

**COVID-19 in Immigrants, Refugees and
Other Newcomers in Ontario:
Characteristics of Those Tested and
Those Confirmed Positive, as of
June 13, 2020**

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Publication Information

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Executive Summary

About This Report

COVID-19 infections have taken a disproportionate toll on immigrants and some racialized populations in several countries, including Canada. The pandemic has sharpened the focus on structural and societal inequalities that have long existed; these inequities put many racialized and immigrant populations at higher risk of both contracting the infection and suffering poor outcomes. In Ontario, COVID-19 has disproportionately affected those living in lower-income areas with high proportions of both immigrants and racialized populations. The City of Toronto recently released data showing a disproportionate number of COVID-19-positive residents among those who self-identify as Black, South Asian, Latin American, South East Asian and Arab/Middle Eastern/West Asian. In the last decade, Canada welcomed on average 275,000 immigrants per year as permanent residents, with Ontario receiving almost half. Immigrants who are permanent residents and citizens and those with temporary work permits are critical to Canada's economy and fill many skilled, semi-skilled and unskilled labour market needs.

This report focuses on patterns of testing and test results for immigrants and refugees from the initial phases of COVID-19 testing through to June 13, 2020. We included all Ontario residents eligible for the Ontario Health Insurance Plan (OHIP) apart from those living in long-term care homes where the dynamics of testing and infection are distinct from those living in the community and should be considered separately. We achieved this undertaking through a longstanding data partnership between ICES and Immigration,

Refugees and Citizenship Canada that has allowed the linkage of the permanent resident file for immigrants landed in Ontario from 1985 to 2017 with ICES health administrative data. We formally engaged members of the ICES Public Advisory Council who identify either as immigrants or as members of the different ethnic communities represented in this report to provide input into a number of key decisions around data analysis, presentation of exhibits, and interpretation and contextualization of the results.

Key Findings

- Although immigrants, refugees and other newcomers make up just over 25% of the Ontario population, they accounted for 43.5% of all COVID-19 cases.
- Rates of testing were lower for immigrants and refugees compared with Canadian-born and long-term residents. The exception is those who immigrated to Ontario in the economic caregiver category, many of whom are employed in the health care sector.
- Percent positivity in those tested and per capita positivity were higher across all immigration categories and among other newcomers than in Canadian-born and long-term residents.
 - Whereas positivity in those tested peaked at the beginning of April 2020 among Canadian-born and long-term residents, there were two pronounced peaks of positivity for immigrants, refugees and newcomers in April and May.
 - Refugees had the highest percent positivity in those tested (10.4% compared to 7.6% in other immigrants and 2.9% in Canadian-born and long-term residents).

- Immigrants who landed in Ontario as economic caregivers had the highest per capita positivity (0.9% compared to 0.3% in other immigrants and 0.1% in Canadian-born and long-term residents).
- The highest rates of positivity (in those tested and per capita) by world region were in immigrants and refugees where a majority were racialized in Canada (Central, Western and East Africa; South America; the Caribbean; South East Asia and South Asia) and who were more likely to live in a low-income neighbourhood.
- Employment as a health care worker, especially among women, accounted for a disproportionate number of COVID-19 cases among immigrants and refugees.
 - Among all women who tested positive, 36% were employed as health care workers; immigrants and refugees made up 45% of these health care workers
 - Being a health care worker accounted for a very high percentage of positive cases among women who immigrated as economic caregivers (55%) and from specific countries of birth (53% from the Philippines, 64% from Jamaica and 76% from Nigeria).
- Socioeconomic factors are closely related to testing and positivity.
 - Fewer years of formal education and a lack of English or French language ability at the time of immigration were associated with lower testing but higher percent positivity among recent adult immigrants and refugees.
 - Some neighbourhood demographic characteristics had differential effects on rates of positive testing among

immigrants and refugees compared with Canadian-born and long-term residents.

- While testing rates were higher among those living in lower-income neighbourhoods for Ontarians in general, positivity was strongly correlated with living in lower-income neighbourhoods for immigrants, refugees and newcomers, but not for Canadian-born and long-term residents.
- Living in neighbourhoods with higher household densities was associated with higher positivity among Ontarians in general, but more so for immigrants, refugees and other newcomers.
- Public health units with large immigrant populations (i.e., Toronto, Peel, Durham, Waterloo, Windsor and York) also included immigrants and refugees with the highest percent positivity.

Limitations

Results must be interpreted in the context of changes in the testing strategy over time, and we cannot differentiate those who were tested with symptoms from those who were tested without. The immigration data are not complete; we could include only those who landed in Ontario from January 1985 to May 2017 and who became permanent residents. We cannot identify people who immigrated to other provinces prior to moving to Ontario or who are temporary foreign workers such as migrant farmers. We excluded people who are not eligible for OHIP (such as asylum seekers awaiting refugee hearings) and those who are long-term

care residents. We lack data on important risk factors for testing and positivity such as occupation (apart from health care workers) and living conditions. We currently do not have comprehensive data on important outcomes such as hospitalization and death. Finally, we have data on demographic and some census-based characteristics but not on the critical structural factors that play an important role in shaping inequities.

Conclusions

This report adds to the emerging evidence on the inequities of COVID-19 infection in Ontario. The systemic inequities that have resulted in income disparities and related precarious employment and housing for many immigrants and refugees will need multi-faceted societal change. In the immediate term, a number of public health initiatives may help to mitigate the disproportionate burden of COVID-19 infections as Ontario prepares for the possibility of a second wave of infections in the fall. This includes initiatives such as more accessible testing options, including mobile testing to help identify and address barriers to testing. A continued focus is needed on securing funding to house those who cannot safely quarantine in their homes and those who are homeless, as well as income supplements for workers who must quarantine but who do not have employer-sponsored sick leave. The high proportion of COVID-19 cases among health care workers, even after the use of personal protective equipment (PPE) was mandated in April, speaks to the need for better training and enforcement of workplace safety measures for all of those at risk of exposure in the workplace. It will be important for Public Health Units with large numbers of immigrants and refugees to continue to work with local

organizations and groups that represent the higher-risk immigrant and refugee communities to develop programs that address emerging issues as the pandemic continues in the short term, while continuing to support efforts to address social and structural issues that contribute to health inequities. In the long-term, it is critical that efforts be made to address the social and structural issues experienced by temporary and permanent immigrants and other racialized groups underpinning the inequities highlighted in this report.

Introduction

Background

COVID-19 infections have taken a disproportionate toll on immigrants and some racialized populations in several countries, including the United States, the United Kingdom and France.¹⁻³ The pandemic has sharpened the focus on structural and societal inequalities that have long existed; these inequities put many racialized and immigrant populations at higher risk of both contracting the infection and suffering poor outcomes. There has been less related reporting in Canada, in part due to the lack of comprehensive race and ethnicity data. Analyses of COVID-19 infection at the neighbourhood level in Ontario and Quebec show that COVID-19 has disproportionately affected those living in lower-income areas with high proportions of both immigrants and Canadian-born residents who self-identify as visible minorities.

Evidence from other countries paints a stark picture of COVID-19 inequities. In the United Kingdom, an analysis of the deaths of 119 National Health Service (NHS) employees revealed that those who were Black, Asian and Minority Ethnic (the so-called BAME categorization) accounted for 63% of deaths among nurses, 64% of deaths among support staff and 95% of deaths among medical staff.⁴ The largest study to date of COVID-19-related mortality included 10,926 deaths in more than 17 million English citizens in the NHS; it showed that compared to White people, Black and South Asian people and those of mixed background were more likely to die with COVID-19, as were those living in areas with the highest degree of material deprivation.² These results accounted for

underlying chronic conditions (e.g., diabetes), many of which are themselves socially determined. A number of U.S. studies have described equally steep gradients in COVID-19 hospitalizations and deaths in Black and Latinx populations and by socioeconomic status.^{3,5}

In Canada, the data that are available indicate that some groups of immigrants are disproportionately affected by COVID-19. Meat packing plants in Alberta that were severely affected by COVID-19 outbreaks were largely staffed by temporary foreign workers and immigrants.⁶ There have been a number of large COVID-19 outbreaks as well as several deaths among temporary foreign workers who are migrant farmers in Ontario.⁷ Reports and dashboards from Ontario⁸ and Quebec⁹ have shown higher risks of COVID-19 infection and severe disease among those living in neighbourhoods with high proportions of immigrants. Public Health Ontario¹⁰ reported that from January 15 to May 14, 2020, people living in the most diverse neighbourhoods (defined as those with a high proportion of recent immigrants and those who identify as visible minorities in census data)¹¹ had higher rates of COVID-19 positivity, hospitalizations, intensive care use, and deaths compared to those living in the least diverse neighbourhoods. Public health units in Ontario have started collecting race and income data on COVID-19 cases. The City of Toronto¹² recently released data on positive cases from May 20 to July 16, 2020 (excluding those in long-term care and retirement homes) indicating a disproportionate percentage of COVID-19 positivity among those who reported Black, South Asian, Latin American, South East Asian or Arab/Middle Eastern/West Asian as their race/ethnicity. The proportion of cases among those who are White or East Asian was lower than would be

expected based on population. In addition, cases were much more likely to occur in low-income households.

Causes of these inequities are complex and often rooted in social and structural inequities, including systemic racism. For COVID-19, occupational risk is critical considering the over-representation of racialized and immigrant populations, especially women, in essential work.¹³ Many of these are public facing and predominately low-paying jobs, including health and social care workers, public transit drivers, custodial staff and retail grocery workers.¹⁴⁻²¹ These communities are also over-represented in occupations that occur in settings such as meat packing plants or factories where physical distancing is difficult and personal protective equipment was initially not universally available. A recent report on the changing workplace in Ontario highlights that employment in many of these sectors is considered precarious -- typically low-wage, temporary, unstable with little or no security and mostly without pensions and benefits (e.g., emergency or sick leave)²² which can impact the ability to access testing and quarantine. Crowded living arrangements are more common in some immigrant populations with multigenerational households, and more generally for those of low income, which make quarantining while distancing from other household members.²³ Refugees are at particular risk of housing insecurity. A City of Toronto analysis of people experiencing homelessness in 2018 found that 40% were refugees or asylum seekers.²⁴ Finally, there may be barriers to seeking health care that may be related to poor outcomes with COVID-19. Despite a universal health insurance system, Canadian studies point to barriers to accessible and high quality health care for immigrants,^{25,26} with causes ranging from

difficulties attending care due to precarious employment, lack of translation services to systemic racism.^{27,28}

In the last decade, Canada welcomed an average of 275,000 immigrants per year as permanent residents, with Ontario receiving almost half of them. Over a similar period, approximately 473,000 foreign nationals held temporary work permits annually.²⁹ Immigrants who are permanent residents and citizens, and also those with temporary work permits, are critical to Canada's economy and fill many skilled, semiskilled and unskilled labour market needs. Among permanent residents, approximately 60% enter Canada via the economic immigrant stream in which the principal applicant meets specific skill requirements to contribute to Canada's economy. A sub-category of economic immigrants are caregivers (about 6% of all economic immigrants) who are qualified to provide care for children, the elderly or those with high medical needs, or work as live-in caregivers. A number of those who immigrate as economic caregivers eventually train to become personal support workers or health care aides.³⁰ Other permanent resident categories include those sponsored by a family member (the family class, about 30% of all permanent residents). Refugees (about 10% of all permanent residents) flee their country because of persecution, war and violence and regions of origin have varied over time related to geopolitical circumstances including war. While many racialized Canadians are not immigrants, many immigrants are racialized Canadians, and more recent immigrants come from countries with diverse ethnic backgrounds. Based on the 2016 census, Statistics Canada reports that more than 80% of permanent residents arriving in Canada prior to 1969 considered themselves to be non-visible minorities (defined as "Caucasian in race or White in

colour"). The proportion of White immigrants decreased steadily after 1969, representing 20%–30% of immigrants arriving between 1985 and 2008 and less than 20% of those arriving after 2009. Of the visible minority population of immigrants in Ontario in 2016, 49% arrived between 1985 and 2016, 16% arrived prior to 1985 and 35% were born in Canada.³¹

Methods

While most Canadian analyses have used neighbourhood-level measures of ethnic diversity and socioeconomic status, this report analyzes COVID-19 testing and positivity among Ontario residents known to be immigrants or refugees. We achieve this through ICES' longstanding data partnership with Immigration, Refugees and Citizenship Canada (IRCC), which has allowed the linkage of the permanent resident file for landed immigrants to Ontario between 1985 to 2017 with ICES health administrative data, which includes COVID-19 testing data. As part of the development of this report, we also formally engaged members of the ICES Public Advisory Council who identify either as immigrants or members of the ethnic communities represented in this report and who volunteered to share their perspectives. PAC members were asked to provide input into a number of key decisions around data analysis, presentation of exhibits, and interpretation and contextualization of the results; they were consulted multiple times throughout the development of the report.

This report focuses on testing and testing results from the initial phase of COVID-19 testing to June 13, 2020 (see Appendix 8.0), in all Ontario residents eligible for the Ontario Health Insurance Plan

(OHIP). We have focused on Ontarians not living in long-term care homes, as the dynamics of infection and testing are distinct and should be separately considered. The immigrants and refugees included are those who obtained permanent residency between January 1, 1985 and May 31, 2017 (based on the IRCC Permanent Resident File currently available at ICES) and those second-generation immigrant children under the age of 19 who were born in Ontario to mothers who gained permanent residence in Ontario since 1985. We classified individuals born or living in Ontario who are not in the IRCC data as the Canadian-born and long-term resident group, although this would include immigrants and refugees who arrived in Ontario prior to 1985 or those who initially immigrated to other provinces. To include other newcomers who arrived in Ontario since June 2017 but in the absence of immigration data, we defined a group who became newly eligible for OHIP since June 2017. This group includes immigrants and refugees who were granted permanent residency, temporary workers who qualified for OHIP,³² 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.

In order to provide context to the results, shed light on intersecting factors that contribute to COVID-19 infection, and capture the heterogeneity among immigrants, we have described in detail characteristics related to immigration pathways. These include recency and category of immigration, region of birth, and for recent immigrant adults, language ability and level of education at the time of landing in Ontario. We present other sociodemographic characteristics by immigration category and analyze COVID-19

testing in the context of a number of neighbourhood characteristics, and we compare testing and test positivity by these neighbourhood factors in immigrants, refugees and newcomers with Canadian-born and long-term residents. To provide more meaningful descriptions of some communities of immigrants at highest risk of infection, and on the advice of the PAC members, we also present testing and positivity by the top countries of birth with the highest total number of cases. Many of these communities have active organizations involved in advocacy and in some cases partnerships with Public Health Units. Data on ethnicity and race are ideally based on self-report and so we do not make direct attributions to individuals based on country of birth. However, for many countries of origin a large majority of immigrants will identify with specific ethnic and racial backgrounds.

We are limited in available individual-level data related to important factors for exposure to COVID-19 such as housing and occupation. However, through a partnership with Public Health Ontario, we linked data from the Integrated Public Health Information System (iPHIS) — the mandatory reporting system on all positive cases — that includes variables on occupation. While data on types of occupations collected by public health units have expanded, we used only the health care worker variable that has been collected since the onset of the pandemic.

Interpretative Cautions

This report focuses on COVID-19 testing among Ontarians eligible for OHIP coverage, excluding those living in long-term care homes. Results need to be interpreted in the context of the Ontario testing

strategy, which has evolved over time. Initially, there were constraints on testing capacity such that only those who needed acute medical care or who had a relevant travel history were tested. As the testing strategy evolved, a number of asymptomatic populations were targeted, including those who worked in congregate settings such as long-term care homes, all hospitalized patients and those needing hospital-based procedures. This means that some groups are over-represented in the testing numbers and that positive cases include those who were symptomatic at the time of testing, as well as those who were asymptomatic. This may distort some associations of characteristics with both testing rates and potential to test positive. It also means that there is an unknown number of untested infected individuals in the general population. This may have been more likely early in the pandemic when testing capacity was constrained but also may be true for those who weren't able to, or did not, access testing as testing criteria were expanded. We try to address these issues by presenting trends over time graphically, identifying when testing criteria changed. We also report two metrics of positivity. The first is percent positivity in those who are tested. In populations where this is relatively high, it is suggestive that the testing strategy may not be reaching all those at high risk. We also present per capita positivity which does present some quantification of the potential burden of disease in any given population. Finally, given that those who have chronic conditions are more likely to be tested as they are more likely to access hospital care for reasons other than COVID-19, we do not describe whether the presence of these conditions relates to testing or positivity. Instead we report testing and positivity in those with a number of chronic conditions by immigration status to

evaluate whether access to testing for groups for whom testing rates should be similar is different for immigrants and refugees.

Main Findings

Our results point to a number of important inequities in rates of both COVID-19 testing and positivity among immigrants and refugees in Ontario.

- While immigrants, refugees and other newcomers made up just over 25% of the Ontario population, they accounted for 43.5% of all COVID-19 cases.
- Rates of testing were lower for immigrants and refugees compared with Canadian-born and long-term residents, with the exception of those who immigrated to Ontario in the economic caregiver category, many of whom are employed in the health care sector.
- Since the testing strategy evolved in mid-May 2020 to include more asymptomatic contacts, there has been a steeper increase in testing among Canadian-born and long-term residents compared to immigrants and refugees, with the exception of economic caregivers.
- Percent positivity in those tested and per capita positivity was higher across all immigration and other newcomer categories, compared with Canadian-born and long-term residents.
 - Whereas positivity in those tested peaked at the beginning of April in Canadian-born and long-term residents, there were two pronounced peaks of positivity in April and May in immigrants, refugees and newcomers.
 - Refugees had the highest percent positivity among those tested (10.4% vs. 7.6% in other immigrants and 2.9% in Canadian-born and long-term residents).
 - Immigrants classified as economic caregivers had the highest per capita positivity (0.9% vs. 0.3% in other immigrants and 0.1% in Canadian-born and long-term residents)
 - The highest rates of positivity (in those tested and per capita) by world region were in immigrants and refugees where a majority are racialized in Canada (Central, Western and East Africa, South America; the Caribbean; South East Asia and South Asia) and who were more likely to live in a low-income neighbourhood.
 - Immigrants and refugees with the lowest rates of positivity (from North America, Europe, Australasia, Southern Africa and East Asia) had the same per capita positivity as Canadian-born and long-term residents and were characterized by a high proportion who arrived in Ontario as economic immigrants and lived in higher-income neighbourhoods.
- Employment as a health care worker, especially among women, accounted for a disproportionate number of cases in immigrants and refugees.
 - Among all adult females who tested positive, 36% were employed as health care workers, and immigrants and refugees make up 45% of these health care workers; those born in the Philippines accounted for 13% and in Jamaica 7% of all cases in female health care workers.

- 55% of all cases in females who landed in Ontario as economic caregivers were health care workers.
- Being a health care worker accounted for a very high percentage of positive cases in adult females from specific countries of birth (53% of those from the Philippines, 64% from Jamaica and 76% from Nigeria).
- Among adult males, the proportion of cases that were health care workers was much lower (9%) than in females, but immigrants and refugees similarly made up a disproportionate number of these cases.
- Testing rates were similar for first- and second-generation immigrant children and youth, but those in the first generation, especially refugees, were more likely to test positive.
- Among those with common chronic conditions, testing rates were lower but test positivity higher in immigrants and refugees compared with Canadian-born and long-term residents with the same conditions.
- Socioeconomic factors were closely related to testing rates and positivity.
 - Among recent adult immigrants and refugees, lower educational attainment and lack of English- or French-language ability at the time of immigration was associated with lower testing but higher percent positivity in those tested.
 - Some neighbourhood demographic characteristics had differential effects on rates of positive testing among immigrants and refugees as compared with Canadian-born and long-term residents.

- While testing rates were higher among those living in lower-income neighbourhoods for Ontarians in general, test positivity rates were strongly correlated with living in lower-income neighbourhoods for immigrants, refugees and newcomers, but not for Canadian-born and long-term residents.
- Living in neighbourhoods with higher household densities was associated with higher test positivity among Ontarians in general, but more so for immigrants, refugees and other newcomers.
- Public health units with large immigrant populations (Toronto, Peel, Durham, Waterloo, Windsor and York) also experienced the highest percent positivity among immigrants and refugees tested for COVID-19.

Limitations

Apart from the challenges in interpreting positivity in the context of a testing strategy that has evolved over time, there are a number of other limitations. The first is that the report only describes 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 analyzed those who were new registrants to OHIP since June 2017 (the newcomer group) but cannot describe any of their other characteristics. This group would include immigrants and refugees, as well as temporary foreign workers who met the criteria for OHIP coverage. This newcomer

group had relatively low COVID-19 testing rates and high positivity and was characterized by a number of neighbourhood sociodemographic characteristics that put them at higher risk of infection. This includes some temporary residents such as migrant farmers who were captured in this newcomer group but cannot be separately described. Until more recent immigration data is integrated at ICES, we cannot further delineate which communities of newcomers are at highest risk. We do not have data on refugee claimants who are waiting for their hearings, as they are not captured in the available immigration data on permanent residents and they are not eligible for OHIP. We do not have comprehensive data for a number of important risk factors for COVID-19 infection that may be particularly important for elucidating causes of COVID-19 infection risk in immigrants and refugees. These would include occupations other than health care, congregate living settings such as shelters, and individual household and housing circumstances. We are not able to identify health care workers in the testing data, only in those cases in the public health surveillance system. This means that we cannot describe whether the proportions of cases in immigrant health care workers reflect their proportions in the workforce or whether there are higher occupational risks for those who are immigrants and refugees. We only have data on demographic and some census-based characteristics and not the critical structural factors that play an important role in shaping inequities. Finally, this report focuses only on testing and positivity and not on important outcomes of COVID-19 such as hospitalization or death. Further work will analyze these outcomes in immigrants and refugees as these data become available at ICES.

Conclusions

This report adds to the emerging evidence of the inequities of COVID-19 infection in Ontario. Immigrants and refugees, many of whom have lived in Ontario for decades, are generally less likely to be tested and more likely to be positive than Canadian-born and long-term residents. There are specific groups of immigrants and refugees at higher risk of COVID-19 infection. These include those who landed in Ontario as refugees, those with lower levels of education and language fluency, those who currently live in lower-income neighbourhoods and with more crowded housing. While the latter neighbourhood characteristics are associated with higher risk in all Ontarians, they confer a higher risk on immigrants and refugees. For women, much of the risk of COVID-19 infection can be attributed to being a health care worker and working in long-term care settings. This has a disproportionate impact on women who immigrated as economic caregivers and were from a number of countries of origin such as the Philippines and Jamaica. While we do not have data on individual's self-reported race and ethnicity, the analyses by region and country of origin support recent findings from the City of Toronto that Black people and other people of colour are disproportionately affected by COVID-19.

This report raises considerations for policy. The systemic inequities that have resulted in income disparities and related precarious occupation and housing for many immigrants and refugees will need multi-faceted societal change. In the immediate term, a number of public health initiatives may help mitigate the disproportionate burden of COVID-19 infections as Ontario prepares for the possibility of a second wave in the fall. This includes initiatives such as more accessible testing options, including mobile testing to help identify and address barriers to testing. A continued

focus is needed on securing funding to house those who cannot safely quarantine in their homes or are homeless, as well as for income supplements for workers must quarantine who do not have employer-sponsored sick leave. The high proportion of cases among health care workers, even after the use of personal protective equipment was mandated in April, speaks to the need for better training and enforcement of safety measures for all of those at risk of exposure in the workplace. Finally, it will be important for public health units to continue to work with local organizations and groups that represent the higher-risk immigrant and refugee communities to develop programs that address emerging issues as the pandemic continues. In the long term, it is critical that efforts be made to address the social and structural issues experienced by temporary and permanent immigrants and other racialized groups, issues that underpin the inequities highlighted in this report.

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1.0 Overview and characteristics of immigrants, refugees and other newcomers in Ontario, as of June 13, 2020

Summary of Exhibits

Exhibit 1.1 displays the definitions of each immigration category used within this report. This figure, and all that follow, do not include those who live in a long-term care home.

Exhibit 1.2 provides an overview of current characteristics (such as age, sex and world region of birth) of people in different immigration categories.









Exhibit 1.3.1 depicts a map of continents in the Eastern Hemisphere (Africa, Asia, and Australia) and provides an overview of current characteristics (such as age, sex, and immigration category) of immigrants and refugees in Ontario from these different regions.

Exhibit 1.3.1 depicts a map of continents in the Western Hemisphere (North America, South America, and Europe) and provides an overview of current characteristics (such as age, sex, and immigration category) of immigrants and refugees in Ontario from these different regions.

Exhibit 1.4 provides a summary of important findings from the entire report on those testing and those confirmed positive for COVID-19 in Ontario. The key findings highlight some of the differences that exist for immigrants and refugees in Ontario with regard to COVID-19 testing and testing positive, and are described in more detail in subsequent exhibits.

Supplementary data for information provided in Exhibits 1.1 to 1.4 can be found in appendices 1.1, 1.2, 1.3, 3.1, 4.1, 7.1, 7.2, and 7.3.

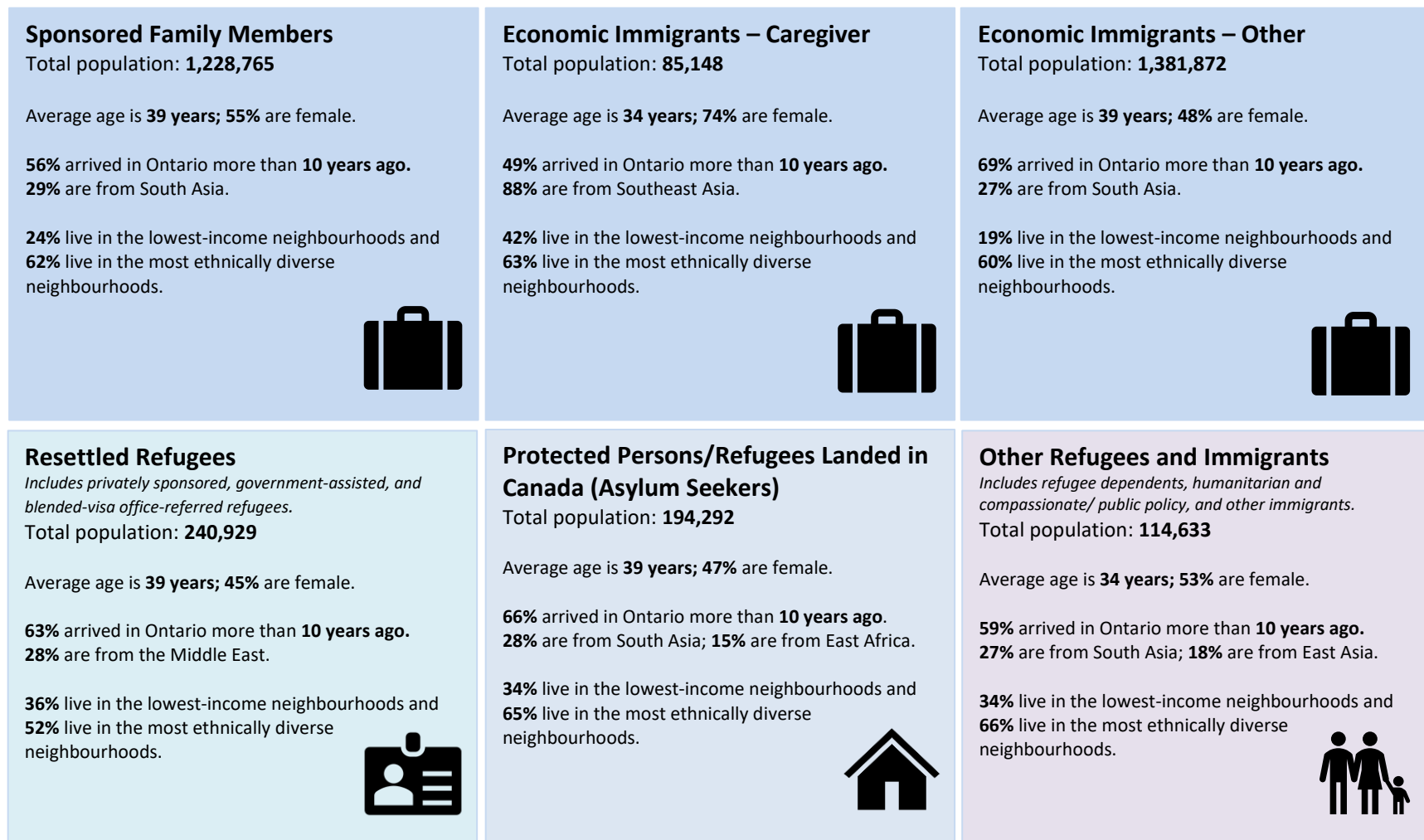
Exhibit 1.1 Definitions of immigration categories

 Newcomer	Individuals who became eligible for Ontario Health Insurance Plan (OHIP) after May 31, 2017. Includes immigrants and refugees who landed in Ontario and for whom immigration records are unavailable, temporary residents and those who migrated from another province.		 Second-Generation Immigrant	Children and youth born in Ontario to mothers who were immigrants and refugees who landed in Ontario since 1985	 Permanent Resident	Individuals granted permanent resident status who have lived in Canada for at least 730 days (two years) in a five-year period
 Immigrants			 Resettled Refugees* (Selected through the United Nations Refugee Resettlement Program)			
Sponsored family	Economic class (caregiver)	Economic class (other)	Privately sponsored refugee	Blended visa office-referred refugees	Government-assisted refugees	
Sponsored by a family member who is a Canadian citizen or permanent resident of Canada and aged 18 years or older.	Selected based on skills and ability to contribute to Canada’s economy. Includes live-in caregivers and caregiver caring for children programs.	Selected based on skills and ability to contribute to Canada’s economy. Includes skilled workers, business immigrants, provincial or territorial nominees and those in the Canadian Experience Class (a permanent residence category for people with one year of skilled work experience in Canada).	Privately sponsored by organizations, individuals or groups of individuals in Canada. Receive resettlement assistance and income support from the sponsoring individuals or groups in the first year.	Sponsored by a partnership of the Government of Canada, the United Nations High Commissioner for Refugees and private organizations. Receive income support from the federal government in first 6 months and resettlement assistance and income support from private sponsors in the first year. The program started in 2013.	Sponsored by and receive resettlement assistance and income support from the Government of Canada in the first year.	
 Protected Persons in Canada		 Other Refugees			 Other	
Refugees* landed in Canada (asylum seekers or refugee claimants)		Refugee* dependents	Humanitarian and compassionate or public policy cases		Other immigrants	
Individuals who applied for refugee protection while in Canada and were granted permanent resident status on the basis of a well-founded fear of returning to their country of origin. Not sponsored by the federal government or a private group.		Family members of a protected person in Canada, who were living abroad at the time of application and whose application for permanent residence was considered concurrently with that of the protected person in Canada.	Sponsored and unsponsored individuals who would not otherwise qualify in any category, in cases where there are strong humanitarian and compassionate considerations, or for public policy reasons.		Post-determination refugee claimants in Canada, deferred removal orders and retirees.	

*The United Nations High Commissioner for Refugees defines a refugee as "someone who is unable or unwilling to return to their country of origin owing to a well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group, or political opinion."

Exhibit 1.2

Sociodemographic characteristics of immigrants and refugees and their children in Ontario, by immigration category at landing, as of March 31, 2020



Notes: 1. Immigrants and refugees in this report are restricted to those who obtained permanent residency between 1985 and 2017. Includes second-generation children and youth (aged ≤ 19 years) of immigrant and refugee mothers.

2. Neighbourhood diversity was derived from ethnic concentration in the Ontario Marginalization Index² and reflects the proportion of residents who are new immigrants and visible minorities.

Exhibit 1.3.1

Characteristics of immigrants and refugees in Ontario,
by world region of birth, as of March 31, 2020:
Eastern Hemisphere

North Africa (57,607 immigrants)

Average age is 37 years; 48% are female.
55% arrived as economic immigrants.
25% live in the lowest-income neighbourhoods and 60% live in the most ethnically diverse neighbourhoods.

East Africa (105,667 immigrants)

Average age is 36 years; 52% are female.
27% arrived as asylum seekers; 27% arrived as sponsored family immigrants.
47% live in the lowest-income neighbourhoods and 66% live in the most ethnically diverse neighbourhoods.

Western Africa (57,093 immigrants)

Average age is 34 years old; 49% are female.
44% arrived as sponsored family immigrants.
37% live in the lowest-income neighbourhoods and 70% live in the most ethnically diverse neighbourhoods.

Central Africa (15,237 immigrants)

Average age is 31 years; 50% are female.
31% arrived as asylum seekers.
44% live in the lowest-income neighbourhoods and 56% live in the most ethnically diverse neighbourhoods.

Middle East (306,750 immigrants)

Average age is 36 years; 49% are female.
48% arrived as economic immigrants; 22% arrived as resettled refugees.
25% live in the lowest-income neighbourhoods and 57% live in the most ethnically diverse neighbourhoods.

East Asia (477,048 immigrants)

Average age is 43 years; 53% are female.
57% arrived as economic immigrants.
19% live in the lowest-income neighbourhoods and 70% live in the most ethnically diverse neighbourhoods.

South Asia (848,423 immigrants)

Average age is 37 years; 49% are female.
42% arrived as sponsored family immigrants, 44% arrived as economic immigrants.
22% live in the lowest-income neighbourhoods and 76% live in the most ethnically diverse neighbourhoods.

Southeast Asia (345,353 immigrants)

Average age is 38 years; 57% are female.
36% arrived as economic immigrants; 36% arrived as sponsored family immigrants.
32% live in the lowest-income neighbourhoods and 63% live in the most ethnically diverse neighbourhoods.

Southern Africa (15,069 immigrants)

Average age is 40 years; 50% are female.
74% arrived as economic immigrants.
12% live in the lowest-income neighbourhoods and 32% live in the most ethnically diverse neighbourhoods.

Australasia & Oceania and Asia Unspecified (9,440 immigrants)

Average age is 38 years; 45% are female.
56% arrived as sponsored family immigrants.
13% live in the lowest-income neighbourhoods and 31% live in the most ethnically diverse neighbourhoods.

Exhibit 1.3.2

Characteristics of immigrants and refugees in Ontario, by world region of birth, as of March 31, 2020:
Western Hemisphere

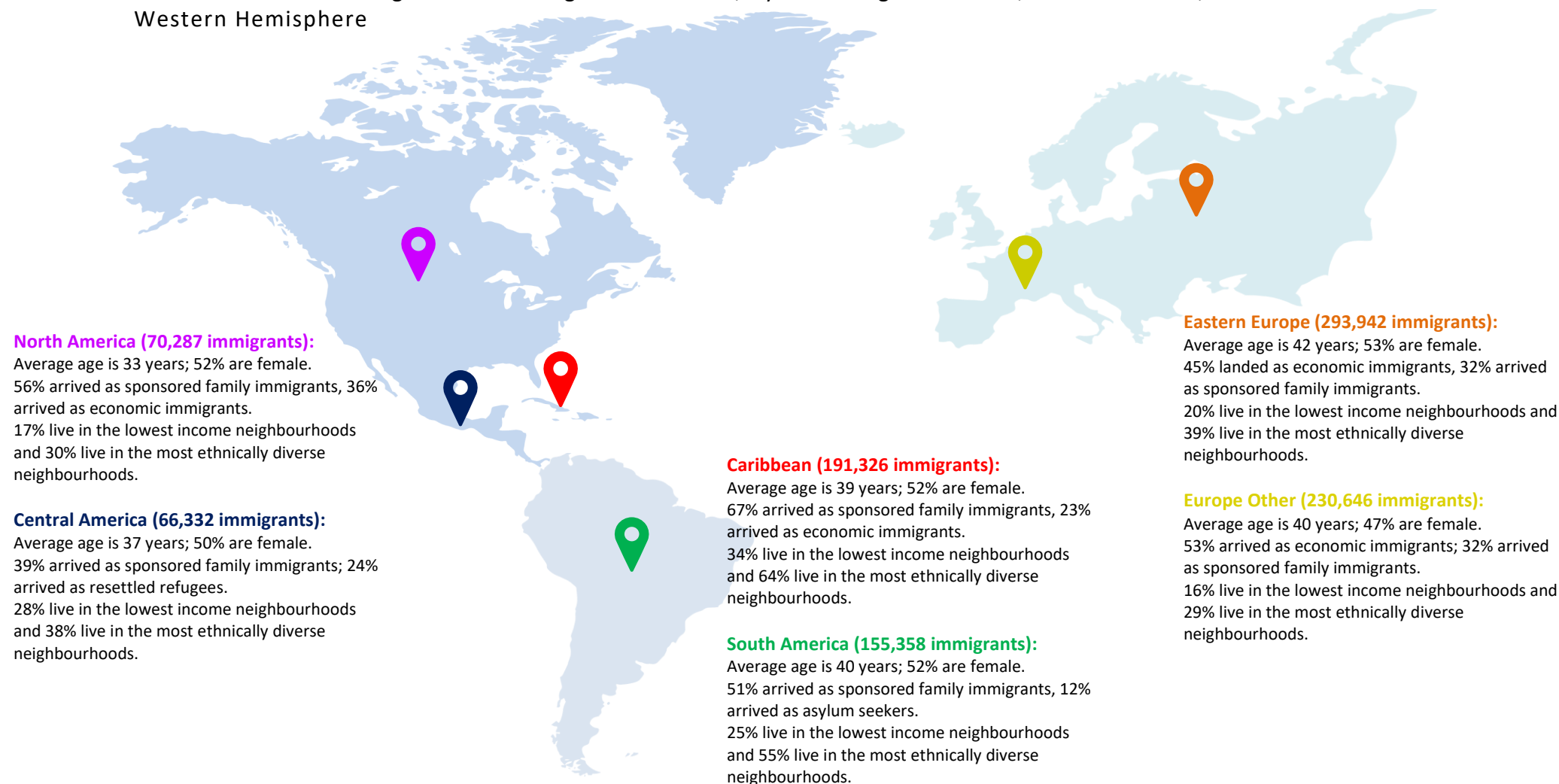


Exhibit 1.4

Overview of COVID-19 testing and positivity among immigrants and refugees in Ontario, as of June 13, 2020

MAIN FINDINGS

Testing and Positivity Patterns



- While immigrants, refugees and other newcomers make up **25%** of the Ontario population, they account for **43.5%** of all COVID-19 cases.



- **Rates of testing are lower for immigrants and refugees** compared with Canadian-born and long-term residents, with the exception of immigrants who came to Ontario in the economic caregiver category, many of whom are employed in the health care sector.



- Rates of percent positivity in those tested and per capita positivity are **higher across all immigration categories and in other newcomers** than in Canadian-born and long-term residents.



- Among those tested, refugees have the highest percent positivity (**10.4%** vs. **7.6%** in other immigrants and **2.9%** in Canadian-born and long-term residents).



- The highest rates of positivity for COVID-19 are in immigrants and refugees from world regions where a majority are racialized in Canada (**Central, Western and East Africa, South America, the Caribbean, Southeast Asia and South Asia**) and more likely to live in a low-income neighbourhood.

Testing and Positivity by Key Characteristics

- Employment as a health care worker, especially among women, accounts for a **disproportionate number of cases of COVID-19 among immigrants and refugees.**



- Among adult females who tested positive for COVID-19, **36%** were employed as health care workers; and **immigrants and refugees make up 45% of these health care workers.** Female health care workers from the Philippines and Jamaica account for 13% and 7% of all cases, respectively.

- Among those with **common chronic conditions**, testing is lower but positivity higher among immigrants and refugees compared to Canadian-born and long-term residents.



- Among recent adult immigrants and refugees, fewer years of formal education and lack of English- or French-language ability at the time of immigration is associated with **low testing rates but high percent positivity** for COVID-19.



- Public health units in Ontario with **large immigrant and refugee populations** (Toronto, Peel, Durham, Waterloo, Windsor and York) **also have the highest percent positivity** in immigrants and refugees tested for COVID-19.



2.0 COVID-19 testing patterns of immigrants, refugees and other newcomers in Ontario, as of June 13, 2020

Summary of Exhibits

Exhibit 2.1.1 depicts an overview of the number and percentage of people in Ontario who were tested for COVID-19 according to different immigration categories.

Exhibit 2.1.2 depicts an overview of the number and percentage of people in Ontario who were confirmed positive for COVID-19 according to different immigration categories.

Exhibit 2.2 explores the differences in the percentage of people in Ontario who were tested for COVID-19, confirmed positive among those who were tested, and confirmed positive among the population depending on their immigration category.

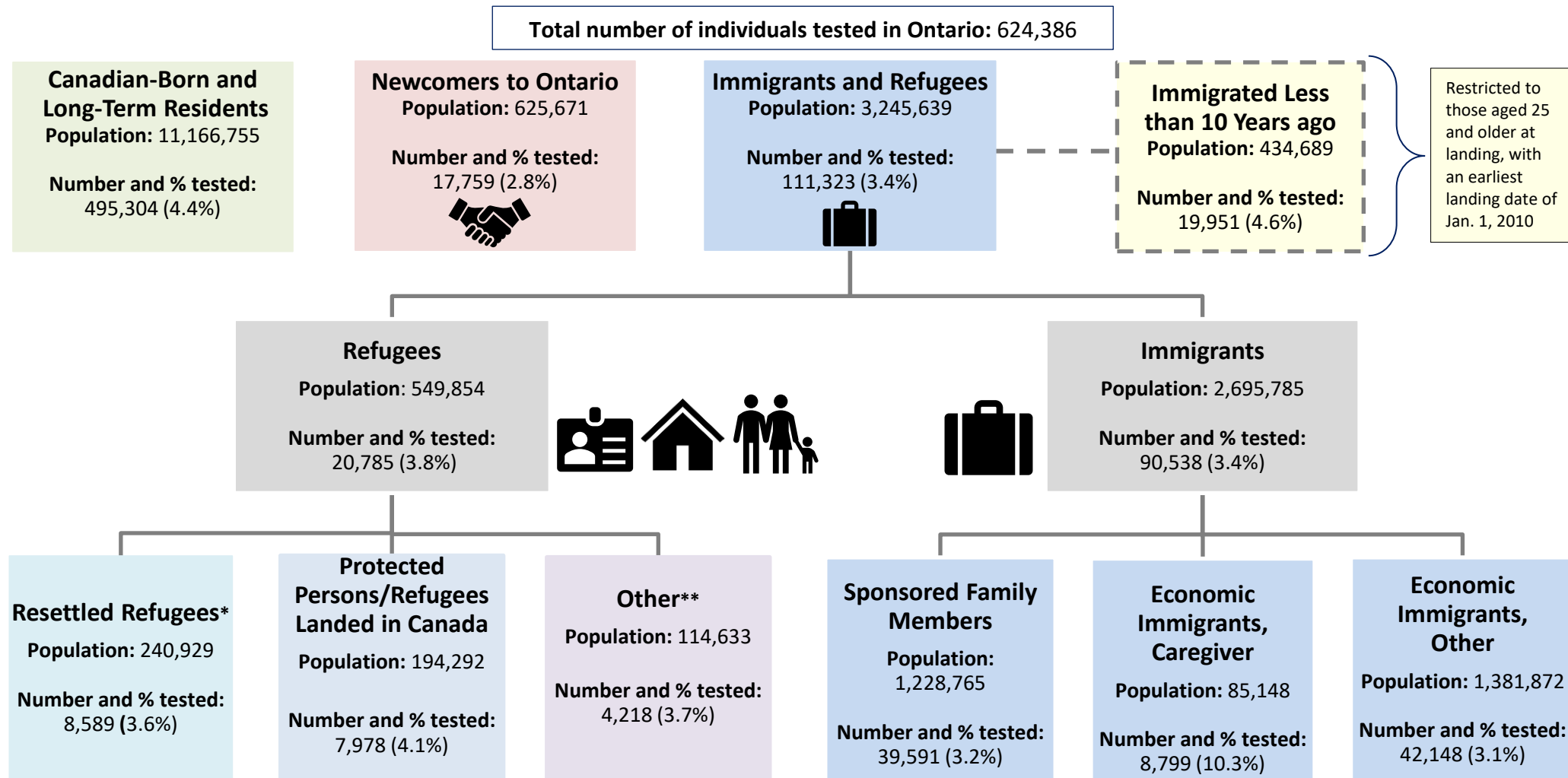
Exhibits 2.3.1 and 2.3.2 provide the weekly number of rate per capita (rate per 100,000 people) that were tested, and confirmed positive, for COVID-19 in Ontario according to immigration category, starting from the week the first case was detected in Ontario on January 12 to the week of June 13, 2020. Key dates when new COVID-19 testing strategies came into effect in Ontario are provided in both graphs to provide more context into fluctuations in testing.

