han Leung, MD Alan Li, MD Patricia Li, MD Roy Male, MD Aleks Meret, MD Elise Mok, MD Rosemary Moodie, MD Katherine Nash, BScN, RN James Owen, MD Michael Peer, MD Marty Perlmutar, MD Navindra Persaud, MD Andrew Pinto, MD Michelle Porepa, MD VikkyQi, MD Noor Ramii, MD Danyaal Raza, MD Katherine Rouleau, MD Caroline Ruderman, MD Janet Saunderson, MD Vanna Schiralli, MD Michael Sgro, MD HafizShuja, MD Farah Siam, MD Susan Shepherd, MD Cinntha Srikanthan, MD Carolyn Taylor, MD Stephen Treherne, MD Suzanne Turner, MD Fatima Uddin, MD Meta van den Heuvel. MD Thea Weisdorf, MD Peter Wong, MD John Yaremko, MD

Sheila Lakhoo, MD

Ethel Ying, MD Elizabeth Young, MD Michael Zajdman, MD

Applied Health Research Centre:

Esmotara Begum, PhD Peter Juni, MD, University of Toronto Gurpreet Lakhanpal, MSc, CCRP, PMP Gerald Lebovic, PhD, University of Toronto Ifeavinchukwu (Shawn) Nnorom, BSc Marc Denzel Nunez, HBSc Audra Stitt, MSc Kevin Thorpe, MMath

Mount Sinai Services Lab:

Raya Assan, MSc, MLT Homa Bondar, BSc George S. Charames, PhD, FACMG Andrea Djolovic, MSc, CCGC Chelsea Gorscak-Dunn Mary Hassan, MLT Rita Kandel, MD Michelle Rodrigues, PhD

Thank you to all participating families for their time and involvement in TARGet Kids!

TARGet Kids!







St. Michael's Foundation

St. Michael's

Inspired Care. **Inspiring Science.**



Research Staff:

Piyumi Konara Mudiyanselage, MScKelly Anderson, MD Xuedi Li, MSc Gordon Arbess. MD



Mary Aglipay mary.aglipay@mail.utoronto.ca