

ICES Report Date: April 29, 2021

Vaccine Coverage by Neighbourhood COVID-19 Risk in Immigrants, Refugees, and other Newcomers, up to April 26, 2021

Purpose:

To determine and compare COVID-19 vaccine coverage by age group and neighbourhood COVID-19 risk between immigrants, refugees, other newcomers and Canadian born/long-term residents in Ontario, and to assess changes in vaccine coverage over time following the introduction of a revised Phase 2 vaccination roll-out and 'hot spot' targeted strategy.

Methods:

We describe vaccine uptake in community-dwelling Ontarians based on the risk of COVID-19 in their neighbourhoods and by age. We report this among individuals who immigrated to Ontario since 1985, either as refugees or through other permanent resident programs and compared with those who are Canadian born/long-term residents (see Appendix for more details). Since the permanent resident data on immigrants at ICES is only current to May 2017, we also report on those who were new to Ontario and recent registrants of the Ontario Health Insurance Plan (since June 2017), acknowledging that they are not all immigrants. This group includes immigrants and refugees who were granted permanent residency, temporary workers or international students who qualify for OHIP, as well as those moving to Ontario from other provinces. Since the onset of the pandemic, the Ontario government has waived the three-month waiting period for OHIP coverage for new registrants. We compared vaccine uptake as of March 29, 2021 with the most recent available data as of April 26, 2021.

Main Findings:

- Rates of COVID-19 vaccination are consistently lower in immigrants, refugees, and recent OHIP registrants than in Canadian-born/long-term residents in all age groups (and especially in those aged 70 and above) and across all neighbourhood risk groups.
 - As of April 26th, overall vaccine coverage in Canadian-born/long-term residents ages ≥ 16 years old is 38% versus 22% in those who came to Ontario as refugees, 28% in all other immigrants and 12% in recent newcomers to Ontario.
 - High levels of vaccine coverage (71-86% across age-risk grid) have been achieved in those aged 70 years and older who are Canadian born/long-term residents.
 - In contrast, with the exception of recent OHIP registrants in the lowest-risk neighbourhoods, vaccine coverage in immigrants, refugees and recent OHIP registrants aged 70 years and older ranges from 47-65% across age-risk grid.
- Universally in those under 65 years of age, vaccine coverage has increased most in those living in neighbourhoods with high COVID-19 risk.
 - While there have been high percent increases in immigrants, refugees and recent OHIP registrants, the largest changes are consistently in those who are Canadian born/long-term residents.

Implications:

Immigrants and refugees have borne a disproportionate burden of COVID-19 infections in Ontario.⁽¹⁾ While the current vaccination strategy has begun to prioritize high-risk communities, immigrants, refugees and very recent newcomers to Ontario still have much lower rates of vaccine coverage and less change over time than Canadian-born or long-term residents. These disparities continue to exist in the “hot spot” neighbourhoods that have been prioritized for vaccines. An amplified effort focused on reducing barriers to vaccination, community-based approaches to implementation and directing vaccines to the highest risk communities is critical. Strategies to address low vaccination rates in older adult immigrants and refugees who are at high risk of severe disease will be important. These efforts and continued surveillance are needed to ensure vaccine equity and improved outcomes for immigrant communities in Ontario.

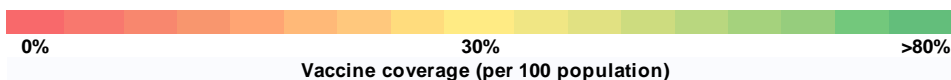
Percentage of Ontarians by immigrant status[§], who have received at least 1 dose of a COVID-19 vaccine as of March 29, 2021¹ (vaccine coverage) by age group and neighbourhood COVID-19 infection risk[‡]

		Refugees										
		Neighbourhood Risk										
		1 (high)	2	3	4	5	6	7	8	9	10 (low)	Overall
80+		30%	41%	39%	32%	35%	34%	37%	40%	32%	30%	35%
75-79		23%	27%	26%	19%	24%	26%	22%	19%	10%	15%	23%
70-74		8%	12%	10%	7%	7%	9%	7%	7%	4%	2%	9%
65-69		5%	5%	5%	4%	4%	4%	6%	5%	3%	4%	5%
60-64		11%	12%	11%	8%	9%	10%	9%	6%	6%	13%	10%
55-59		5%	5%	5%	5%	5%	5%	6%	6%	6%	6%	5%
50-54		4%	4%	4%	4%	5%	5%	6%	6%	6%	8%	5%
45-49		4%	5%	5%	6%	5%	5%	5%	5%	4%	6%	5%
40-44		4%	5%	5%	6%	5%	6%	6%	6%	6%	6%	5%
16-39		3%	4%	4%	4%	4%	4%	5%	4%	4%	6%	4%
Overall (16+)		5%	6%	6%	6%	6%	6%	6%	6%	5%	7%	6%