Exhibit 2.4 provides the weekly proportion of people tested for COVID-19 in Ontario who were confirmed positive (percent positivity) according to immigration category, from the week the first case was detected in Ontario on January 12, to the week of June 13, 2020. Key dates when new COVID-19 testing strategies came into effect in Ontario are included in this graph to provide context.

Supplementary data for information provided in Exhibits 2.1.1 to 2.4 can be found in appendices 1.1, 3.1 and 4.1.

Exhibit 2.1.1

Overview of Ontario residents tested for COVID-19, as of June 13, 2020



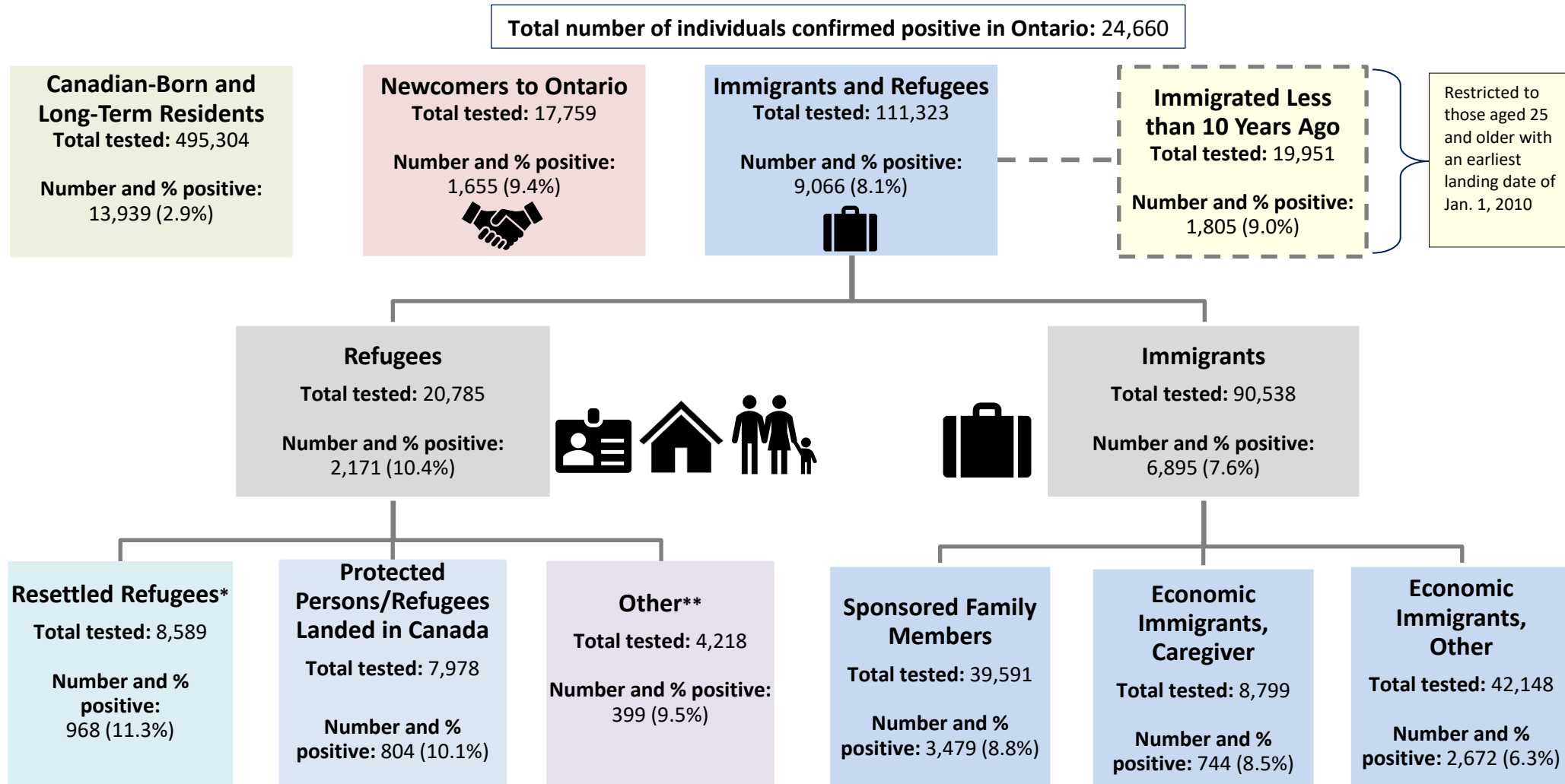
Notes: 1. Excludes long-term care residents. Immigrants and refugees were restricted to those who obtained permanent residency between 1985 and 2017 and includes second-generation children and youth (aged ≤ 19 years) of immigrant and refugee mothers. Newcomers include all those who migrated to Ontario from June 2017 onward and for whom no immigration data are available; includes both immigrants and those migrating from other provinces.

* Includes privately sponsored, government-assisted, and blended visa office-referred refugees.

** Includes refugee dependents, humanitarian and compassionate/public policy consideration cases, and other immigrants categories.

Exhibit 2.1.2

Overview of Ontario residents confirmed positive for COVID-19, as of June 13, 2020



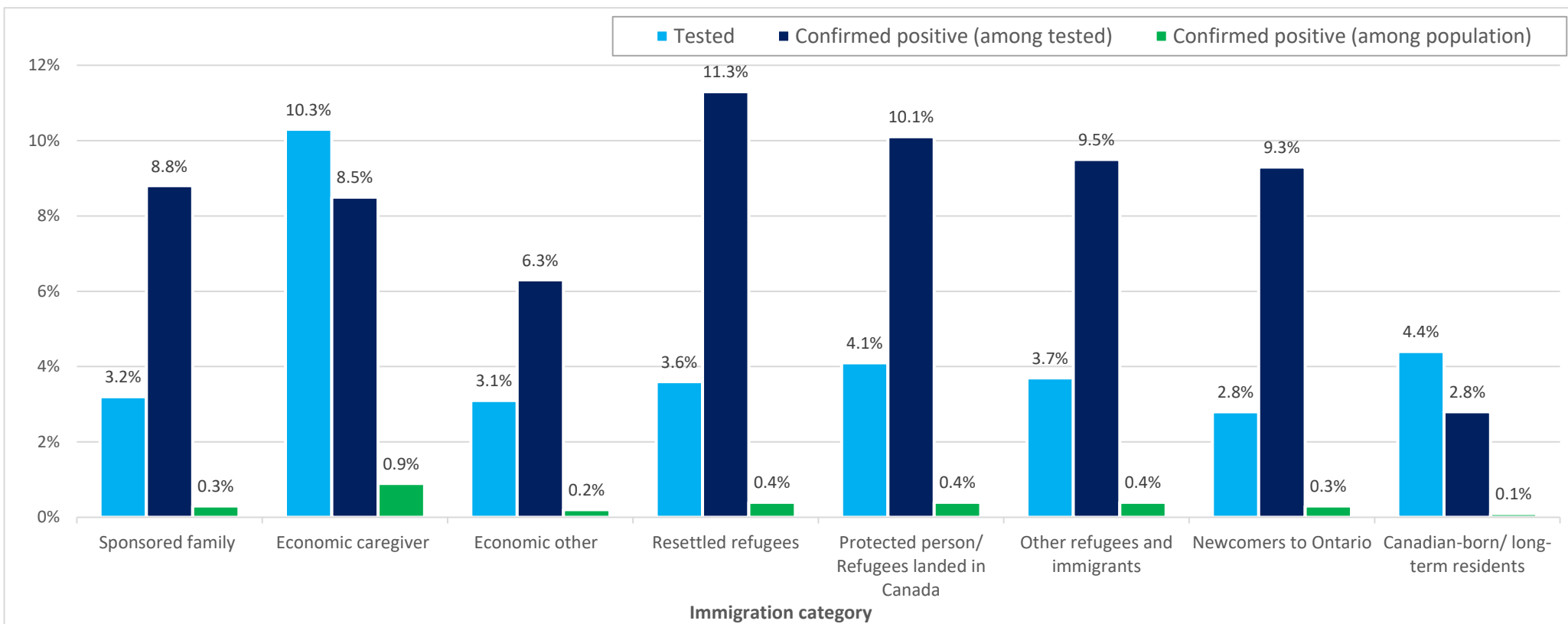
Notes: 1. Excludes long-term care residents. Immigrants and refugees are restricted to those who obtained permanent residency between 1985 and 2017 and includes second-generation children and youth (aged ≤ 19 years) of immigrant and refugee mothers. Newcomers include those who migrated to Ontario from June 2017 onward and for whom no immigration data are available; includes both immigrants and those migrating from other provinces.

* Includes privately sponsored, government-assisted and blended visa office-referred refugees.

** Includes refugee dependents, humanitarian and compassionate/public policy consideration cases, and other immigrants categories.

Exhibit 2.2

Proportion of residents tested for COVID-19, percent positivity for COVID-19 in those tested, and per capita positivity in Ontario, by immigration category, as of June 13, 2020

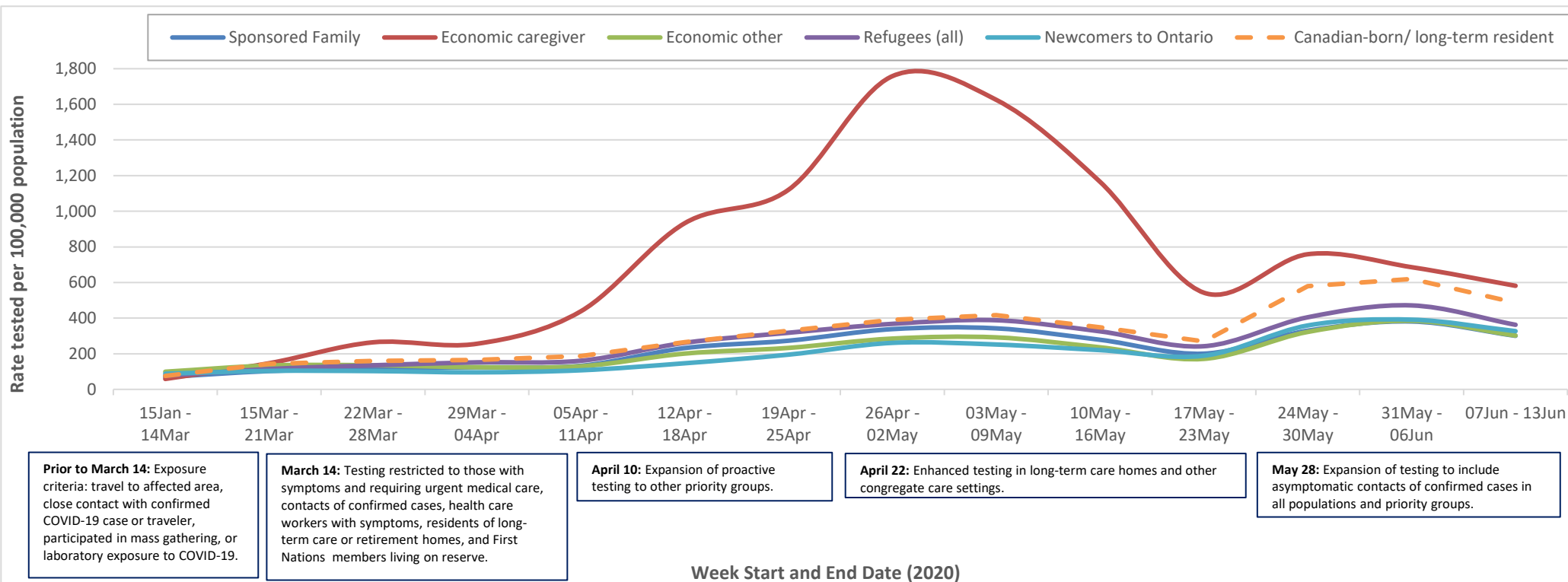


Key Findings: Economic caregivers were the only immigrant group with a higher proportion of testing than Canadian-born and long-term residents; they also had the highest per capita positivity (0.9% vs. 0.1% in Canadian-born and long-term residents). Both percent positivity in those tested and per capita positivity were higher in all immigrant categories compared with Canadian-born and more pronounced in all refugee sub-groups.

Notes: 1. Excludes long-term care residents. Immigrants and refugees restricted to those who obtained permanent residency between 1985 and 2017 and includes second-generation children and youth (aged ≤ 19 years) of immigrant and refugee mothers. Newcomers include all those who migrated to Ontario from June 2017 onward and for whom no immigration data are available; includes both immigrants and those migrating from other provinces.

Exhibit 2.3.1

Weekly number of individuals tested for COVID-19 per 100,000 population in Ontario, by immigration category, January 15 to June 13, 2020

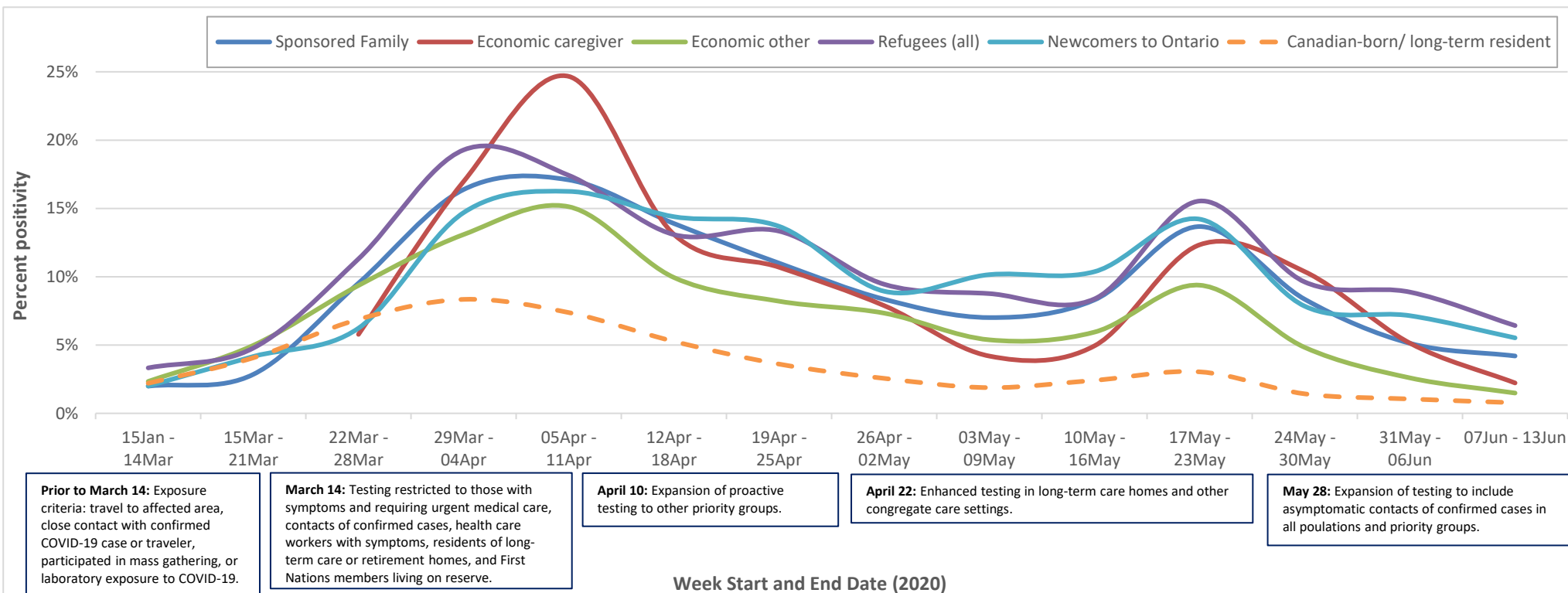


Key Findings: The general pattern of per capita testing was similar across most immigration categories, although testing rates were lower compared to Canadian-born and long-term residents. With the expansion of testing to asymptomatic carriers, per capita testing of Canadian-born and long-term residents increased more than in most immigrants and refugees. The exception is those who landed in Ontario as economic caregivers; they had a pronounced peak of testing during the phase of enhanced testing in long-term care and other congregate care settings and high overall levels of testing.

Notes: 1. Excludes long-term care residents. Immigrants and refugees restricted to those who obtained permanent residency between 1985 and 2017 and includes second-generation children and youth (aged ≤ 19 years) of immigrant and refugee mothers. Newcomers include all those who migrated to Ontario from June 2017 onward and for whom no immigration data are available; includes both immigrants and those migrating from other provinces.

Exhibit 2.3.2

Weekly percent positivity in those tested for COVID-19 in Ontario, by immigration category, January 15 to June 13, 2020



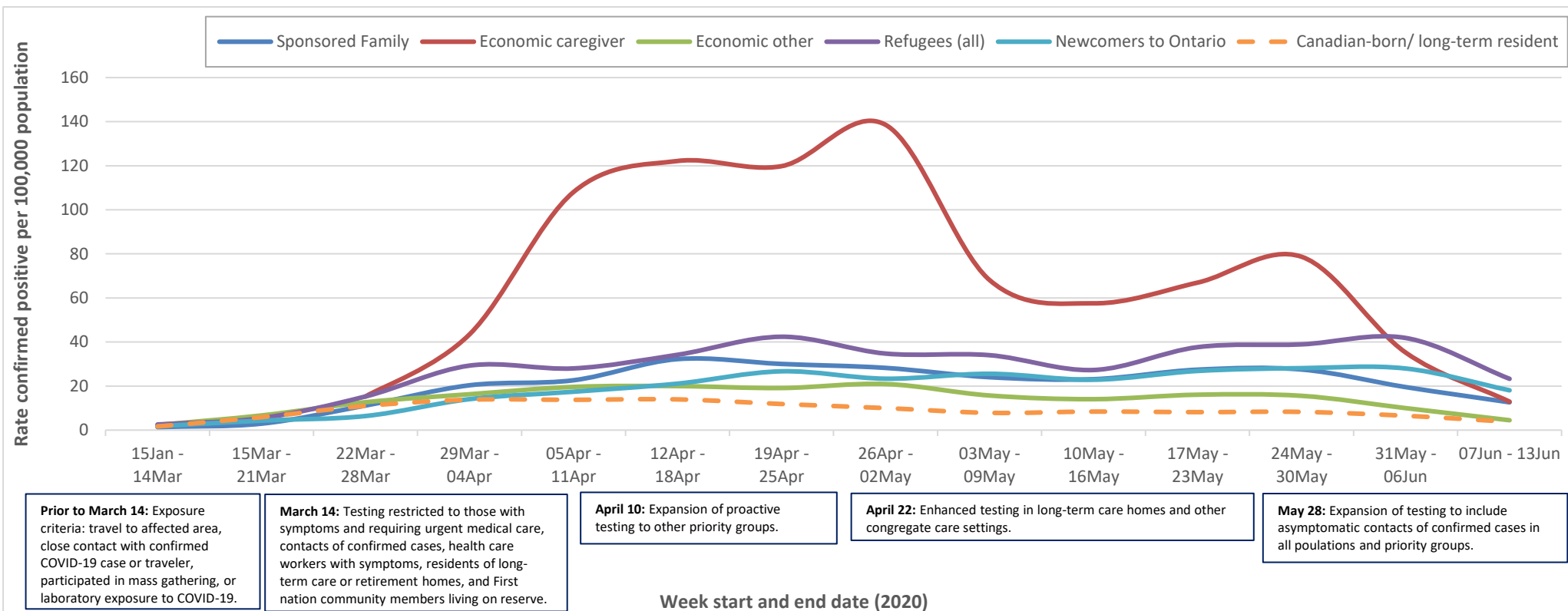
Key Findings: From the first few weeks of the pandemic to mid-June 2020, percent positivity was higher in all immigration categories compared with Canadian-born and long-term residents. The two periods of peak positivity in April and May were much more pronounced among immigrants and refugees, with the highest peak of positivity in April being experienced by those who immigrated under the economic caregiver program. Refugees had the second highest and highest percent positivity in the April and May peaks, respectively.

Notes: 1. Excludes long-term care residents. Immigrants and refugees restricted to those who obtained permanent residency between 1985 and 2017 and includes second-generation children and youth (aged ≤ 19 years) of immigrant and refugee mothers. Newcomers include all those who migrated to Ontario from June 2017 onward and for whom no immigration data are available; includes both immigrants and those migrating from other provinces.

2. Data for economic caregivers before the week of March 22 have been suppressed due to low counts ($n < 6$).

Exhibit 2.3.3

Weekly number of individuals in Ontario confirmed positive for COVID-19 per 100,000 population, by immigration category, January 15 to June 13, 2020



3.0 and 4.0 COVID-19 testing of immigrants, refugees and other newcomers in Ontario, by age group, sex and sociodemographic characteristics, as of June 13, 2020

Summary of Exhibits

Exhibit 3.1.1 and 3.1.2 illustrate the differences in the number of people tested and confirmed positive for COVID-19 depending on immigration status, age group and sex for people living in Ontario. Differences can be seen particularly for immigrants, refugees and newcomers, and between women and men.

Exhibit 3.2 compares the number of people tested and confirmed positive for COVID-19 between first-generation (born outside Canada) and second-generation (born in Ontario) immigrant and refugee children and youth in Ontario, and how this differs depending on immigration category.

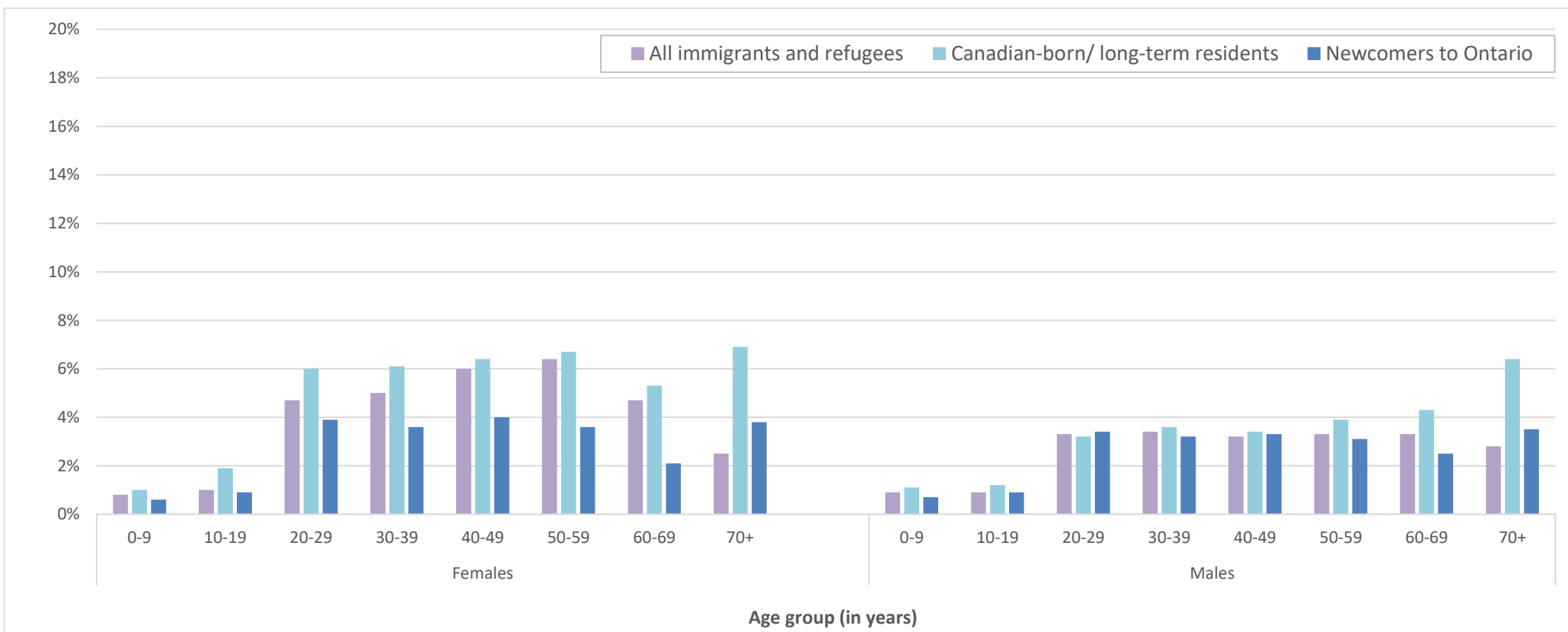
Exhibit 4.1 displays data specifically on recent immigrants and refugees (landed since January 1, 2010, and aged 25 and older at landing) tested and confirmed positive for COVID-19. The figure depicts the relationship between Canadian language ability and level of education at time of landing in Ontario and testing and testing positive for COVID-19.

Exhibits 4.2, 4.3, 4.4 and 4.5 explore the relationship between testing and testing positive for COVID-19 in Ontario according to different neighbourhood characteristics (such as ethnic diversity, income and number of people per household) separated into lower and higher groups (quintiles), and according to immigration status.

Supplementary data for information provided in Exhibits 3.1.1 to 4.5 can be found in appendices 3.1, 4.1, 4.3 and 5.1.

Exhibit 3.1.1

Proportion of Ontario residents tested for COVID-19, by immigration status, age group and sex, as of June 13, 2020

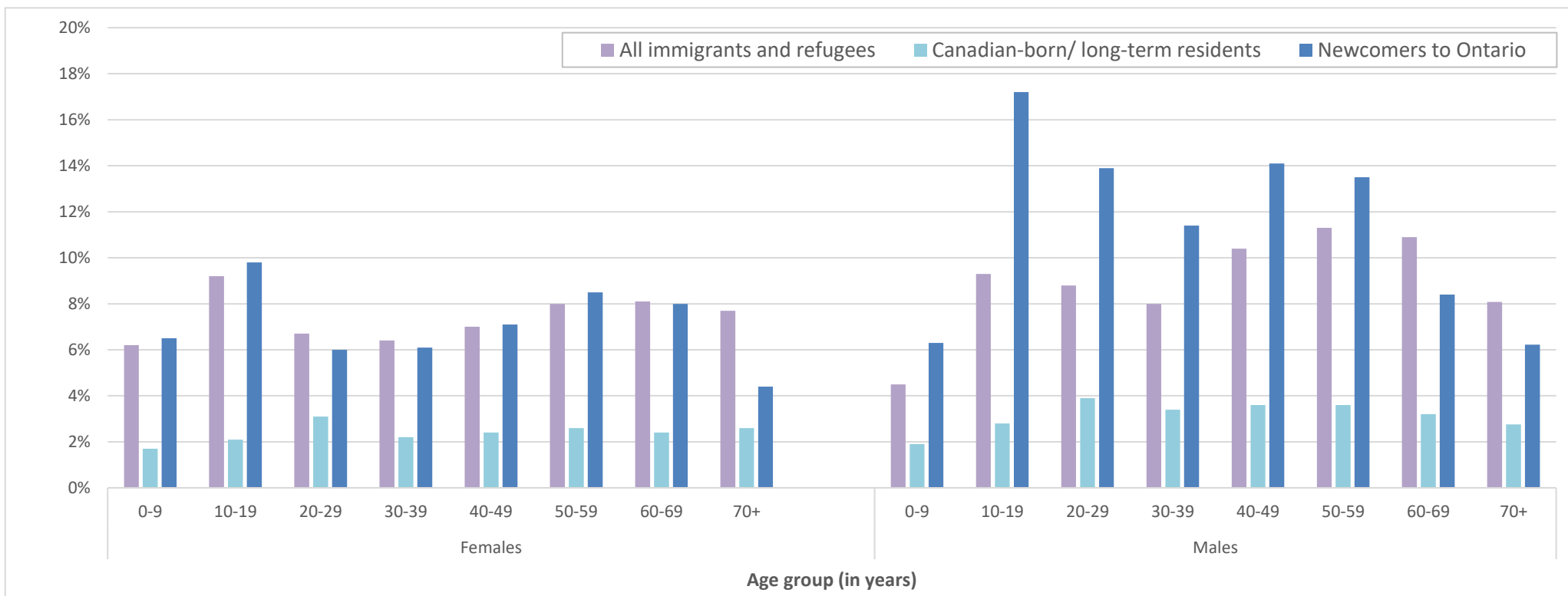


Key Findings: Among females, newcomers were the least likely to be tested across all age groups, and apart from those 70 years and older, testing was slightly lower among immigrants and refugees compared with Canadian-born and long-term residents. Among males up to age 59, testing was similar for all immigrant categories.

Notes: 1. Excludes long-term care residents. Immigrants and refugees restricted to those who obtained permanent residency between 1985 and 2017 and includes second-generation children and youth (aged ≤ 19 years) of immigrant and refugee mothers. Newcomers include all those who migrated to Ontario from June 2017 onward and for whom no immigration data are available; includes both immigrants and those migrating from other provinces.

Exhibit 3.1.2

Percent positivity in those tested for COVID-19 in Ontario, by immigration status, age group and sex, as of June 13, 2020

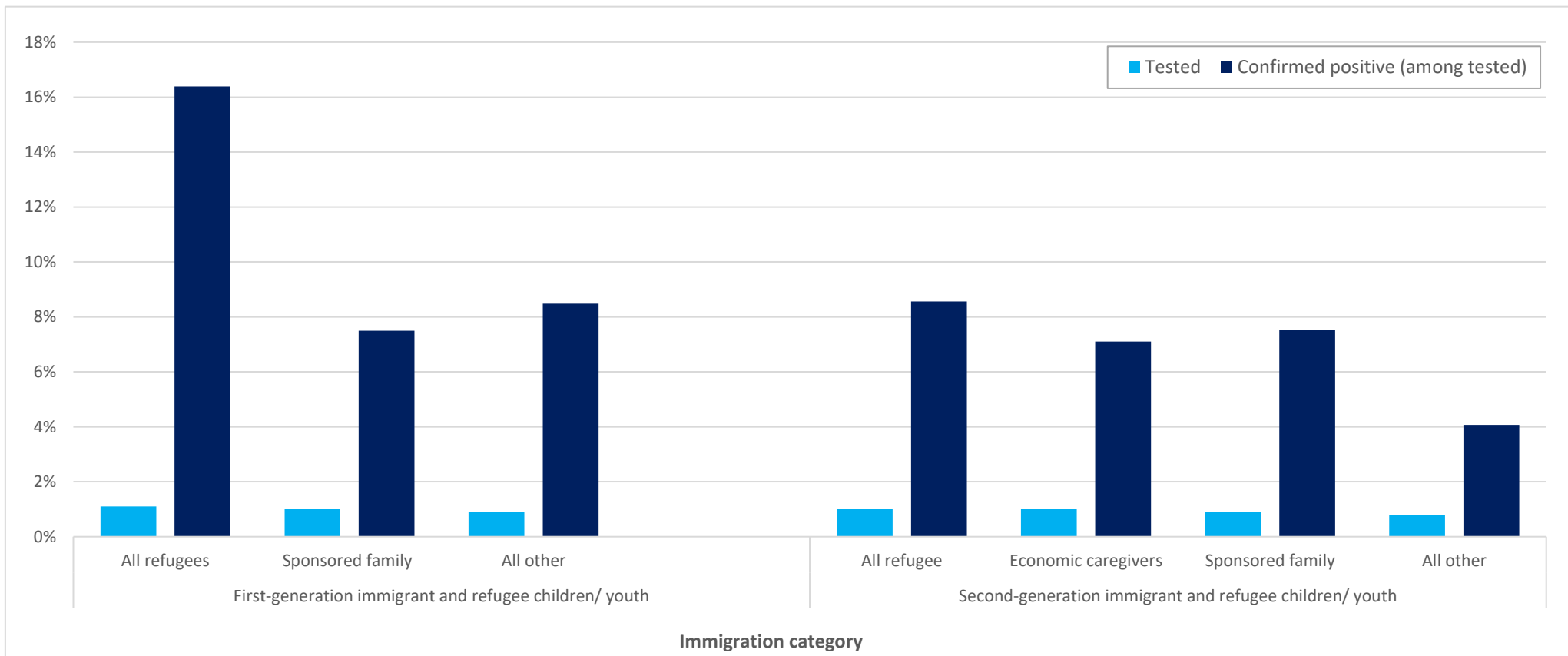


Key Findings: In all age groups, female immigrants, refugees and newcomers had similar rates of test positivity, and all had higher rates than female Canadian-born and long-term residents. Male newcomers (those who migrated to Ontario from June 2017 onward) had higher percent positivity than other immigrants and refugees, especially those in the age groups between 10–19 years and 50–59 years.

Notes: 1. Excludes long-term care residents. Immigrants and refugees are restricted to those who obtained permanent residency between 1985 and 2017 and includes second-generation children and youth (aged ≤ 19 years) of immigrant and refugee mothers. Newcomers include all those who migrated to Ontario from June 2017 onward and for whom no immigration data are available; includes both immigrants and those moving from other provinces.

Exhibit 3.2

Proportion of first- and second-generation immigrant and refugee children and youth in Ontario tested for COVID-19 and percent positivity in those tested, by immigration category, as of June 13, 2020

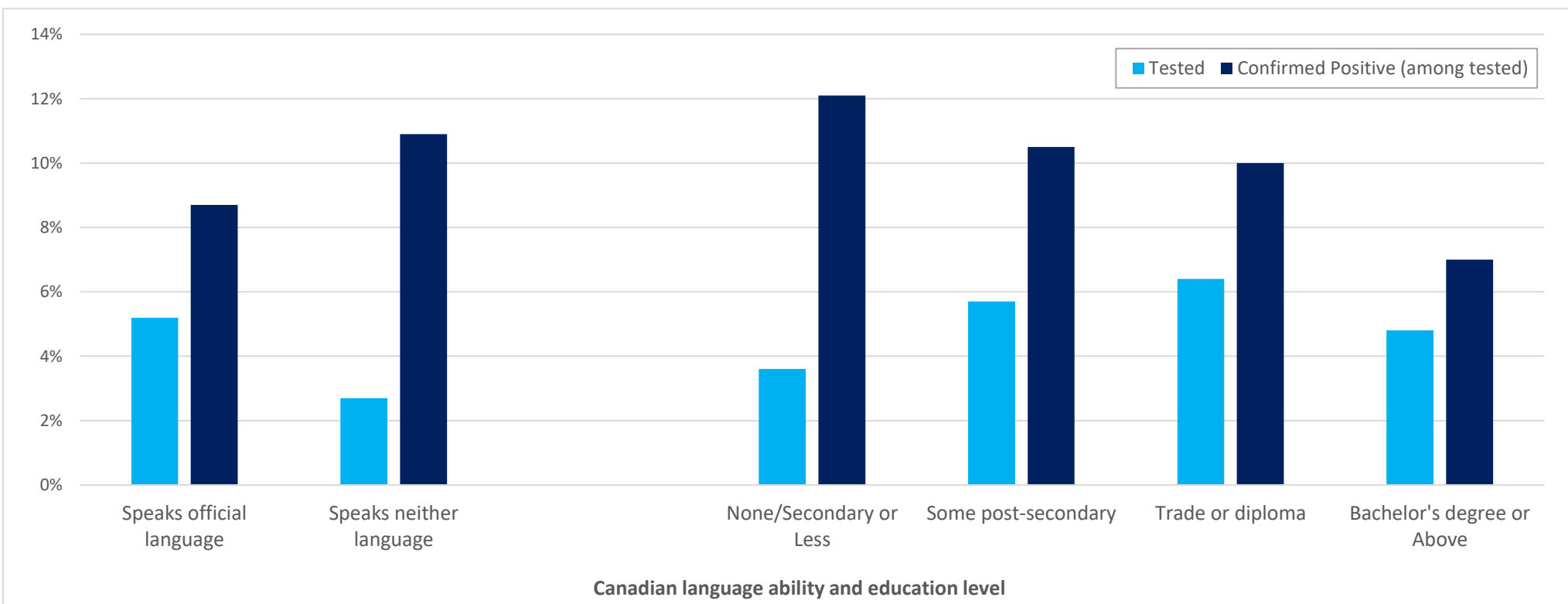


Key Finding: Among children and youth whose mothers were immigrants or refugees, testing rates were very similar to first-generation immigrants and refugees. Children and youth who were refugees were most likely to test positive.

Notes: 1. Immigrants and refugees were restricted to those who obtained permanent residency between 1985 and 2017 and include second-generation children and youth (aged ≤ 19 years) of immigrant and refugee mothers. Second-generation children were included in the immigration category of their mother.

Exhibit 4.1

Proportion of recent immigrants and refugees in Ontario (landed since January 1, 2010, and aged 25+ at landing) tested for COVID-19 and percent positivity in those tested, by Canadian language ability and level of education at time of landing in Canada, as of June 13, 2020



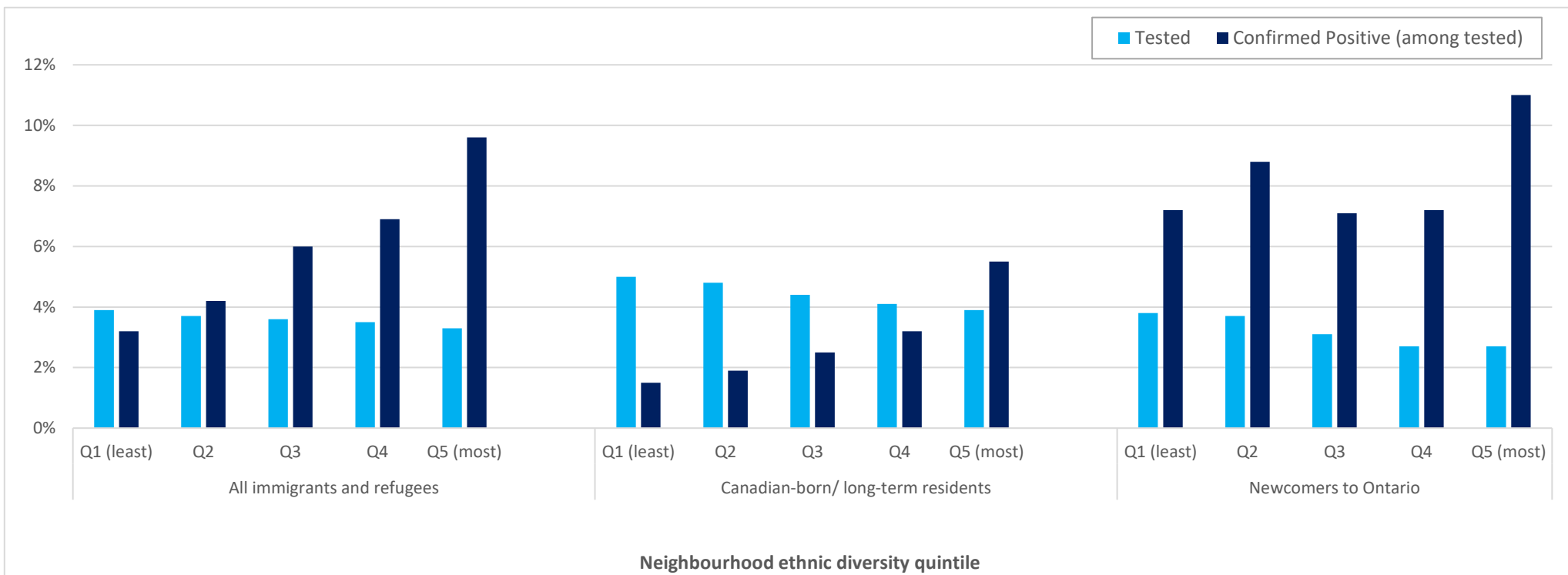
Key Findings: Recent immigrant adults not fluent in English or French at landing were less likely to be tested but more likely to test positive compared with those who spoke either official language. Testing was lowest among immigrants with less than a high school education and those with at least a university degree at landing, whereas percent positivity in those tested was inversely related to the amount of formal education.

Notes: 1. Excludes long-term care residents.

2. Excludes those whose Canadian language ability and level of education were not stated.

Exhibit 4.2

Proportion of Ontario residents tested for COVID-19 and percent positivity in those tested, by immigration status and neighbourhood ethnic diversity, as of June 13, 2020



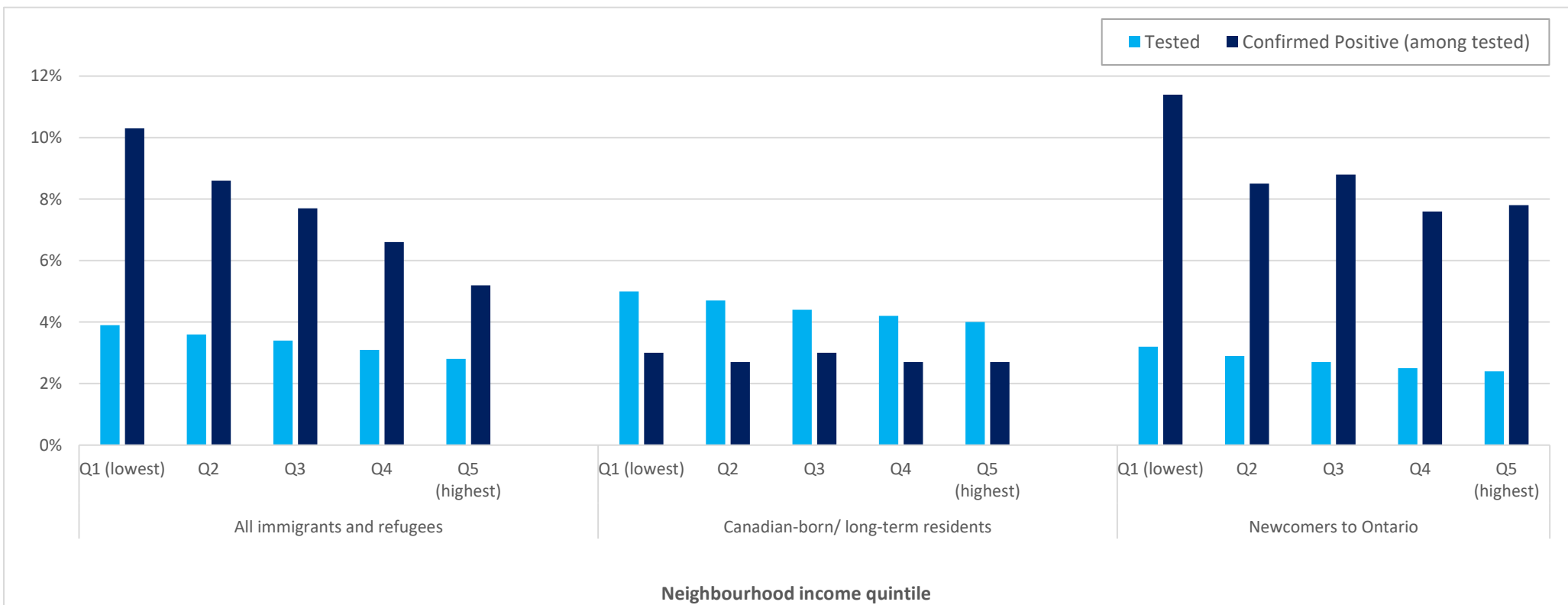
Key Findings: The trend of testing and percent positivity was similar among immigrants and refugees and Canadian-born and long-term residents, with slightly higher testing in those living in the least diverse neighbourhoods and increasing percent positivity as neighbourhood diversity increased. However, immigrants, refugees and other newcomers had lower rates of testing and much higher percent positivity than Canadian-born and long-term residents in neighbourhoods characterized by the same level of diversity.

Notes: 1. Excludes long-term care residents. Immigrants and refugees restricted to those who obtained permanent residency between 1985 and 2017 and includes second-generation children and youth (aged ≤ 19 years) of immigrant and refugee mothers. Newcomers include all those who migrated to Ontario from June 2017 onward and for whom no immigration data are available; includes both immigrants and those migrating from other provinces.

2. Neighbourhood diversity was derived from ethnic concentration in the Ontario Marginalization Index; it reflects the proportion of residents who are new immigrants and visible minorities.

Exhibit 4.3

Proportion of Ontario residents tested for COVID-19 and percent positivity in those tested, by immigration status and neighbourhood income, as of June 13, 2020

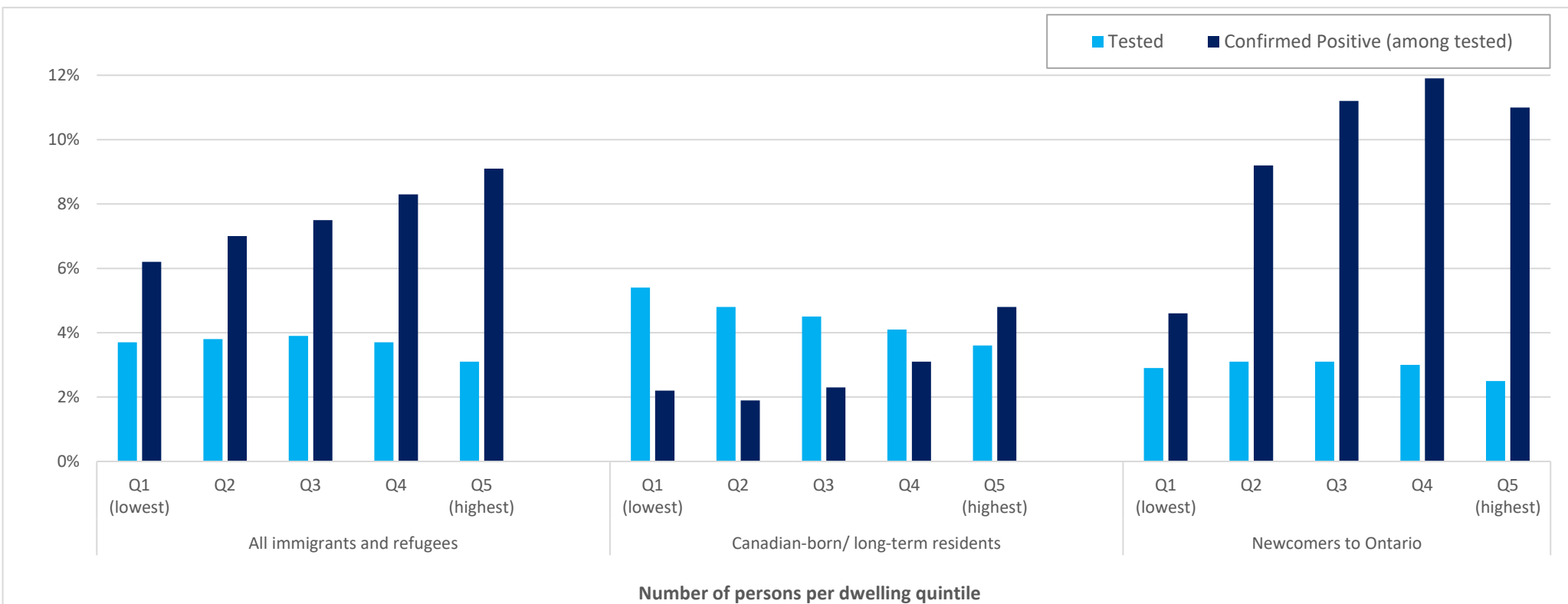


Key Findings: Testing was highest in those living in the lowest income neighbourhoods for all groups. Canadian born and long-term residents had the highest proportions of residents tested in any quintile. Percent positivity was inversely associated with neighbourhood income quintile for immigrants, refugees and other newcomers but not for Canadian-born and long-term residents.

Notes: 1. Excludes long-term care residents. Immigrants and refugees restricted to those who obtained permanent residency between 1985 and 2017 and includes second-generation children and youth (aged ≤ 19 years) of immigrant and refugee mothers. Newcomers include all those who migrated to Ontario from June 2017 onward and for whom no immigration data are available; includes both immigrants and those migrating from other provinces.

Exhibit 4.4

Proportion of Ontario residents tested for COVID-19 and percent positivity in those tested, by immigration status and number of persons per dwelling, as of June 13, 2020



Key Findings: Across all groups, testing was the lowest in those living in neighbourhoods with the lowest number of persons per dwelling. The trend for percent positivity generally showed an increase as the number of persons per dwelling increased across all groups although immigrants, refugees and other newcomers had higher rates of positivity than Canadian-born and long-term residents in the same neighbourhood quintile.

Notes: 1. Excludes long-term care residents. Immigrants and refugees restricted to those who obtained permanent residency between 1985 and 2017 and includes second-generation children and youth (aged ≤ 19 years) of immigrant and refugee mothers. Newcomers include all those who migrated to Ontario from June 2017 onward and for whom no immigration data are available; includes both immigrants and those migrating from other provinces.

5.0 World regions and selected countries of birth for immigrants and refugees in Ontario, tested and confirmed positive for COVID-19, as of June 13, 2020

Summary of Exhibits

Exhibits 5.1.1, 5.1.2, and 5.1.3 explore whether the number of people tested for COVID-19 and confirmed positive in those tested in Ontario differs in immigrants and refugees depending on the world region or country in which they were born and their sex, and how these results compare to Canadian-born and long-term residents and all immigrants and refugees as a whole. Countries of birth were ranked according to testing rates within the top 20 countries with the most COVID-19 positive cases, and the top 10 are included in the exhibits.

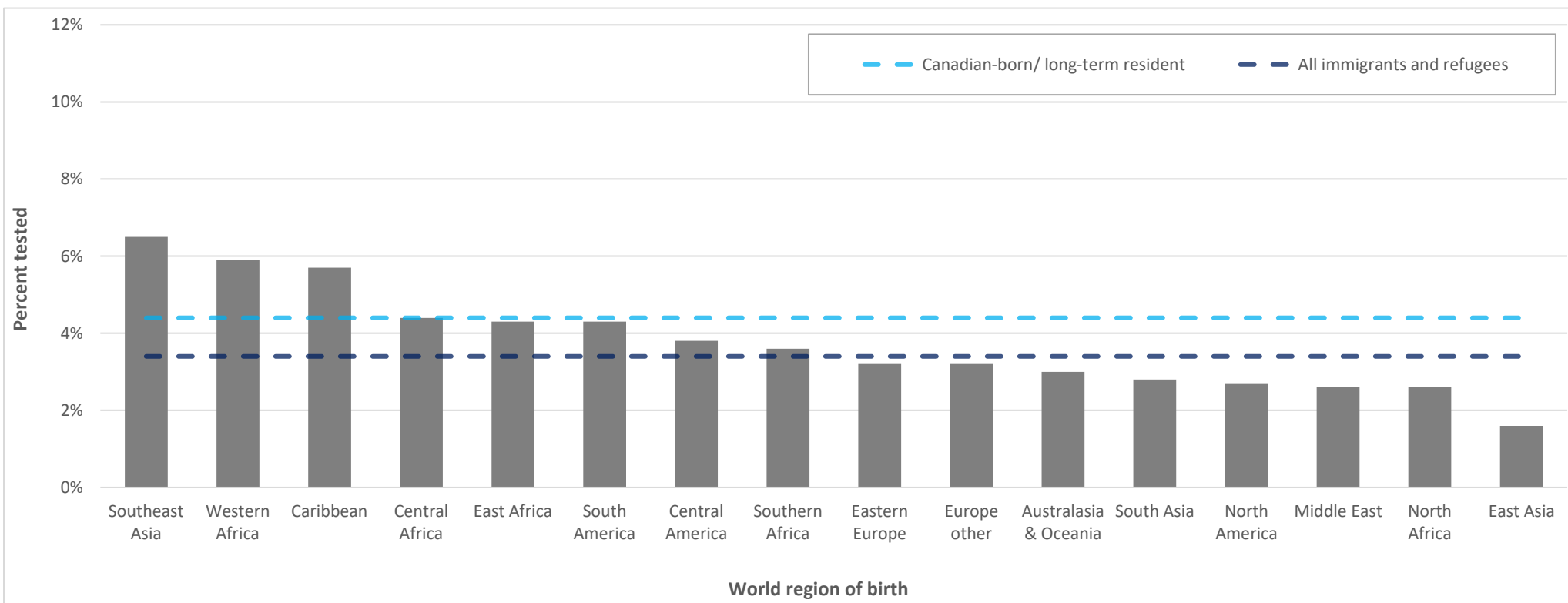
Exhibits 5.2.1, 5.2.2, and 5.2.3 examine whether the number of people confirmed positive for COVID-19 in those tested (percent positivity) in Ontario differs in immigrants and refugees depending on the world region or country in which they were born and their sex, and how these results compare to Canadian-born and long-term residents and all immigrants and refugees as a whole. Countries of birth were ranked according to positivity in those tested within the top 20 countries with the most COVID-19 positive cases, and the top 10 are included in the exhibits.

Exhibits 5.3.1, 5.3.2 and 5.3.3 differ from the previous exhibits, as they examine the number of people confirmed positive for COVID-19 in the population (per capita positivity), rather than in those tested (these represent smaller percentages for this reason). The exhibits portray whether there are differences in immigrants and refugees depending on the world region or country in which they were born and their sex, and how these results compare to Canadian-born and long-term residents and all immigrants and refugees as a whole. Countries of birth were ranked by per capita positivity according to the top 20 countries with the most COVID-19 positive cases, and the top 10 are included in the exhibits.

Supplementary data for information provided in Exhibits 5.1.1 to 5.3.3 can be found in appendices 3.1, 4.1, 6.1, 6.2, and 6.3.

Exhibit 5.1.1

Proportion of those tested for COVID-19, by world region of birth of immigrants and refugees in Ontario, as of June 13, 2020

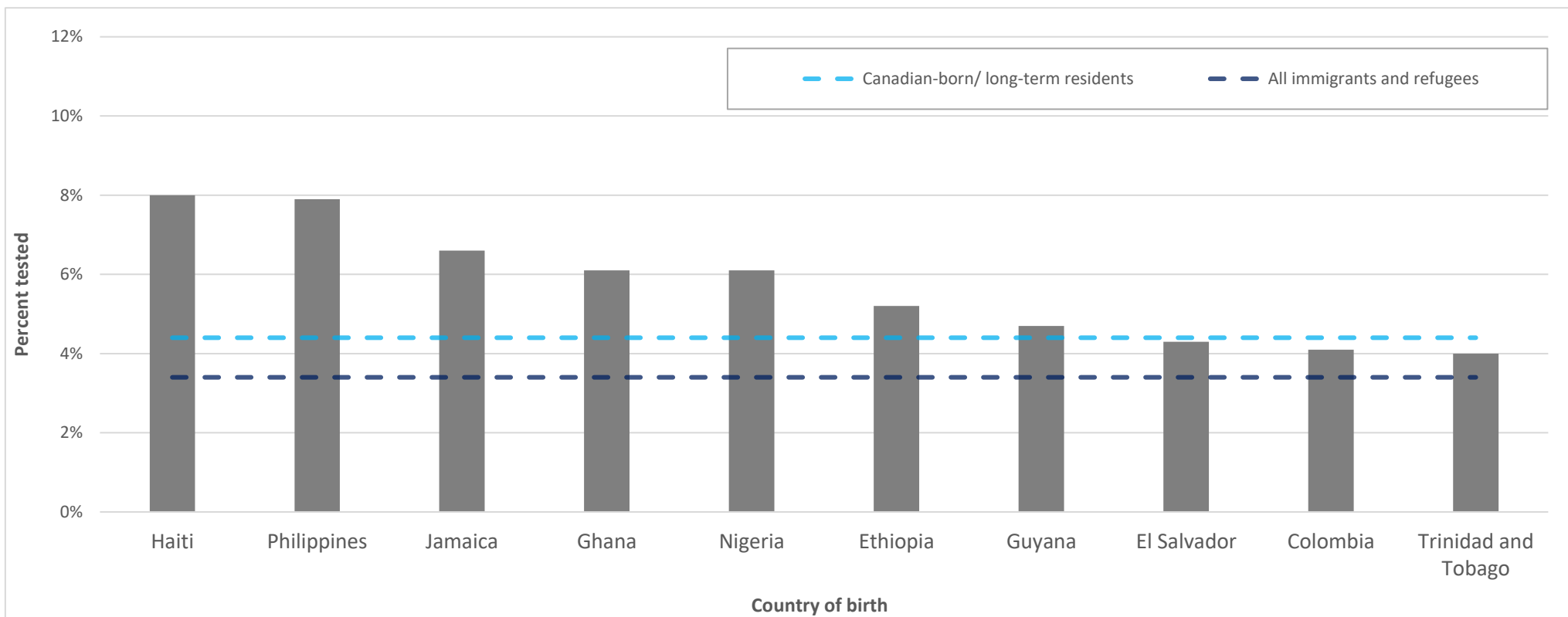


Key Findings: The proportion of those tested is higher among immigrants and refugees from Southeast Asia, all African regions (except North Africa), the Caribbean, South and Central America compared with all immigrants and refugees. Immigrants and refugees from Southeast Asia, Western Africa and the Caribbean had a higher proportion of testing compared with Canadian-born and long-term residents. Immigrants and refugees from East Asia had the lowest rate of testing.

Notes: 1. Excludes long-term care residents. Immigrants and refugees restricted to those who obtained permanent residency between 1985 and 2017 and includes second-generation children and youth (aged ≤ 19 years) of immigrant and refugee mothers. 'Europe other' excludes Eastern Europe and includes Central Europe, Western Europe, and other parts of Europe in the North and South.
2. Second-generation children are assigned to maternal region of birth.

Exhibit 5.1.2

Countries of birth of immigrants and refugees in Ontario with the top 10 highest proportions of those tested (ranked from the countries with the top 20 counts of COVID-10 positive cases), as of June 13, 2020



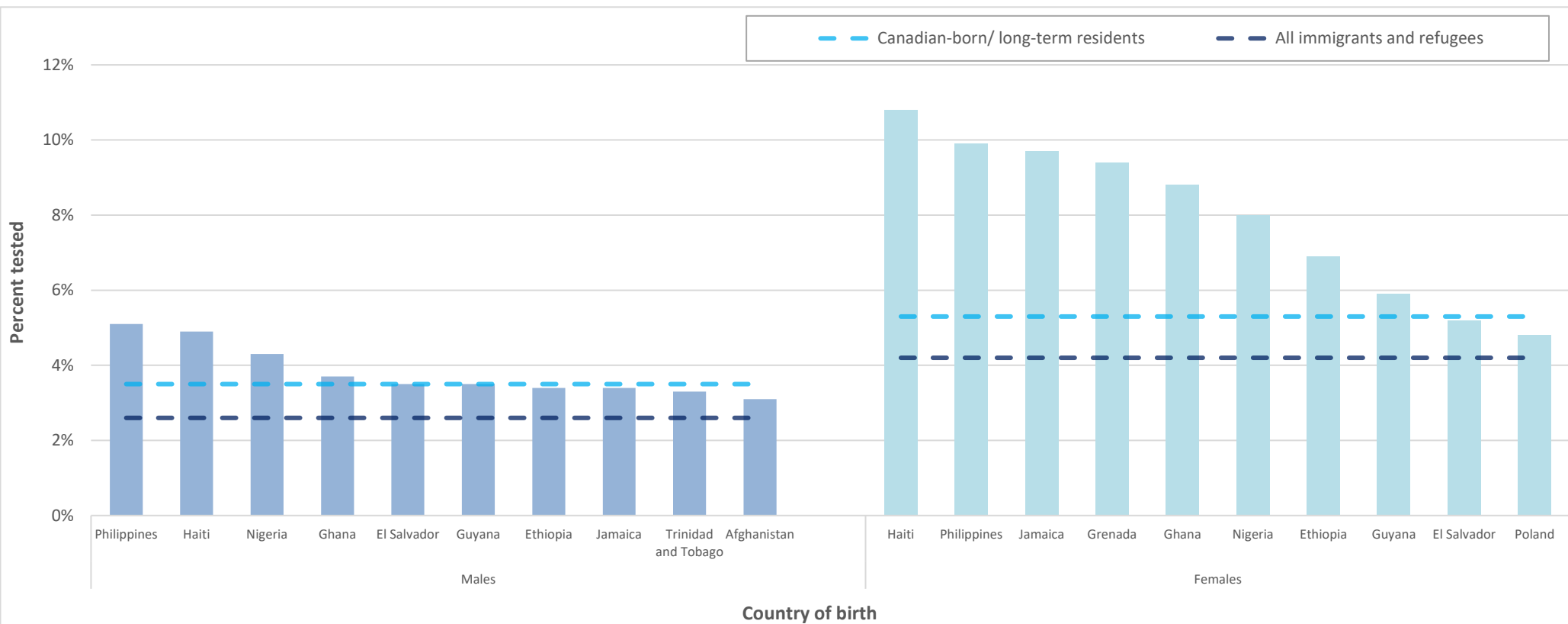
Key Findings: The proportion of those tested for COVID-19 is higher among immigrants and refugees from Haiti, Philippines, Jamaica, Ghana, Nigeria, Ethiopia and Guyana compared with all Canadian-born and long-term residents. Compared with the average of all immigrants and refugees, the proportion tested is higher among immigrants and refugees from all countries identified above.

Notes: 1. Excludes long-term care residents. Immigrants and refugees restricted to those who obtained permanent residency between 1985 and 2017 and includes second-generation children and youth (aged ≤ 19 years) of immigrant and refugee mothers.

2. Second-generation children are assigned to maternal country of birth.

Exhibit 5.1.3

Country of birth of immigrants and refugees in Ontario with the top 10 highest proportions of those tested (ranked from the countries with the top 20 counts of COVID-19 positive cases), by sex, as of June 13, 2020



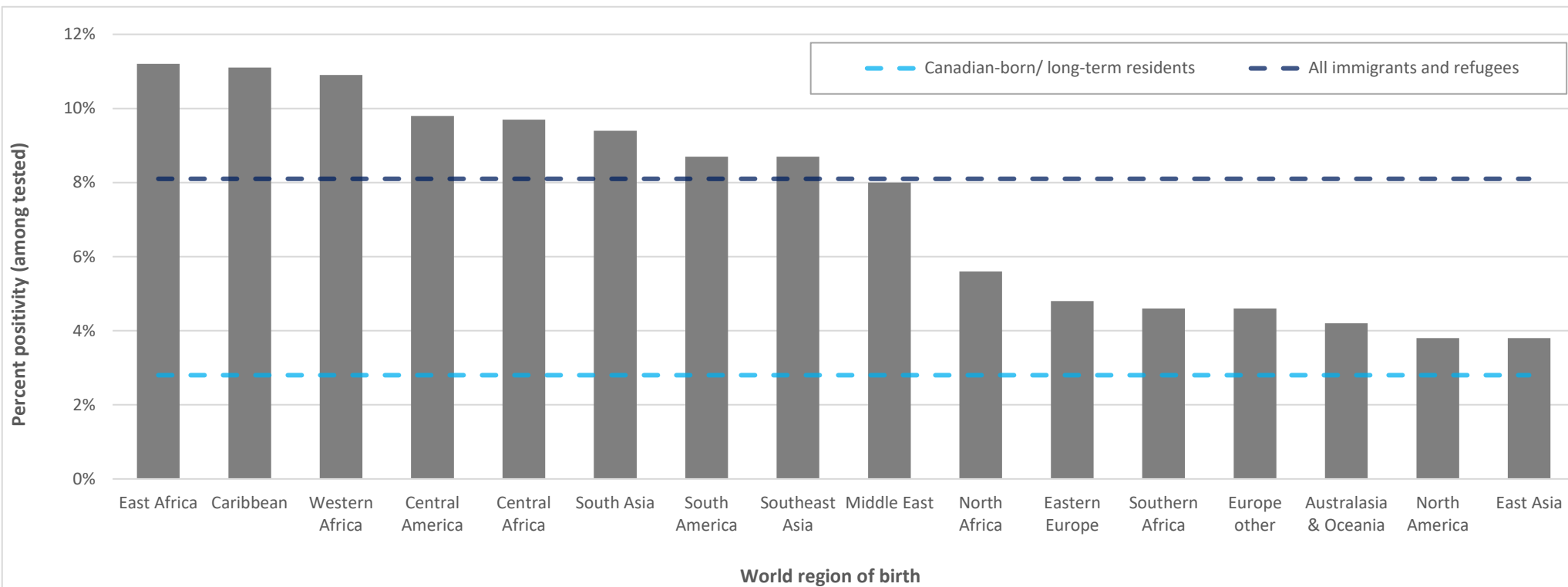
Key Findings: The countries of birth with the highest proportion of testing were similar for male and female immigrants and refugees. Female immigrants and refugees had higher rates of testing than males from the same countries.

Notes: 1. Excludes long-term care residents. Immigrants and refugees restricted to those who obtained permanent residency between 1985 and 2017 and includes second-generation children and youth (aged ≤ 19 years) of immigrant and refugee mothers.

2. Second-generation children are assigned to maternal country of birth.

Exhibit 5.2.1

Percent positivity for COVID-19 in those tested, by world region of birth of immigrants and refugees in Ontario, as of June 13, 2020

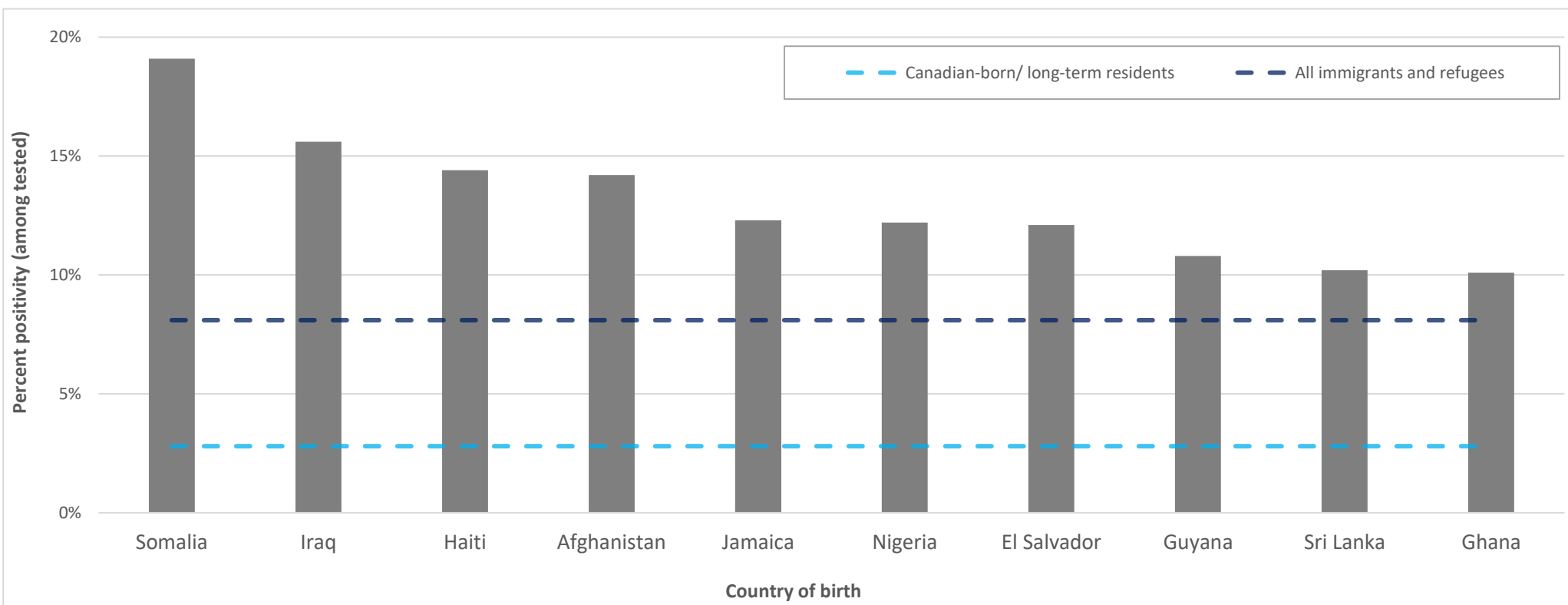


Key Findings: Percent positivity in those tested was higher among immigrants and refugees from East Africa, the Caribbean, Western Africa, Central America, Central Africa, South Asia, South America and Southeast Asia compared with all immigrants and refugees. Immigrants and refugees from all world regions had a higher percent positivity compared with Canadian-born and long-term residents. Immigrants and refugees from East Asia had the lowest percent positivity.

Notes: 1. Excludes long-term care residents. Immigrants and refugees restricted to those who obtained permanent residency between 1985 and 2017 and includes second-generation children and youth (aged ≤ 19 years) of immigrant and refugee mothers. 'Europe other' excludes Eastern Europe, includes Central Europe, Western Europe, and other parts of Europe in the North and South.
2. Second-generation children are assigned to maternal region of birth.

Exhibit 5.2.2

Countries of birth of immigrants and refugees in Ontario with the 10 highest rates of percent positivity for COVID-19 among those tested (ranked from the 20 countries with the highest counts of COVID-19 positive cases), as of June 13, 2020



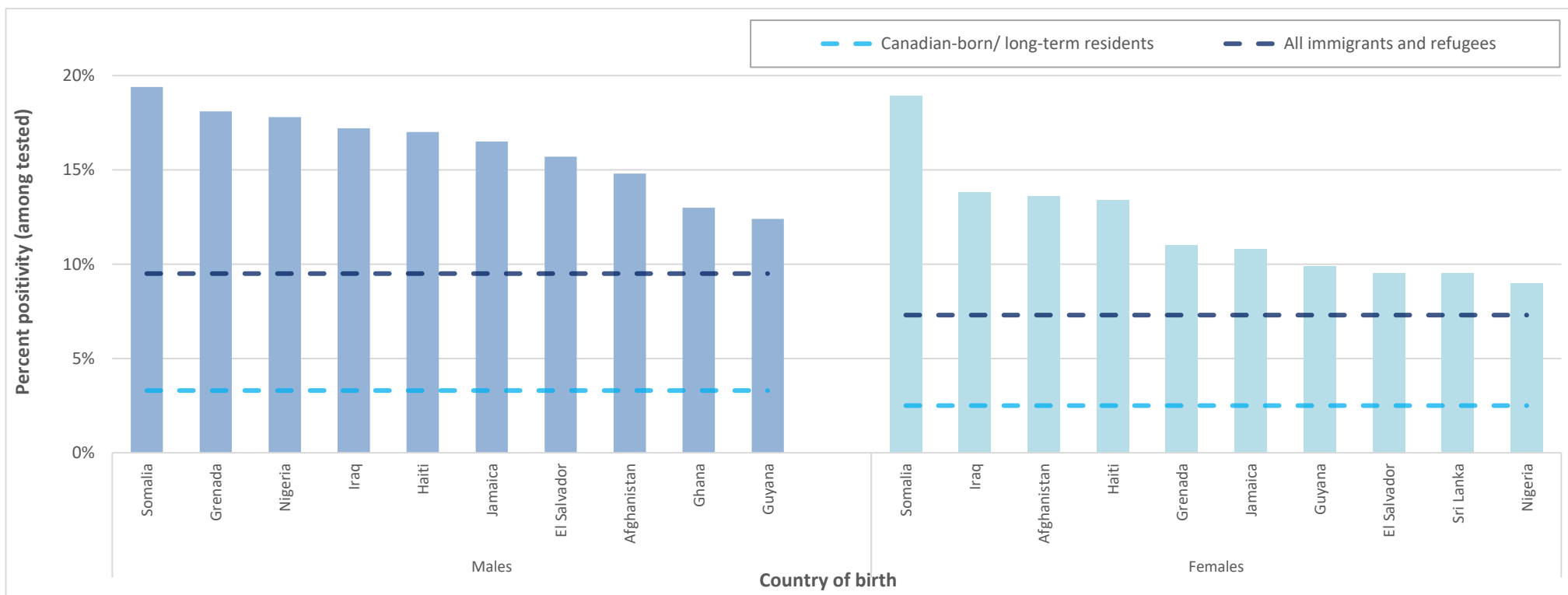
Key Findings: Percent positivity for COVID-19 in those tested was higher among immigrants and refugees from the countries identified above compared to all immigrants and refugees and to Canadian-born and long-term residents. Immigrants and refugees from Somalia had the highest positivity rate (19.1%).

Notes: 1. Excludes long-term care residents. Immigrants and refugees are restricted to those who obtained permanent residency between 1985 and 2017 and includes second-generation children and youth (aged ≤ 19 years) of immigrant and refugee mothers.

2. Second-generation children are assigned to maternal country of birth.

Exhibit 5.2.3

Countries of birth of immigrants and refugees in Ontario with the 10 highest rates of percent positivity for COVID-19 among those tested (ranked from the 20 countries with the highest counts of COVID-19 positive cases), by sex, as of June 13, 2020



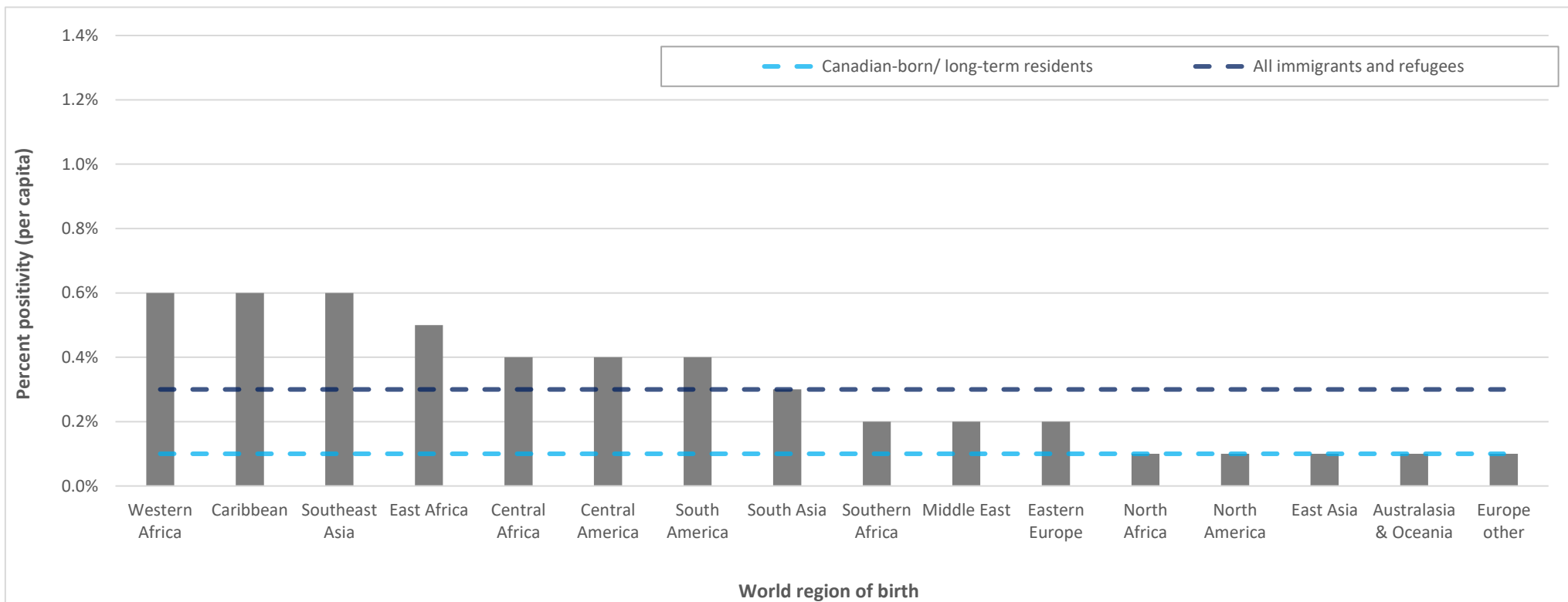
Key Findings: The countries of birth with the highest rates of percent positivity in those tested for COVID-19 were similar for male and female immigrants and refugees. Within the same country of birth, percent positivity was higher among males than females. Percent positivity was higher among immigrants and refugees from the countries identified above compared to all immigrants and refugees and to Canadian-born and long-term residents.

Notes: 1. Excludes long-term care residents. Immigrants and refugees are restricted to those who obtained permanent residency between 1985 and 2017 and includes second-generation children and youth (aged ≤ 19 years) of immigrant and refugee mothers.

2. Second-generation children are assigned to maternal country of birth.

Exhibit 5.3.1

Per capita positivity for COVID-19 among immigrants and refugees in Ontario, by world region of birth, as of June 13, 2020

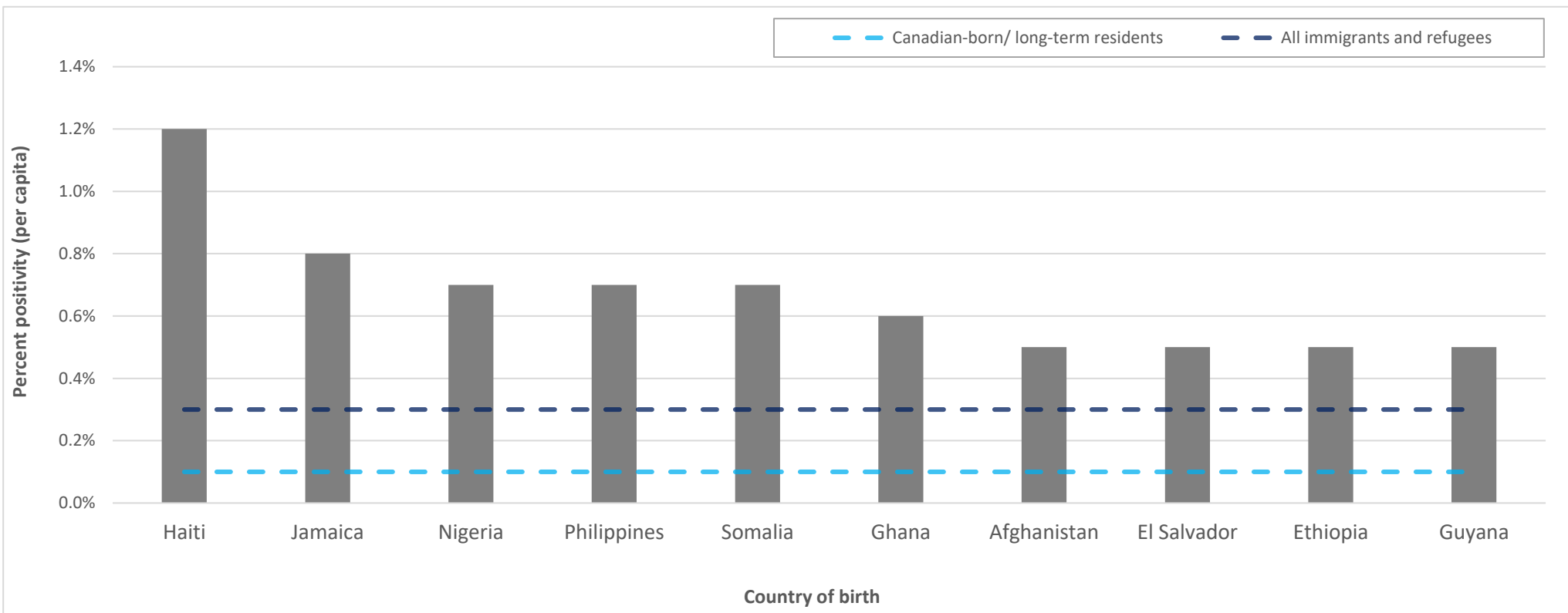


Key Findings: Per capita positivity for COVID-19 was higher among immigrants and refugees from Western Africa, the Caribbean, Southeast Asia, East Africa, Central Africa, Central America and South America compared with all immigrants and refugees and with Canadian-born and long-term residents. Immigrants and refugees from North Africa, North America, East Asia, Australasia and Oceania, and other parts of Europe had the lowest per capita positivity, equaling that of Canadian-born and long-term residents.

Notes: 1. Excludes long-term care residents. Immigrants and refugees are restricted to those who obtained permanent residency between 1985 and 2017 and includes second-generation children and youth (aged ≤ 19 years) of immigrant and refugee mothers. 'Europe other' excludes Eastern Europe, includes Central Europe, Western Europe, and other parts of Europe in the North and South.
2. Second-generation children are assigned to maternal country of birth.

Exhibit 5.3.2

Countries of birth of immigrants and refugees in Ontario with the 10 highest rates of per capita positivity for COVID-19 (ranked from 20 countries with the highest counts of COVID-19 positive cases), as of June 13, 2020



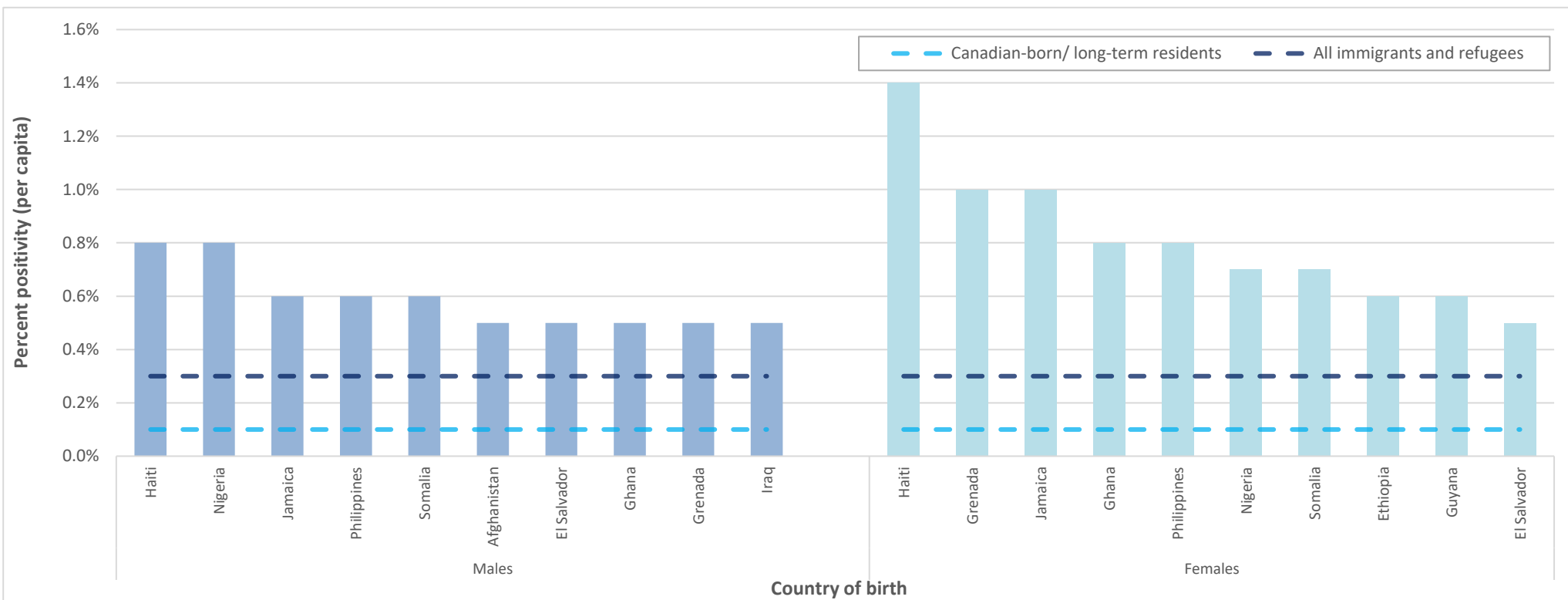
Key Findings: Per capita positivity for COVID-19 was much higher among immigrants and refugees from the countries identified above, compared with all immigrants and refugees and with Canadian-born and long-term residents. Haiti had the highest measured cumulative incidence of COVID-19 (1.2% compared with 0.1% in Canadian-born and long-term residents and 0.3% in all immigrants and refugees).

Notes: 1. Excludes long-term care residents. Immigrants and refugees are restricted to those who obtained permanent residency between 1985 and 2017 and includes second-generation children and youth (aged ≤19 years) of immigrant and refugee mothers.

2. Second-generation children are assigned to maternal country of birth.

Exhibit 5.3.3

Countries of birth of immigrants and refugees in Ontario with the 10 highest rates of per capita positivity for COVID-19 (ranked from the 20 countries with the highest counts of COVID-19 positive cases), by sex, as of June 13, 2020



Key Findings: Per capita positivity for COVID-19 was higher for females than males in the top 10 countries. When males and females from the same country are compared, the cumulative incidence of COVID-19 was higher among females.

Notes: 1. Excludes long-term care residents. Immigrants and refugees were restricted to those who obtained permanent residency between 1985 and 2017 and includes second-generation children and youth aged ≤ 19 years of immigrant and refugee mothers.

2. Second-generation children are assigned to maternal country of birth.

6.0 Testing and percent positivity for COVID-19 by selected chronic conditions in immigrants and refugees and Canadian-born and long-term residents in Ontario, as of June 13, 2020

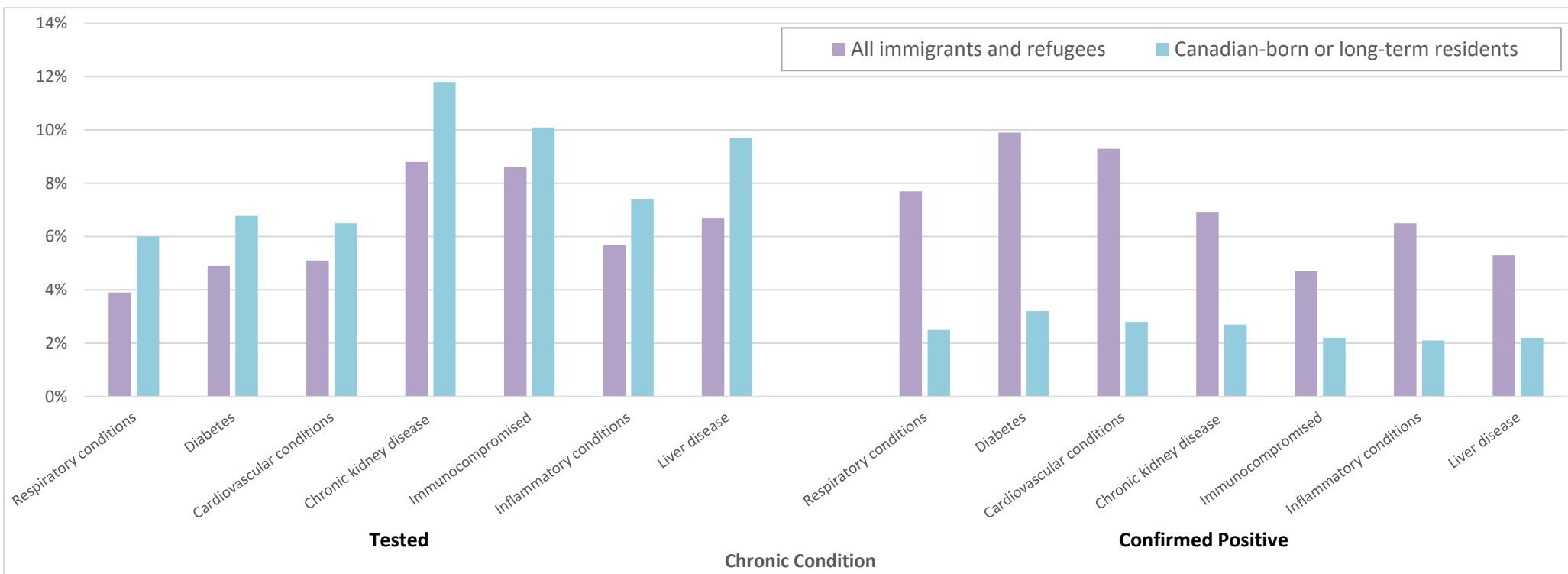
Summary of Exhibit

Exhibit 6.1 explores whether immigrants and refugees in Ontario who live with chronic conditions (such as lung and heart conditions and diabetes) are as likely to be tested and confirmed positive for COVID-19 when compared to Canadian-born and long-term residents. Newcomers to Ontario are not included in this exhibit as many have not lived long enough in Ontario to capture an accurate picture from their health care data of the presence of chronic conditions.