		Other immigrant groups										
		Neighbourhood Risk										
		1 (high)	2	3	4	5	6	7	8	9	10 (low)	Overall
80+		38%	39%	39%	38%	39%	39%	37%	36%	35%	37%	38%
75-79		30%	30%	28%	29%	33%	32%	26%	25%	20%	15%	29%
70-74		8%	12%	11%	11%	14%	13%	12%	11%	4%	5%	11%
65-69		6%	7%	6%	6%	6%	6%	7%	6%	5%	6%	6%
60-64		15%	17%	15%	15%	14%	15%	15%	13%	12%	19%	15%
55-59		7%	8%	7%	7%	7%	7%	7%	8%	7%	10%	7%
50-54		6%	8%	7%	7%	7%	8%	7%	7%	7%	9%	7%
45-49		7%	8%	7%	8%	8%	8%	7%	8%	7%	11%	8%
40-44		6%	7%	6%	7%	7%	7%	7%	8%	7%	12%	7%
16-39		5%	5%	5%	6%	5%	5%	6%	6%	6%	9%	5%
Overall (16+)		8%	10%	9%	9%	9%	9%	9%	9%	8%	11%	9%

		Recent OHIP registrants										
		Neighbourhood Risk										
		1 (high)	2	3	4	5	6	7	8	9	10 (low)	Overall
80+		42%	42%	43%	49%	50%	50%	51%	52%	69%	60%	49%
75-79		25%	25%	25%	25%	29%	29%	26%	24%	22%	16%	25%
70-74		6%	11%	8%	8%	10%	10%	10%	9%	5%	7%	9%
65-69		2%	3%	2%	4%	3%	4%	4%	4%	4%	6%	3%
60-64		8%	9%	8%	7%	7%	9%	11%	8%	8%	17%	9%
55-59		3%	3%	3%	4%	3%	3%	3%	3%	4%	6%	3%
50-54		2%	3%	3%	3%	4%	3%	4%	3%	4%	5%	3%
45-49		3%	4%	3%	4%	4%	4%	3%	4%	5%	5%	4%
40-44		3%	3%	3%	4%	4%	4%	4%	5%	4%	5%	4%
16-39		2%	3%	3%	4%	4%	4%	4%	5%	4%	7%	3%
Overall (16+)		3%	4%	4%	4%	5%	5%	4%	6%	6%	8%	4%

		Canadian-born/ Long-term residents										
		Neighbourhood Risk										
		1 (high)	2	3	4	5	6	7	8	9	10 (low)	Overall
80+		61%	67%	71%	73%	72%	75%	71%	77%	71%	72%	72%
75-79		43%	48%	48%	48%	46%	47%	40%	42%	28%	27%	40%
70-74		16%	22%	20%	19%	20%	20%	18%	17%	9%	9%	16%
65-69		10%	13%	13%	12%	12%	11%	11%	11%	8%	8%	10%
60-64		24%	29%	28%	24%	24%	23%	21%	20%	15%	21%	22%
55-59		8%	10%	11%	11%	12%	12%	11%	12%	11%	12%	11%
50-54		6%	8%	8%	9%	10%	10%	10%	10%	10%	12%	9%
45-49		6%	7%	7%	9%	10%	9%	9%	10%	10%	12%	9%
40-44		6%	7%	7%	8%	9%	9%	9%	9%	9%	11%	9%
16-39		4%	5%	5%	7%	7%	7%	7%	7%	7%	8%	7%
Overall (16+)		12%	16%	15%	16%	16%	16%	15%	16%	14%	16%	15%



^{*} The COVaxON dataset used for these estimates includes vaccination events up to March 29, 2021. Vaccinations administered in recent days may not be in the COVaxON dataset due to reporting delays.

[‡] Forward Sortation Areas (FSA, first three characters of a postal code) were grouped into deciles (each representing a neighbourhood risk group) based on the cumulative incidence of COVID-19 infection among residents living outside of long-term care facilities within each FSA as of March 28, 2021. Vaccine coverage is the number of residents in each age group and neighbourhood risk stratum who received at least 1 dose of a COVID-19 vaccine, divided by the total number of individuals in the stratum (excluding long-term care residents). The OHIP Registered Persons Database was used to determine the postal code of residence and derive the population estimates for each stratum. These estimates may differ from Ontario Census population estimates.