Supplementary data for information provided in Exhibit 6.1 can be found in appendices 3.1 and 4.1.

Exhibit 6.1

Proportion tested and confirmed positive for COVID-19 among those with select chronic conditions In Ontario, by immigration status, as of June 13, 2020



Key Finding: Among immigrants and refugees with any of the chronic conditions listed above, the proportion tested for COVID-19 was somewhat lower and the percent positivity in those tested was higher compared to Canadian-born and long-term residents with the same conditions.

Notes: 1. Excludes long-term care residents. Immigrants and refugees are restricted to those who obtained permanent residency between 1985 and 2017 and includes second-generation children and youth (aged ≤ 19 years) of immigrant and refugee mothers. Medical conditions have not been reported for Newcomers, as many have not had sufficient time in Ontario to contribute the necessary health care use data to allow for identification of these conditions.

2. Respiratory conditions encompass asthma and chronic obstructive pulmonary disease. Cardiovascular conditions encompass heart failure, history of transient ischemic attack or stroke, hypertension and ischemic heart disease. Inflammatory conditions encompass inflammatory bowel disease and rheumatoid arthritis. These chronic conditions are identified using validated algorithms in ICES data holdings. The latest diagnosis date is March 31, 2019.

7.0 Testing and positivity for COVID-19 in immigrants and refugees in Ontario's public health units, as of June 13, 2020

Summary of Exhibits

Exhibits 7.1 and 7.2 provide a visual overview of the differences across Ontario in the proportions of immigrants and refugees tested for COVID-19 and confirmed positive. Each map depicts the province's 34 public health units and illustrates how rates of testing may vary depending on where a person lives.

Supplementary data for information provided in Exhibits 7.1 and 7.2 can be found in appendices 3.1 and 4.1.

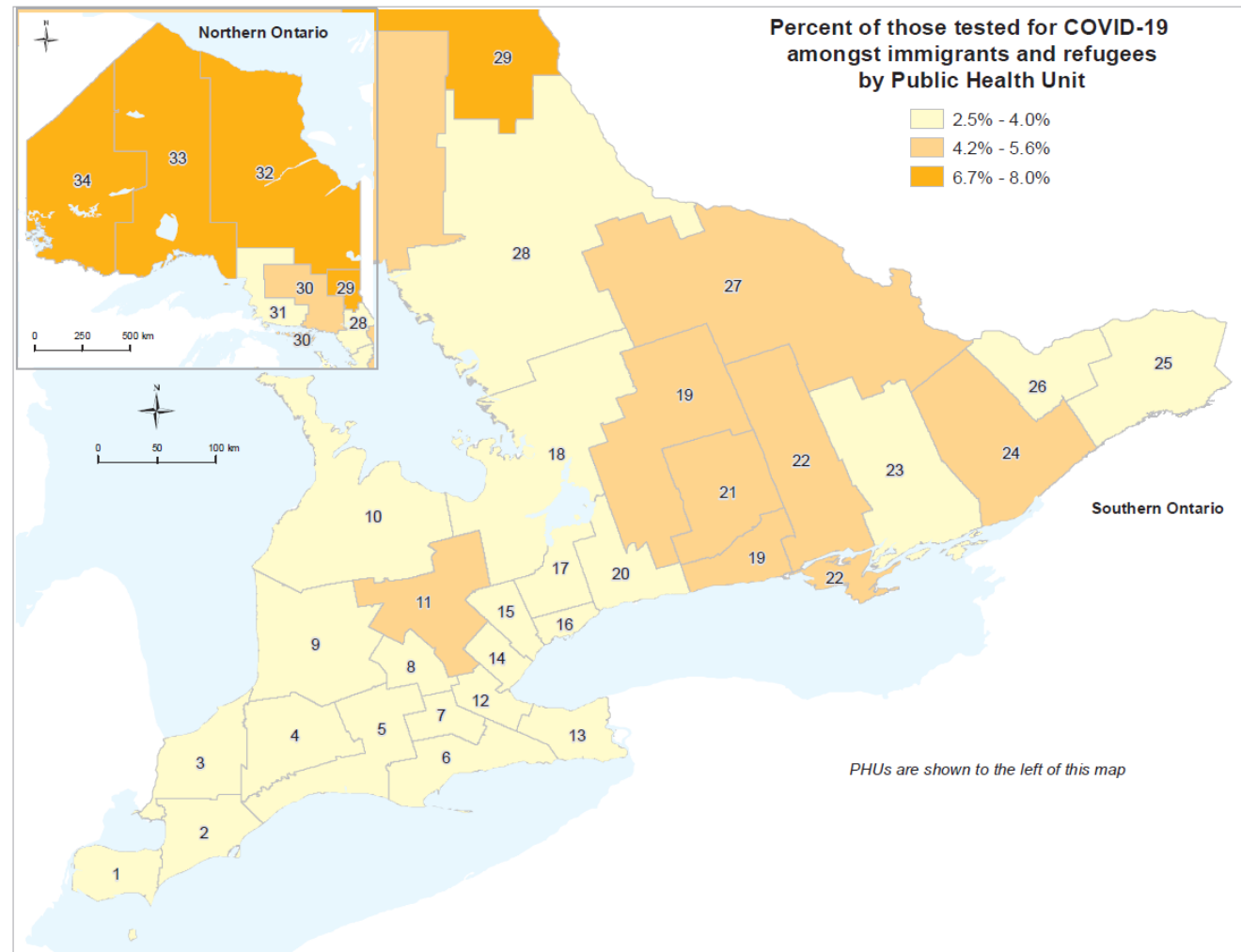
Exhibit 7.1

Proportion of those tested for COVID-19 among immigrants and refugees in Ontario, by public health unit, as of June 13, 2020

Key Finding: Northwestern Health Unit, Thunder Bay District Health Unit, Porcupine Health Unit and Timiskaming Health Unit had the highest proportions of immigrants and refugees tested for COVID-19.

Public Health Unit (PHU) Name

- 1 Windsor-Essex County Health Unit
- 2 Chatham-Kent Health Unit
- 3 Lambton Health Unit
- 4 Middlesex-London Health Unit
- 5 Southwestern Health Unit
- 6 Haldimand-Norfolk Health Unit
- 7 Brant County Health Unit
- 8 Region of Waterloo Public Health
- 9 Huron Perth Health Unit
- 10 Grey Bruce Health Unit
- 11 Wellington-Dufferin-Guelph Health Unit
- 12 Hamilton Public Health Services
- 13 Niagara Region Public Health Department
- 14 Halton Region Health Department
- 15 Peel Public Health
- 16 Toronto Public Health
- 17 York Region Public Health Services
- 18 Simcoe Muskoka District Health Unit
- 19 Haliburton, Kawartha, Pine Ridge District Health Unit
- 20 Durham Region Health Department
- 21 Peterborough Public Health Unit
- 22 Hastings and Prince Edward Counties Health Unit
- 23 Kingston, Frontenac and Lennox & Addington Health Unit
- 24 Leeds, Grenville and Lanark District Health Unit
- 25 Eastern Ontario Health Unit
- 26 Ottawa Public Health
- 27 Renfrew County and District Health Unit
- 28 North Bay Parry Sound District Health Unit
- 29 Timiskaming Health Unit
- 30 Sudbury and District Health Unit
- 31 Algoma Public Health Unit
- 32 Porcupine Health Unit
- 33 Thunder Bay District Health Unit
- 34 Northwestern Health Unit



Notes: 1. Excludes long-term care residents. Immigrants and refugees are restricted to those who obtained permanent residency between 1985 and 2017 and includes second-generation children and youth (aged ≤ 19 years) of immigrant and refugee mothers.

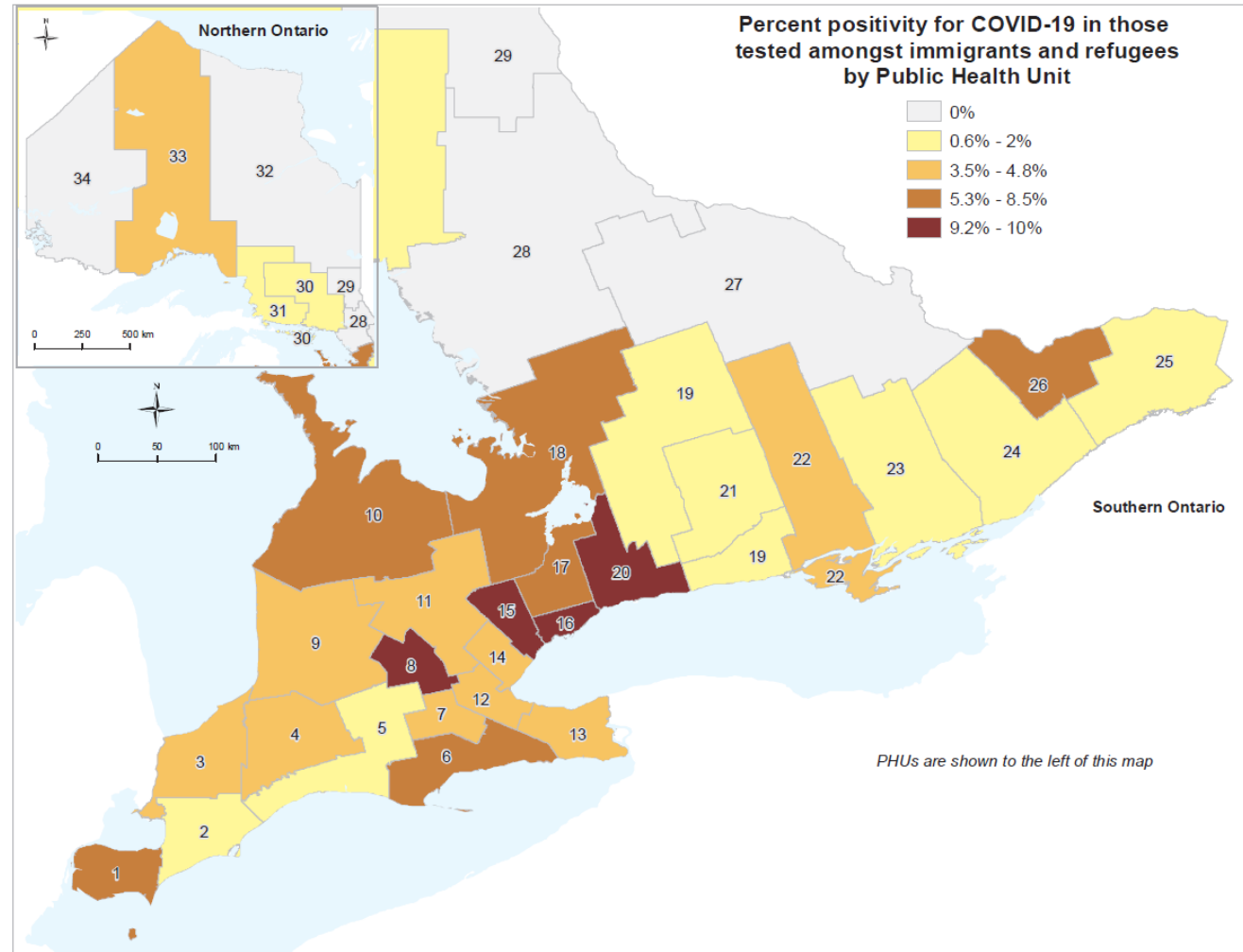
Exhibit 7.2

Percent positivity for COVID-19 in those tested among immigrants and refugees in Ontario, by public health unit, as of June 13, 2020

Key Finding: Immigrants and refugees who resided in communities served by the Waterloo, Peel, Toronto and Durham public health units had the highest percent positivity for COVID-19 (ranging from 9.2% to 10.0%).

Public Health Unit (PHU) Name

- 1 Windsor-Essex County Health Unit
- 2 Chatham-Kent Health Unit
- 3 Lambton Health Unit
- 4 Middlesex-London Health Unit
- 5 Southwestern Health Unit
- 6 Haldimand-Norfolk Health Unit
- 7 Brant County Health Unit
- 8 Region of Waterloo Public Health
- 9 Huron Perth Health Unit
- 10 Grey Bruce Health Unit
- 11 Wellington-Dufferin-Guelph Health Unit
- 12 Hamilton Public Health Services
- 13 Niagara Region Public Health Department
- 14 Halton Region Health Department
- 15 Peel Public Health
- 16 Toronto Public Health
- 17 York Region Public Health Services
- 18 Simcoe Muskoka District Health Unit
- 19 Haliburton, Kawartha, Pine Ridge District Health Unit
- 20 Durham Region Health Department
- 21 Peterborough Public Health Unit
- 22 Hastings and Prince Edward Counties Health Unit
- 23 Kingston, Frontenac and Lennox & Addington Health Unit
- 24 Leeds, Grenville and Lanark District Health Unit
- 25 Eastern Ontario Health Unit
- 26 Ottawa Public Health
- 27 Renfrew County and District Health Unit
- 28 North Bay Parry Sound District Health Unit
- 29 Timiskaming Health Unit
- 30 Sudbury and District Health Unit
- 31 Algoma Public Health Unit
- 32 Porcupine Health Unit
- 33 Thunder Bay District Health Unit
- 34 Northwestern Health Unit



Notes: 1. Excludes long-term care residents. Immigrants and refugees were restricted to those who obtained permanent residency between 1985 and 2017 and includes second-generation children and youth (aged ≤ 19 years) of immigrant and refugee mothers.

8.0 Proportion of COVID-19 cases among health care workers in Ontario, as of June 13, 2020

Summary of Exhibits

Exhibit 8.1 illustrates how many health care workers have been confirmed positive for COVID-19 in Ontario and some of their key characteristics (number who are female and male, immigration status, and the top 5 countries of birth for those who are immigrants and refugees).

Exhibit 8.2 compares the differences in the proportion of health care workers (and long-term care workers as a subset of health care workers) in those confirmed positive for COVID-19 in Ontario who are immigrants and refugees, other newcomers and Canadian-born and long-term residents.

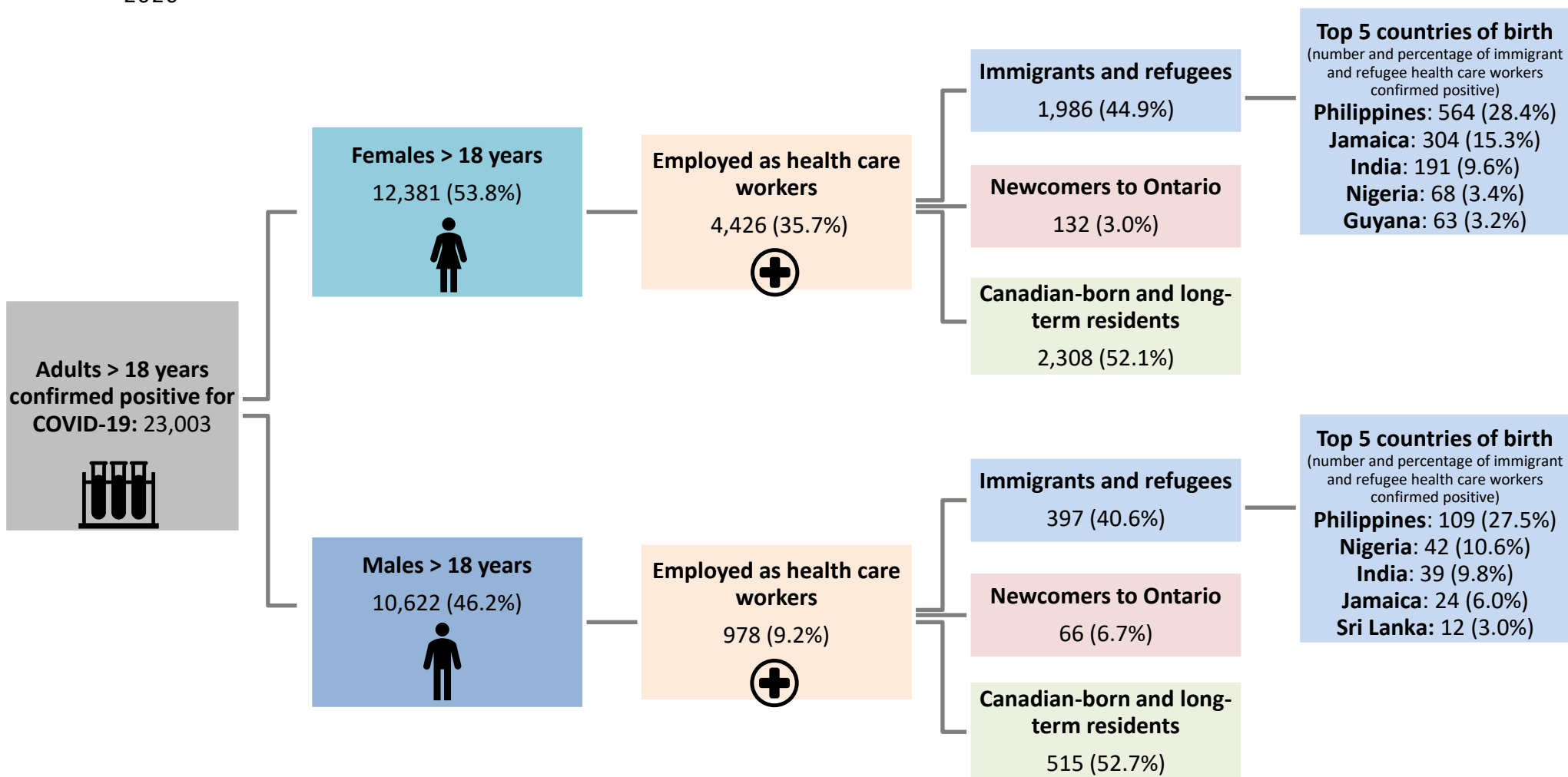
Exhibit 8.3 explores the differences in the proportion of health care and long-term care workers in those confirmed positive for COVID-19 in Ontario according to world region of birth of immigrants and refugees, compared to other newcomers and Canadian-born and long-term residents.

Exhibits 8.4 and 8.5 explore the differences in proportion of health care and long-term care workers in those confirmed positive for COVID-19 in Ontario according to their countries of birth and further divided by sex. Countries of birth were ranked according to the top 20 countries with the most COVID-19 positive cases. We included the top 10 countries of birth for females but only the top 8 for males as the numbers of health care workers in other countries of birth were very low.

Supplementary data for information provided in Exhibits 8.1 to 8.5 can be found in appendices 4.1, 7.1, 7.2, and 7.3.

Exhibit 8.1

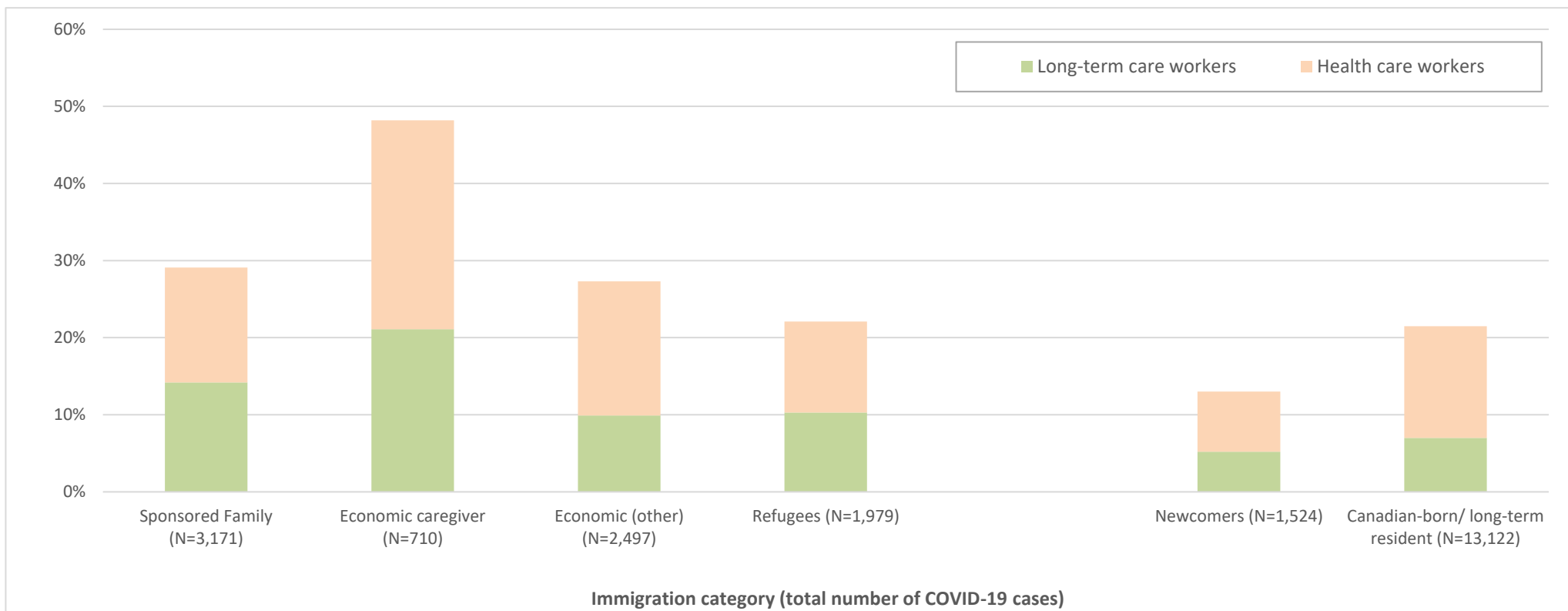
Overview of health care workers in Ontario confirmed positive for COVID-19, by immigration status, as of June 13, 2020



Notes: 1. Excludes long-term care residents. Immigrants and refugees are restricted to those who obtained permanent residency between 1985 and 2017. Newcomers include all those who migrated to Ontario from June 2017 onward and for whom no immigration data are available; includes both immigrants and those migrating from other provinces.

Exhibit 8.2

Proportion of health care workers among COVID-19 cases in Ontario adults older than 18 years, by immigration category, as of June 13, 2020



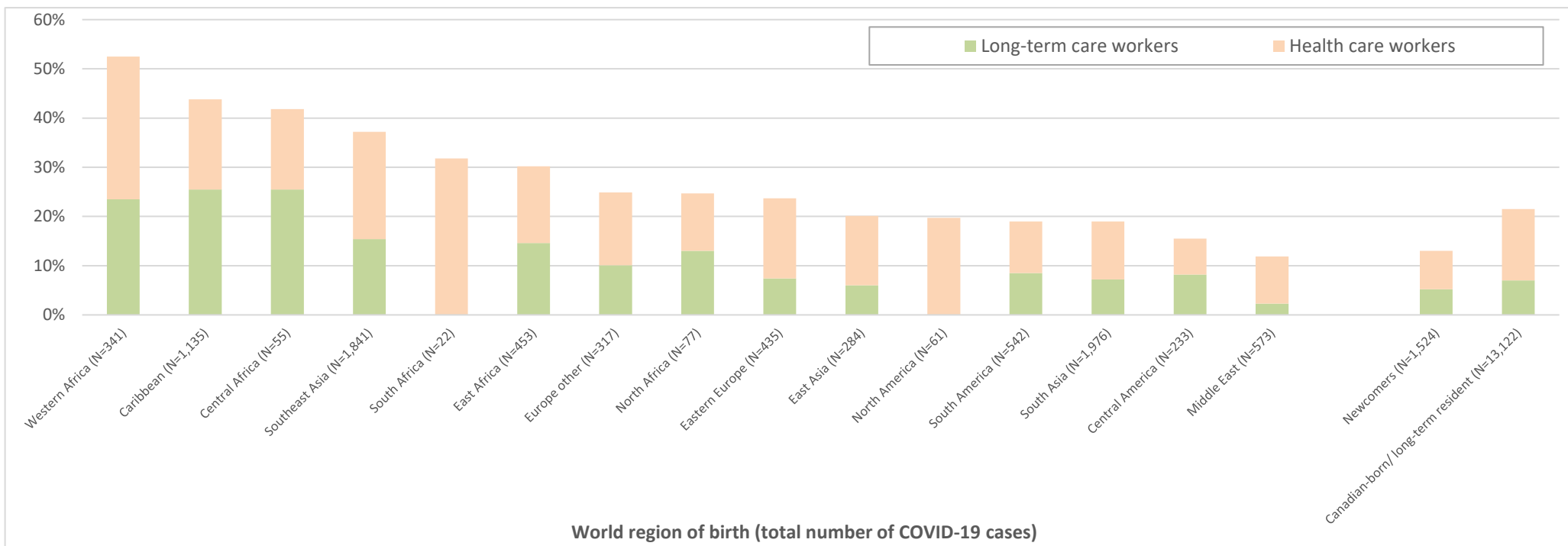
Key Findings: Among adults who tested positive for COVID-19, a larger proportion of cases among immigrants and refugees were health care workers compared to both Canadian-born and long-term residents and newcomers to Ontario. Almost half of the cases in the economic caregivers category were health care workers, compared to about one-quarter of cases in the sponsored family, economic other and refugee categories.

Notes: 1. Long-term care workers represent a subset of health care workers.

2. Excludes long-term care residents. Newcomers include all those who migrated to Ontario from June 2017 onward and for whom no immigration data are available; includes both immigrants and those migrating from other provinces.

Exhibit 8.3

Proportion of health care workers among COVID-19 cases in Ontario adults older than 18 years, by world region of birth, as of June 13, 2020



Key Findings: Among adults who tested positive for COVID-19, immigrants and refugees from Western Africa, the Caribbean, Central Africa and Southeast Asia had the highest proportions who were health care workers. Those from North America, East Asia, South America, South Asia, Central America and the Middle East had lower proportions of cases who were health care workers compared to Canadian-born and long-term residents. Immigrants and refugees from almost all world regions had a higher proportion of cases who were long-term care workers compared to Canadian-born and long-term residents.

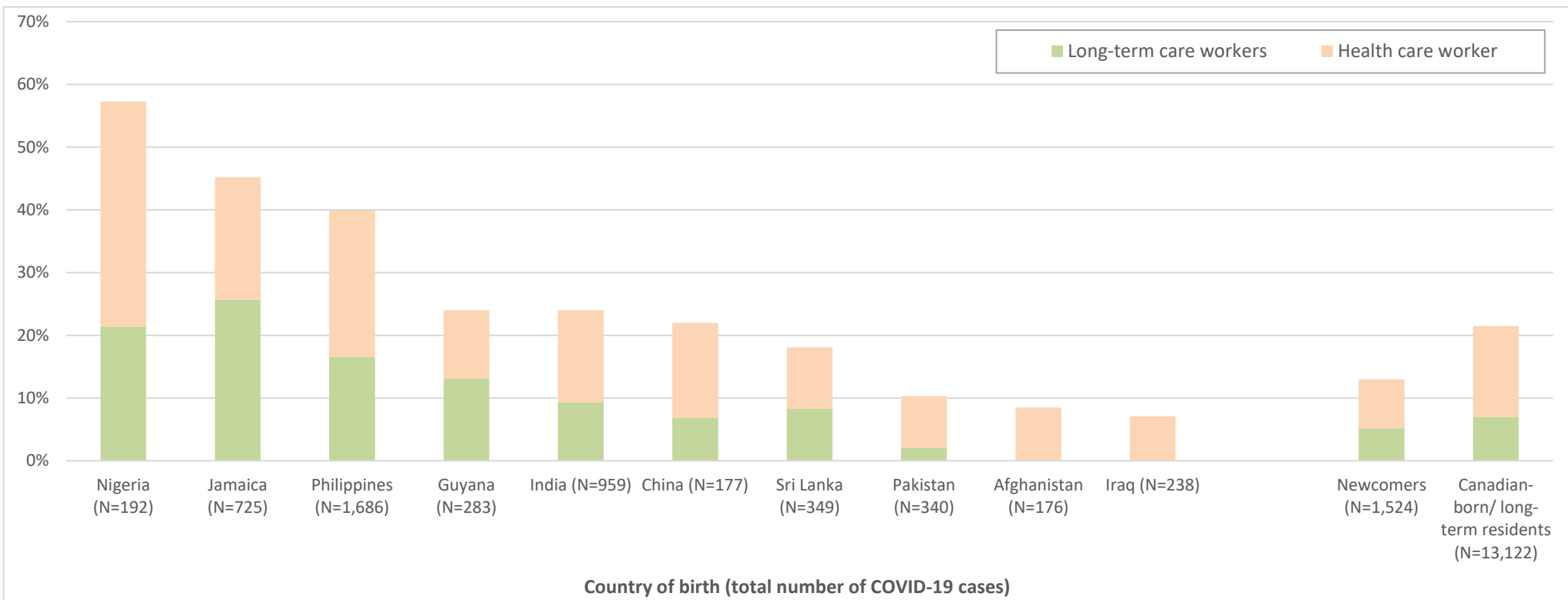
Notes: 1. Long-term care workers represent a subset of health care workers.

2. Excludes long-term care residents. Newcomers include those who migrated to Ontario from June 2017 onward and for whom no immigration data are available; includes both immigrants and those migrating from other provinces.

3. Data for long-term care workers from North America and South Africa have been suppressed due to low counts ($n < 6$). Data for all health care workers from Australasia and Oceania world region have been suppressed due to low counts ($n < 6$).

Exhibit 8.4

Countries of birth with the highest proportion of health care workers among COVID-19 cases in Ontario adults older than 18 years (ranked from those with the top 20 counts of COVID-19 positive cases), as of June 13, 2020



Key Findings: Among adults who tested positive for COVID-19, those born in Nigeria, Jamaica, the Philippines, Guyana and India had higher proportions of cases who were health care workers compared to Canadian-born and long-term residents. Those from countries of birth other than China, Pakistan, Afghanistan and Iraq had higher proportions of cases who were long-term care workers compared to Canadian-born and long-term residents.

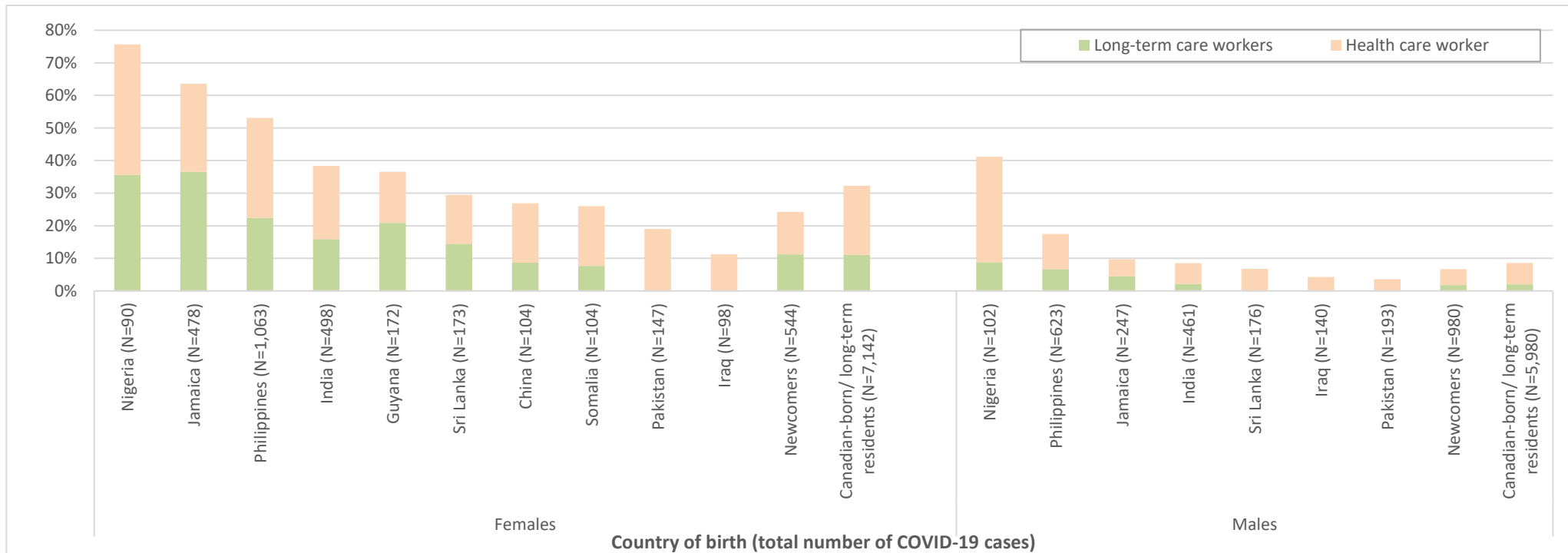
Notes: 1. Long-term care workers represent a subset of health care workers.

2. Excludes long-term care residents. Newcomers include all those who migrated to Ontario from June 2017 onward and for whom no immigration data are available; includes both immigrants and those migrating from other provinces.

3. Data for long-term care workers from Afghanistan and Iraq have been suppressed due to low counts ($n < 6$).

Exhibit 8.5

Countries of birth with the highest proportion of health care workers among COVID-19 cases in Ontario adults older than 18 years of age (ranked from those with the top 20 counts of COVID-19 positive cases), by sex, as of June 13, 2020



Key Findings: Among adults who tested positive for COVID-19, there was a much higher proportion of females who were health care workers and long-term care workers compared to males born in the same country. Male adults from Nigeria and the Philippines had the highest proportion of cases who were health care workers. Among females, the highest proportion of cases who were health care workers were born in Nigeria, Jamaica and the Philippines.

Notes: 1. Long-term care workers represent a subset of health care workers.

2. Excludes long-term care residents; only countries with a minimum of 6 health care workers included. Newcomers include all those who migrated to Ontario from June 2017 onward and for whom no immigration data are available; includes both immigrants and those migrating from other provinces.

3. Data for long-term care workers from Iraq (male and female) and Pakistan and Sri Lanka (male only) have been suppressed due to low counts (n<6).

Appendix 1.1 Baseline characteristics of Canadian-born and long-term residents, newcomers, and immigrants and refugees landed in Ontario between January 1, 1985, and May 31, 2017, as of March 31, 2020

Variable	Sponsored family members	Economic immigrant, caregiver	Economic immigrant, other	Privately sponsored refugees	Blended visa office–referred refugees	Govt-assisted refugees	Protected persons/Refugees (asylum seekers)	Refugee dependents	Humanitarian and compassionate/Public policy cases	Other immigrants	Other newcomers to Ontario	Canadian-born and long-term residents	Total
Number	1,228,765	85,148	1,381,872	125,744	3,294	111,891	194,292	66,626	41,409	6,598	625,671	11,166,755	15,038,065
SOCIODEMOGRAPHIC CHARACTERISTICS													
Age													
Mean ± SD	39.07 ± 24.08	34.34 ± 19.79	38.64 ± 19.33	42.20 ± 21.15	21.49 ± 16.25	36.15 ± 21.18	39.04 ± 19.96	29.13 ± 17.96	39.32 ± 21.30	58.55 ± 24.02	29.90 ± 16.58	42.30 ± 23.32	40.99 ± 22.87
Median (IQR)	39 (16–55)	40 (14–50)	41 (23–54)	46 (27–59)	16 (8–35)	37 (17–54)	42 (24–53)	28 (16–40)	41 (23–55)	55 (46–83)	29 (21–37)	43 (23–61)	41 (23–59)
Age group, n (%)													
0–9 years	176,066 (14.3%)	15,410 (18.1%)	123,660 (8.9%)	12,529 (10.0%)	963 (29.2%)	15,536 (13.9%)	19,738 (10.2%)	10,074 (15.1%)	4,506 (10.9%)	219 (3.3%)	86,140 (13.8%)	1,074,432 (9.6%)	1,539,273 (10.2%)
Second generation	171,333 (13.9%)	15,223 (17.9%)	110,863 (8.0%)	10,806 (8.6%)	331 (10.0%)	12,321 (11.0%)	19,173 (9.9%)	9,534 (14.3%)	4,303 (10.4%)	219 (3.3%)			
Immigrant or refugee	4,733 (0.4%)	187 (0.2%)	12,797 (0.9%)	1,723 (1.4%)	632 (19.2%)	3,215 (2.9%)	565 (0.3%)	540 (0.8%)	203 (0.5%)	0 (0%)			
10–19 years	185,986 (15.1%)	11,674 (13.7%)	167,251 (12.1%)	13,320 (10.6%)	876 (26.6%)	16,528 (14.8%)	22,487 (11.6%)	11,749 (17.6%)	4,499 (10.9%)	475 (7.2%)	63,198 (10.1%)	1,146,176 (10.3%)	1,644,219 (10.9%)
Second generation	165,732 (13.5%)	7,482 (8.8%)	85,266 (6.2%)	8,212 (6.5%)	0 (0%)	8,025 (7.2%)	16,479 (8.5%)	4,461 (6.7%)	2,245 (5.4%)	464 (7.0%)			
Immigrant or refugee	20,254 (1.6%)	4,192 (4.9%)	81,985 (5.9%)	5,108 (4.1%)	876 (26.6%)	8,503 (7.6%)	6,008 (3.1%)	7,288 (10.9%)	2,254 (5.4%)	11 (0.2%)			
20–29 years	58,168 (4.7%)	3,747 (4.4%)	158,558 (11.5%)	8,636 (6.9%)	367 (11.1%)	11,472 (10.3%)	17,203 (8.9%)	14,665 (22.0%)	4,837 (11.7%)	126 (1.9%)	164,695 (26.3%)	1,524,010 (13.6%)	1,966,484 (13.1%)
30–39 years	195,833 (15.9%)	10,204 (12.0%)	217,716 (15.8%)	18,500 (14.7%)	542 (16.5%)	17,841 (15.9%)	30,327 (15.6%)	13,246 (19.9%)	5,843 (14.1%)	315 (4.8%)	179,380 (28.7%)	1,435,458 (12.9%)	2,125,205 (14.1%)
40–49 years	206,899 (16.8%)	22,617 (26.6%)	243,310 (17.6%)	15,295 (12.2%)	371 (11.3%)	14,680 (13.1%)	39,662 (20.4%)	6,211 (9.3%)	7,319 (17.7%)	963 (14.6%)	65,079 (10.4%)	1,366,303 (12.2%)	1,988,709 (13.2%)
50–59 years	153,753 (12.5%)	15,523 (18.2%)	267,219 (19.3%)	27,583 (21.9%)	112 (3.4%)	17,903 (16.0%)	37,398 (19.2%)	6,239 (9.4%)	7,32 (17.7%)	1,717 (26.0%)	27,596 (4.4%)	1,600,518 (14.3%)	2,162,890 (14.4%)
60–69 years	93,260 (7.6%)	5,076 (6.0%)	159,240 (11.5%)	21,700 (17.3%)	46 (1.4%)	13,212 (11.8%)	17,963 (9.2%)	3,360 (5.0%)	4,111 (9.9%)	419 (6.4%)	22,317 (3.6%)	1,471,712 (13.2%)	1,812,416 (12.1%)
70+ years	158,800 (12.9%)	897 (1.0%)	44,918 (3.2%)	8,181 (6.4%)	17 (0.6%)	4,719 (4.2%)	9,514 (4.8%)	1,082 (1.6%)	2,965 (7.1%)	2,364 (35.8%)	17,266 (2.8%)	1,548,146 (13.9%)	1,798,869 (11.9%)

Variable	Sponsored family members	Economic immigrant, caregiver	Economic immigrant, other	Privately sponsored refugees	Blended visa office–referred refugees	Govt-assisted refugees	Protected persons/ Refugees (asylum seekers)	Refugee dependents	Humanitarian and compassionate/Public policy cases	Other immigrants	Other newcomers to Ontario	Canadian-born and long-term residents	Total
Number	1,228,765	85,148	1,381,872	125,744	3,294	111,891	194,292	66,626	41,409	6,598	625,671	11,166,755	15,038,065
Sex, n (%)													
Female	677,427 (55.1%)	63,354 (74.4%)	657,359 (47.6%)	55,510 (44.1%)	1,614 (49.0%)	52,106 (46.6%)	90,599 (46.6%)	35,688 (53.6%)	21,760 (52.5%)	3,388 (51.3%)	308,057 (49.2%)	5,637,060 (50.5%)	7,603,922 (50.6%)
Male	551,338 (44.9%)	21,794 (25.6%)	724,513 (52.4%)	70,234 (55.9%)	1,680 (51.0%)	59,785 (53.4%)	103,693 (53.4%)	30,938 (46.4%)	19,649 (47.5%)	3,210 (48.7%)	317,614 (50.8%)	5,529,695 (49.5%)	7,434,143 (49.4%)
Neighbourhood income quintile, n (%)													
Q1 (lowest)	295,104 (24.0%)	35,331 (41.5%)	264,909 (19.2%)	39,102 (31.1%)	1,643 (49.9%)	45,494 (40.7%)	66,932 (34.4%)	23,142 (34.7%)	14,046 (33.9%)	1,547 (23.4%)	180,092 (28.8%)	1,985,576 (17.8%)	2,952,918 (19.6%)
Q2	273,898 (22.3%)	20,616 (24.2%)	267,252 (19.3%)	24,121 (19.2%)	808 (24.5%)	22,562 (20.2%)	43,066 (22.2%)	16,257 (24.4%)	9,789 (23.6%)	1,436 (21.8%)	141,839 (22.7%)	2,111,353 (18.9%)	2,932,997 (19.5%)
Q3	275,275 (22.4%)	13,532 (15.9%)	292,567 (21.2%)	24,634 (19.6%)	427 (13.0%)	18,549 (16.6%)	36,412 (18.7%)	12,585 (18.9%)	8,018 (19.4%)	1,184 (17.9%)	119,894 (19.2%)	2,219,074 (19.9%)	3,022,151 (20.1%)
Q4	224,850 (18.3%)	9,174 (10.8%)	301,077 (21.8%)	22,316 (17.7%)	222 (6.7%)	15,178 (13.6%)	30,737 (15.8%)	9,590 (14.4%)	6,015 (14.5%)	1,266 (19.2%)	99,206 (15.9%)	2,320,273 (20.8%)	3,039,904 (20.2%)
Q5 (highest)	156,041 (12.7%)	6,419 (7.5%)	250,779 (18.1%)	15,208 (12.1%)	189 (5.7%)	9,845 (8.8%)	16,597 (8.5%)	4,863 (7.3%)	3,433 (8.3%)	1,139 (17.3%)	80,753 (12.9%)	2,491,952 (22.3%)	3,037,218 (20.2%)
Missing	3,597 (0.3%)	76 (0.1%)	5,288 (0.4%)	363 (0.3%)	< 6	263 (0.2%)	548 (0.3%)	189 (0.3%)	108 (0.3%)	26 (0.4%)	3,887 (0.6%)	38,527 (0.3%)	52,877 (0.4%)
Ethnic concentration quintile, n (%)													
Q1 (lowest)	34,268 (2.8%)	1,823 (2.1%)	31,586 (2.3%)	3,702 (2.9%)	309 (9.4%)	2,844 (2.5%)	3,109 (1.6%)	827 (1.2%)	995 (2.4%)	148 (2.2%)	25,133 (4.0%)	2,115,320 (18.9%)	2,220,064 (14.8%)
Q2	60,435 (4.9%)	3,971 (4.7%)	62,368 (4.5%)	7,726 (6.1%)	400 (12.1%)	7,095 (6.3%)	7,261 (3.7%)	2,197 (3.3%)	1,794 (4.3%)	222 (3.4%)	39,185 (6.3%)	2,189,766 (19.6%)	2,382,420 (15.8%)
Q3	114,883 (9.3%)	7,532 (8.8%)	131,931 (9.5%)	15,396 (12.2%)	564 (17.1%)	14,122 (12.6%)	16,393 (8.4%)	5,206 (7.8%)	3,915 (9.5%)	408 (6.2%)	70,318 (11.2%)	2,240,655 (20.1%)	2,621,323 (17.4%)
Q4	254,974 (20.8%)	18,345 (21.5%)	323,545 (23.4%)	30,976 (24.6%)	683 (20.7%)	30,455 (27.2%)	41,419 (21.3%)	12,741 (19.1%)	8,699 (21.0%)	1,121 (17.0%)	142,197 (22.7%)	2,315,545 (20.7%)	3,180,700 (21.2%)
Q5 (highest)	759,952 (61.8%)	53,366 (62.7%)	826,430 (59.8%)	67,524 (53.7%)	1,332 (40.4%)	57,041 (51.0%)	125,473 (64.6%)	45,433 (68.2%)	25,880 (62.5%)	4,672 (70.8%)	343,757 (54.9%)	2,170,446 (19.4%)	4,481,306 (29.8%)
Missing	4,253 (0.3%)	111 (0.1%)	6,012 (0.4%)	420 (0.3%)	6 (0.2%)	334 (0.3%)	637 (0.3%)	222 (0.3%)	126 (0.3%)	27 (0.4%)	5,081 (0.8%)	135,023 (1.2%)	152,252 (1.0%)