[§] The Immigration, Refugee and Citizenship Canada permanent resident data used includes individuals who landed from January 1, 1985 to May 31, 2017. Individuals who are new to Ontario and recent registrants of the Ontario Health Insurance Plan are categorized separately, although they may not all be immigrants. Further those who landed prior to 1985 or in another province and subsequently moved to Ontario would be part of the Canadian-born and long-term resident group.

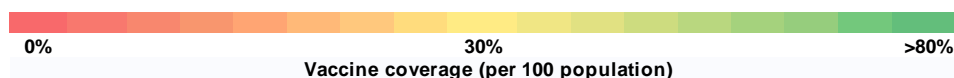
Percentage of Ontarians by immigrant status[§], who have received at least 1 dose of a COVID-19 vaccine as of April 26, 2021¹ (vaccine coverage) by age group and neighbourhood COVID-19 infection risk[‡]

	Refugees										Overall
	Neighbourhood Risk										
	1 (high)	2	3	4	5	6	7	8	9	10 (low)	
80+	48%	57%	53%	47%	47%	50%	54%	50%	50%	40%	51%
75-79	55%	60%	58%	51%	53%	51%	62%	52%	48%	47%	56%
70-74	54%	62%	53%	47%	49%	48%	53%	49%	48%	30%	53%
65-69	53%	55%	47%	40%	42%	41%	44%	37%	33%	21%	46%
60-64	50%	49%	43%	36%	35%	36%	38%	28%	27%	31%	42%
55-59	38%	37%	29%	26%	21%	21%	24%	20%	17%	19%	29%
50-54	32%	30%	23%	18%	15%	14%	15%	14%	13%	15%	23%
45-49	16%	19%	12%	13%	11%	12%	12%	11%	9%	14%	14%
40-44	12%	14%	12%	12%	11%	13%	13%	10%	10%	9%	12%
16-39	8%	8%	7%	7%	7%	7%	8%	8%	6%	9%	8%
Overall (16+)	26%	27%	21%	19%	17%	18%	19%	17%	15%	16%	22%

	Other immigrant groups										Overall
	Neighbourhood Risk										
	1 (high)	2	3	4	5	6	7	8	9	10 (low)	
80+	53%	52%	52%	49%	50%	50%	50%	47%	52%	48%	51%
75-79	60%	58%	57%	55%	56%	56%	56%	54%	59%	52%	57%
70-74	61%	60%	59%	57%	58%	59%	57%	57%	54%	51%	59%
65-69	58%	59%	55%	53%	54%	53%	53%	51%	45%	35%	55%
60-64	56%	57%	52%	51%	49%	49%	51%	46%	43%	40%	52%
55-59	47%	45%	38%	39%	29%	29%	29%	28%	28%	29%	38%
50-54	43%	42%	31%	32%	21%	20%	19%	18%	16%	17%	31%
45-49	22%	27%	18%	19%	17%	17%	16%	16%	15%	18%	20%
40-44	17%	21%	15%	17%	16%	16%	16%	16%	14%	17%	17%
16-39	12%	12%	9%	11%	9%	9%	9%	10%	10%	12%	10%
Overall (16+)	32%	33%	27%	27%	24%	24%	24%	23%	22%	23%	28%

	Recent OHIP registrants										Overall
	Neighbourhood Risk										
	1 (high)	2	3	4	5	6	7	8	9	10 (low)	
80+	53%	52%	55%	57%	59%	58%	65%	61%	79%	76%	60%
75-79	46%	46%	49%	49%	53%	53%	54%	55%	59%	66%	51%
70-74	48%	50%	50%	49%	50%	50%	53%	49%	58%	60%	51%
65-69	46%	46%	43%	42%	41%	46%	44%	44%	47%	38%	44%
60-64	44%	43%	39%	39%	35%	40%	44%	38%	41%	38%	41%
55-59	35%	32%	27%	29%	22%	22%	26%	26%	28%	28%	28%
50-54	26%	24%	21%	21%	16%	13%	14%	11%	14%	11%	18%
45-49	16%	18%	12%	13%	12%	12%	12%	12%	12%	10%	13%
40-44	14%	15%	10%	14%	13%	13%	13%	13%	12%	10%	13%
16-39	8%	7%	6%	9%	7%	7%	7%	8%	7%	10%	7%
Overall (16+)	12%	13%	10%	13%	11%	12%	11%	13%	14%	16%	12%