Variable	Sponsored family members	Economic immigrant, caregiver	Economic immigrant, other	Privately sponsored refugees	Blended visa office–referred refugees	Govt-assisted refugees	Protected persons/ Refugees (asylum seekers)	Refugee dependents	Humanitarian and compassionate/Public policy cases	Other immigrants	Other newcomers to Ontario	Canadian-born and long-term residents	Total
Number	1,228,765	85,148	1,381,872	125,744	3,294	111,891	194,292	66,626	41,409	6,598	625,671	11,166,755	15,038,065
Residential instability quintile, n (%)													
Q1 (lowest)	390,349 (31.8%)	10,963 (12.9%)	418,522 (30.3%)	29,543 (23.5%)	183 (5.6%)	17,045 (15.2%)	44,867 (23.1%)	16,626 (25.0%)	9,115 (22.0%)	2,153 (32.6%)	122,698 (19.6%)	2,262,962 (20.3%)	3,325,026 (22.1%)
Q2	205,093 (16.7%)	9,827 (11.5%)	236,955 (17.1%)	19,272 (15.3%)	239 (7.3%)	14,455 (12.9%)	28,481 (14.7%)	10,135 (15.2%)	6,294 (15.2%)	1,138 (17.2%)	79,683 (12.7%)	2,219,188 (19.9%)	2,830,760 (18.8%)
Q3	173,678 (14.1%)	11,126 (13.1%)	199,598 (14.4%)	17,903 (14.2%)	402 (12.2%)	16,057 (14.4%)	26,044 (13.4%)	9,227 (13.8%)	5,950 (14.4%)	762 (11.5%)	81,999 (13.1%)	2,155,056 (19.3%)	2,697,802 (17.9%)
Q4	177,678 (14.5%)	16,959 (19.9%)	178,034 (12.9%)	21,375 (17.0%)	842 (25.6%)	20,825 (18.6%)	30,969 (15.9%)	10,192 (15.3%)	7,229 (17.5%)	740 (11.2%)	88,855 (14.2%)	2,083,435 (18.7%)	2,637,133 (17.5%)
Q5 (highest)	277,714 (22.6%)	36,162 (42.5%)	342,751 (24.8%)	37,231 (29.6%)	1,622 (49.2%)	43,175 (38.6%)	63,294 (32.6%)	20,224 (30.4%)	12,695 (30.7%)	1,778 (26.9%)	247,355 (39.5%)	2,311,091 (20.7%)	3,395,092 (22.6%)
Missing	4,253 (0.3%)	111 (0.1%)	6,012 (0.4%)	420 (0.3%)	6 (0.2%)	334 (0.3%)	637 (0.3%)	222 (0.3%)	126 (0.3%)	27 (0.4%)	5,081 (0.8%)	135,023 (1.2%)	152,252 (1.0%)
Number of persons per dwelling quintile, n (%)													
Q1 (lowest)	134,377 (10.9%)	13,674 (16.1%)	190,969 (13.8%)	17,201 (13.7%)	965 (29.3%)	21,009 (18.8%)	28,423 (14.6%)	8,248 (12.4%)	5,621 (13.6%)	950 (14.4%)	155,452 (24.8%)	2,125,780 (19.0%)	2,702,669 (18.0%)
Q2	116,942 (9.5%)	12,256 (14.4%)	126,109 (9.1%)	15,862 (12.6%)	886 (26.9%)	17,459 (15.6%)	21,322 (11.0%)	6,900 (10.4%)	4,582 (11.1%)	819 (12.4%)	79,310 (12.7%)	2,160,464 (19.3%)	2,562,911 (17.0%)
Q3	97,754 (8.0%)	11,024 (12.9%)	108,880 (7.9%)	12,029 (9.6%)	386 (11.7%)	12,731 (11.4%)	16,948 (8.7%)	5,569 (8.4%)	3,951 (9.5%)	352 (5.3%)	58,062 (9.3%)	1,677,642 (15.0%)	2,005,328 (13.3%)
Q4	257,664 (21.0%)	24,498 (28.8%)	291,348 (21.1%)	30,734 (24.4%)	570 (17.3%)	27,032 (24.2%)	43,796 (22.5%)	14,424 (21.6%)	9,669 (23.3%)	1,115 (16.9%)	117,375 (18.8%)	2,750,338 (24.6%)	3,568,563 (23.7%)
Q5 (highest)	617,796 (50.3%)	23,580 (27.7%)	658,334 (47.6%)	49,475 (39.3%)	482 (14.6%)	33,319 (29.8%)	83,125 (42.8%)	31,232 (46.9%)	17,458 (42.2%)	3,336 (50.6%)	210,159 (33.6%)	2,382,945 (21.3%)	4,111,241 (27.3%)
Missing	4,232 (0.3%)	116 (0.1%)	6,232 (0.5%)	443 (0.4%)	< 6	341 (0.3%)	678 (0.3%)	253 (0.4%)	128 (0.3%)	26 (0.4%)	5,313 (0.8%)	69,586 (0.6%)	87,353 (0.6%)
Public health unit of residence, n (%)													
Algoma Public Health	1,247 (0.1%)	25 (0.0%)	811 (0.1%)	82 (0.1%)	30 (0.9%)	91 (0.1%)	44 (0.0%)	19 (0.0%)	24 (0.1%)	8 (0.1%)	1,044 (0.2%)	115,495 (1.0%)	118,920 (0.8%)
Brant County Health Unit	5,669 (0.5%)	289 (0.3%)	3,670 (0.3%)	584 (0.5%)	27 (0.8%)	312 (0.3%)	389 (0.2%)	141 (0.2%)	124 (0.3%)	14 (0.2%)	2,066 (0.3%)	147,247 (1.3%)	160,532 (1.1%)

Variable	Sponsored family members	Economic immigrant, caregiver	Economic immigrant, other	Privately sponsored refugees	Blended visa office–referred refugees	Govt-assisted refugees	Protected persons/Refugees (asylum seekers)	Refugee dependents	Humanitarian and compassionate/Public policy cases	Other immigrants	Other newcomers to Ontario	Canadian-born and long-term residents	Total
Number	1,228,765	85,148	1,381,872	125,744	3,294	111,891	194,292	66,626	41,409	6,598	625,671	11,166,755	15,038,065
Durham Region Health Department	60,741 (4.9%)	2,714 (3.2%)	54,607 (4.0%)	5,290 (4.2%)	47 (1.4%)	2,963 (2.6%)	10,137 (5.2%)	3,487 (5.2%)	1,960 (4.7%)	182 (2.8%)	14,325 (2.3%)	567,358 (5.1%)	723,811 (4.8%)
Grey Bruce Health Unit	2,372 (0.2%)	75 (0.1%)	2,846 (0.2%)	159 (0.1%)	69 (2.1%)	93 (0.1%)	121 (0.1%)	57 (0.1%)	35 (0.1%)	9 (0.1%)	1,490 (0.2%)	165,648 (1.5%)	172,974 (1.2%)
Haldimand-Norfolk Health Unit	2,004 (0.2%)	83 (0.1%)	1,506 (0.1%)	160 (0.1%)	1–10	94 (0.1%)	140 (0.1%)	24 (0.0%)	71 (0.2%)	< 6	818 (0.1%)	109,389 (1.0%)	114,300 (0.8%)
Haliburton, Kawartha, Pine Ridge District Health Unit	2,426 (0.2%)	126 (0.1%)	2,216 (0.2%)	217 (0.2%)	37 (1.1%)	97 (0.1%)	191 (0.1%)	47 (0.1%)	82 (0.2%)	15 (0.2%)	1,087 (0.2%)	186,596 (1.7%)	193,137 (1.3%)
Halton Region Health Department	45,643 (3.7%)	2,885 (3.4%)	82,433 (6.0%)	4,893 (3.9%)	154 (4.7%)	2,365 (2.1%)	4,937 (2.5%)	1,332 (2.0%)	1,050 (2.5%)	126 (1.9%)	27,991 (4.5%)	450,663 (4.0%)	624,472 (4.2%)
City of Hamilton – Public Health & Social Services	33,941 (2.8%)	2,506 (2.9%)	32,656 (2.4%)	7,202 (5.7%)	151 (4.6%)	9,929 (8.9%)	6,914 (3.6%)	2,047 (3.1%)	1,549 (3.7%)	83 (1.3%)	17,149 (2.7%)	472,422 (4.2%)	586,549 (3.9%)
Hastings and Prince Edward Counties Health Unit	2,545 (0.2%)	149 (0.2%)	2,086 (0.2%)	171 (0.1%)	15 (0.5%)	163 (0.1%)	162 (0.1%)	63 (0.1%)	51 (0.1%)	7 (0.1%)	2,291 (0.4%)	167,450 (1.5%)	175,153 (1.2%)
Huron Perth Health Unit	2,081 (0.2%)	70 (0.1%)	2,391 (0.2%)	178 (0.1%)	92 (2.8%)	176 (0.2%)	100 (0.1%)	35 (0.1%)	20–30	< 6	1,753 (0.3%)	137,061 (1.2%)	143,970 (1.0%)
Chatham-Kent Health Unit	1,978 (0.2%)	51 (0.1%)	1,074 (0.1%)	174 (0.1%)	44 (1.3%)	169 (0.2%)	92 (0.0%)	16 (0.0%)	94 (0.2%)	11 (0.2%)	1,263 (0.2%)	103,983 (0.9%)	108,949 (0.7%)
Kingston, Frontenac and Lennox & Addington Health Unit	3,643 (0.3%)	227 (0.3%)	5,454 (0.4%)	297 (0.2%)	42 (1.3%)	376 (0.3%)	292 (0.2%)	114 (0.2%)	64 (0.2%)	7 (0.1%)	4,987 (0.8%)	190,858 (1.7%)	206,361 (1.4%)
Lambton Health Unit	2,195 (0.2%)	75 (0.1%)	1,894 (0.1%)	156 (0.1%)	48 (1.5%)	134 (0.1%)	85 (0.0%)	23 (0.0%)	33 (0.1%)	6 (0.1%)	2,004 (0.3%)	128,251 (1.1%)	134,904 (0.9%)
Leeds, Grenville and Lanark District Health Unit	2,157 (0.2%)	138 (0.2%)	1,603 (0.1%)	96 (0.1%)	55 (1.7%)	83 (0.1%)	89 (0.0%)	28 (0.0%)	56 (0.1%)	13 (0.2%)	2,070 (0.3%)	176,413 (1.6%)	182,801 (1.2%)
Middlesex-London Health Unit	20,843 (1.7%)	1,165 (1.4%)	26,240 (1.9%)	5,419 (4.3%)	176 (5.3%)	9,800 (8.8%)	5,650 (2.9%)	1,408 (2.1%)	824 (2.0%)	59 (0.9%)	19,789 (3.2%)	414,089 (3.7%)	505,462 (3.4%)
Niagara Region Public Health Department	16,202 (1.3%)	1,134 (1.3%)	14,645 (1.1%)	2,372 (1.9%)	87 (2.6%)	1,261 (1.1%)	3,993 (2.1%)	1,180 (1.8%)	758 (1.8%)	64 (1.0%)	9,533 (1.5%)	434,929 (3.9%)	486,158 (3.2%)

Variable	Sponsored family members	Economic immigrant, caregiver	Economic immigrant, other	Privately sponsored refugees	Blended visa office–referred refugees	Govt-assisted refugees	Protected persons/Refugees (asylum seekers)	Refugee dependents	Humanitarian and compassionate/Public policy cases	Other immigrants	Other newcomers to Ontario	Canadian-born and long-term residents	Total
Number	1,228,765	85,148	1,381,872	125,744	3,294	111,891	194,292	66,626	41,409	6,598	625,671	11,166,755	15,038,065
North Bay Parry Sound District Health Unit	1,298 (0.1%)	52 (0.1%)	1,067 (0.1%)	100 (0.1%)	21 (0.6%)	62 (0.1%)	54 (0.0%)	10–20	30 (0.1%)	< 6	1,084 (0.2%)	130,820 (1.2%)	134,606 (0.9%)
Northwestern Health Unit	742 (0.1%)	117 (0.1%)	609 (0.0%)	15 (0.0%)	7 (0.2%)	15 (0.0%)	14 (0.0%)	7 (0.0%)	16 (0.0%)	8 (0.1%)	1,710 (0.3%)	86,421 (0.8%)	89,681 (0.6%)
Ottawa Public Health	59,957 (4.9%)	4,645 (5.5%)	71,450 (5.2%)	6,761 (5.4%)	459 (13.9%)	14,227 (12.7%)	15,592 (8.0%)	4,501 (6.8%)	2,295 (5.5%)	197 (3.0%)	57,028 (9.1%)	832,340 (7.5%)	1,069,452 (7.1%)
Peel Public Health	295,614 (24.1%)	9,717 (11.4%)	294,471 (21.3%)	21,714 (17.3%)	169 (5.1%)	11,019 (9.8%)	26,143 (13.5%)	9,662 (14.5%)	6,398 (15.5%)	617 (9.4%)	115,009 (18.4%)	802,002 (7.2%)	1,592,535 (10.6%)
Peterborough County-City Health Unit	2,431 (0.2%)	114 (0.1%)	2,322 (0.2%)	306 (0.2%)	30–40	325 (0.3%)	268 (0.1%)	91 (0.1%)	55 (0.1%)	< 6	1,746 (0.3%)	141,805 (1.3%)	149,500 (1.0%)
Porcupine Health Unit	585 (0.0%)	76 (0.1%)	502 (0.0%)	22 (0.0%)	< 6	10–20	38 (0.0%)	19 (0.0%)	20 (0.0%)	< 6	774 (0.1%)	85,910 (0.8%)	87,967 (0.6%)
Renfrew County and District Health Unit	1,161 (0.1%)	56 (0.1%)	1,177 (0.1%)	76 (0.1%)	18 (0.5%)	57 (0.1%)	45 (0.0%)	1–10	25 (0.1%)	< 6	1,935 (0.3%)	103,069 (0.9%)	107,631 (0.7%)
Eastern Ontario Health Unit	2,285 (0.2%)	145 (0.2%)	1,859 (0.1%)	87 (0.1%)	10–20	133 (0.1%)	346 (0.2%)	134 (0.2%)	91 (0.2%)	< 6	5,077 (0.8%)	211,999 (1.9%)	222,174 (1.5%)
Simcoe Muskoka District Health Unit	22,155 (1.8%)	1,302 (1.5%)	18,580 (1.3%)	2,607 (2.1%)	86 (2.6%)	1,428 (1.3%)	3,060 (1.6%)	1,060 (1.6%)	878 (2.1%)	38 (0.6%)	8,399 (1.3%)	546,750 (4.9%)	606,343 (4.0%)
Sudbury and District Health Unit	2,084 (0.2%)	103 (0.1%)	2,112 (0.2%)	137 (0.1%)	33 (1.0%)	88 (0.1%)	176 (0.1%)	85 (0.1%)	38 (0.1%)	7 (0.1%)	2,989 (0.5%)	199,270 (1.8%)	207,122 (1.4%)
Thunder Bay District Health Unit	1,810 (0.1%)	107 (0.1%)	1,455 (0.1%)	411 (0.3%)	42 (1.3%)	310 (0.3%)	90 (0.0%)	27 (0.0%)	26 (0.1%)	6 (0.1%)	2,411 (0.4%)	154,379 (1.4%)	161,074 (1.1%)
Timiskaming Health Unit	257 (0.0%)	< 6	150 (0.0%)	13 (0.0%)	0 (0.0%)	< 6	11 (0.0%)	< 6	< 6	< 6	299 (0.0%)	33,874 (0.3%)	34,621 (0.2%)
Region of Waterloo Public Health	36,425 (3.0%)	1,262 (1.5%)	41,056 (3.0%)	7,309 (5.8%)	384 (11.7%)	11,557 (10.3%)	4,561 (2.3%)	1,377 (2.1%)	923 (2.2%)	70 (1.1%)	26,943 (4.3%)	463,066 (4.1%)	594,933 (4.0%)
Wellington-Dufferin-Guelph Health Unit	14,819 (1.2%)	1,141 (1.3%)	14,829 (1.1%)	2,539 (2.0%)	124 (3.8%)	1,220 (1.1%)	1,111 (0.6%)	445 (0.7%)	271 (0.7%)	33 (0.5%)	7,479 (1.2%)	270,815 (2.4%)	314,826 (2.1%)

Variable	Sponsored family members	Economic immigrant, caregiver	Economic immigrant, other	Privately sponsored refugees	Blended visa office–referred refugees	Govt-assisted refugees	Protected persons/ Refugees (asylum seekers)	Refugee dependents	Humanitarian and compassionate/Public policy cases	Other immigrants	Other newcomers to Ontario	Canadian-born and long-term residents	Total
Number	1,228,765	85,148	1,381,872	125,744	3,294	111,891	194,292	66,626	41,409	6,598	625,671	11,166,755	15,038,065
Windsor-Essex County Health Unit	25,062 (2.0%)	655 (0.8%)	22,851 (1.7%)	5,340 (4.2%)	135 (4.1%)	8,445 (7.5%)	4,433 (2.3%)	1,334 (2.0%)	1,279 (3.1%)	102 (1.5%)	17,214 (2.8%)	364,418 (3.3%)	451,268 (3.0%)
York Region Public Health Services	157,727 (12.8%)	6,706 (7.9%)	230,825 (16.7%)	6,681 (6.0%)	24,702 (12.7%)	9,515 (14.3%)	5,109 (12.3%)	2,233 (33.8%)			52,940 (8.5%)	752,800 (6.7%)	1,261,060 (8.4%)
Southwestern Health Unit	5,660 (0.5%)	192 (0.2%)	3,865 (0.3%)	565 (0.4%)	44 (1.3%)	381 (0.3%)	334 (0.2%)	92 (0.1%)	162 (0.4%)	6 (0.1%)	2,304 (0.4%)	206,375 (1.8%)	219,980 (1.5%)
Toronto Public Health	389,455 (31.7%)	46,969 (55.2%)	431,320 (31.2%)	38,188 (30.4%)	563 (17.1%)	27,556 (24.6%)	79,434 (40.9%)	28,043 (42.1%)	16,878 (40.8%)	2,624 (39.8%)	206,804 (33.1%)	1,779,714 (15.9%)	3,047,548 (20.3%)
Unknown/ missing	3,551 (0.3%)	73 (0.1%)	5,240 (0.4%)	356 (0.3%)	< 6	262 (0.2%)	544 (0.3%)	185 (0.3%)	107 (0.3%)	26 (0.4%)	3,866 (0.6%)	33,076 (0.3%)	47,291 (0.3%)
CLINICAL CHARACTERISTICS													
Chronic conditions, n (%)													
Respiratory (asthma, COPD)	160,493 (13.1%)	7,928 (9.3%)	136,426 (9.9%)	17,712 (14.1%)	114 (3.5%)	14,384 (12.9%)	28,470 (14.7%)	6,559 (9.8%)	4,573 (11.0%)	1,155 (17.5%)	3,197 (0.5%)	2,396,958 (21.5%)	2,777,969 (18.5%)
Chronic kidney disease (incl. chronic dialysis)	24,457 (2.0%)	830 (1.0%)	15,773 (1.1%)	2,169 (1.7%)	19 (0.6%)	1,513 (1.4%)	3,453 (1.8%)	572 (0.9%)	804 (1.9%)	340 (5.2%)	2,202 (0.4%)	242,761 (2.2%)	294,893 (2.0%)
Diabetes	135,996 (11.1%)	6,120 (7.2%)	121,189 (8.8%)	15,175 (12.1%)	111 (3.4%)	11,108 (9.9%)	25,089 (12.9%)	4,289 (6.4%)	4,847 (11.7%)	1,269 (19.2%)	9,069 (1.4%)	1,071,906 (9.6%)	1,406,168 (9.4%)
Cardiovascular (CHF, TIA/ stroke, Ischemic cardiac disease, hypertension)	235,750 (19.2%)	13,193 (15.5%)	211,508 (15.3%)	28,341 (22.5%)	91 (2.8%)	17,667 (15.8%)	35,361 (18.2%)	5,824 (8.7%)	7,820 (18.9%)	2,562 (38.8%)	12,238 (2.0%)	2,525,735 (22.6%)	3,096,090 (20.6%)
Immuno-compromised	8,321 (0.7%)	366 (0.4%)	6,719 (0.5%)	985 (0.8%)	19 (0.6%)	1,088 (1.0%)	2,709 (1.4%)	432 (0.6%)	398 (1.0%)	86 (1.3%)	814 (0.1%)	100,174 (0.9%)	122,111 (0.8%)
Inflammatory (IBD, rheumatoid arthritis)	8,328 (0.7%)	339 (0.4%)	8,216 (0.6%)	1,175 (0.9%)	< 6	848 (0.8%)	1,536 (0.8%)	324 (0.5%)	253 (0.6%)	60–70	296 (0.0%)	156,790 (1.4%)	178,171 (1.2%)
Liver disease	6,009 (0.5%)	227 (0.3%)	6,196 (0.4%)	903 (0.7%)	< 6	769 (0.7%)	1,302 (0.7%)	255 (0.4%)	287 (0.7%)	60–70	341 (0.1%)	75,972 (0.7%)	92,326 (0.6%)

Variable	Sponsored family members	Economic immigrant, caregiver	Economic immigrant, other	Privately sponsored refugees	Blended visa office–referred refugees	Govt-assisted refugees	Protected persons/Refugees (asylum seekers)	Refugee dependents	Humanitarian and compassionate/Public policy cases	Other immigrants	Other newcomers to Ontario	Canadian-born and long-term residents	Total
Number	1,228,765	85,148	1,381,872	125,744	3,294	111,891	194,292	66,626	41,409	6,598	625,671	11,166,755	15,038,065
IMMIGRATION CHARACTERISTICS													
Recency of immigration, n (%)													
Recent (0 to ≤ 5 years)	55,853 (4.5%)	10,664 (12.5%)	40,233 (2.9%)	11,634 (9.3%)	2830–2840	13,484 (12.1%)	2,384 (1.2%)	4,167 (6.3%)	1,464 (3.5%)	< 6			142,720 (0.9%)
Intermediate (>5 to ≤10 years)	148,858 (12.1%)	10,169 (11.9%)	194,866 (14.1%)	10,568 (8.4%)	120–130	11,166 (10.0%)	27,747 (14.3%)	11,809 (17.7%)	8,063 (19.5%)	40–50			423,423 (2.8%)
Long-term residents (>10 years)	686,929 (55.9%)	41,608 (48.9%)	950,596 (68.8%)	84,521 (67.2%)	0 (0.0%)	66,892 (59.8%)	128,497 (66.1%)	36,653 (55.0%)	25,333 (61.2%)	5,863 (88.9%)			2,026,892 (13.5%)
Second generation children and youth	337,125 (27.4%)	22,707 (26.7%)	196,177 (14.2%)	19,021 (15.1%)	331 (10.0%)	20,349 (18.2%)	35,664 (18.4%)	13,997 (21.0%)	6,549 (15.8%)	684 (10.4%)			652,604 (4.3%)
World subregion of origin, n (%)													
Central Africa	3,017 (0.2%)	29 (0.0%)	2,276 (0.2%)	445 (0.4%)	31 (0.9%)	2,314 (2.1%)	4,675 (2.4%)	1,585 (2.4%)	838 (2.0%)	27 (0.4%)			15,237 (0.1%)
Western Africa	25,018 (2.0%)	223 (0.3%)	16,734 (1.2%)	2,496 (2.0%)	41 (1.2%)	1,089 (1.0%)	7,897 (4.1%)	2,016 (3.0%)	1,525 (3.7%)	54 (0.8%)			57,093 (0.4%)
East Africa	28,782 (2.3%)	328 (0.4%)	19,013 (1.4%)	11,970 (9.5%)	171 (5.2%)	9,958 (8.9%)	28,687 (14.8%)	4,733 (7.1%)	1,863 (4.5%)	162 (2.5%)			105,667 (0.7%)
Southern Africa	2,761 (0.2%)	39 (0.0%)	11,215 (0.8%)	154 (0.1%)	< 6	160–170	488 (0.3%)	110–120	89 (0.2%)	20–30			15,069 (0.1%)
Middle East	64,196 (5.2%)	203 (0.2%)	148,203 (10.7%)	32,105 (25.5%)	2,762 (83.8%)	32,922 (29.4%)	19,648 (10.1%)	4,088 (6.1%)	2,225 (5.4%)	398 (6.0%)			306,750 (2.0%)
North Africa	14,649 (1.2%)	113 (0.1%)	31,714 (2.3%)	1,127 (0.9%)	59 (1.8%)	3,770 (3.4%)	4,641 (2.4%)	1,012 (1.5%)	408 (1.0%)	114 (1.7%)			57,607 (0.4%)
Central America	26,069 (2.1%)	224 (0.3%)	13,375 (1.0%)	4,921 (3.9%)	0 (0.0%)	10,920 (9.8%)	7,097 (3.7%)	1,591 (2.4%)	2,037 (4.9%)	98 (1.5%)			66,332 (0.4%)
South America	79,462 (6.5%)	1,127 (1.3%)	44,545 (3.2%)	2,475 (2.0%)	30 (0.9%)	2,174 (1.9%)	18,414 (9.5%)	3,236 (4.9%)	3,742 (9.0%)	153 (2.3%)			155,358 (1.0%)
Caribbean	127,793 (10.4%)	1,826 (2.1%)	43,651 (3.2%)	227 (0.2%)	0 (0.0%)	119 (0.1%)	8,854 (4.6%)	3,098 (4.6%)	5,515 (13.3%)	243 (3.7%)			191,326 (1.3%)
North America	39,053 (3.2%)	45 (0.1%)	25,044 (1.8%)	359 (0.3%)	0 (0.0%)	340 (0.3%)	682 (0.4%)	3,120 (4.7%)	1,528 (3.7%)	116 (1.8%)			70,287 (0.5%)
East Asia	165,622 (13.5%)	1,321 (1.6%)	272,562 (19.7%)	1,140 (0.9%)	0 (0.0%)	392 (0.4%)	14,883 (7.7%)	11,251 (16.9%)	5,886 (14.2%)	3,991 (60.5%)			477,048 (3.2%)

Variable	Sponsored family members	Economic immigrant, caregiver	Economic immigrant, other	Privately sponsored refugees	Blended visa office–referred refugees	Govt-assisted refugees	Protected persons/Refugees (asylum seekers)	Refugee dependents	Humanitarian and compassionate/Public policy cases	Other immigrants	Other newcomers to Ontario	Canadian-born and long-term residents	Total
Number	1,228,765	85,148	1,381,872	125,744	3,294	111,891	194,292	66,626	41,409	6,598	625,671	11,166,755	15,038,065
Australasia & Oceania/Asia unspecified	5,318 (0.4%)	74 (0.1%)	3,774 (0.3%)	152 (0.1%)	0 (0.0%)	1–6	28 (0.0%)	1–6	75 (0.2%)	11 (0.2%)			9,440 (0.1%)
Southeast Asia	125,018 (10.2%)	74,976 (88.1%)	123,912 (9.0%)	7,562 (6.0%)	148 (4.5%)	10,338 (9.2%)	847 (0.4%)	591 (0.9%)	1,742 (4.2%)	219 (3.3%)			345,353 (2.3%)
South Asia	354,393 (28.8%)	1,541 (1.8%)	370,460 (26.8%)	23,972 (19.1%)	< 6	13,119 (11.7%)	53,553 (27.6%)	23,056 (34.6%)	7,735 (18.7%)	500–600			848,423 (5.6%)
Eastern Europe	94,754 (7.7%)	1,703 (2.0%)	132,234 (9.6%)	30,717 (24.4%)	0 (0.0%)	8,669 (7.7%)	17,301 (8.9%)	4,441 (6.7%)	3,991 (9.6%)	132 (2.0%)			293,942 (2.0%)
Europe other	72,844 (5.9%)	1,375 (1.6%)	123,158 (8.9%)	5,897 (4.7%)	42 (1.3%)	15,577 (13.9%)	6,593 (3.4%)	2,688 (4.0%)	2,209 (5.3%)	263 (4.0%)			230,646 (1.5%)
Not stated													61 (0.0%)

Notes: 1. Denominator includes children aged ≤19 years of immigrant and refugee mothers in IRCC (second generation). 2. Chronic conditions have not been reported for newcomers due to an insufficient 2-year look-back period. 3. Chronic conditions were identified using validated algorithms for ICES data holdings; the latest diagnosis date is March 31, 2019. 4. Numbers are too low to report for 'not stated' group. 5. Some cells are suppressed due to low counts (n < 6) or reported as ranges to protect privacy.

Appendix 1.2. Baseline characteristics of immigrants and refugees landed in Ontario between January 1, 1985, and May 31, 2017, by world region of birth (Eastern Hemisphere), as of March 31, 2020

Eastern Hemisphere												
Variable	North Africa	East Africa	Western Africa	Central Africa	Southern Africa	Australasia & Oceania/ Asia unspecified	Middle East	East Asia	South Asia	Southeast Asia	Not stated	Total
Number	57,607	105,667	57,093	15,237	15,069	9,440	306,750	477,048	848,423	345,353	61	3,245,639
SOCIODEMOGRAPHIC CHARACTERISTICS												
Age												
Mean \pm SD	36.58 \pm 21.13	35.74 \pm 21.01	34.13 \pm 20.06	30.77 \pm 18.80	40.17 \pm 21.69	37.62 \pm 19.20	35.70 \pm 20.87	42.84 \pm 22.24	36.85 \pm 21.59	38.43 \pm 21.43		38.60 \pm 21.53
Median (IQR)	38 (17–53)	37 (17–52)	36 (15–50)	31 (14–46)	41 (23–56)	40 (21–51)	36 (18–51)	45 (28–58)	38 (17–52)	41 (19–54)		40 (19–54)
Age group, n (%)												
0–9 years	7,067 (12.3%)	14,472 (13.7%)	8,645 (15.1%)	2,685 (17.6%)	1,524 (10.1%)	918 (9.7%)	37,698 (12.3%)	47,572 (10.0%)	111,193 (13.1%)	40,918 (11.8%)		378,701 (11.7%)
Second generation	6,401 (11.1%)	13,897 (13.2%)	8,264 (14.5%)	2,575 (16.9%)	1,382 (9.2%)	771 (8.2%)	30,640 (10.0%)	45,626 (9.6%)	103,634 (12.2%)	39,593 (11.5%)		354,106 (54.3%)
Immigrants and refugees	666 (1.2%)	575 (0.5%)	381 (0.7%)	110 (0.7%)	142 (0.9%)	147 (1.6%)	7,058 (2.3%)	1,946 (0.4%)	7,559 (0.9%)	1,325 (0.4%)		24,595 (0.9%)
10–19 years	9,279 (16.1%)	17,093 (16.2%)	9,359 (16.4%)	2,297 (15.1%)	1,808 (12.0%)	1,354 (14.3%)	47,036 (15.3%)	45,392 (9.5%)	126,197 (14.9%)	47,028 (13.6%)		434,845 (13.4%)
Second generation	5,344 (9.3%)	13,007 (12.3%)	6,220 (10.9%)	1,351 (8.9%)	1,123 (7.5%)	827 (8.8%)	20,167 (6.6%)	35,556 (7.5%)	90,958 (10.7%)	31,735 (9.2%)		298,366 (45.7%)
Immigrants and refugees	3,935 (6.8%)	4,086 (3.9%)	3,139 (5.5%)	946 (6.2%)	685 (4.5%)	527 (5.6%)	26,869 (8.8%)	9,836 (2.1%)	35,239 (4.2%)	15,293 (4.4%)		136,479 (5.3%)
20–29 years	5,905 (10.3%)	8,922 (8.4%)	4,874 (8.5%)	2,266 (14.9%)	1,457 (9.7%)	664 (7.0%)	37,396 (12.2%)	36,417 (7.6%)	71,200 (8.4%)	31,415 (9.1%)		277,779 (8.6%)
30–39 years	7,632 (13.2%)	16,748 (15.8%)	9,092 (15.9%)	2,535 (16.6%)	2,460 (16.3%)	1,705 (18.1%)	52,594 (17.1%)	70,221 (14.7%)	142,568 (16.8%)	46,419 (13.4%)		510,367 (15.7%)
40–49 years	10,154 (17.6%)	17,822 (16.9%)	9,893 (17.3%)	2,649 (17.4%)	2,373 (15.7%)	2,147 (22.7%)	47,187 (15.4%)	76,494 (16.0%)	152,252 (17.9%)	64,012 (18.5%)		557,327 (17.2%)
50–59 years	9,458 (16.4%)	17,106 (16.2%)	9,328 (16.3%)	1,923 (12.6%)	2,410 (16.0%)	1,581 (16.7%)	43,608 (14.2%)	93,522 (19.6%)	113,602 (13.4%)	59,519 (17.2%)		534,776 (16.5%)
60–69 years	4,974 (8.6%)	8,523 (8.1%)	4,770 (8.4%)	685 (4.5%)	1,744 (11.6%)	695 (7.4%)	23,818 (7.8%)	53,905 (11.3%)	69,988 (8.2%)	34,129 (9.9%)		318,387 (9.8%)
70+ years	3,138 (5.4%)	4,981 (4.7%)	1,132 (2.0%)	197 (1.3%)	1,293 (8.6%)	376 (4.0%)	17,413 (5.7%)	53,525 (11.2%)	61,423 (7.2%)	21,913 (6.3%)		233,457 (7.2%)

Eastern Hemisphere												
Variable	North Africa	East Africa	Western Africa	Central Africa	Southern Africa	Australasia & Oceania/ Asia unspecified	Middle East	East Asia	South Asia	Southeast Asia	Not stated	Total
Number	57,607	105,667	57,093	15,237	15,069	9,440	306,750	477,048	848,423	345,353	61	3,245,639
Sex, n (%)												
Female	27,515 (47.8%)	54,605 (51.7%)	27,662 (48.5%)	7,638 (50.1%)	7,583 (50.3%)	4,279 (45.3%)	148,801 (48.5%)	252,950 (53.0%)	418,706 (49.4%)	195,949 (56.7%)		1,658,805 (51.1%)
Male	30,092 (52.2%)	51,062 (48.3%)	29,431 (51.5%)	7,599 (49.9%)	7,486 (49.7%)	5,161 (54.7%)	157,949 (51.5%)	224,098 (47.0%)	429,717 (50.6%)	149,404 (43.3%)		1,586,834 (48.9%)
Neighbourhood income quintile, n (%)												
Q1 (lowest)	14,351 (24.9%)	49,837 (47.2%)	21,094 (36.9%)	6,767 (44.4%)	1,816 (12.1%)	1,218 (12.9%)	77,157 (25.2%)	91,199 (19.1%)	183,090 (21.6%)	111,594 (32.3%)		787,250 (24.3%)
Q2	9,725 (16.9%)	19,516 (18.5%)	11,056 (19.4%)	2,869 (18.8%)	2,169 (14.4%)	1,711 (18.1%)	56,619 (18.5%)	103,159 (21.6%)	187,885 (22.1%)	81,904 (23.7%)		679,805 (20.9%)
Q3	9,924 (17.2%)	15,725 (14.9%)	12,132 (21.2%)	2,529 (16.6%)	2,455 (16.3%)	1,934 (20.5%)	56,055 (18.3%)	84,994 (17.8%)	222,065 (26.2%)	70,523 (20.4%)		683,183 (21.0%)
Q4	12,791 (22.2%)	12,722 (12.0%)	8,084 (14.2%)	1,927 (12.6%)	3,444 (22.9%)	1,991 (21.1%)	63,397 (20.7%)	104,977 (22.0%)	163,472 (19.3%)	52,248 (15.1%)		620,425 (19.1%)
Q5 (highest)	10,538 (18.3%)	7,626 (7.2%)	4,421 (7.7%)	1,068 (7.0%)	5,134 (34.1%)	2,552 (27.0%)	52,240 (17.0%)	91,675 (19.2%)	88,450 (10.4%)	28,421 (8.2%)		464,513 (14.3%)
Missing	278 (0.5%)	241 (0.2%)	306 (0.5%)	77 (0.5%)	51 (0.3%)	34 (0.4%)	1,282 (0.4%)	1,044 (0.2%)	3,461 (0.4%)	663 (0.2%)		10,463 (0.3%)
Ethnic concentration quintile, n (%)												
Q1 (lowest)	821 (1.4%)	1,307 (1.2%)	790 (1.4%)	314 (2.1%)	936 (6.2%)	858 (9.1%)	4,960 (1.6%)	5,169 (1.1%)	7,522 (0.9%)	6,472 (1.9%)		79,611 (2.5%)
Q2	2,263 (3.9%)	3,616 (3.4%)	1,826 (3.2%)	690 (4.5%)	1,562 (10.4%)	1,248 (13.2%)	13,265 (4.3%)	12,180 (2.6%)	18,243 (2.2%)	14,289 (4.1%)		153,469 (4.7%)
Q3	5,012 (8.7%)	8,053 (7.6%)	4,216 (7.4%)	1,640 (10.8%)	2,649 (17.6%)	1,916 (20.3%)	29,777 (9.7%)	30,973 (6.5%)	42,499 (5.0%)	30,228 (8.8%)		310,350 (9.6%)
Q4	14,398 (25.0%)	22,160 (21.0%)	10,070 (17.6%)	4,008 (26.3%)	4,969 (33.0%)	2,441 (25.9%)	81,246 (26.5%)	94,255 (19.8%)	133,142 (15.7%)	76,791 (22.2%)		722,958 (22.3%)
Q5 (highest)	34,784 (60.4%)	70,208 (66.4%)	39,861 (69.8%)	8,492 (55.7%)	4,887 (32.4%)	2,930 (31.0%)	176,100 (57.4%)	333,333 (69.9%)	643,416 (75.8%)	216,792 (62.8%)		1,967,103 (60.6%)
Missing	329 (0.6%)	323 (0.3%)	330 (0.6%)	93 (0.6%)	66 (0.4%)	47 (0.5%)	1,402 (0.5%)	1,138 (0.2%)	3,601 (0.4%)	781 (0.2%)		12,148 (0.4%)

Eastern Hemisphere												
Variable	North Africa	East Africa	Western Africa	Central Africa	Southern Africa	Australasia & Oceania/ Asia unspecified	Middle East	East Asia	South Asia	Southeast Asia	Not stated	Total
Number	57,607	105,667	57,093	15,237	15,069	9,440	306,750	477,048	848,423	345,353	61	3,245,639
Residential instability quintile, n (%)												
Q1 (lowest)	15,873 (27.6%)	15,795 (14.9%)	14,505 (25.4%)	2,065 (13.6%)	4,486 (29.8%)	2,374 (25.1%)	75,803 (24.7%)	161,736 (33.9%)	347,800 (41.0%)	70,348 (20.4%)		939,366 (28.9%)
Q2	9,156 (15.9%)	11,884 (11.2%)	7,282 (12.8%)	1,847 (12.1%)	2,638 (17.5%)	1,620 (17.2%)	50,076 (16.3%)	90,826 (19.0%)	135,769 (16.0%)	51,825 (15.0%)		531,889 (16.4%)
Q3	7,716 (13.4%)	12,307 (11.6%)	7,123 (12.5%)	1,958 (12.9%)	2,193 (14.6%)	1,513 (16.0%)	41,762 (13.6%)	65,628 (13.8%)	113,880 (13.4%)	49,776 (14.4%)		460,747 (14.2%)
Q4	7,885 (13.7%)	20,814 (19.7%)	9,625 (16.9%)	2,901 (19.0%)	2,306 (15.3%)	1,572 (16.7%)	41,525 (13.5%)	50,134 (10.5%)	100,826 (11.9%)	63,217 (18.3%)		464,843 (14.3%)
Q5 (highest)	16,648 (28.9%)	44,544 (42.2%)	18,228 (31.9%)	6,373 (41.8%)	3,380 (22.4%)	2,314 (24.5%)	96,182 (31.4%)	107,586 (22.6%)	146,547 (17.3%)	109,406 (31.7%)		836,646 (25.8%)
Missing	329 (0.6%)	323 (0.3%)	330 (0.6%)	93 (0.6%)	66 (0.4%)	47 (0.5%)	1,402 (0.5%)	1,138 (0.2%)	3,601 (0.4%)	781 (0.2%)		12,148 (0.4%)
Number of persons per dwelling quintile, n (%)												
Q1 (lowest)	8,760 (15.2%)	20,260 (19.2%)	5,988 (10.5%)	3,173 (20.8%)	2,514 (16.7%)	1,821 (19.3%)	51,488 (16.8%)	62,715 (13.1%)	54,228 (6.4%)	45,447 (13.2%)		421,437 (13.0%)
Q2	5,954 (10.3%)	14,219 (13.5%)	5,206 (9.1%)	2,350 (15.4%)	1,887 (12.5%)	1,347 (14.3%)	33,427 (10.9%)	41,554 (8.7%)	48,696 (5.7%)	41,661 (12.1%)		323,137 (10.0%)
Q3	4,876 (8.5%)	10,142 (9.6%)	4,757 (8.3%)	1,617 (10.6%)	1,673 (11.1%)	1,184 (12.5%)	26,681 (8.7%)	25,040 (5.2%)	44,423 (5.2%)	35,413 (10.3%)		269,624 (8.3%)
Q4	11,550 (20.0%)	24,036 (22.7%)	13,723 (24.0%)	3,506 (23.0%)	3,464 (23.0%)	2,088 (22.1%)	68,142 (22.2%)	85,288 (17.9%)	141,764 (16.7%)	89,600 (25.9%)		700,850 (21.6%)
Q5 (highest)	26,122 (45.3%)	36,658 (34.7%)	27,089 (47.4%)	4,490 (29.5%)	5,473 (36.3%)	2,957 (31.3%)	125,548 (40.9%)	261,115 (54.7%)	555,557 (65.5%)	132,420 (38.3%)		1,518,137 (46.8%)
Missing	345 (0.6%)	352 (0.3%)	330 (0.6%)	101 (0.7%)	58 (0.4%)	43 (0.5%)	1,464 (0.5%)	1,336 (0.3%)	3,755 (0.4%)	812 (0.2%)		12,454 (0.4%)
Public health unit of residence, n (%)												
Algoma Public Health	20 (0.0%)	30 (0.0%)	58 (0.1%)	10 (0.1%)	16 (0.1%)	21 (0.2%)	121 (0.0%)	184 (0.0%)	331 (0.0%)	109 (0.0%)		2,381 (0.1%)
Brant County Health Unit	119 (0.2%)	177 (0.2%)	252 (0.4%)	58 (0.4%)	68 (0.5%)	72 (0.8%)	498 (0.2%)	514 (0.1%)	2,923 (0.3%)	1,387 (0.4%)		11,219 (0.3%)

Eastern Hemisphere												
Variable	North Africa	East Africa	Western Africa	Central Africa	Southern Africa	Australasia & Oceania/ Asia unspecified	Middle East	East Asia	South Asia	Southeast Asia	Not stated	Total
Number	57,607	105,667	57,093	15,237	15,069	9,440	306,750	477,048	848,423	345,353	61	3,245,639
Durham Region Health Department	1,847 (3.2%)	3,068 (2.9%)	2,825 (4.9%)	845 (5.5%)	546 (3.6%)	431 (4.6%)	7,216 (2.4%)	8,483 (1.8%)	53,124 (6.3%)	13,741 (4.0%)		142,128 (4.4%)
Grey Bruce Health Unit	55 (0.1%)	57 (0.1%)	65 (0.1%)	17 (0.1%)	69 (0.5%)	60 (0.6%)	257 (0.1%)	388 (0.1%)	957 (0.1%)	354 (0.1%)		5,836 (0.2%)
Haldimand-Norfolk Health Unit	19 (0.0%)	25 (0.0%)	53 (0.1%)	18 (0.1%)	52 (0.3%)	32 (0.3%)	160 (0.1%)	174 (0.0%)	318 (0.0%)	267 (0.1%)		4,093 (0.1%)
Haliburton, Kawartha, Pine Ridge District Health Unit	30–40	69 (0.1%)	42 (0.1%)	< 6	87 (0.6%)	67 (0.7%)	204 (0.1%)	465 (0.1%)	626 (0.1%)	467 (0.1%)		5,454 (0.2%)
Halton Region Health Department	5,534 (9.6%)	2,149 (2.0%)	2,240 (3.9%)	379 (2.5%)	1,833 (12.2%)	634 (6.7%)	13,941 (4.5%)	16,750 (3.5%)	40,868 (4.8%)	10,375 (3.0%)		145,818 (4.5%)
City of Hamilton – Public Health & Social Services	2,304 (4.0%)	3,728 (3.5%)	1,777 (3.1%)	1,146 (7.5%)	684 (4.5%)	368 (3.9%)	14,230 (4.6%)	5,925 (1.2%)	16,410 (1.9%)	11,454 (3.3%)		96,978 (3.0%)
Hastings and Prince Edward Counties Health Unit	37 (0.1%)	75 (0.1%)	51 (0.1%)	13 (0.1%)	46 (0.3%)	52 (0.6%)	226 (0.1%)	526 (0.1%)	993 (0.1%)	631 (0.2%)		5,412 (0.2%)
Huron Perth Health Unit	20–30	101 (0.1%)	33 (0.1%)	< 6	50 (0.3%)	46 (0.5%)	220 (0.1%)	279 (0.1%)	483 (0.1%)	427 (0.1%)		5,156 (0.2%)
Chatham-Kent Health Unit	30–40	54 (0.1%)	50 (0.1%)	< 6	16 (0.1%)	20 (0.2%)	218 (0.1%)	212 (0.0%)	411 (0.0%)	409 (0.1%)		3,703 (0.1%)
Kingston, Frontenac and Lennox & Addington Health Unit	349 (0.6%)	220 (0.2%)	167 (0.3%)	60 (0.4%)	84 (0.6%)	107 (1.1%)	941 (0.3%)	1,432 (0.3%)	1,694 (0.2%)	944 (0.3%)		10,516 (0.3%)
Lambton Health Unit	52 (0.1%)	80 (0.1%)	81 (0.1%)	14 (0.1%)	64 (0.4%)	39 (0.4%)	298 (0.1%)	335 (0.1%)	750 (0.1%)	392 (0.1%)		4,649 (0.1%)
Leeds, Grenville and Lanark District Health Unit	42 (0.1%)	62 (0.1%)	47 (0.1%)	12 (0.1%)	63 (0.4%)	74 (0.8%)	207 (0.1%)	251 (0.1%)	422 (0.0%)	395 (0.1%)		4,318 (0.1%)
Middlesex-London Health Unit	2,675 (4.6%)	2,045 (1.9%)	1,008 (1.8%)	413 (2.7%)	376 (2.5%)	315 (3.3%)	14,151 (4.6%)	6,264 (1.3%)	9,505 (1.1%)	5,619 (1.6%)		71,584 (2.2%)
Niagara Region Public Health Department	1,308 (2.3%)	1,234 (1.2%)	645 (1.1%)	285 (1.9%)	330 (2.2%)	203 (2.2%)	2,584 (0.8%)	3,762 (0.8%)	4,923 (0.6%)	4,713 (1.4%)		41,696 (1.3%)
North Bay Parry Sound District Health Unit	24 (0.0%)	37 (0.0%)	62 (0.1%)	7 (0.0%)	41 (0.3%)	51 (0.5%)	107 (0.0%)	202 (0.0%)	420 (0.0%)	172 (0.0%)		2,702 (0.1%)
Northwestern Health Unit	1–10	20–30	11 (0.0%)	< 6	13 (0.1%)	16 (0.2%)	33 (0.0%)	51 (0.0%)	84 (0.0%)	322 (0.1%)		1,550 (0.0%)

Eastern Hemisphere												
Variable	North Africa	East Africa	Western Africa	Central Africa	Southern Africa	Australasia & Oceania/ Asia unspecified	Middle East	East Asia	South Asia	Southeast Asia	Not stated	Total
Number	57,607	105,667	57,093	15,237	15,069	9,440	306,750	477,048	848,423	345,353	61	3,245,639
Ottawa Public Health	7,281 (12.6%)	17,195 (16.3%)	3,806 (6.7%)	4,448 (29.2%)	670 (4.4%)	668 (7.1%)	32,828 (10.7%)	21,552 (4.5%)	24,473 (2.9%)	15,820 (4.6%)		180,084 (5.5%)
Peel Public Health	12,307 (21.4%)	11,956 (11.3%)	16,340 (28.6%)	1,388 (9.1%)	1,212 (8.0%)	1,435 (15.2%)	45,436 (14.8%)	37,579 (7.9%)	324,943 (38.3%)	59,200 (17.1%)		675,524 (20.8%)
Peterborough County-City Health Unit	78 (0.1%)	147 (0.1%)	119 (0.2%)	44 (0.3%)	78 (0.5%)	61 (0.6%)	484 (0.2%)	647 (0.1%)	1,063 (0.1%)	628 (0.2%)		5,949 (0.2%)
Porcupine Health Unit	21 (0.0%)	27 (0.0%)	45 (0.1%)	12 (0.1%)	32 (0.2%)	19 (0.2%)	34 (0.0%)	98 (0.0%)	211 (0.0%)	262 (0.1%)		1,283 (0.0%)
Renfrew County and District Health Unit	35 (0.1%)	27 (0.0%)	11 (0.0%)	1–10	< 6	30 (0.3%)	117 (0.0%)	262 (0.1%)	334 (0.0%)	199 (0.1%)		2,627 (0.1%)
Eastern Ontario Health Unit	138 (0.2%)	180 (0.2%)	94 (0.2%)	136 (0.9%)	23 (0.2%)	39 (0.4%)	238 (0.1%)	220 (0.0%)	979 (0.1%)	364 (0.1%)		5,098 (0.2%)
Simcoe Muskoka District Health Unit	351 (0.6%)	679 (0.6%)	1,210 (2.1%)	130 (0.9%)	368 (2.4%)	276 (2.9%)	3,756 (1.2%)	3,545 (0.7%)	7,817 (0.9%)	5,133 (1.5%)		51,194 (1.6%)
Sudbury and District Health Unit	150 (0.3%)	166 (0.2%)	202 (0.4%)	170 (1.1%)	82 (0.5%)	84 (0.9%)	249 (0.1%)	418 (0.1%)	891 (0.1%)	469 (0.1%)		4,863 (0.1%)
Thunder Bay District Health Unit	109 (0.2%)	87 (0.1%)	122 (0.2%)	12 (0.1%)	17 (0.1%)	73 (0.8%)	351 (0.1%)	308 (0.1%)	470 (0.1%)	674 (0.2%)		4,284 (0.1%)
Timiskaming Health Unit	< 6	< 6	19 (0.0%)	< 6	1–10	14 (0.1%)	8 (0.0%)	21 (0.0%)	75 (0.0%)	29 (0.0%)		448 (0.0%)
Region of Waterloo Public Health	2,998 (5.2%)	5,489 (5.2%)	1,183 (2.1%)	360 (2.4%)	458 (3.0%)	246 (2.6%)	10,559 (3.4%)	9,279 (1.9%)	23,006 (2.7%)	8,258 (2.4%)		104,924 (3.2%)
Wellington-Dufferin-Guelph Health Unit	586 (1.0%)	1,262 (1.2%)	705 (1.2%)	112 (0.7%)	275 (1.8%)	230 (2.4%)	1,813 (0.6%)	2,693 (0.6%)	8,222 (1.0%)	5,602 (1.6%)		36,532 (1.1%)
Windsor-Essex County Health Unit	1,912 (3.3%)	1,888 (1.8%)	1,184 (2.1%)	565 (3.7%)	194 (1.3%)	89 (0.9%)	18,458 (6.0%)	5,554 (1.2%)	10,919 (1.3%)	5,253 (1.5%)		69,636 (2.1%)
York Region Public Health Services	5,138 (8.9%)	5,746 (5.4%)	2,804 (4.9%)	290 (1.9%)	3,179 (21.1%)	689 (7.3%)	59,297 (19.3%)	169,507 (35.5%)	76,741 (9.0%)	31,881 (9.2%)		455,320 (14.0%)
Southwestern Health Unit	37 (0.1%)	135 (0.1%)	156 (0.3%)	20 (0.1%)	84 (0.6%)	68 (0.7%)	307 (0.1%)	403 (0.1%)	1,656 (0.2%)	1,083 (0.3%)		11,301 (0.3%)
Toronto Public Health	11,690 (20.3%)	47,205 (44.7%)	19,321 (33.8%)	4,175 (27.4%)	3,898 (25.9%)	2,777 (29.4%)	75,924 (24.8%)	177,723 (37.3%)	227,929 (26.9%)	157,660 (45.7%)		1,061,030 (32.7%)
Unknown/missing	278 (0.5%)	240 (0.2%)	305 (0.5%)	76 (0.5%)	47 (0.3%)	34 (0.4%)	1,279 (0.4%)	1,042 (0.2%)	3,452 (0.4%)	660 (0.2%)		10,349 (0.3%)

Eastern Hemisphere												
Variable	North Africa	East Africa	Western Africa	Central Africa	Southern Africa	Australasia & Oceania/ Asia unspecified	Middle East	East Asia	South Asia	Southeast Asia	Not stated	Total
Number	57,607	105,667	57,093	15,237	15,069	9,440	306,750	477,048	848,423	345,353	61	3,245,639
CLINICAL CHARACTERISTICS												
Chronic conditions, n (%)												
Respiratory (asthma, COPD)	6,467 (11.2%)	15,309 (14.5%)	5,818 (10.2%)	991 (6.5%)	2,230 (14.8%)	1,120 (11.9%)	32,872 (10.7%)	39,502 (8.3%)	106,849 (12.6%)	42,389 (12.3%)		377,814 (11.6%)
Chronic kidney disease (incl. chronic dialysis)	1,017 (1.8%)	1,493 (1.4%)	1,084 (1.9%)	173 (1.1%)	249 (1.7%)	123 (1.3%)	3,933 (1.3%)	5,634 (1.2%)	15,045 (1.8%)	6,514 (1.9%)		49,930 (1.5%)
Diabetes	5,849 (10.2%)	10,912 (10.3%)	5,080 (8.9%)	841 (5.5%)	947 (6.3%)	632 (6.7%)	23,609 (7.7%)	36,870 (7.7%)	118,610 (14.0%)	38,085 (11.0%)		325,193 (10.0%)
Cardiovascular (CHF, TIA/stroke, Ischemic cardiac disease, hypertension)	8,881 (15.4%)	14,211 (13.4%)	11,964 (21.0%)	1,888 (12.4%)	2,407 (16.0%)	1,123 (11.9%)	37,227 (12.1%)	73,023 (15.3%)	154,123 (18.2%)	72,416 (21.0%)		558,117 (17.2%)
Immunocompromised	478 (0.8%)	2,183 (2.1%)	1,262 (2.2%)	480 (3.2%)	195 (1.3%)	60 (0.6%)	1,398 (0.5%)	1,786 (0.4%)	3,617 (0.4%)	1,820 (0.5%)		21,123 (0.7%)
Inflammatory (IBD, rheumatoid arthritis)	407 (0.7%)	644 (0.6%)	183 (0.3%)	48 (0.3%)	171 (1.1%)	52 (0.6%)	2,007 (0.7%)	1,730 (0.4%)	6,618 (0.8%)	1,511 (0.4%)		21,085 (0.6%)
Liver disease	322 (0.6%)	510 (0.5%)	235 (0.4%)	63 (0.4%)	54 (0.4%)	19 (0.2%)	1,044 (0.3%)	3,340 (0.7%)	3,665 (0.4%)	1,971 (0.6%)		16,013 (0.5%)
IMMIGRATION CHARACTERISTICS												
Recency of immigration, n (%)												
Recent (0 to ≤5 years)	2,530 (4.4%)	4,171 (3.9%)	2,332 (4.1%)	992 (6.5%)	437 (2.9%)	396 (4.2%)	31,363 (10.2%)	13,416 (2.8%)	39,725 (4.7%)	20,828 (6.0%)		142,720 (4.4%)
Intermediate (>5 to ≤10 years)	10,882 (18.9%)	13,136 (12.4%)	9,421 (16.5%)	2,974 (19.5%)	1,593 (10.6%)	1,557 (16.5%)	54,888 (17.9%)	60,741 (12.7%)	120,777 (14.2%)	47,064 (13.6%)		423,423 (13.0%)

Eastern Hemisphere												
Variable	North Africa	East Africa	Western Africa	Central Africa	Southern Africa	Australasia & Oceania/ Asia unspecified	Middle East	East Asia	South Asia	Southeast Asia	Not stated	Total
Number	57,607	105,667	57,093	15,237	15,069	9,440	306,750	477,048	848,423	345,353	61	3,245,639
Long-term residents (>10 years)	32,446 (56.3%)	61,443 (58.1%)	30,855 (54.0%)	7,345 (48.2%)	10,533 (69.9%)	5,887 (62.4%)	169,684 (55.3%)	321,690 (67.4%)	493,253 (58.1%)	206,130 (59.7%)		2,026,892 (62.4%)
Second generation children and youth	11,749 (20.4%)	26,917 (25.5%)	14,485 (25.4%)	3,926 (25.8%)	2,506 (16.6%)	1,600 (16.9%)	50,815 (16.6%)	81,201 (17.0%)	194,668 (22.9%)	71,331 (20.7%)		652,604 (20.1%)
Immigration category, n (%)												
Sponsored family member	14,649 (25.4%)	28,782 (27.2%)	25,018 (43.8%)	3,017 (19.8%)	2,761 (18.3%)	5,318 (56.3%)	64,196 (20.9%)	165,622 (34.7%)	354,393 (41.8%)	125,018 (36.2%)		1,228,765 (37.9%)
Economic immigrant, caregiver	113 (0.2%)	328 (0.3%)	223 (0.4%)	29 (0.2%)	39 (0.3%)	74 (0.8%)	203 (0.1%)	1,321 (0.3%)	1,541 (0.2%)	74,976 (21.7%)		85,148 (2.6%)
Economic immigrant, other	31,714 (55.1%)	19,013 (18.0%)	16,734 (29.3%)	2,276 (14.9%)	11,215 (74.4%)	3,774 (40.0%)	148,203 (48.3%)	272,562 (57.1%)	370,460 (43.7%)	123,912 (35.9%)		1,381,872 (42.6%)
Privately sponsored refugee	1,127 (2.0%)	11,970 (11.3%)	2,496 (4.4%)	445 (2.9%)	154 (1.0%)	152 (1.6%)	32,105 (10.5%)	1,140 (0.2%)	23,972 (2.8%)	7,562 (2.2%)		125,744 (3.9%)
Blended visa office–referred refugee	59 (0.1%)	171 (0.2%)	41 (0.1%)	31 (0.2%)	< 6	< 6	2,762 (0.9%)	0 (0.0%)	< 6	148 (0.0%)		3,294 (0.1%)
Government-assisted refugee	3,770 (6.5%)	9,958 (9.4%)	1,089 (1.9%)	2,314 (15.2%)	170–180	< 6	32,922 (10.7%)	392 (0.1%)	13,110– 13,120	10,338 (3.0%)		111,891 (3.4%)
Protected person/Refugee (asylum seeker)	4,641 (8.1%)	28,687 (27.1%)	7,897 (13.8%)	4,675 (30.7%)	488 (3.2%)	28 (0.3%)	19,648 (6.4%)	14,883 (3.1%)	53,553 (6.3%)	847 (0.2%)		194,292 (6.0%)
Refugee dependent	1,012 (1.8%)	4,733 (4.5%)	2,016 (3.5%)	1,585 (10.4%)	114 (0.8%)	6 (0.1%)	4,088 (1.3%)	11,251 (2.4%)	23,056 (2.7%)	591 (0.2%)		66,626 (2.1%)
Humanitarian and compassionate/Public policy case	408 (0.7%)	1,863 (1.8%)	1,525 (2.7%)	838 (5.5%)	89 (0.6%)	75 (0.8%)	2,225 (0.7%)	5,886 (1.2%)	7,735 (0.9%)	1,742 (0.5%)		41,409 (1.3%)
Other immigrant	114 (0.2%)	162 (0.2%)	54 (0.1%)	27 (0.2%)	28 (0.2%)	11 (0.1%)	398 (0.1%)	3,991 (0.8%)	589 (0.1%)	219 (0.1%)		6,598 (0.2%)

Notes: 1. Denominator includes children aged ≤19 years of immigrant and refugee mothers in IRCC (second generation), 2. Chronic conditions were identified using validated algorithms for ICES data holdings; the latest diagnosis date is March 31, 2019. 3. Numbers are too low to report for 'not stated' group, 4. Some cells are suppressed due to low counts (n < 6) or reported as ranges to protect privacy.

Appendix 1.3 Baseline characteristics of immigrants and refugees landed in Ontario between January 1, 1985, and May 31, 2017, by world region of birth (Western Hemisphere), as of March 31, 2020

Western Hemisphere								
Variable	North America	Central Africa	Caribbean	South America	Eastern Europe	Europe other	Not stated	Total
Number	70,287	15,237	191,326	155,358	293,942	230,646	61	3,245,639
SOCIODEMOGRAPHIC CHARACTERISTICS								
Age								
Mean ± SD	33.23 ± 20.57	30.77 ± 18.80	38.89 ± 20.82	40.21 ± 21.23	41.80 ± 21.48	40.34 ± 20.87		38.60 ± 21.53
Median (IQR)	31 (16–50)	31 (14–46)	41 (21–54)	42 (24–56)	44 (27–58)	42 (25–56)		40 (19–54)
Age group, n (%)								
0–9 years	7,906 (11.2%)	2,685 (17.6%)	20,838 (10.9%)	16,538 (10.6%)	29,775 (10.1%)	22,721 (9.9%)		378,701 (11.7%)
Second generation	6,354 (9.0%)	2,575 (16.9%)	20,422 (10.7%)	16,167 (10.4%)	29,133 (9.9%)	21,318 (9.2%)		354,106 (54.3%)
Immigrants and refugees	1,552 (2.2%)	110 (0.7%)	416 (0.2%)	371 (0.2%)	642 (0.2%)	1,403 (0.6%)		24,595 (0.9%)
10–19 years	16,543 (23.5%)	2,297 (15.1%)	25,301 (13.2%)	18,139 (11.7%)	31,291 (10.6%)	27,672 (12.0%)		434,845 (13.4%)
Second generation	5,009 (7.1%)	1,351 (8.9%)	19,906 (10.4%)	14,607 (9.4%)	24,711 (8.4%)	20,513 (8.9%)		298,366 (45.7%)
Immigrants and refugees	11,534 (16.4%)	946 (6.2%)	5,395 (2.8%)	3,532 (2.3%)	6,580 (2.2%)	7,159 (3.1%)		136,479 (5.3%)
20–29 years	9,791 (13.9%)	2,266 (14.9%)	14,107 (7.4%)	12,580 (8.1%)	18,802 (6.4%)	17,465 (7.6%)		277,779 (8.6%)
30–39 years	9,614 (13.7%)	2,535 (16.6%)	31,962 (16.7%)	23,138 (14.9%)	45,292 (15.4%)	36,933 (16%)		510,367 (15.7%)
40–49 years	8,667 (12.3%)	2,649 (17.4%)	33,760 (17.6%)	27,794 (17.9%)	50,142 (17.1%)	38,785 (16.8%)		557,327 (17.2%)
50–59 years	8,646 (12.3%)	1,923 (12.6%)	34,839 (18.2%)	28,149 (18.1%)	54,024 (18.4%)	46,297 (20.1%)		534,776 (16.5%)
60–69 years	6,036 (8.6%)	685 (4.5%)	19,389 (10.1%)	17,693 (11.4%)	40,197 (13.7%)	25,839 (11.2%)		318,387 (9.8%)
70+ years	3,084 (4.4%)	197 (1.3%)	11,130 (5.8%)	11,327 (7.3%)	24,419 (8.3%)	14,934 (6.5%)		233,457 (7.2%)

Western Hemisphere								
Variable	North America	Central Africa	Caribbean	South America	Eastern Europe	Europe other	Not stated	Total
Number	70,287	15,237	191,326	155,358	293,942	230,646	61	3,245,639
Sex, n (%)								
Female	36,747 (52.3%)	7,638 (50.1%)	98,636 (51.6%)	80,618 (51.9%)	154,565 (52.6%)	109,338 (47.4%)		1,658,805 (51.1%)
Male	33,540 (47.7%)	7,599 (49.9%)	92,690 (48.4%)	74,740 (48.1%)	139,377 (47.4%)	121,308 (52.6%)		1,586,834 (48.9%)
Neighbourhood income quintile, n (%)								
Q1 (lowest)	11,752 (16.7%)	6,767 (44.4%)	64,645 (33.8%)	39,327 (25.3%)	57,148 (19.4%)	37,653 (16.3%)		787,250 (24.3%)
Q2	12,406 (17.7%)	2,869 (18.8%)	42,726 (22.3%)	35,438 (22.8%)	51,128 (17.4%)	45,475 (19.7%)		679,805 (20.9%)
Q3	13,930 (19.8%)	2,529 (16.6%)	41,714 (21.8%)	33,953 (21.9%)	54,480 (18.5%)	47,469 (20.6%)		683,183 (21.0%)
Q4	14,175 (20.2%)	1,927 (12.6%)	26,422 (13.8%)	26,856 (17.3%)	69,284 (23.6%)	48,082 (20.8%)		620,425 (19.1%)
Q5 (highest)	17,759 (25.3%)	1,068 (7.0%)	15,211 (8.0%)	19,314 (12.4%)	61,002 (20.8%)	51,335 (22.3%)		464,513 (14.3%)
Missing	265 (0.4%)	77 (0.5%)	608 (0.3%)	470 (0.3%)	900 (0.3%)	632 (0.3%)		10,463 (0.3%)
Ethnic concentration quintile, n (%)								
Q1 (lowest)	8,007 (11.4%)	314 (2.1%)	4,137 (2.2%)	3,481 (2.2%)	12,446 (4.2%)	18,906 (8.2%)		79,611 (2.5%)
Q2	9,557 (13.6%)	690 (4.5%)	7,910 (4.1%)	8,042 (5.2%)	23,719 (8.1%)	28,491 (12.4%)		153,469 (4.7%)
Q3	13,423 (19.1%)	1,640 (10.8%)	16,726 (8.7%)	17,462 (11.2%)	48,207 (16.4%)	46,389 (20.1%)		310,350 (9.6%)
Q4	17,714 (25.2%)	4,008 (26.3%)	39,647 (20.7%)	40,001 (25.7%)	92,593 (31.5%)	70,069 (30.4%)		722,958 (22.3%)
Q5 (highest)	21,039 (29.9%)	8,492 (55.7%)	122,215 (63.9%)	85,836 (55.3%)	115,874 (39.4%)	65,832 (28.5%)		1,967,103 (60.6%)
Missing	547 (0.8%)	93 (0.6%)	691 (0.4%)	536 (0.3%)	1,103 (0.4%)	959 (0.4%)		12,148 (0.4%)
Residential instability quintile, n (%)								
Q1 (lowest)	16,310 (23.2%)	2,065 (13.6%)	44,121 (23.1%)	37,967 (24.4%)	67,137 (22.8%)	50,681 (22.0%)		939,366 (28.9%)

Western Hemisphere								
Variable	North America	Central Africa	Caribbean	South America	Eastern Europe	Europe other	Not stated	Total
Number	70,287	15,237	191,326	155,358	293,942	230,646	61	3,245,639
Q2	12,219 (17.4%)	1,847 (12.1%)	28,333 (14.8%)	24,635 (15.9%)	52,026 (17.7%)	41,093 (17.8%)		531,889 (16.4%)
Q3	11,984 (17.1%)	1,958 (12.9%)	27,135 (14.2%)	23,615 (15.2%)	43,154 (14.7%)	40,107 (17.4%)		460,747 (14.2%)
Q4	12,230 (17.4%)	2,901 (19.0%)	34,234 (17.9%)	25,211 (16.2%)	39,834 (13.6%)	39,249 (17.0%)		464,843 (14.3%)
Q5 (highest)	16,997 (24.2%)	6,373 (41.8%)	56,812 (29.7%)	43,394 (27.9%)	90,688 (30.9%)	58,557 (25.4%)		836,646 (25.8%)
Missing	547 (0.8%)	93 (0.6%)	691 (0.4%)	536 (0.3%)	1,103 (0.4%)	959 (0.4%)		12,148 (0.4%)
Number of persons per dwelling quintile, n (%)								
Q1 (lowest)	13,111 (18.7%)	3,173 (20.8%)	21,876 (11.4%)	21,804 (14.0%)	56,607 (19.3%)	40,832 (17.7%)		421,437 (13.0%)
Q2	11,387 (16.2%)	2,350 (15.4%)	20,886 (10.9%)	15,798 (10.2%)	35,547 (12.1%)	33,737 (14.6%)		323,137 (10.0%)
Q3	9,006 (12.8%)	1,617 (10.6%)	17,621 (9.2%)	14,957 (9.6%)	32,638 (11.1%)	30,980 (13.4%)		269,624 (8.3%)
Q4	15,850 (22.6%)	3,506 (23.0%)	47,003 (24.6%)	38,077 (24.5%)	75,354 (25.6%)	62,772 (27.2%)		700,850 (21.6%)
Q5 (highest)	20,555 (29.2%)	4,490 (29.5%)	83,234 (43.5%)	64,168 (41.3%)	92,688 (31.5%)	61,403 (26.6%)		1,518,137 (46.8%)
Missing	378 (0.5%)	101 (0.7%)	706 (0.4%)	554 (0.4%)	1,108 (0.4%)	922 (0.4%)		12,454 (0.4%)
Public health unit of residence, n (%)								
Algoma Public Health	532 (0.8%)	10 (0.1%)	101 (0.1%)	137 (0.1%)	282 (0.1%)	371 (0.2%)		2,381 (0.1%)
Brant County Health Unit	533 (0.8%)	58 (0.4%)	944 (0.5%)	440 (0.3%)	1,563 (0.5%)	1,413 (0.6%)		11,219 (0.3%)
Durham Region Health Department	2,790 (4.0%)	845 (5.5%)	19,733 (10.3%)	9,541 (6.1%)	7,593 (2.6%)	8,245 (3.6%)		142,128 (4.4%)
Grey Bruce Health Unit	582 (0.8%)	17 (0.1%)	250 (0.1%)	233 (0.1%)	668 (0.2%)	1,660 (0.7%)		5,836 (0.2%)
Haldimand-Norfolk Health Unit	281 (0.4%)	18 (0.1%)	337 (0.2%)	141 (0.1%)	467 (0.2%)	1,102 (0.5%)		4,093 (0.1%)

Western Hemisphere								
Variable	North America	Central Africa	Caribbean	South America	Eastern Europe	Europe other	Not stated	Total
Number	70,287	15,237	191,326	155,358	293,942	230,646	61	3,245,639
Haliburton, Kawartha, Pine Ridge District Health Unit	516 (0.7%)	< 6	316 (0.2%)	271 (0.2%)	777 (0.3%)	1,388 (0.6%)		5,454 (0.2%)
Halton Region Health Department	4,063 (5.8%)	379 (2.5%)	4,985 (2.6%)	7,865 (5.1%)	16,693 (5.7%)	15,217 (6.6%)		145,818 (4.5%)
City of Hamilton – Public Health & Social Services	2,672 (3.8%)	1,146 (7.5%)	4,901 (2.6%)	4,085 (2.6%)	10,647 (3.6%)	13,259 (5.7%)		96,978 (3.0%)
Hastings and Prince Edward Counties Health Unit	408 (0.6%)	13 (0.1%)	359 (0.2%)	261 (0.2%)	487 (0.2%)	1,052 (0.5%)		5,412 (0.2%)
Huron Perth Health Unit	498 (0.7%)	< 6	200 (0.1%)	147 (0.1%)	324 (0.1%)	1,790 (0.8%)		5,156 (0.2%)
Chatham-Kent Health Unit	410 (0.6%)	< 6	272 (0.1%)	114 (0.1%)	401 (0.1%)	485 (0.2%)		3,703 (0.1%)
Kingston, Frontenac and Lennox & Addington Health Unit	828 (1.2%)	60 (0.4%)	411 (0.2%)	349 (0.2%)	881 (0.3%)	1,747 (0.8%)		10,516 (0.3%)
Lambton Health Unit	718 (1.0%)	14 (0.1%)	162 (0.1%)	166 (0.1%)	408 (0.1%)	863 (0.4%)		4,649 (0.1%)
Leeds, Grenville and Lanark District Health Unit	717 (1.0%)	12 (0.1%)	157 (0.1%)	137 (0.1%)	449 (0.2%)	1,158 (0.5%)		4,318 (0.1%)
Middlesex-London Health Unit	2,445 (3.5%)	413 (2.7%)	2,402 (1.3%)	5,428 (3.5%)	7,697 (2.6%)	7,931 (3.4%)		71,584 (2.2%)
Niagara Region Public Health Department	2,972 (4.2%)	285 (1.9%)	2,590 (1.4%)	2,638 (1.7%)	5,615 (1.9%)	5,881 (2.5%)		41,696 (1.3%)
North Bay Parry Sound District Health Unit	376 (0.5%)	7 (0.0%)	99 (0.1%)	89 (0.1%)	367 (0.1%)	599 (0.3%)		2,702 (0.1%)
Northwestern Health Unit	625 (0.9%)	< 6	51 (0.0%)	18 (0.0%)	45 (0.0%)	205 (0.1%)		1,550 (0.0%)
Ottawa Public Health	4,732 (6.7%)	4,448 (29.2%)	10,704 (5.6%)	5,045 (3.2%)	13,496 (4.6%)	13,055 (5.7%)		180,084 (5.5%)
Peel Public Health	7,502 (10.7%)	1,388 (9.1%)	48,055 (25.1%)	31,872 (20.5%)	43,361 (14.8%)	26,005 (11.3%)		675,524 (20.8%)
Peterborough County-City Health Unit	391 (0.6%)	44 (0.3%)	286 (0.1%)	248 (0.2%)	679 (0.2%)	900 (0.4%)		5,949 (0.2%)

Western Hemisphere								
Variable	North America	Central Africa	Caribbean	South America	Eastern Europe	Europe other	Not stated	Total
Number	70,287	15,237	191,326	155,358	293,942	230,646	61	3,245,639
Porcupine Health Unit	89 (0.1%)	12 (0.1%)	86 (0.0%)	56 (0.0%)	132 (0.0%)	129 (0.1%)		1,283 (0.0%)
Renfrew County and District Health Unit	291 (0.4%)	1–10	71 (0.0%)	90 (0.1%)	378 (0.1%)	701 (0.3%)		2,627 (0.1%)
Eastern Ontario Health Unit	492 (0.7%)	136 (0.9%)	381 (0.2%)	155 (0.1%)	347 (0.1%)	1,158 (0.5%)		5,098 (0.2%)
Simcoe Muskoka District Health Unit	1,643 (2.3%)	130 (0.9%)	3,529 (1.8%)	3,809 (2.5%)	9,072 (3.1%)	8,126 (3.5%)		51,194 (1.6%)
Sudbury and District Health Unit	365 (0.5%)	170 (1.1%)	212 (0.1%)	176 (0.1%)	462 (0.2%)	651 (0.3%)		4,863 (0.1%)
Thunder Bay District Health Unit	446 (0.6%)	12 (0.1%)	154 (0.1%)	183 (0.1%)	558 (0.2%)	551 (0.2%)		4,284 (0.1%)
Timiskaming Health Unit	58 (0.1%)	< 6	22 (0.0%)	16 (0.0%)	69 (0.0%)	80 (0.0%)		448 (0.0%)
Region of Waterloo Public Health	3,085 (4.4%)	360 (2.4%)	3,789 (2.0%)	5,279 (3.4%)	12,578 (4.3%)	13,698 (5.9%)		104,924 (3.2%)
Wellington-Dufferin-Guelph Health Unit	1,277 (1.8%)	112 (0.7%)	1,992 (1.0%)	1,594 (1.0%)	3,690 (1.3%)	5,435 (2.4%)		36,532 (1.1%)
Windsor-Essex County Health Unit	4,040 (5.7%)	565 (3.7%)	1,603 (0.8%)	1,196 (0.8%)	6,911 (2.4%)	6,373 (2.8%)		69,636 (2.1%)
York Region Public Health Services	5,276 (7.5%)	290 (1.9%)	9,694 (5.1%)	12,892 (8.3%)	52,826 (18.0%)	15,736 (6.8%)		455,320 (14.0%)
Southwestern Health Unit	713 (1.0%)	20 (0.1%)	593 (0.3%)	438 (0.3%)	1,272 (0.4%)	2,801 (1.2%)		11,301 (0.3%)
Toronto Public Health	17,681 (25.2%)	4,175 (27.4%)	71,283 (37.3%)	59,787 (38.5%)	91,869 (31.3%)	70,275 (30.5%)		1,061,030 (32.7%)
Unknown/missing	240 (0.3%)	76 (0.5%)	602 (0.3%)	462 (0.3%)	878 (0.3%)	606 (0.3%)		10,349 (0.3%)
CLINICAL CHARACTERISTICS								
Chronic conditions, n (%)								
Respiratory (asthma, COPD)	8,778 (12.5%)	991 (6.5%)	25,719 (13.4%)	20,659 (13.3%)	31,726 (10.8%)	29,074 (12.6%)		377,814 (11.6%)

Western Hemisphere								
Variable	North America	Central Africa	Caribbean	South America	Eastern Europe	Europe other	Not stated	Total
Number	70,287	15,237	191,326	155,358	293,942	230,646	61	3,245,639
Chronic kidney disease (incl. chronic dialysis)	612 (0.9%)	173 (1.1%)	4,422 (2.3%)	3,021 (1.9%)	3,434 (1.2%)	2,388 (1.0%)		49,930 (1.5%)
Diabetes	2,823 (4.0%)	841 (5.5%)	24,125 (12.6%)	17,990 (11.6%)	17,855 (6.1%)	14,949 (6.5%)		325,193 (10.0%)
Cardiovascular (CHF, TIA/stroke, Ischemic cardiac disease, hypertension)	6,839 (9.7%)	1,888 (12.4%)	42,230 (22.1%)	28,386 (18.3%)	56,318 (19.2%)	37,799 (16.4%)		558,117 (17.2%)
Immunocompromised	443 (0.6%)	480 (3.2%)	2,610 (1.4%)	1,311 (0.8%)	1,482 (0.5%)	1,358 (0.6%)		21,123 (0.7%)
Inflammatory (IBD, rheumatoid arthritis)	415 (0.6%)	48 (0.3%)	1,374 (0.7%)	1,489 (1.0%)	2,090 (0.7%)	1,821 (0.8%)		21,085 (0.6%)
Liver disease	213 (0.3%)	63 (0.4%)	618 (0.3%)	800 (0.5%)	1,647 (0.6%)	1,038 (0.5%)		16,013 (0.5%)
IMMIGRATION CHARACTERISTICS								
Recency of immigration, n (%)								
Recent (0 to ≤5 years)	3,283 (4.7%)	992 (6.5%)	6,505 (3.4%)	3,566 (2.3%)	5,706 (1.9%)	5,825 (2.5%)		142,720 (4.4%)
Intermediate (>5 to ≤10 years)	12,357 (17.6%)	2,974 (19.5%)	21,387 (11.2%)	15,121 (9.7%)	22,132 (7.5%)	21,862 (9.5%)		423,423 (13.0%)
Long-term residents (>10 years)	43,284 (61.6%)	7,345 (48.2%)	123,105 (64.3%)	105,896 (68.2%)	212,260 (72.2%)	161,127 (69.9%)		2,026,892 (62.4%)
Second generation children and youth	11,363 (16.2%)	3,926 (25.8%)	40,329 (21.1%)	30,775 (19.8%)	53,844 (18.3%)	41,832 (18.1%)		652,604 (20.1%)
Immigration category, n (%)								
Sponsored family member	39,053 (55.6%)	3,017 (19.8%)	127,793 (66.8%)	79,462 (51.1%)	94,754 (32.2%)	72,844 (31.6%)		1,228,765 (37.9%)
Economic immigrant, caregiver	45 (0.1%)	29 (0.2%)	1,826 (1.0%)	1,127 (0.7%)	1,703 (0.6%)	1,375 (0.6%)		85,148 (2.6%)
Economic immigrant, other	25,044 (35.6%)	2,276 (14.9%)	43,651 (22.8%)	44,545 (28.7%)	132,234 (45.0%)	123,158 (53.4%)		1,381,872 (42.6%)
Privately sponsored refugee	359 (0.5%)	445 (2.9%)	227 (0.1%)	2,475 (1.6%)	30,717 (10.5%)	5,897 (2.6%)		125,744 (3.9%)
Blended visa office–referred refugee	0 (0.0%)	31 (0.2%)	0 (0.0%)	30 (0.0%)	0 (0.0%)	42 (0.0%)		3,294 (0.1%)

Western Hemisphere								
Variable	North America	Central Africa	Caribbean	South America	Eastern Europe	Europe other	Not stated	Total
Number	70,287	15,237	191,326	155,358	293,942	230,646	61	3,245,639
Government-assisted refugee	340 (0.5%)	2,314 (15.2%)	119 (0.1%)	2,174 (1.4%)	8,669 (2.9%)	15,577 (6.8%)		111,891 (3.4%)
Protected person/Refugee (asylum seeker)	682 (1.0%)	4,675 (30.7%)	8,854 (4.6%)	18,414 (11.9%)	17,301 (5.9%)	6,593 (2.9%)		194,292 (6.0%)
Refugee dependent	3,120 (4.4%)	1,585 (10.4%)	3,098 (1.6%)	3,236 (2.1%)	4,441 (1.5%)	2,688 (1.2%)		66,626 (2.1%)
Humanitarian and compassionate/Public policy case	1,528 (2.2%)	838 (5.5%)	5,515 (2.9%)	3,742 (2.4%)	3,991 (1.4%)	2,209 (1.0%)		41,409 (1.3%)
Other immigrant	116 (0.2%)	27 (0.2%)	243 (0.1%)	153 (0.1%)	132 (0.0%)	263 (0.1%)		6,598 (0.2%)

Notes: 1. Denominator includes children aged ≤19 years of immigrant and refugee mothers in IRCC (second generation). 2. Chronic conditions were identified using validated algorithms for ICES data holdings; the latest diagnosis date is March 31, 2019. 3. Numbers are too low to report for 'not stated' group. 4. Some cells are suppressed due to low counts (n < 6) or reported as ranges to protect privacy.