	Canadian-born/ Long-term residents										Overall
	Neighbourhood Risk										
	1 (high)	2	3	4	5	6	7	8	9	10 (low)	
80+	76%	79%	81%	83%	83%	84%	85%	86%	86%	85%	83%
75-79	76%	80%	82%	82%	83%	83%	85%	85%	84%	81%	82%
70-74	74%	78%	79%	79%	80%	80%	81%	81%	79%	71%	78%
65-69	70%	73%	73%	67%	68%	67%	71%	68%	61%	48%	65%
60-64	67%	70%	69%	61%	62%	61%	65%	58%	55%	48%	60%
55-59	54%	57%	52%	46%	45%	45%	46%	43%	40%	35%	45%
50-54	48%	50%	42%	33%	30%	29%	28%	27%	24%	23%	32%
45-49	26%	36%	26%	25%	26%	26%	26%	25%	22%	21%	25%
40-44	22%	29%	24%	23%	26%	26%	25%	23%	21%	19%	24%
16-39	12%	13%	11%	12%	12%	12%	12%	12%	12%	13%	12%
Overall (16+)	37%	42%	38%	37%	37%	38%	39%	38%	37%	36%	38%



¹ The COVaxON dataset used for these estimates includes vaccination events up to April 26, 2021. Vaccinations administered in recent days may not be in the COVaxON dataset due to reporting delays.

[‡] Forward Sortation Areas (FSA, first three characters of a postal code) were grouped into deciles (each representing a neighbourhood risk group) based on the cumulative incidence of COVID-19 infection among residents living outside of long-term care facilities within each FSA as of March 28, 2021. Vaccine coverage is the number of residents in each age group and neighbourhood risk stratum who received at least 1 dose of a COVID-19 vaccine, divided by the total number of individuals in the stratum (excluding long-term care residents). The OHIP Registered Persons Database was used to determine the postal code of residence and derive the population estimates for each stratum. These estimates may differ from Ontario Census population estimates.

[§] The Immigration, Refugee and Citizenship Canada permanent resident data used includes individuals who landed from January 1, 1985 to May 31, 2017. Individuals who are new to Ontario and recent registrants of the Ontario Health Insurance Plan are categorized separately, although they may not all be immigrants. Further those who landed prior to 1985 or in another province and subsequently moved to Ontario would be part of the Canadian-born and long-term resident group.



Change in COVID-19 vaccine coverage by age group and neighbourhood COVID-19 infection risk from March 29, 2021 to April 26, 2021[‡]

Refugees

Neighbourhood Risk

	1 (high)	2	3	4	5	6	7	8	9	10 (low)	Overall
80+	18%	16%	14%	16%	13%	16%	17%	10%	17%	10%	16%
75-79	33%	33%	32%	32%	29%	25%	40%	34%	38%	32%	32%
70-74	47%	50%	43%	40%	42%	40%	46%	42%	44%	28%	44%
65-69	48%	50%	42%	36%	38%	37%	38%	33%	30%	17%	42%
60-64	39%	38%	32%	27%	27%	26%	28%	22%	21%	17%	32%
55-59	33%	32%	24%	22%	15%	16%	18%	14%	11%	13%	24%
50-54	27%	26%	19%	14%	10%	9%	9%	8%	7%	7%	18%
45-49	12%	14%	7%	7%	6%	7%	7%	6%	5%	8%	9%
40-44	8%	9%	6%	6%	6%	7%	7%	5%	4%	3%	7%
16-39	5%	5%	3%	3%	3%	3%	3%	3%	3%	2%	4%
Overall (16+)	20%	20%	15%	13%	12%	12%	13%	11%	10%	9%	16%

Other immigrant groups

Neighbourhood Risk

	1 (high)	2	3	4	5	6	7	8	9	10 (low)	Overall
80+	15%	13%	13%	11%	11%	11%	13%	11%	16%	11%	13%
75-79	30%	29%	28%	26%	23%	25%	30%	29%	39%	36%	28%
70-74	53%	48%	48%	46%	44%	45%	45%	45%	50%	46%	48%
65-69	53%	52%	49%	47%	47%	47%	47%	45%	41%	29%	49%
60-64	42%	40%	38%	36%	35%	34%	35%	33%	32%	22%	37%
55-59	40%	37%	31%	32%	21%	22%	22%	20%	21%	19%	31%
50-54	37%	34%	24%	25%	13%	12%	12%	11%	9%	8%	24%
45-49	15%	19%	10%	11%	9%	9%	9%	8%	8%	7%	12%
40-44	11%	14%	9%	9%	9%	9%	9%	8%	7%	5%	10%
16-39	7%	6%	4%	5%	4%	4%	4%	4%	4%	3%	5%
Overall (16+)	23%	23%	18%	18%	15%	15%	15%	14%	14%	12%	19%