Appendix 2.1 Baseline characteristics of immigrants and refugees aged 25 years and older at arrival with an earliest landing date of January 1, 2010, by immigrant category , as of March 31, 2020

Variable	Sponsored family members	Economic immigrant, caregiver	Economic class, other	Privately sponsored refugees	Blended visa office–referred refugees	Government-assisted refugees	Protected persons/ Refugees (asylum seekers)	Refugee dependents	Humanitarian and compassionate /Public policy cases	Other immigrants	Total
Number	167,649	31,249	168,777	12,300	1,124	10,692	28,268	5,166	9,019	157	434,401
SOCIODEMOGRAPHIC CHARACTERISTICS											
Age											
Mean ± SD	51.33 ± 17.08	44.43 ± 7.63	42.14 ± 8.26	47.02 ± 12.97	41.16 ± 9.30	45.71 ± 12.23	47.08 ± 12.10	46.31 ± 10.52	51.65 ± 13.50	51.43 ± 12.75	46.65 ± 13.56
Median (IQR)	45 (36–67)	43 (39–49)	41 (36–47)	44 (37–55)	39 (35–45)	43 (36–52)	44 (38–53)	45 (38–53)	49 (42–59)	51 (41–60)	43 (36–53)
Age group, n (%)											
20–29 years	2,434 (1.5%)	178 (0.6%)	2,113 (1.3%)	235 (1.9%)	40–50	149 (1.4%)	234 (0.8%)	81 (1.6%)	40 (0.4%)	< 6	5,507 (1.3%)
30–39 years	60,043 (35.8%)	8,947 (28.6%)	73,109 (43.3%)	4,120 (33.5%)	536 (47.7%)	3,933 (36.8%)	8,504 (30.1%)	1,454 (28.1%)	1,611 (17.9%)	30 (19.1%)	162,287 (37.4%)
40–49 years	30,692 (18.3%)	14,366 (46.0%)	61,202 (36.3%)	3,493 (28.4%)	371 (33.0%)	3,316 (31.0%)	9,788 (34.6%)	1,799 (34.8%)	2,951 (32.7%)	43 (27.4%)	128,021 (29.5%)
50–59 years	14,620 (8.7%)	6,635 (21.2%)	26,654 (15.8%)	2,248 (18.3%)	112 (10.0%)	1,814 (17.0%)	5,619 (19.9%)	1,245 (24.1%)	2,261 (25.1%)	42 (26.8%)	61,250 (14.1%)
60–69 years	23,932 (14.3%)	1,074 (3.4%)	5,210 (3.1%)	1,351 (11.0%)	46 (4.1%)	874 (8.2%)	2,288 (8.1%)	449 (8.7%)	1,102 (12.2%)	29 (18.5%)	36,355 (8.4%)
70+ years	35,928 (21.5%)	49 (0.2%)	489 (0.3%)	853 (6.9%)	10–20	606 (5.7%)	1,835 (6.5%)	138 (2.7%)	1,054 (11.7%)	10–20	40,981 (9.4%)
Sex, n (%)											
Female	92,562 (55.2%)	26,201 (83.8%)	77,989 (46.2%)	5,905 (48.0%)	552 (49.1%)	5,452 (51.0%)	14,096 (49.9%)	3,072 (59.5%)	5,235 (58.0%)	74 (47.1%)	231,138 (53.2%)
Male	75,087 (44.8%)	5,048 (16.2%)	90,788 (53.8%)	6,395 (52.0%)	572 (50.9%)	5,240 (49.0%)	14,172 (50.1%)	2,094 (40.5%)	3,784 (42.0%)	83 (52.9%)	203,263 (46.8%)
Neighbourhood income quintile, n (%)											

Variable	Sponsored family members	Economic immigrant, caregiver	Economic class, other	Privately sponsored refugees	Blended visa office–referred refugees	Government-assisted refugees	Protected persons/Refugees (asylum seekers)	Refugee dependents	Humanitarian and compassionate /Public policy cases	Other immigrants	Total
Number	167,649	31,249	168,777	12,300	1,124	10,692	28,268	5,166	9,019	157	434,401
Q1 (lowest)	38,355 (22.9%)	14,287 (45.7%)	37,485 (22.2%)	6,176 (50.2%)	585 (52.0%)	6,401 (59.9%)	12,061 (42.7%)	2,250 (43.6%)	3,421 (37.9%)	56 (35.7%)	121,077 (27.9%)
Q2	37,122 (22.1%)	7,311 (23.4%)	33,873 (20.1%)	2,392 (19.4%)	261 (23.2%)	2,134 (20.0%)	6,251 (22.1%)	1,284 (24.9%)	2,125 (23.6%)	31 (19.7%)	92,784 (21.4%)
Q3	36,227 (21.6%)	4,355 (13.9%)	35,745 (21.2%)	1,880 (15.3%)	135 (12.0%)	1,117 (10.4%)	4,532 (16.0%)	774 (15.0%)	1,582 (17.5%)	30 (19.1%)	86,377 (19.9%)
Q4	32,009 (19.1%)	2,870 (9.2%)	33,661 (19.9%)	1,233 (10.0%)	78 (6.9%)	702 (6.6%)	3,502 (12.4%)	565 (10.9%)	1,164 (12.9%)	21 (13.4%)	75,805 (17.5%)
Q5 (highest)	23,486 (14.0%)	2,400 (7.7%)	27,390 (16.2%)	599 (4.9%)	64 (5.7%)	311 (2.9%)	1,841 (6.5%)	279 (5.4%)	701 (7.8%)	19 (12.1%)	57,090 (13.1%)
Missing	450 (0.3%)	26 (0.1%)	623 (0.4%)	20 (0.2%)	< 6	27 (0.3%)	81 (0.3%)	14 (0.3%)	26 (0.3%)	0 (0.0%)	1,268 (0.3%)
Ethnic concentration quintile, n (%)											
Q1 (lowest)	5,386 (3.2%)	697 (2.2%)	3,133 (1.9%)	168 (1.4%)	101 (9.0%)	174 (1.6%)	409 (1.4%)	55 (1.1%)	210 (2.3%)	13 (8.3%)	10,346 (2.4%)
Q2	8,809 (5.3%)	1,390 (4.4%)	6,758 (4.0%)	445 (3.6%)	134 (11.9%)	485 (4.5%)	1,021 (3.6%)	156 (3.0%)	371 (4.1%)	11 (7.0%)	19,580 (4.5%)
Q3	16,232 (9.7%)	2,679 (8.6%)	15,797 (9.4%)	951 (7.7%)	180 (16.0%)	987 (9.2%)	2,436 (8.6%)	391 (7.6%)	893 (9.9%)	16 (10.2%)	40,562 (9.3%)
Q4	36,045 (21.5%)	6,398 (20.5%)	39,313 (23.3%)	2,326 (18.9%)	238 (21.2%)	2,451 (22.9%)	5,930 (21.0%)	918 (17.8%)	1,986 (22.0%)	52 (33.1%)	95,657 (22.0%)
Q5 (highest)	100,593 (60.0%)	20,050 (64.2%)	103,069 (61.1%)	8,385 (68.2%)	470 (41.8%)	6,565 (61.4%)	18,380 (65.0%)	3,629 (70.2%)	5,531 (61.3%)	65 (41.4%)	266,737 (61.4%)
Missing	584 (0.3%)	35 (0.1%)	707 (0.4%)	25 (0.2%)	< 6	30 (0.3%)	92 (0.3%)	17 (0.3%)	28 (0.3%)	0 (0.0%)	1,519 (0.3%)
Residential instability quintile, n (%)											
Q1 (lowest)	49,313 (29.4%)	3,264 (10.4%)	42,862 (25.4%)	1,752 (14.2%)	63 (5.6%)	733 (6.9%)	4,716 (16.7%)	937 (18.1%)	1,615 (17.9%)	26 (16.6%)	105,281 (24.2%)
Q2	27,146 (16.2%)	3,073 (9.8%)	25,092 (14.9%)	1,236 (10.0%)	74 (6.6%)	767 (7.2%)	3,556 (12.6%)	730 (14.1%)	1,215 (13.5%)	21 (13.4%)	62,910 (14.5%)
Q3	23,850 (14.2%)	3,742 (12.0%)	23,986 (14.2%)	1,281 (10.4%)	126 (11.2%)	1,130 (10.6%)	3,707 (13.1%)	668 (12.9%)	1,215 (13.5%)	25 (15.9%)	59,730 (13.7%)
Q4	23,703 (14.1%)	6,355 (20.3%)	22,089 (13.1%)	2,479 (20.2%)	252 (22.4%)	1,895 (17.7%)	4,676 (16.5%)	815 (15.8%)	1,672 (18.5%)	31 (19.7%)	63,967 (14.7%)

Variable	Sponsored family members	Economic immigrant, caregiver	Economic class, other	Privately sponsored refugees	Blended visa office–referred refugees	Government-assisted refugees	Protected persons/ Refugees (asylum seekers)	Refugee dependents	Humanitarian and compassionate /Public policy cases	Other immigrants	Total
Number	167,649	31,249	168,777	12,300	1,124	10,692	28,268	5,166	9,019	157	434,401
Q5 (highest)	43,053 (25.7%)	14,780 (47.3%)	54,041 (32.0%)	5,527 (44.9%)	608 (54.1%)	6,137 (57.4%)	11,521 (40.8%)	1,999 (38.7%)	3,274 (36.3%)	54 (34.4%)	140,994 (32.5%)
Missing	584 (0.3%)	35 (0.1%)	707 (0.4%)	25 (0.2%)	< 6	30 (0.3%)	92 (0.3%)	17 (0.3%)	28 (0.3%)	0 (0.0%)	1,519 (0.3%)
Number of persons per dwelling quintile, n (%)											
Q1 (lowest)	23,692 (14.1%)	5,387 (17.2%)	31,390 (18.6%)	1,827 (14.9%)	355 (31.6%)	2,727 (25.5%)	5,046 (17.9%)	766 (14.8%)	1,449 (16.1%)	35 (22.3%)	72,674 (16.7%)
Q2	17,245 (10.3%)	4,754 (15.2%)	16,494 (9.8%)	2,130 (17.3%)	302 (26.9%)	2,053 (19.2%)	3,544 (12.5%)	621 (12.0%)	1,062 (11.8%)	23 (14.6%)	48,228 (11.1%)
Q3	13,802 (8.2%)	4,298 (13.8%)	13,709 (8.1%)	1,223 (9.9%)	123 (10.9%)	1,218 (11.4%)	2,773 (9.8%)	476 (9.2%)	1,002 (11.1%)	15 (9.6%)	38,639 (8.9%)
Q4	33,989 (20.3%)	9,059 (29.0%)	34,534 (20.5%)	2,850 (23.2%)	185 (16.5%)	2,162 (20.2%)	6,539 (23.1%)	1,185 (22.9%)	2,213 (24.5%)	40 (25.5%)	92,756 (21.4%)
Q5 (highest)	78,359 (46.7%)	7,710 (24.7%)	71,875 (42.6%)	4,242 (34.5%)	158 (14.1%)	2,501 (23.4%)	10,270 (36.3%)	2,100 (40.7%)	3,265 (36.2%)	44 (28.0%)	180,524 (41.6%)
Missing	562 (0.3%)	41 (0.1%)	775 (0.5%)	28 (0.2%)	< 6	31 (0.3%)	96 (0.3%)	18 (0.3%)	28 (0.3%)	0 (0.0%)	1,580 (0.4%)
Public health unit of residence, n (%)											
Algoma Public Health	220 (0.1%)	< 6	141 (0.1%)	0 (0.0%)	9 (0.8%)	20 (0.2%)	< 6	< 6	6 (0.1%)	0 (0.0%)	406 (0.1%)
Brant County Health Unit	718 (0.4%)	108 (0.3%)	445 (0.3%)	22 (0.2%)	9 (0.8%)	7 (0.1%)	60 (0.2%)	8 (0.2%)	31 (0.3%)	0 (0.0%)	1,408 (0.3%)
Durham Region Health Department	6,930 (4.1%)	783 (2.5%)	6,077 (3.6%)	250 (2.0%)	16 (1.4%)	60 (0.6%)	1,022 (3.6%)	173 (3.3%)	357 (4.0%)	8 (5.1%)	15,676 (3.6%)
Grey Bruce Health Unit	386 (0.2%)	27 (0.1%)	290 (0.2%)	< 6	20 (1.8%)	< 6	20 (0.1%)	< 6	< 6	< 6	755 (0.2%)
Haldimand-Norfolk Health Unit	223 (0.1%)	31 (0.1%)	121 (0.1%)	7 (0.1%)	< 6	< 6	15 (0.1%)	< 6	9 (0.1%)	< 6	415 (0.1%)
Haliburton, Kawartha, Pine Ridge District Health Unit	376 (0.2%)	38 (0.1%)	194 (0.1%)	8 (0.1%)	10 (0.9%)	< 6	22 (0.1%)	< 6	15 (0.2%)	< 6	671 (0.2%)
Halton Region Health Department	7,321 (4.4%)	1,102 (3.5%)	11,591 (6.9%)	354 (2.9%)	50–60	155 (1.4%)	743 (2.6%)	86 (1.7%)	234 (2.6%)	< 6	21,641 (5.0%)

Variable	Sponsored family members	Economic immigrant, caregiver	Economic class, other	Privately sponsored refugees	Blended visa office–referred refugees	Government-assisted refugees	Protected persons/ Refugees (asylum seekers)	Refugee dependents	Humanitarian and compassionate /Public policy cases	Other immigrants	Total
Number	167,649	31,249	168,777	12,300	1,124	10,692	28,268	5,166	9,019	157	434,401
City of Hamilton – Public Health & Social Services	4,450 (2.7%)	809 (2.6%)	3,588 (2.1%)	661 (5.4%)	50–60	1,192 (11.1%)	1,109 (3.9%)	163 (3.2%)	328 (3.6%)	< 6	12,351 (2.8%)
Hastings and Prince Edward Counties Health Unit	419 (0.2%)	64 (0.2%)	252 (0.1%)	11 (0.1%)	< 6	< 6	31 (0.1%)	< 6	13 (0.1%)	0 (0.0%)	802 (0.2%)
Huron Perth Health Unit	255 (0.2%)	31 (0.1%)	219 (0.1%)	16 (0.1%)	28 (2.5%)	11 (0.1%)	14 (0.0%)	0 (0.0%)	9 (0.1%)	0 (0.0%)	583 (0.1%)
Chatham-Kent Health Unit	250 (0.1%)	13 (0.0%)	121 (0.1%)	11 (0.1%)	11 (1.0%)	8 (0.1%)	22 (0.1%)	< 6	21 (0.2%)	< 6	458 (0.1%)
Kingston, Frontenac and Lennox & Addington Health Unit	658 (0.4%)	95 (0.3%)	810 (0.5%)	41 (0.3%)	11 (1.0%)	54 (0.5%)	30 (0.1%)	< 6	13 (0.1%)	< 6	1,718 (0.4%)
Lambton Health Unit	357 (0.2%)	29 (0.1%)	218 (0.1%)	8 (0.1%)	15 (1.3%)	7 (0.1%)	13 (0.0%)	< 6	14 (0.2%)	< 6	664 (0.2%)
Leeds, Grenville and Lanark District Health Unit	408 (0.2%)	45 (0.1%)	147 (0.1%)	7 (0.1%)	17 (1.5%)	< 6	8 (0.0%)	< 6	12 (0.1%)	< 6	649 (0.1%)
Middlesex-London Health Unit	2,935 (1.8%)	392 (1.3%)	3,865 (2.3%)	503 (4.1%)	60–70	1,203 (11.3%)	963 (3.4%)	111 (2.1%)	207 (2.3%)	< 6	10,247 (2.4%)
Niagara Region Public Health Department	2,333 (1.4%)	400 (1.3%)	1,623 (1.0%)	147 (1.2%)	29 (2.6%)	31 (0.3%)	570 (2.0%)	88 (1.7%)	157 (1.7%)	7 (4.5%)	5,385 (1.2%)
North Bay Parry Sound District Health Unit	237 (0.1%)	18 (0.1%)	139 (0.1%)	9 (0.1%)	8 (0.7%)	0 (0.0%)	7 (0.0%)	< 6	8 (0.1%)	< 6	427 (0.1%)
Northwestern Health Unit	131 (0.1%)	36 (0.1%)	88 (0.1%)	0 (0.0%)	< 6	< 6	< 6	0 (0.0%)	< 6	< 6	269 (0.1%)
Ottawa Public Health	9,317 (5.6%)	1,625 (5.2%)	9,108 (5.4%)	890 (7.2%)	155 (13.8%)	1,545 (14.5%)	2,167 (7.7%)	409 (7.9%)	690 (7.7%)	30 (19.1%)	25,936 (6.0%)
Peel Public Health	36,203 (21.6%)	3,122 (10.0%)	38,121 (22.6%)	1,867 (15.2%)	58 (5.2%)	1,109 (10.4%)	3,631 (12.8%)	621 (12.0%)	1,512 (16.8%)	18 (11.5%)	86,262 (19.9%)
Peterborough County-City Health Unit	381 (0.2%)	38 (0.1%)	327 (0.2%)	34 (0.3%)	9 (0.8%)	67 (0.6%)	30 (0.1%)	0 (0.0%)	1–6	< 6	893 (0.2%)
Porcupine Health Unit	113 (0.1%)	30 (0.1%)	112 (0.1%)	< 6	< 6	0 (0.0%)	8 (0.0%)	< 6	< 6	< 6	276 (0.1%)
Renfrew County and District Health Unit	196 (0.1%)	18 (0.1%)	125 (0.1%)	< 6	< 6	0 (0.0%)	< 6	0 (0.0%)	< 6	0 (0.0%)	349 (0.1%)
Eastern Ontario Health Unit	445 (0.3%)	49 (0.2%)	218 (0.1%)	9 (0.1%)	< 6	< 6	47 (0.2%)	10 (0.2%)	28 (0.3%)	< 6	813 (0.2%)

Variable	Sponsored family members	Economic immigrant, caregiver	Economic class, other	Privately sponsored refugees	Blended visa office–referred refugees	Government-assisted refugees	Protected persons/Refugees (asylum seekers)	Refugee dependents	Humanitarian and compassionate /Public policy cases	Other immigrants	Total
Number	167,649	31,249	168,777	12,300	1,124	10,692	28,268	5,166	9,019	157	434,401
Simcoe Muskoka District Health Unit	3,071 (1.8%)	456 (1.5%)	1,858 (1.1%)	130 (1.1%)	20–30	60 (0.6%)	499 (1.8%)	96 (1.9%)	158 (1.8%)	< 6	6,359 (1.5%)
Sudbury and District Health Unit	364 (0.2%)	50 (0.2%)	435 (0.3%)	12 (0.1%)	10 (0.9%)	< 6	45 (0.2%)	7 (0.1%)	< 6	< 6	932 (0.2%)
Thunder Bay District Health Unit	296 (0.2%)	32 (0.1%)	249 (0.1%)	19 (0.2%)	15 (1.3%)	39 (0.4%)	23 (0.1%)	< 6	8 (0.1%)	< 6	682 (0.2%)
Timiskaming Health Unit	49 (0.0%)	< 6	24 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	< 6	0 (0.0%)	76 (0.0%)
Region of Waterloo Public Health	5,192 (3.1%)	536 (1.7%)	5,552 (3.3%)	868 (7.1%)	131 (11.7%)	1,044 (9.8%)	742 (2.6%)	108 (2.1%)	193 (2.1%)	0 (0.0%)	14,366 (3.3%)
Wellington-Dufferin-Guelph Health Unit	1,953 (1.2%)	457 (1.5%)	1,777 (1.1%)	363 (3.0%)	40 (3.6%)	56 (0.5%)	182 (0.6%)	25 (0.5%)	50 (0.6%)	0 (0.0%)	4,903 (1.1%)
Windsor-Essex County Health Unit	3,059 (1.8%)	223 (0.7%)	2,015 (1.2%)	891 (7.2%)	46 (4.1%)	1,202 (11.2%)	614 (2.2%)	88 (1.7%)	292 (3.2%)	11 (7.0%)	8,441 (1.9%)
York Region Public Health Services	24,797 (14.8%)	2,433 (7.8%)	21,273 (12.6%)	706 (5.7%)	20–30	435 (4.1%)	2,847 (10.1%)	612 (11.8%)	768 (8.5%)	< 6	53,903 (12.4%)
Southwestern Health Unit	683 (0.4%)	75 (0.2%)	323 (0.2%)	12 (0.1%)	13 (1.2%)	11 (0.1%)	51 (0.2%)	< 6	19 (0.2%)	< 6	1,191 (0.3%)
Toronto Public Health	52,479 (31.3%)	18,053 (57.8%)	56,710 (33.6%)	4,418 (35.9%)	220 (19.6%)	2,328 (21.8%)	12,642 (44.7%)	2,514 (48.7%)	3,817 (42.3%)	53 (33.8%)	153,234 (35.3%)
Unknown/missing	444 (0.3%)	26 (0.1%)	621 (0.4%)	20 (0.2%)	< 6	27 (0.3%)	81 (0.3%)	14 (0.3%)	26 (0.3%)	0 (0.0%)	1,260 (0.3%)
CLINICAL CHARACTERISTICS											
Chronic conditions, n (%)											
Respiratory (asthma, COPD)	6,895 (4.1%)	1,147 (3.7%)	5,245 (3.1%)	618 (5.0%)	44 (3.9%)	758 (7.1%)	1,708 (6.0%)	196 (3.8%)	615 (6.8%)	26 (16.6%)	17,252 (4.0%)
Chronic kidney disease (incl. chronic dialysis)	4,054 (2.4%)	325 (1.0%)	1,341 (0.8%)	239 (1.9%)	14 (1.2%)	253 (2.4%)	582 (2.1%)	73 (1.4%)	298 (3.3%)	11 (7.0%)	7,190 (1.7%)
Diabetes	21,423 (12.8%)	2,296 (7.3%)	11,577 (6.9%)	1,569 (12.8%)	104 (9.3%)	1,636 (15.3%)	3,741 (13.2%)	607 (11.7%)	1,467 (16.3%)	33 (21.0%)	44,453 (10.2%)
Cardiovascular (CHF, TIA/stroke, Ischemic cardiac disease, hypertension)	36,715 (21.9%)	5,431 (17.4%)	18,279 (10.8%)	2,586 (21.0%)	91 (8.1%)	2,060 (19.3%)	5,752 (20.3%)	815 (15.8%)	2,357 (26.1%)	42 (26.8%)	74,128 (17.1%)
Immunocompromised	820 (0.5%)	94 (0.3%)	398 (0.2%)	74 (0.6%)	9 (0.8%)	111 (1.0%)	565 (2.0%)	50 (1.0%)	131 (1.5%)	18 (11.5%)	2,270 (0.5%)

Variable	Sponsored family members	Economic immigrant, caregiver	Economic class, other	Privately sponsored refugees	Blended visa office–referred refugees	Government-assisted refugees	Protected persons/ Refugees (asylum seekers)	Refugee dependents	Humanitarian and compassionate /Public policy cases	Other immigrants	Total
Number	167,649	31,249	168,777	12,300	1,124	10,692	28,268	5,166	9,019	157	434,401
Inflammatory diseases (IBD, rheumatoid arthritis)	787 (0.5%)	91 (0.3%)	536 (0.3%)	70 (0.6%)	< 6	66 (0.6%)	161 (0.6%)	27 (0.5%)	67 (0.7%)	< 6	1,809 (0.4%)
Liver disease	723 (0.4%)	77 (0.2%)	409 (0.2%)	41 (0.3%)	< 6	67 (0.6%)	181 (0.6%)	26 (0.5%)	65 (0.7%)	1–6	1,598 (0.4%)
CHARACTERISTICS AT LANDING											
Canadian language ability, n (%)											
Bilingual	3,216 (1.9%)	103 (0.3%)	8,171 (4.8%)	102 (0.8%)	< 6	110 (1.0%)	1,018 (3.6%)	111 (2.1%)	190 (2.1%)	< 6	13,027 (3.0%)
English	98,118 (58.5%)	29,595 (94.7%)	144,507 (85.6%)	6,071 (49.4%)	307 (27.3%)	2,338 (21.9%)	22,334 (79.0%)	2,359 (45.7%)	7,574 (84.0%)	140 (89.2%)	313,343 (72.1%)
French	1,886 (1.1%)	63 (0.2%)	1,182 (0.7%)	121 (1.0%)	1–10	153 (1.4%)	1,081 (3.8%)	328 (6.3%)	332 (3.7%)	< 6	5,155 (1.2%)
Neither	63,558 (37.9%)	1,460 (4.7%)	14,748 (8.7%)	5,859 (47.6%)	785 (69.8%)	7,901 (73.9%)	3,752 (13.3%)	2,283 (44.2%)	759 (8.4%)	10 (6.4%)	101,115 (23.3%)
Not stated	871 (0.5%)	28 (0.1%)	169 (0.1%)	147 (1.2%)	20–25	190 (1.8%)	83 (0.3%)	85 (1.6%)	164 (1.8%)	< 6	1,761 (0.4%)
Highest education level (aged 25 years and older), n (%)											
None	36,181 (21.6%)	524 (1.7%)	11,538 (6.8%)	1,590 (12.9%)	119 (10.6%)	2,143 (20.0%)	1,147 (4.1%)	798 (15.4%)	528 (5.9%)	1–6	54,574 (12.6%)
Secondary or less	48,993 (29.2%)	1,527 (4.9%)	9,203 (5.5%)	6,143 (49.9%)	723 (64.3%)	6,542 (61.2%)	12,831 (45.4%)	2,247 (43.5%)	4,197 (46.5%)	70 (44.6%)	92,476 (21.3%)
Some university – no degree	7,872 (4.7%)	2,661 (8.5%)	2,909 (1.7%)	476 (3.9%)	14 (1.2%)	186 (1.7%)	2,030 (7.2%)	275 (5.3%)	593 (6.6%)	11 (7.0%)	17,027 (3.9%)
Trade/diploma	22,756 (13.6%)	7,355 (23.5%)	16,303 (9.7%)	1,598 (13.0%)	42 (3.7%)	603 (5.6%)	5,173 (18.3%)	775 (15.0%)	2,292 (25.4%)	34 (21.7%)	56,931 (13.1%)
Bachelor's degree or higher	50,262 (30.0%)	19,098 (61.1%)	116,709 (69.1%)	2,265 (18.4%)	63 (5.6%)	996 (9.3%)	6,938 (24.5%)	842 (16.3%)	1,304 (14.5%)	33 (21.0%)	198,510 (45.7%)
Not stated	1,585 (0.9%)	80–90	12,115 (7.2%)	228 (1.9%)	163 (14.5%)	222 (2.1%)	149 (0.5%)	229 (4.4%)	105 (1.2%)	< 6	14,883 (3.4%)
World subregion of origin, n (%)											

Variable	Sponsored family members	Economic immigrant, caregiver	Economic class, other	Privately sponsored refugees	Blended visa office–referred refugees	Government-assisted refugees	Protected persons/ Refugees (asylum seekers)	Refugee dependents	Humanitarian and compassionate /Public policy cases	Other immigrants	Total
Number	167,649	31,249	168,777	12,300	1,124	10,692	28,268	5,166	9,019	157	434,401
Central Africa	574 (0.3%)	10–20	438 (0.3%)	88 (0.7%)	13 (1.2%)	292 (2.7%)	712 (2.5%)	159 (3.1%)	215 (2.4%)	< 6	2,506 (0.6%)
Western Africa	2,896 (1.7%)	59 (0.2%)	3,079 (1.8%)	19 (0.2%)	10–20	40 (0.4%)	1,766 (6.2%)	295 (5.7%)	282 (3.1%)	< 6	8,458 (1.9%)
East Africa	3,575 (2.1%)	128 (0.4%)	1,556 (0.9%)	1,921 (15.6%)	67 (6.0%)	744 (7.0%)	2,990 (10.6%)	449 (8.7%)	476 (5.3%)	15 (9.6%)	11,921 (2.7%)
Southern Africa	502 (0.3%)	< 6	803 (0.5%)	< 6	0 (0.0%)	< 6	209 (0.7%)	15 (0.3%)	25 (0.3%)	< 6	1,562 (0.4%)
Middle East	9,804 (5.8%)	37 (0.1%)	19,919 (11.8%)	8,203 (66.7%)	936 (83.3%)	8,030 (75.1%)	3,239 (11.5%)	305 (5.9%)	497 (5.5%)	11 (7.0%)	50,981 (11.7%)
North Africa	2,427 (1.4%)	24 (0.1%)	5,388 (3.2%)	133 (1.1%)	20 (1.8%)	160 (1.5%)	607 (2.1%)	54 (1.0%)	136 (1.5%)	0 (0.0%)	8,949 (2.1%)
Central America	3,751 (2.2%)	67 (0.2%)	1,656 (1.0%)	< 6	0 (0.0%)	< 6	1,033 (3.7%)	175 (3.4%)	624 (6.9%)	6 (3.8%)	7,318 (1.7%)
South America	7,348 (4.4%)	252 (0.8%)	4,434 (2.6%)	26 (0.2%)	10 (0.9%)	26 (0.2%)	3,014 (10.7%)	285 (5.5%)	953 (10.6%)	10 (6.4%)	16,358 (3.8%)
Caribbean	12,128 (7.2%)	267 (0.9%)	2,957 (1.8%)	< 6	< 6	10 (0.1%)	3,229 (11.4%)	473 (9.2%)	1,722 (19.1%)	23 (14.6%)	20,810 (4.8%)
North America	6,970 (4.2%)	16 (0.1%)	2,535 (1.5%)	< 6	0 (0.0%)	0 (0.0%)	< 6	24 (0.5%)	70 (0.8%)	11 (7.0%)	9,628 (2.2%)
East Asia	33,533 (20.0%)	576 (1.8%)	25,976 (15.4%)	< 6	0 (0.0%)	8 (0.1%)	3,296 (11.7%)	1,146 (22.2%)	572 (6.3%)	< 6	65,117 (15.0%)
Australasia & Oceania/ Asia unspecified	1,152 (0.7%)	< 6	697 (0.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	< 6	1–6	< 6	1,861 (0.4%)
Southeast Asia	14,976 (8.9%)	29,070 (93.0%)	14,422 (8.5%)	80 (0.7%)	58 (5.2%)	259 (2.4%)	96 (0.3%)	20 (0.4%)	458 (5.1%)	15 (9.6%)	59,454 (13.7%)
South Asia	45,044 (26.9%)	383 (1.2%)	65,395 (38.7%)	1,800 (14.6%)	< 6	1,081 (10.1%)	4,985 (17.6%)	1,346 (26.1%)	1,526 (16.9%)	20–30	121,592 (28.0%)
Eastern Europe	11,879 (7.1%)	277 (0.9%)	7,914 (4.7%)	11 (0.1%)	0 (0.0%)	24 (0.2%)	2,328 (8.2%)	293 (5.7%)	964 (10.7%)	6 (3.8%)	23,696 (5.5%)
Europe other	11,087 (6.6%)	73 (0.2%)	11,608 (6.9%)	10 (0.1%)	0 (0.0%)	12 (0.1%)	763 (2.7%)	126 (2.4%)	492 (5.5%)	15 (9.6%)	24,186 (5.6%)
Not stated	< 6	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	< 6	< 6	< 6	0 (0.0%)	< 6

Notes: 1. Includes immigrants who landed between January 1, 2010 and May 31, 2017. 2. Chronic conditions were identified using validated algorithms for ICES data holdings; the latest diagnosis date is March 31, 2019. 3. Some cells are suppressed due to low counts (n < 6) or reported as ranges to protect privacy.

Appendix 3.1. Sociodemographic and clinical characteristics of Ontario residents tested for COVID-19, by immigrant status, as of June 13, 2020

Variable	Population tested (N=624,386)		
	Immigrants	Canadian-born and long-term residents	Other newcomers to Ontario
Number tested for COVID-19	111,323	495,304	17,759
SOCIODEMOGRAPHIC CHARACTERISTICS			
Age group, n (%)			
0–9 years	3,236 (0.9%)	10,933 (1.0%)	583 (0.7%)
Second generation	3,120 (0.9%)		
Immigrants and refugees	116 (0.5%)		
10–19 years	4,103 (0.9%)	17,604 (1.5%)	565 (0.9%)
Second generation	2,684 (0.9%)		
Immigrants and refugees	1,419 (1.0%)		
20–29 years	11,066 (4.0%)	70,272 (4.6%)	6,053 (3.7%)
30–39 years	21,807 (4.3%)	69,486 (4.8%)	6,129 (3.4%)
40–49 years	26,439 (4.7%)	67,200 (4.9%)	2,352 (3.6%)
50–59 years	25,805 (4.8%)	85,693 (5.4%)	924 (3.3%)
60–69 years	12,731 (4%)	70,310 (4.8%)	514 (2.3%)
70+ years	6,136 (8.3%)	103,806 (29.1%)	639 (25.5%)
Sex, n (%)			
Female	69,376 (4.2%)	300,690 (5.3%)	9,266 (3.0%)
Male	41,947 (2.6%)	194,614 (3.5%)	8,493 (2.7%)
Neighbourhood income quintile, n (%)			
Q1 (lowest)	30,974 (3.9%)	99,853 (5.0%)	5,818 (3.2%)
Q2	24,654 (3.6%)	98,883 (4.7%)	4,139 (2.9%)
Q3	23,157 (3.4%)	97,909 (4.4%)	3,292 (2.7%)
Q4	19,267 (3.1%)	97,325 (4.2%)	2,479 (2.5%)

Variable	Population tested (N=624,386)		
	Immigrants	Canadian-born and long-term residents	Other newcomers to Ontario
Q5 (highest)	12,938 (2.8%)	99,484 (4.0%)	1,918 (2.4%)
Missing	333 (3.2%)	1,850 (4.8%)	113 (2.9%)
Ethnic concentration quintile, n (%)			
Q1 (lowest)	3,140 (3.9%)	104,791 (5.0%)	951 (3.8%)
Q2	5,752 (3.7%)	104,056 (4.8%)	1,442 (3.7%)
Q3	11,176 (3.6%)	98,607 (4.4%)	2,174 (3.1%)
Q4	25,102 (3.5%)	95,772 (4.1%)	3,822 (2.7%)
Q5 (highest)	65,736 (3.3%)	84,978 (3.9%)	9,207 (2.7%)
Missing	417 (3.4%)	7,100 (5.3%)	163 (3.2%)
Residential instability quintile, n (%)			
Q1 (lowest)	27,335 (2.9%)	81,848 (3.6%)	2,982 (2.4%)
Q2	17,369 (3.3%)	92,141 (4.2%)	2,120 (2.7%)
Q3	15,946 (3.5%)	94,821 (4.4%)	2,318 (2.8%)
Q4	18,478 (4.0%)	99,731 (4.8%)	2,930 (3.3%)
Q5 (highest)	31,778 (3.8%)	119,663 (5.2%)	7,246 (2.9%)
Missing	417 (3.4%)	7,100 (5.3%)	163 (3.2%)
Number of persons per dwelling quintile, n (%)			
Q1 (lowest)	15,399 (3.7%)	114,393 (5.4%)	4,494 (2.9%)
Q2	12,235 (3.8%)	103,526 (4.8%)	2,497 (3.1%)
Q3	10,394 (3.9%)	75,165 (4.5%)	1,799 (3.1%)
Q4	25,972 (3.7%)	113,683 (4.1%)	3,476 (3.0%)
Q5 (highest)	46,906 (3.1%)	84,940 (3.6%)	5,322 (2.5%)
Missing	417 (3.3%)	3,597 (5.2%)	171 (3.2%)
Public health unit of residence, n (%)			

Variable	Population tested (N=624,386)		
	Immigrants	Canadian-born and long-term residents	Other newcomers to Ontario
Algoma Public Health	94 (3.9%)	5,798 (5.0%)	37 (3.5%)
Brant County Health Unit	430 (3.8%)	7,257 (4.9%)	57 (2.8%)
Durham Region Health Department	4,553 (3.2%)	19,330 (3.4%)	330 (2.3%)
Grey Bruce Health Unit	171 (2.9%)	5,267 (3.2%)	44 (3.0%)
Haldimand-Norfolk Health Unit	133 (3.2%)	4,679 (4.3%)	33 (4.0%)
Haliburton, Kawartha, Pine Ridge District Health Unit	275 (5%)	11,552 (6.2%)	44 (4.0%)
Halton Region Health Department	3,707 (2.5%)	14,673 (3.3%)	464 (1.7%)
City of Hamilton – Public Health & Social Services	3,922 (4.0%)	19,376 (4.1%)	506 (3.0%)
Hastings and Prince Edward Counties Health Unit	225 (4.2%)	8,208 (4.9%)	83 (3.6%)
Huron Perth Health Unit	166 (3.2%)	5,544 (4%)	65 (3.7%)
Chatham-Kent Health Unit	114 (3.1%)	3,762 (3.6%)	76 (6.0%)
Kingston, Frontenac and Lennox & Addington Health Unit	357 (3.4%)	8,393 (4.4%)	145 (2.9%)
Lambton Health Unit	162 (3.5%)	6,368 (5.0%)	65 (3.2%)
Leeds, Grenville and Lanark District Health Unit	197 (4.6%)	9,097 (5.2%)	74 (3.6%)
Middlesex-London Health Unit	2,342 (3.3%)	16,817 (4.1%)	606 (3.1%)
Niagara Region Public Health Department	1,628 (3.9%)	19,762 (4.5%)	304 (3.2%)
North Bay Parry Sound District Health Unit	90 (3.3%)	6,084 (4.7%)	45 (4.2%)
Northwestern Health Unit	119 (7.7%)	5,047 (5.8%)	78 (4.6%)
Ottawa Public Health	6,565 (3.6%)	37,453 (4.5%)	1,704 (3.0%)
Peel Public Health	22,301 (3.3%)	32,276 (4%)	2,909 (2.5%)
Peterborough County-City Health Unit	336 (5.6%)	11,926 (8.4%)	82 (4.7%)
Porcupine Health Unit	103 (8.0%)	4,537 (5.3%)	33 (4.3%)
Renfrew County and District Health Unit	116 (4.4%)	6,467 (6.3%)	74 (3.8%)
Eastern Ontario Health Unit	206 (4.0%)	11,438 (5.4%)	218 (4.3%)
Simcoe Muskoka District Health Unit	1,938 (3.8%)	23,293 (4.3%)	277 (3.3%)
Sudbury and District Health Unit	253 (5.2%)	12,658 (6.4%)	131 (4.4%)

Variable	Population tested (N=624,386)		
	Immigrants	Canadian-born and long-term residents	Other newcomers to Ontario
Thunder Bay District Health Unit	285 (6.7%)	10,278 (6.7%)	170 (7.1%)
Timiskaming Health Unit	34 (7.6%)	1,988 (5.9%)	11 (3.7%)
Region of Waterloo Public Health	2,861 (2.7%)	16,009 (3.5%)	687 (2.5%)
Wellington-Dufferin-Guelph Health Unit	1,600 (4.4%)	14,696 (5.4%)	252 (3.4%)
Windsor-Essex County Health Unit	2,031 (2.9%)	18,972 (5.2%)	623 (3.6%)
York Region Public Health Services	12,208 (2.7%)	28,374 (3.8%)	1,091 (2.1%)
Southwestern Health Unit	352 (3.1%)	8,597 (4.2%)	75 (3.3%)
Toronto Public Health	41,122 (3.9%)	77,713 (4.4%)	6,254 (3%)
Unknown/missing	327 (3.2%)	1,615 (4.9%)	112 (2.9%)
CLINICAL CHARACTERISTICS			
Chronic conditions, n (%)			
Respiratory (asthma, COPD)	14,881 (3.9%)	144,678 (6.0%)	
Chronic kidney disease (incl. chronic dialysis)	4,370 (8.8%)	28,766 (11.8%)	
Diabetes	16,030 (4.9%)	73,255 (6.8%)	
Cardiovascular (CHF, TIA/stroke, cardiac ischemic disease, hypertension)	28,279 (5.1%)	164,936 (6.5%)	
Immunocompromised	1,826 (8.6%)	10,098 (10.1%)	
Inflammatory (IBD, rheumatoid arthritis)	1,200 (5.7%)	11,618 (7.4%)	
Liver disease	1,069 (6.7%)	7,348 (9.7%)	
Recency of immigration, n (%)			
Recent (0 to ≤ 5 years)	4,293 (3.0%)		
Intermediate (> 5 to ≤ 10 years)	15,768 (3.7%)		
Long-term residents (> 10 years)	85,457 (4.2%)		
Second-generation children and youth	5,805 (0.9%)		
Immigrant class, n (%)			
Sponsored family member	39,591 (3.2%)		
Economic immigrant, caregiver	8,799 (10.3%)		

Variable	Population tested (N=624,386)		
	Immigrants	Canadian-born and long-term residents	Other newcomers to Ontario
Economic immigrant, other	42,148 (3.1%)		
Privately sponsored refugee	4,700 (3.7%)		
Blended visa office–referred refugee	56 (1.7%)		
Government-assisted refugee	3,833 (3.4%)		
Protected person/Refugee (asylum seeker)	7,978 (4.1%)		
Refugee dependent	2,275 (3.4%)		
Humanitarian and compassionate/Public policy case	1,732 (4.2%)		
Other immigrant	211 (3.2%)		
World subregion of origin, n (%)			
Central Africa	673 (4.4%)		
Western Africa	3,354 (5.9%)		
East Africa	4,582 (4.3%)		
Southern Africa	549 (3.6%)		
Middle East	7,897 (2.6%)		
North Africa	1,507 (2.6%)		
Central America	2,540 (3.8%)		
South America	6,707 (4.3%)		
Caribbean	10,994 (5.7%)		
North America	1,905 (2.7%)		
East Asia	7,866 (1.6%)		
Australasia & Oceania/Asia unspecified	286 (3.0%)		
Southeast Asia	22,300 (6.5%)		
South Asia	23,443 (2.8%)		
Eastern Europe	9,451 (3.2%)		
Europe other	7,267 (3.2%)		
Not stated	< 6		

Notes: 1. Denominator excludes long-term care residents. 2. Includes children born in Ontario to immigrant mothers (second generation). 3. Chronic conditions have not been reported for newcomers due to an insufficient 2-year look-back period. 4. Chronic conditions were identified using validated algorithms for ICES data holdings; the latest diagnosis date is March 31, 2019. 5. Results are shown in row percentages. 6. Some cells are suppressed due to low counts (n < 6) or reported as ranges to protect privacy.