Recent OHIP registrants

Neighbourhood Risk

	1 (high)	2	3	4	5	6	7	8	9	10 (low)	Overall
80+	11%	11%	12%	8%	9%	8%	14%	9%	10%	16%	11%
75-79	21%	21%	24%	24%	24%	23%	28%	31%	36%	50%	26%
70-74	42%	39%	42%	40%	40%	40%	43%	40%	53%	53%	42%
65-69	44%	43%	41%	38%	38%	42%	41%	40%	43%	32%	41%
60-64	36%	34%	31%	32%	28%	30%	34%	30%	33%	21%	32%
55-59	31%	29%	24%	25%	19%	19%	23%	23%	24%	22%	25%
50-54	24%	22%	19%	18%	12%	10%	11%	8%	9%	6%	15%
45-49	13%	14%	9%	10%	8%	8%	8%	8%	7%	5%	10%
40-44	11%	12%	8%	10%	9%	9%	9%	8%	8%	4%	9%
16-39	5%	5%	3%	6%	3%	3%	3%	3%	3%	3%	4%
Overall (16+)	9%	9%	7%	9%	7%	7%	7%	7%	8%	8%	8%

Canadian-born/ Long-term residents

Neighbourhood Risk

	1 (high)	2	3	4	5	6	7	8	9	10 (low)	Overall
80+	15%	12%	10%	9%	10%	9%	14%	9%	14%	13%	12%
75-79	33%	31%	33%	34%	37%	36%	45%	43%	56%	54%	42%
70-74	58%	56%	59%	60%	60%	60%	64%	64%	69%	63%	62%
65-69	60%	60%	60%	55%	56%	56%	60%	57%	54%	40%	54%
60-64	43%	41%	41%	37%	38%	37%	44%	39%	40%	27%	38%
55-59	46%	46%	42%	35%	33%	34%	35%	32%	29%	23%	34%
50-54	42%	42%	34%	24%	20%	20%	19%	17%	14%	11%	22%
45-49	20%	28%	19%	16%	17%	17%	17%	16%	12%	10%	16%
40-44	16%	22%	17%	15%	17%	17%	16%	14%	11%	9%	15%
16-39	8%	8%	5%	5%	5%	5%	5%	5%	5%	4%	5%
Overall (16+)	24%	26%	23%	22%	21%	22%	24%	22%	24%	20%	23%

[‡]The COVaxON dataset used for these estimates includes vaccination events up to April 26, 2021 and compares with the estimates derived from an earlier dataset (with events up to March 29, 2021).

[†] Forward Sortation Areas (FSA, first three characters of a postal code) were grouped into deciles (each representing a neighbourhood risk group) based on the cumulative incidence of COVID-19 infection among residents living outside of long-term care facilities within each FSA as of March 28, 2021. Vaccine coverage is the number of residents in each age group and neighbourhood risk stratum who received at least 1 dose of a COVID-19 vaccine, divided by the total number of individuals in the stratum (excluding long-term care residents). The OHIP Registered Persons Database was used to determine the postal code of residence and derive the population estimates for each stratum. These estimates may differ from Ontario Census population estimates.

Appendix:

Methods & Analysis:

- We identified individuals alive and eligible for the Ontario Health Insurance Plan (OHIP) as of January 1st, 2021 using the OHIP Registered Persons Database (RPDB).
- We used recent health care transaction records (e.g., OHIP physician billings, Ontario Drug Benefit [ODB] Plan claims) and Resident Assessment Instrument (RAI) assessments from the Continuing Care Reporting System (CCRS) to determine whether an individual resided in a long-term care (LTC) home. These individuals were excluded from the analyses.
- For all other individuals, the last recorded postal code in OHIP RPDB was used to determine their neighbourhood, as defined by the forward sortation area (FSA; first 3 characters of the postal code). The number of individuals in each FSA was used as the denominator for vaccination rates, and FSAs with <200 individuals were excluded from the analysis (8 FSAs were excluded).
- We used a combination of datasets (Ontario Laboratory Information System [OLIS], Public Health Case and Contact Management (CCM) Solutions and testing data from laboratories within the COVID-19 Diagnostic Network) to determine the cumulative incidence of COVID-19 cases as of March 28, 2021 for each FSA.
- We ranked FSAs based on their cumulative incidence of COVID-19 infection among residents living outside of long-term care facilities within each FSA and grouped FSAs into deciles based on this rank order. Each decile has 10% of the Ontario population (~1.5 million individuals) and represents the neighbourhood risk of COVID-19, where 1 = highest incidence neighbourhoods and 10 = lowest incidence neighbourhoods.
- We used the Immigration, Refugees and Citizenship Canada (IRCC) permanent resident file (with data from 1985-May 2017) to identify individuals who immigrated to Ontario as:
 - Refugees (resettled refugees, refugee dependents and those who became permanent residents following successful asylum claims)
 - Other permanent residents (i.e., sponsored family, economic class)
- We classified other Ontarians as
 - Recent registrants (since June 2017) of OHIP, also referred to as ‘newcomers’
 - Long-term residents/Canadian-born
- For each of the above groups, we determine the vaccine coverage for each risk group x age group stratum.
- We used the COVaxON dataset that included vaccination events up to April 26th, 2021 for vaccine coverage estimates.

Data Caveats & Limitations:

- All numbers are estimates and are based on health care transactions and information recorded in ICES data holdings that are available at the time of this report.
- Death information in the OHIP RPDB is lagged by up to 6 months. Therefore, individuals who died prior to January 1st, 2021 may still be included in the denominators.
- Recent contact with a LTC facility was used as a proxy for LTC residence. This algorithm may misclassify individuals who were recently relocated to a private home or elsewhere.
- Individuals living in retirement homes and other congregate settings are included in these estimates. We are currently unable to identify whether an individual resides in these settings.

- Record of vaccination events is dependent on Public Health Units entering this information into COVaxON.
- The IRCC data used in this report only includes immigrants and refugees who landed as permanent residents in Ontario from January 1, 1985, to May 31, 2017. Those who landed either prior to 1985 or in another province and subsequently moved to Ontario would be part of the Canadian-born and long-term resident group in this report.
- We have categorized simplistically all those who have immigrated to Ontario since 1985 as 2 groups (plus new OHIP registrants, some of whom will be immigrants). We acknowledge that we have not captured the diversity of immigration categories and pathways to settlement, regions of origin that reflect in part race and ethnicity, recency of immigration or any post-settlement experience as better reflected in the reference below.

Acknowledgements:

This work is supported by the Applied Health Research Questions (AHRQ) Portfolio at ICES, which is funded by the Ontario Ministry of Health. For more information on AHRQ and how to submit a request, please visit www.ices.on.ca/DAS/AHRQ. This work is also supported by the Ontario Health Data Platform (OHDP), a Province of Ontario initiative to support Ontario's ongoing response to COVID-19 and its related impacts. Parts of this material are based on data and information compiled and provided by Ontario Ministry of Health, the Canadian Institute for Health Information, Public Health Ontario and Immigration, Refugees and Citizenship Canada (IRCC) current to May 2017. The analyses, conclusions, opinions and statements expressed herein are solely those of the authors and do not reflect those of ICES, the OHDP, IRCC or the funding or data sources; no endorsement is intended or should be inferred. We would like to acknowledge Public Health Ontario for access to case level data from iPHIS Plus and COVID-19 laboratory data, as well as assistance with data interpretation. We also thank the staff of Ontario's public health units who are responsible for COVID-19 case and contact management and data collection within iPHIS Plus.

This report was prepared by the ICES COVID-19 Committee as part of the Applied Health Research Question (AHRQ # 2021 0950 080 000. Toronto: Institute for Clinical Evaluative Sciences; 2020). For questions, please contact:

- Dr. Astrid Guttman, Chief Science Officer (astrid.guttman@ices.on.ca)
- Hannah Chung, Associate Research Methodologist (hannah.chung@ices.on.ca)

References:

1. Guttman A, Gandhi S, Wanigaratne S, Lu H, Ferreira-Legere LE, Paul J, Gozdyra P, Campbell T, Chung H, Fung K, Chen B, Kwong JC, Rosella L, Shah BR, Saunders N, Paterson JM, Bronskill SE, Azimae M, Vermeulen MJ, Schull MJ. *COVID-19 in Immigrants, Refugees and Other Newcomers in Ontario: Characteristics of Those Tested and Those Confirmed Positive, as of June 13, 2020*. Toronto, ON: ICES; 2020.