Appendix 4.1 Sociodemographic and clinical characteristics of individuals who tested positive for COVID-19 and per capita in Ontario, by immigrant status, as of June 13, 2020

Variable	Immigrants and refugees			Canadian-born and long-term residents			Other newcomers to Ontario		
Number	9,066			13,939			1,655		
	Number tested positive	% Positive in those tested	% Positive per capita	Number tested positive	% Positive in those tested	% Positive per capita	Number tested positive	% Positive in those tested	% Positive per capita
SOCIODEMOGRAPHIC CHARACTERISTICS									
Age group, n (%)									
0–9 years	171	5.3%	0.0%	196	1.8%	0.0%	37	6.3%	0.0%
Second generation	161	5.2%	0.0%						
Immigrant and refugees	10	8.6%	0.0%						
10–19 years	380	9.3%	0.1%	414	2.4%	0.0%	77	13.6%	0.1%
Second generation	229	8.5%	0.1%						
Immigrant and refugees	151	10.6%	0.1%						
20–29 years	835	7.5%	0.3%	2386	3.4%	0.2%	581	9.6%	0.4%
30–39 years	1525	7.0%	0.3%	1833	2.6%	0.1%	535	8.7%	0.3%
40–49 years	2,125	8.0%	0.4%	1887	2.8%	0.1%	249	10.6%	0.4%
50–59 years	2,364	9.2%	0.4%	2512	2.9%	0.2%	101	10.9%	0.4%
60–69 years	1,184	9.3%	0.4%	1932	2.7%	0.1%	42	8.2%	0.2%
70+ years	482	21.3%	0.6%	2779	8.4%	0.8%	33	14.0%	0.9%
Sex, n (%)									
Female	5,063	7.3%	0.3%	7,573	2.5%	0.1%	597	6.4%	0.2%
Male	4,003	9.5%	0.3%	6,366	3.3%	0.1%	1,058	12.5%	0.3%
Neighbourhood income quintile, n (%)									
Q1 (lowest)	3,199	10.3%	0.4%	3,027	3.0%	0.2%	662	11.4%	0.4%
Q2	2,117	8.6%	0.3%	2,683	2.7%	0.1%	350	8.5%	0.2%

Variable	Immigrants and refugees			Canadian-born and long-term residents			Other newcomers to Ontario		
Number	9,066			13,939			1,655		
	Number tested positive	% Positive in those tested	% Positive per capita	Number tested positive	% Positive in those tested	% Positive per capita	Number tested positive	% Positive in those tested	% Positive per capita
Q3	1,788	7.7%	0.3%	2,922	3.0%	0.1%	290	8.8%	0.2%
Q4	1,273	6.6%	0.2%	2,603	2.7%	0.1%	188	7.6%	0.2%
Q5 (highest)	669	5.2%	0.1%	2,646	2.7%	0.1%	149	7.8%	0.2%
Missing	20	6.0%	0.2%	58	3.1%	0.2%	16	14.2%	0.4%
Ethnic concentration quintile, n (%)									
Q1 (lowest)	101	3.2%	0.1%	1,595	1.5%	0.1%	68	7.2%	0.3%
Q2	243	4.2%	0.2%	1,970	1.9%	0.1%	127	8.8%	0.3%
Q3	669	6.0%	0.2%	2,511	2.5%	0.1%	155	7.1%	0.2%
Q4	1,724	6.9%	0.2%	3,066	3.2%	0.1%	274	7.2%	0.2%
Q5 (highest)	6,304	9.6%	0.3%	4,648	5.5%	0.2%	1,013	11.0%	0.3%
Missing	25	6.0%	0.2%	149	2.1%	0.1%	18	11.0%	0.4%
Residential instability quintile, n (%)									
Q1 (lowest)	2,244	8.20%	0.20%	3,025	3.70%	0.10%	287	9.6%	0.20%
Q2	1,217	7.00%	0.20%	2,488	2.70%	0.10%	225	10.6%	0.30%
Q3	1,215	7.60%	0.30%	2,302	2.40%	0.10%	246	10.6%	0.30%
Q4	1,705	9.20%	0.40%	2,544	2.60%	0.10%	302	10.3%	0.30%
Q5 (highest)	2,660	8.40%	0.30%	3,431	2.90%	0.10%	577	8.0%	0.20%
Missing	25	6.00%	0.20%	149	2.10%	0.10%	18	11.0%	0.40%
Number of persons per dwelling quintile, n (%)									
Q1 (lowest)	962	6.20%	0.20%	2,520	2.20%	0.10%	208	4.6%	0.10%
Q2	862	7.00%	0.30%	2,017	1.90%	0.10%	230	9.2%	0.30%
Q3	775	7.50%	0.30%	1,703	2.30%	0.10%	201	11.2%	0.30%

Variable	Immigrants and refugees			Canadian-born and long-term residents			Other newcomers to Ontario		
Number	9,066			13,939			1,655		
	Number tested positive	% Positive in those tested	% Positive per capita	Number tested positive	% Positive in those tested	% Positive per capita	Number tested positive	% Positive in those tested	% Positive per capita
Q4	2,168	8.30%	0.30%	3,539	3.10%	0.10%	414	11.9%	0.40%
Q5 (highest)	4,275	9.10%	0.30%	4,036	4.80%	0.20%	586	11.0%	0.30%
Missing	24	5.80%	0.20%	124	3.40%	0.20%	16	9.4%	0.35
Public health unit of residence, n (%)									
Algoma Public Health	< 6			23	0.4%	0.0%	< 6		
Brant County Health Unit	17	4.0%	0.2%	156	2.1%	0.1%	< 6		
Durham Region Health Department	456	10.0%	0.3%	757	3.9%	0.1%	42	12.7%	0.3%
Grey Bruce Health Unit	10	5.8%	0.2%	64	1.2%	0.0%	< 6		
Haldimand-Norfolk Health Unit	7	5.3%	0.2%	163	3.5%	0.1%	8	24.2%	1.0%
Haliburton, Kawartha, Pine Ridge District Health Unit	< 6			147	1.3%	0.1%	< 6		
Halton Region Health Department	178	4.8%	0.1%	497	3.4%	0.1%	24	5.2%	0.1%
City of Hamilton – Public Health & Social Services	176	4.5%	0.2%	503	2.6%	0.1%	25	4.9%	0.1%
Hastings and Prince Edward Counties Health Unit	8	3.6%	0.1%	40	0.5%	0.0%	< 6		
Huron Perth Health Unit	6	3.6%	0.1%	47	0.8%	0.0%	< 6		
Chatham-Kent Health Unit	< 6			99	2.6%	0.1%	36	47.4%	2.9%
Kingston, Frontenac and Lennox & Addington Health Unit	< 6			75	0.9%	0.0%	< 6		
Lambton Health Unit	6	3.7%	0.1%	230	3.6%	0.2%	7	10.8%	0.3%
Leeds, Grenville and Lanark District Health Unit	< 6			225	2.5%	0.1%	< 6		
Middlesex-London Health Unit	86	3.7%	0.1%	364	2.2%	0.1%	25	4.1%	0.1%
Niagara Region Public Health Department	61	3.7%	0.1%	514	2.6%	0.1%	21	6.9%	0.2%
North Bay Parry Sound District Health Unit	0	0.0%	0.0%	38	0.6%	0.0%	0	0.0%	0.0%

Variable	Immigrants and refugees			Canadian-born and long-term residents			Other newcomers to Ontario		
Number	9,066			13,939			1,655		
	Number tested positive	% Positive in those tested	% Positive per capita	Number tested positive	% Positive in those tested	% Positive per capita	Number tested positive	% Positive in those tested	% Positive per capita
Northwestern Health Unit	0	0.0%	0.0%	22	0.4%	0.0%	0	0.0%	0.0%
Ottawa Public Health	444	6.8%	0.2%	840	2.2%	0.1%	115	6.7%	0.2%
Peel Public Health	2,057	9.2%	0.3%	1,745	5.4%	0.2%	276	9.5%	0.2%
Peterborough County-City Health Unit	6	1.8%	0.1%	107	0.9%	0.1%	< 6		
Porcupine Health Unit	0	0.0%	0.0%	69	1.5%	0.1%	0	0.0%	0.0%
Renfrew County and District Health Unit	< 6			24	0.4%	0.0%	< 6		
Eastern Ontario Health Unit	< 6			119	1.0%	0.1%	< 6		
Simcoe Muskoka District Health Unit	105	5.4%	0.2%	347	1.5%	0.1%	16	5.8%	0.2%
Sudbury and District Health Unit	< 6			56	0.4%	0.0%	< 6		
Thunder Bay District Health Unit	10	3.5%	0.2%	82	0.8%	0.1%	0	0.0%	0.0%
Timiskaming Health Unit	0	0.0%	0.0%	12	0.6%	0.0%	0	0.0%	0.0%
Region of Waterloo Public Health	263	9.2%	0.3%	555	3.5%	0.1%	97	14.1%	0.4%
Wellington-Dufferin-Guelph Health Unit	69	4.3%	0.2%	300	2.0%	0.1%	14	5.6%	0.2%
Windsor-Essex County Health Unit	173	8.5%	0.2%	549	2.9%	0.2%	166	26.6%	1.0%
York Region Public Health Services	853	7.0%	0.2%	1,259	4.4%	0.2%	107	9.8%	0.2%
Southwestern Health Unit	7	2.0%	0.1%	86	1.0%	0.0%	7	9.3%	0.3%
Toronto Public Health	4,027	9.8%	0.4%	3,778	4.9%	0.2%	635	10.2%	0.3%
Unknown/missing	19	5.8%	0.2%	47	2.9%	0.1%	16	14.3%	0.4%
CLINICAL CHARACTERISTICS									
Chronic conditions, n (%)									
Respiratory (asthma, COPD)	1,140	7.7%	0.3%	3,597	2.5%	0.2%			
Chronic kidney disease (incl. chronic dialysis)	302	6.9%	0.6%	786	2.7%	0.3%			
Diabetes	1,579	9.9%	0.5%	2,350	3.2%	0.2%			
Cardiovascular (CHF, TIA/stroke, Ischemic cardiac disease, hypertension)	2,621	9.3%	0.5%	4,670	2.8%	0.2%			

Variable	Immigrants and refugees			Canadian-born and long-term residents			Other newcomers to Ontario		
Number	9,066			13,939			1,655		
	Number tested positive	% Positive in those tested	% Positive per capita	Number tested positive	% Positive in those tested	% Positive per capita	Number tested positive	% Positive in those tested	% Positive per capita
Immunocompromised	85	4.7%	0.4%	224	2.2%	0.2%			
Inflammatory (IBD, rheumatoid arthritis)	78	6.5%	0.4%	241	2.1%	0.2%			
Liver disease	57	5.3%	0.4%	161	2.2%	0.2%			
Recency of immigration, n (%)									
Recent (≤5 years)	454	10.6%	0.3%						
Intermediate (>5 to ≤10 years)	1,445	9.2%	0.3%						
Long-term residents (>10 years)	6,776	7.9%	0.3%						
Second generation children and youth	391	6.7%	0.1%						
Immigrant class, n (%)									
Sponsored family member	3,479	8.8%	0.3%						
Economic immigrant, caregiver	744	8.5%	0.9%						
Economic immigrant, other	2,672	6.3%	0.2%						
Privately sponsored refugee	525	11.2%	0.4%						
Blended visa office–referred refugee	< 6								
Government-assisted refugee	439	11.5%	0.4%						
Protected person/Refugee (asylum seeker)	804	10.1%	0.4%						
Refugee dependent	226	9.9%	0.3%						
Humanitarian and compassionate/Public policy case	157	9.1%	0.4%						
Other immigrant	10–20	7.6%	0.2%						
World subregion of origin, n (%)									
Central Africa	65	9.7%	0.4%						
Western Africa	366	10.9%	0.6%						

Variable	Immigrants and refugees			Canadian-born and long-term residents			Other newcomers to Ontario		
Number	9,066			13,939			1,655		
	Number tested positive	% Positive in those tested	% Positive per capita	Number tested positive	% Positive in those tested	% Positive per capita	Number tested positive	% Positive in those tested	% Positive per capita
East Africa	511	11.2%	0.5%						
Southern Africa	25	4.6%	0.2%						
Middle East	635	8.0%	0.2%						
North Africa	84	5.6%	0.1%						
Central America	250	9.8%	0.4%						
South America	583	8.7%	0.4%						
Caribbean	1,220	11.1%	0.6%						
North America	72	3.8%	0.1%						
East Asia	302	3.8%	0.1%						
Australasia & Oceania/Asia unspecified	12	4.2%	0.1%						
Southeast Asia	1,946	8.7%	0.6%						
South Asia	2,205	9.4%	0.3%						
Eastern Europe	456	4.8%	0.2%						
Europe other	334	4.6%	0.1%						
Not stated	0	0.0%	0.0%						

Notes: 1. Denominator excludes long-term care residents. 2. Includes children born in Ontario to immigrant mothers (second generation). 3. Chronic conditions have not been reported for newcomers due to an insufficient 2-year look-back period. 4. Chronic conditions were identified using validated algorithms for ICES data holdings; the latest diagnosis date is March 31, 2019. 5. Results are shown in row percentages. 6. Some cells are suppressed due to low counts (n < 6) or reported as ranges to protect privacy.

Appendix 4.2 COVID-19 testing and positivity among immigrants and refugees, Canadian-born and long-term residents, and newcomers in Ontario, by age group and sex, as of June 13, 2020

Females																		
	Immigrants and refugees						Canadian-born and long-term residents						Other newcomers to Ontario					
Variable	Total population	Number tested	% Tested	Number tested positive	% Positive in those tested	% Positive per capita	Total population	Number tested	% Tested	Number tested positive	% Positive in those tested	% Positive per capita	Total population	Number tested	% Tested	Number tested positive	% Positive in those tested	% Positive per capita
Number	1,658,805	69,376		5,063			5,637,060	300,690		7,573			308,057	9,266		597		
Age group, n (%)																		
< 10 y	184,533	1,450	0.8%	90	6.2%	0.0%	523,684	5,118	1.0%	87	1.7%	0.0%	41,835	263	0.6%	17	6.5%	0.0%
10–19	210,726	2,087	1.0%	193	9.2%	0.1%	559,185	10,456	1.9%	217	2.1%	0.0%	30,634	275	0.9%	27	9.8%	0.1%
20–29	136,885	6,464	4.7%	432	6.7%	0.2%	745,134	45,079	6.0%	1,409	3.1%	0.2%	84,188	3,325	3.9%	201	6.0%	0.2%
30–39	271,446	13,565	5.0%	865	6.4%	0.2%	714,135	43,485	6.1%	945	2.2%	0.1%	87,057	3,130	3.6%	192	6.1%	0.2%
40–49	300,156	18,132	6.0%	1,262	7.0%	0.3%	685,110	43,829	6.4%	1,038	2.4%	0.2%	29,506	1,172	4.0%	83	7.1%	0.3%
50–59	266,553	16,959	6.4%	1,364	8.0%	0.3%	808,770	54,458	6.7%	1,394	2.6%	0.2%	12,941	472	3.6%	40	8.5%	0.3%
60–69	156,980	7,394	4.7%	602	8.1%	0.2%	760,710	40,008	5.3%	961	2.4%	0.1%	12,358	263	2.1%	21	8.0%	0.2%
70+	131,526	3325	2.5%	255	7.7%	0.2%	840,332	58,257	6.9%	1522	2.6%	0.2%	9538	366	3.8%	16	4.4%	0.2%

Males																		
	Immigrants and refugees						Canadian-born and long-term residents						Other newcomers to Ontario					
Variable	Total population	Number tested	% tested	Number tested positive	% Positive in those tested	% Positive per capita	Total population	Number tested	% tested	Number tested positive	% Positive in those tested	% Positive per capita	Total population	Number tested	% tested	Number tested positive	% Positive in those tested	% Positive per capita
Number	1,586,834	41,947		4,003			5,529,695	194,614		6,366			317,614	8,493		1,058		
Age group, n (%)																		
< 10 y	194,168	1,786	0.9%	81	4.5%	0.0%	550,748	5,815	1.1%	109	1.9%	0.0%	44,305	320	0.7%	20	6.3%	0.0%
10–19	224,119	2,016	0.9%	187	9.3%	0.1%	586,991	7,148	1.2%	197	2.8%	0.0%	32,564	290	0.9%	50	17.2%	0.2%
20–29	140,894	4,602	3.3%	403	8.8%	0.3%	778,876	25,193	3.2%	977	3.9%	0.1%	80,507	2,728	3.4%	380	13.9%	0.5%
30–39	238,921	8,242	3.4%	660	8.0%	0.3%	721,323	26,001	3.6%	888	3.4%	0.1%	92,323	2,999	3.2%	343	11.4%	0.4%

Males

	Immigrants and refugees						Canadian-born and long-term residents						Other newcomers to Ontario					
Variable	Total population	Number tested	% tested	Number tested positive	% Positive in those tested	% Positive per capita	Total population	Number tested	% tested	Number tested positive	% Positive in those tested	% Positive per capita	Total population	Number tested	% tested	Number tested positive	% Positive in those tested	% Positive per capita
Number	1,586,834	41,947		4,003			5,529,695	194,614		6,366			317,614	8,493		1,058		
40–49	257,171	8,307	3.2%	863	10.4%	0.3%	681,193	23,371	3.4%	849	3.6%	0.1%	35,573	1,180	3.3%	166	14.1%	0.5%
50–59	268,223	8,846	3.3%	1,000	11.3%	0.4%	791,748	31,235	3.9%	1,118	3.6%	0.1%	14,655	452	3.1%	61	13.5%	0.4%
60–69	161,407	5,337	3.3%	582	10.9%	0.4%	711,002	30,302	4.3%	971	3.2%	0.1%	9,959	251	2.5%	21	8.4%	0.2%
70+	101,931	2,811	2.8%	227	8.1%	0.2%	707,814	45,549	6.4%	1,257	2.8%	0.2%	7,728	273	3.5%	17	6.2%	0.2%

Notes: 1. Denominator excludes long-term care residents. 2. Includes children born in Ontario to immigrant mothers (second generation). 3. Results are shown in row percentages.

Appendix 4.3 COVID-19 testing and positivity among first- and second-generation immigrant and refugee children and youth younger than 19 years in Ontario, by recency of immigration, as of June 13, 2020

First-Generation Immigrant and Refugee Children and Youth																				
	All refugees					Sponsored family members					All other					Total				
	Total population	Number tested	% tested	Number tested positive	% Positive in those tested	Total population	Number tested	% tested	Number tested positive	% Positive in those tested	Total population	Number tested	% tested	Number tested positive	% Positive in those tested	Total population	Number tested	% tested	Number tested positive	% Positive in those tested
All	36,915	421	1.1%	69	16.4%	24,987	254	1.0%	19	7.5%	99,173	861	0.9%	73	8.5%	161,075	1,536	1.0%	161	10.5%
Recent (≤ 10 years)	28,157	273	1.0%	50–60		14,404	138	1.0%	10–20		58,859	489	0.8%	53	10.8%	101,420	900	0.9%	118	13.1%
Not recent (> 10 years)	8,758	148	1.7%	10–20		10,583	116	1.1%	< 6		40,314	372	0.9%	20	5.4%	59,655	636	1.1%	43	6.8%

Second-Generation Immigrant and Refugee Children and Youth															
	All refugees					Economic immigrant, caregiver					Sponsored family member				
	Total population	Number tested	% tested	Number tested positive	% Positive in those tested	Total population	Number tested	% tested	Number tested positive	% Positive in those tested	Total population	Number tested	% tested	Number tested positive	% Positive in those tested
All	95,890	958	1.0%	82	8.6%	22,705	238	1.0%	17	7.1%	337,065	2,986	0.9%	225	7.5%
Recent (≤ 10 years)	13,919	160	1.1%	10–20		2,861	39	1.4%	< 6		53,971	508	0.9%	15	3.0%
Not recent (> 10 years)	81,971	798	1.0%	70–80		19,844	199	1.0%	10–20		283,094	2,478	0.9%	210	8.5%

	All other					Total				
	Total population	Number tested	% tested	Number tested positive	% Positive in those tested	Total population	Number tested	% tested	Number tested positive	% Positive in those tested
All	196,812	1,622	0.8%	66	4.1%	652,472	5,804	0.9%	390	6.7%
Recent (≤ 10 years)	31,585	292	0.9%	9	3.1%	102,336	999	1.0%	37	3.7%
Not recent (> 10 years)	165,227	1,330	0.8%	57	4.3%	550,136	4,805	0.9%	353	7.3%

Notes: 1. Second-generation children and youth include those born in Ontario to immigrant and refugee mothers. 2. Results are shown in row percentages. 3. Some cells are suppressed due to low counts (n < 6) or reported as ranges to protect privacy.

Appendix 5.1 COVID-19 testing and positivity among recent immigrants and refugees landed in Ontario in the last 10 years, by sociodemographic characteristics, as of June 13, 2020

Recent Immigrants and Refugees					
Variable	Number tested	% Tested	Number tested positive	% Positive in those tested	% Positive per capita
Number	19,951		1,805		
Canadian language ability, n (%)					
Bilingual	486	3.7%	46	9.5%	0.4%
English	16,339	5.2%	1,409	8.6%	0.4%
French	317	6.1%	40	12.6%	0.8%
Neither	2,724	2.7%	296	10.9%	0.3%
Not stated	85	4.8%	14	16.5%	0.8%
Highest education level (aged 25 and older), n (%)					
None	1,875	3.4%	195	10.4%	0.4%
Secondary or less	3,400	3.7%	444	13.1%	0.5%
Some university – no degree	967	5.7%	102	10.5%	0.6%
Trade/diploma	3,651	6.4%	366	10.0%	0.6%
Bachelor's degree or higher	9,623	4.8%	673	7.0%	0.3%
Not stated	435	2.9%	25	5.7%	0.2%
Immigrant category, n (%)					
Sponsored family member	5,377	3.2%	500	9.3%	0.3%
Economic immigrant, caregiver	4,595	14.7%	409	8.9%	1.3%
Economic immigrant, other	6,502	3.9%	436	6.7%	0.3%
Privately sponsored refugee	490	4.0%	95	19.4%	0.8%
Blended visa office–referred refugee	37	3.3%	< 6		
Government-assisted refugee	361	3.4%	67	18.6%	0.6%
Protected person/Refugee (asylum seeker)	1,759	6.2%	197	11.2%	0.7%
Refugee dependent	277	5.4%	43	15.5%	0.8%

Recent Immigrants and Refugees					
Variable	Number tested	% Tested	Number tested positive	% Positive in those tested	% Positive per capita
Number	19,951		1,805		
Humanitarian & compassionate/Public policy case	546	6.1%	55	10.1%	0.6%
Other immigrant	7	4.5%	< 6		
World subregion of origin, n (%)					
Central Africa	175	7.0%	12	6.9%	0.5%
Western Africa	730	8.6%	81	11.1%	1.0%
East Africa	698	5.9%	97	13.9%	0.8%
Southern Africa	68	4.4%	< 6		
Middle East	1,545	3.0%	147	9.5%	0.3%
North Africa	248	2.8%	14	5.6%	0.2%
Central America	302	4.1%	35	11.6%	0.5%
South America	836	5.1%	72	8.6%	0.4%
Caribbean	1,461	7.0%	186	12.7%	0.9%
North America	363	3.8%	15	4.1%	0.2%
East Asia	990	1.5%	43	4.3%	0.1%
Australasia & Oceania/Asia unspecified	40–50	2.5%	< 6		
Southeast Asia	6,551	11.0%	616	9.4%	1.0%
South Asia	4,433	3.6%	397	9.0%	0.3%
Eastern Europe	723	3.1%	50	6.9%	0.2%
Europe other	781	3.2%	35	4.5%	0.1%
Not stated	< 6		0	0.0%	0.0%

Notes: 1. Denominator excludes long-term care residents. 2. Includes children born in Ontario to immigrant mothers (second generation). 3. Some cells are suppressed due to low counts (n < 6) or reported as ranges to protect privacy.

Appendix 6.1 Top 20 countries of birth of immigrants and refugees tested and confirmed positive for COVID-19 in Ontario, as of June 13, 2020

All Immigrants and Refugees		Tested		Positive		
Value	Population	Number tested	% tested	Number tested positive	% Positive in those tested	% Positive per capita
All countries	3,245,639	111,323		9,066		
Afghanistan	44,605	1,419	3.2%	201	14.2%	0.5%
Bangladesh	47,708	1,383	2.9%	119	8.6%	0.2%
China	333,501	5,010	1.5%	192	3.8%	0.1%
Colombia	31,885	1,300	4.1%	84	6.5%	0.3%
El Salvador	21,331	917	4.3%	111	12.1%	0.5%
Ethiopia	24,854	1,295	5.2%	128	9.9%	0.5%
Ghana	21,555	1,322	6.1%	134	10.1%	0.6%
Guyana	58,878	2,789	4.7%	300	10.8%	0.5%
Haiti	9,652	770	8.0%	111	14.4%	1.2%
India	420,902	12,077	2.9%	1,064	8.8%	0.3%
Iran	96,846	3,017	3.1%	169	5.6%	0.2%
Iraq	57,451	1,703	3.0%	265	15.6%	0.5%
Jamaica	96,229	6,358	6.6%	779	12.3%	0.8%
Nigeria	28,246	1,709	6.1%	208	12.2%	0.7%
Pakistan	194,801	4,190	2.2%	383	9.1%	0.2%
Philippines	257,950	20,269	7.9%	1,774	8.8%	0.7%
Poland	78,662	2,893	3.7%	133	4.6%	0.2%
Somalia	31,445	1,082	3.4%	207	19.1%	0.7%
Sri Lanka	130,230	3,778	2.9%	385	10.2%	0.3%
Trinidad and Tobago	37,965	1,536	4.0%	108	7.0%	0.3%
All other countries	1,220,943	36,506	3.0%	2,211	6.1%	0.2%

Notes: 1. Denominator excludes long-term care residents. 2. Includes children born in Ontario to immigrant mothers (second generation). 3. The top 20 countries included those with the highest counts of positive cases, among which the top 10 are presented for % tested, % positive among those tested and % positive per capita.

Appendix 6.2 Top 20 countries of birth of female immigrants and refugees tested and confirmed positive for COVID-19 in Ontario, as of June 13, 2020

Female Immigrants and Refugees		Tested		Positive		
Value	Total Number	Number tested	% Tested	Number tested positive	% Positive in those tested	% Positive per capita
All countries	1,658,805	69,376		5,063		
Afghanistan	21,999	715	3.3%	97	13.6%	0.4%
Bangladesh	23,723	728	3.1%	52	7.1%	0.2%
China	176,368	3,296	1.9%	114	3.5%	0.1%
El Salvador	10,200	529	5.2%	50	9.5%	0.5%
Ethiopia	12,690	877	6.9%	77	8.8%	0.6%
Ghana	10,427	914	8.8%	81	8.9%	0.8%
Grenada	4,370	410	9.4%	45	11.0%	1.0%
Guyana	30,998	1,823	5.9%	180	9.9%	0.6%
Haiti	5,070	546	10.8%	73	13.4%	1.4%
India	205,957	6,762	3.3%	544	8.0%	0.3%
Iran	47,498	1,678	3.5%	80	4.8%	0.2%
Iraq	28,518	813	2.9%	112	13.8%	0.4%
Jamaica	48,850	4,738	9.7%	512	10.8%	1.0%
Nigeria	13,692	1,090	8.0%	98	9.0%	0.7%
Pakistan	95,270	2,063	2.2%	164	7.9%	0.2%
Philippines	147,398	14,584	9.9%	1,111	7.6%	0.8%
Poland	40,776	1,943	4.8%	78	4.0%	0.2%
Somalia	16,727	660	3.9%	125	18.9%	0.7%
Sri Lanka	66,700	1,989	3.0%	189	9.5%	0.3%
Trinidad and Tobago	19,617	934	4.8%	64	6.9%	0.3%
All other countries	631,957	22,284	3.5%	1217	5.5%	0.2%

Notes: 1. Denominator excludes long-term care residents. 2. Includes children born in Ontario to immigrant mothers (second generation). 3. The top 20 countries included those with the highest counts of positive cases, among which the top 10 are presented for % tested, % positive among those tested and % positive per capita.

Appendix 6.3 Top 20 countries of birth of male immigrants and refugees tested and confirmed positive for COVID-19 in Ontario, as of June 13, 2020

Male Immigrants and Refugees		Tested		Tested Positive		
Value	Total Number	Number tested	% Tested	Number tested positive	% Positive in those tested	% Positive per capita
All countries	1,586,834	41,947		4,003		
Afghanistan	22,606	704	3.1%	104	14.8%	0.5%
Bangladesh	23,985	655	2.7%	67	10.2%	0.3%
China	157,133	1,714	1.1%	78	4.6%	0.0%
El Salvador	11,131	388	3.5%	61	15.7%	0.5%
Ethiopia	12,164	418	3.4%	51	12.2%	0.4%
Ghana	11,128	408	3.7%	53	13.0%	0.5%
Grenada	3,552	105	3.0%	19	18.1%	0.5%
Guyana	27,880	966	3.5%	120	12.4%	0.4%
Haiti	4,582	224	4.9%	38	17.0%	0.8%
India	214,945	5,315	2.5%	520	9.8%	0.2%
Iran	49,348	1,339	2.7%	89	6.6%	0.2%
Iraq	28,933	890	3.1%	153	17.2%	0.5%
Jamaica	47,379	1,620	3.4%	267	16.5%	0.6%
Nigeria	14,554	619	4.3%	110	17.8%	0.8%
Pakistan	99,531	2,127	2.1%	219	10.3%	0.2%
Philippines	110,552	5,685	5.1%	663	11.7%	0.6%
Poland	37,886	950	2.5%	55	5.8%	0.1%
Somalia	14,718	422	2.9%	82	19.4%	0.6%
Sri Lanka	63,530	1,789	2.8%	196	11.0%	0.3%
Trinidad and Tobago	18,348	602	3.3%	44	7.3%	0.2%
All other countries	612,949	15,007	2.4%	1014	6.8%	0.2%

Notes: 1. Denominator excludes long-term care residents. 2. Includes children born in Ontario to immigrant mothers (second generation). 3. The top 20 countries includes those with the highest counts of positive cases, among which the top 10 are presented for % tested, % positive among those tested and % positivity per capita.

Appendix 7.1 Number and proportion of health care workers among COVID-19 cases in Ontario adults older than 18 years, overall and by sex and immigration category, as of June 13, 2020

Overall							
Variable	Sponsored family members	Economic immigrant, caregiver	Economic immigrant, other	Refugees (all)	Other newcomers to Ontario	Canadian-born and long-term residents	Total
Number	3,171	710	2,497	1,979	1,524	13,122	23,003
Health care worker							
Yes	922 (29.1%)	342 (48.2%)	682 (27.3%)	437 (22.1%)	198 (13.0%)	2,823 (21.5%)	5,404 (23.5%)
Long-term care worker	451 (14.2%)	150 (21.1%)	246 (9.9%)	204 (10.3%)	79 (5.2%)	912 (7.0%)	2,042 (8.9%)
No	988 (31.2%)	78 (11.0%)	849 (34.0%)	658 (33.2%)	590 (38.7%)	5,108 (38.9%)	8,271 (36.0%)
Unknown	1,261 (39.8%)	290 (40.8%)	966 (38.7%)	884 (44.7%)	736 (48.3%)	5,191 (39.6%)	9,328 (40.6%)
Females							
Variable	Sponsored family members	Economic immigrant, caregiver	Economic immigrant, other	Refugees (all)	Other newcomers to Ontario	Canadian-born and long-term residents	TOTAL
Number	1,857	596	1,242	1,000	544	7,142	12,381
Health care worker							
Yes	788 (42.4%)	325 (54.5%)	529 (42.6%)	344 (34.4%)	132 (24.3%)	2,308 (32.3%)	4,426 (35.7%)
Long-term care worker	400 (21.5%)	145 (24.3%)	205 (16.5%)	170 (17.0%)	61 (11.2%)	792 (11.1%)	1,773 (14.3%)
No	456 (24.6%)	58 (9.7%)	322 (25.9%)	241 (24.1%)	197 (36.2%)	2,368 (33.2%)	3,642 (29.4%)
Unknown	613 (33.0%)	213 (35.7%)	391 (31.5%)	415 (41.5%)	215 (39.5%)	2,466 (34.5%)	4,313 (34.8%)
Males							
Variable	Sponsored family members	Economic immigrant, caregiver	Economic immigrant, other	Refugees (all)	Other newcomers to Ontario	Canadian-born and long-term residents	Total
Number	1,314	114	1,255	979	980	5,980	10,622
Health care worker							
Yes	134 (10.2%)	17 (14.9%)	153 (12.2%)	93 (9.5%)	66 (6.7%)	515 (8.6%)	978 (9.2%)
Long-term care worker	51 (3.9%)	< 6	41 (3.3%)	34 (3.5%)	18 (1.8%)	120 (2.0%)	269 (2.5%)
No	532 (40.5%)	20 (17.5%)	527 (42.0%)	417 (42.6%)	393 (40.1%)	2,740 (45.8%)	4,629 (43.6%)
Unknown	648 (49.3%)	77 (67.5%)	575 (45.8%)	469 (47.9%)	521 (53.2%)	2,725 (45.6%)	5,015 (47.2%)

Notes: 1. Long-term care workers represent a subset of health care workers. 2. Some cells are suppressed due to low counts (n < 6) to protect privacy.

Appendix 7.2 Number and proportion of health care workers among COVID-19 cases in Ontario adults older than 18 years, by world region of birth, as of June 13, 2020

Variable	Central Africa	Western Africa	East Africa	Southern Africa	Middle East	North Africa	Central America	South America	Caribbean	North America	East Asia	Southeast Asia	South Asia	Eastern Europe	Europe other
Number	55	341	453	22	573	77	233	542	1,135	61	284	1,841	1,976	435	317
Health care worker															
Yes	23 (41.8%)	179 (52.5%)	137 (30.2%)	7 (31.8%)	68 (11.9%)	19 (24.7%)	36 (15.5%)	103 (19.0%)	497 (43.8%)	12 (19.7%)	57 (20.1%)	685 (37.2%)	375 (19.0%)	103 (23.7%)	79 (24.9%)
Long-term care worker	14 (25.5%)	80 (23.5%)	66 (14.6%)	1–6	13 (2.3%)	10 (13.0%)	19 (8.2%)	46 (8.5%)	289 (25.5%)	1–6	17 (6.0%)	284 (15.4%)	143 (7.2%)	32 (7.4%)	32 (10.1%)
No	15 (27.3%)	41 (12.0%)	106 (23.4%)	8 (36.4%)	222 (38.7%)	28 (36.4%)	90 (38.6%)	172 (31.7%)	226 (19.9%)	23 (37.7%)	103 (36.3%)	362 (19.7%)	889 (45.0%)	161 (37.0%)	120 (37.9%)
Unknown	17 (30.9%)	121 (35.5%)	210 (46.4%)	7 (31.8%)	283 (49.4%)	30 (39.0%)	107 (45.9%)	267 (49.3%)	412 (36.3%)	26 (42.6%)	124 (43.7%)	794 (43.1%)	712 (36.0%)	171 (39.3%)	118 (37.2%)

Notes: 1. Long-term care workers represent a subset of health care workers. 2. Some cells are suppressed due to low counts (n < 6) or reported as ranges to protect privacy.

Appendix 7.3 Countries of birth with the 10 highest proportions of health care workers among COVID-19 cases in Ontario adults older than 18 years (ranked from the 20 countries with the highest counts of positive COVID-19 cases), as of June 13, 2020

Overall												
Variable	Afghanistan	China	Guyana	India	Iraq	Jamaica	Nigeria	Pakistan	Philippines	Sri Lanka	Other	Total
Number	176	177	283	959	238	725	192	340	1,686	349	3,232	8,357
Health care worker												
Yes	15 (8.5%)	39 (22.0%)	68 (24.0%)	230 (24.0%)	17 (7.1%)	328 (45.2%)	110 (57.3%)	35 (10.3%)	673 (39.9%)	63 (18.1%)	805 (24.9%)	2,383 (28.5%)
Long-term care worker	1–6	12 (6.8%)	37 (13.1%)	89 (9.3%)	1–6	186 (25.7%)	41 (21.4%)	7 (2.1%)	280 (16.6%)	29 (8.3%)	364 (11.3%)	1,051 (12.6%)
No	70 (39.8%)	62 (35.0%)	78 (27.6%)	454 (47.3%)	71 (29.8%)	154 (21.2%)	20 (10.4%)	172 (50.6%)	280 (16.6%)	148 (42.4%)	1,064 (32.9%)	2,573 (30.8%)
Unknown	91 (51.7%)	76 (42.9%)	137 (48.4%)	275 (28.7%)	150 (63.0%)	243 (33.5%)	62 (32.3%)	133 (39.1%)	733 (43.5%)	138 (39.5%)	1,363 (42.2%)	3,401 (40.7%)

Females												
Variable	China	Guyana	India	Iraq	Jamaica	Nigeria	Pakistan	Philippines	Somalia	Sri Lanka	Other	Total
Number	104	172	498	98	478	90	147	1,063	104	173	1,768	4,695
Health care worker												
Yes	28 (26.9%)	63 (36.6%)	191 (38.4%)	11 (11.2%)	304 (63.6%)	68 (75.6%)	28 (19.0%)	564 (53.1%)	27 (26.0%)	51 (29.5%)	651 (36.8%)	1,986 (42.3%)
Long-term care worker	9 (8.7%)	36 (20.9%)	79 (15.9%)	1–6	175 (36.6%)	32 (35.6%)	1–6	238 (22.4%)	8 (7.7%)	25 (14.5%)	310 (17.5%)	920 (19.6%)
No	32 (30.8%)	35 (20.3%)	195 (39.2%)	30 (30.6%)	57 (11.9%)	1–6	65 (44.2%)	123 (11.6%)	10–20	54 (31.2%)	466 (26.4%)	1,077 (22.9%)
Unknown	44 (42.3%)	74 (43.0%)	112 (22.5%)	57 (58.2%)	117 (24.5%)	10–20	54 (36.7%)	376 (35.4%)	60–70	68 (39.3%)	651 (36.8%)	1,632 (34.8%)

Males									
Variable	India	Iraq	Jamaica	Nigeria	Pakistan	Philippines	Sri Lanka	Other	Total
Number	461	140	247	102	193	623	176	1,720	3,662
Health care worker									
Yes	39 (8.5%)	6 (4.3%)	24 (9.7%)	42 (41.2%)	7 (3.6%)	109 (17.5%)	12 (6.8%)	158 (9.2%)	397 (10.8%)
Long-term care worker	10 (2.2%)	1–6	11 (4.5%)	9 (8.8%)	1–6	42 (6.7%)	1–6	53 (3.1%)	131 (3.6%)
No	259 (56.2%)	41 (29.3%)	97 (39.3%)	16 (15.7%)	107 (55.4%)	157 (25.2%)	94 (53.4%)	725 (42.2%)	1,496 (40.9%)
Unknown	163 (35.4%)	93 (66.4%)	126 (51.0%)	44 (43.1%)	79 (40.9%)	357 (57.3%)	70 (39.8%)	837 (48.6%)	1,769 (48.3%)

Notes: 1. Long-term care workers represent a subset of health care workers. 2. Countries of birth with the highest number of cases (ranked). 3. Afghanistan, Guyana, and Iran moved to 'other' category. 4. Some cells are reported as ranges to protect privacy.

Appendix 8.0 Methods

Study Period

The observation period began on January 15, 2020, to align with the COVID-19 surveillance period in Canada. We included all individuals in Ontario who were tested for COVID-19 between January 15 and June 13, 2020.

Study Population

Using the Registered Persons Database (RPDB), we identified a cohort of community-dwelling Ontario residents who were alive, eligible for the Ontario Health Insurance Plan (OHIP) and living in Ontario at the beginning of the observation period. Long-term care residents were excluded. A cumulative population cohort was created, where we retained individuals who were born and individuals who died during the observation period.

We created a comprehensive data set that integrated all available COVID-19 diagnostic laboratory results in Ontario from multiple sources, including the Ontario Laboratory Information System (OLIS) database, Public Health Ontario (PHO) Labware, and distributed testing data from laboratories in the COVID-19 Diagnostic Network. The latter two data sets contained test results up to April 13, 2020. We converted each of these data sets to identify unique COVID-19 testing days per individual (i.e., testing episodes). To avoid double counting testing episodes across data sets, we considered testing episodes within +/- 3 days of each other for the same individual (using the linked, encrypted ICES identifier) as the same testing episode, and assigned the testing episode date as the OLIS specimen collection date (if found in OLIS) or the earliest log-in

date. Where the results were discordant, we classified the testing episode based on the more clinically severe result (i.e., positive > indeterminate > negative > pending result) and used this result's date as the testing episode date. We also incorporated confirmed COVID-19 cases from the Integrated Public Health Information System (iPHIS). We identified the closest positive testing episode associated with each iPHIS case using the earliest of the specimen collection or case reported date recorded in iPHIS. Where there were no positive testing episodes found, we added the iPHIS case to the integrated data set as a unique testing episode.

Using this integrated data set, we selected one testing episode per individual based on a hierarchy (i.e., the earliest testing episode where the individual was confirmed positive for COVID-19, or their earliest episode where the results were indeterminate, or earliest episode where the individual tested negative COVID-19) and identified individuals who were ever tested for COVID-19 in our population cohort. Individuals tested for COVID-19 whose testing episodes were not linked were excluded from the analysis (N=15,791).

We used the Immigration, Refugees and Citizenship Canada (IRCC) Permanent Resident Database to identify immigrants and refugees. The IRCC database includes records for immigrants and refugees who landed in Ontario between January 1, 1985, and May 31, 2017 and captures information at the time of admission approval or entry into Canada such as immigration category, Canadian language ability, level of education, and country of birth. The permanent resident database does not include those in Canada under

temporary resident permits, such as students and workers, nor asylum seekers who have not yet had their refugee hearing.

Ontario residents without an immigration record in the IRCC permanent resident database were categorized as 'Canadian-born or long-term resident', and includes residents born in Canada, immigrants and refugees who arrived in Ontario before January 1, 1985, or landed in another province and subsequently moved to Ontario. We identified second-generation children and youth aged 19 years and younger who were born in Ontario to mothers who are immigrants or refugees using the Ontario Mother-Baby linked data set (MOMBABY), which links delivering mothers' inpatient admission records to those of their newborns. These children and youth were assigned the same immigration category and country or world region of origin as their mother, essentially assigning these as a household attribute but only for children and youth of an age likely to be still living in the same household as their mother. To account for the gap in immigration data after May 31, 2017, we created a category of other newcomers. These were individuals who became eligible for OHIP coverage after May 31, 2017. This group would include immigrants and refugees, as well as those who moved to Ontario from another Canadian province. Temporary residents who are eligible for OHIP would be included in the newcomer group.

We created two subgroups of adults for certain analyses. The first was a more recent group of immigrants and refugees who had landed in Ontario at age 25 years or older since April 1, 2010 in order to describe COVID-19 testing and results by education and language ability. We restricted these analyses to a recent cohort as the education and language data are available only at the time of

landing in Canada and can change after resettlement. The second subgroup were adults (older than 18 years) who had tested positive and were in the iPHIS Plus surveillance data set. We used the health care worker flag from iPHIS Plus to identify those cases who self-reported or were identified through outbreak numbers as health care workers. We used the generic health care worker flag and also reported on a subset of health care workers identified as working in long-term care homes.

Analyses

We assigned an index date to all individuals in our study cohort to describe current sociodemographic and clinical characteristics for those eligible to be tested for COVID-19 testing between January 15 and June 13, 2020. The index date was March 31, 2020, the most recent date of available data for select health administrative databases. For those who were tested or died before March 31, 2020, the date of COVID-19 testing or death was used as the index date. For individuals who were tested or who died thereafter, March 31, 2020, was used as the index date.

We linked to multiple health and demographic administrative data sets to examine baseline sociodemographic and clinical characteristics of Ontario residents by immigration status, as of the index date. For newcomers to Ontario, we did not report chronic conditions, as many did not have sufficient time in Ontario to contribute the necessary health care use data to the allow identification of these conditions. Outcomes included the proportion of individuals tested among the population, percent positivity among those tested, and positivity per population (per capita). We reported these by immigration category, recency of

immigration, and world region of birth. World region country classifications aligned with those of the World Bank with some regions with smaller populations further aggregated. To further describe specific communities of immigrants and refugees, we identified countries with the top 20 counts of positive COVID-19 cases overall and by sex, and among these, present the top 10 by testing outcome, by positivity among those tested, and by positivity per capita. To explore whether certain neighbourhood factors are differentially related to testing and positivity among immigrants, refugees and newcomers compared with Canadian-born and long-term residents, we stratified outcomes by neighbourhood quintiles of household income, ethnic diversity and a measure of household density. Finally, to determine whether there might be differential access to testing in similar clinical populations, we calculated testing and positivity in groups with chronic conditions by immigration status. Given the large sample sizes for most of our analyses, we did not do tests of statistical significance but report differences that we interpret as clinically meaningful.

Data Limitations

The OLIS COVID-19 and iPHIS test data used in this report are current to June 13, 2020, and DL and PHO Labware to April 13. The overall linkage rate for DL and PHO Labware was 86% and 97%, respectively. Cases created in iPHIS underwent only deterministic linkage; 3,551 iPHIS records were unlinked at the time of the analysis. For this report, the date of the testing episode represents the date of specimen collection. Due to the time required for transportation and processing of specimens, it takes 6 days for

approximately 95% of results to be finalized and reported into OLIS for a given testing date.

OLIS is a transactional database and not all laboratories in Ontario contributed their COVID-19 testing data to OLIS. Among the laboratories that contributed, some did not contribute for the full time period covered by the study. The integrated data set was compiled to create a comprehensive COVID-19 testing data set; however, we are likely under-reporting the number of individuals tested during the study period. For example, test results submitted to OLIS with only a medical record number and unconsented test results were excluded from the study.

Of 23,533 records of adults with positive COVID-19 tests, 530 could not be linked to iPHIS Plus cases. This is likely due to missing personal health identifiers needed for linkage. There were no significant differences in the percentage unlinked by immigration category, region or country of birth. The health care worker variable contains missing data which we have enumerated in the tables. It is unknown whether these missing data bias the results that we present.

Characterization of the tested cohort required linkage to the RPDB, which for this analysis included individuals born by March 31, 2020 and recorded in the healthcare registry. As a result, the number of infants tested for COVID-19 is underestimated. Due to data limitations, we are unable to identify immigrants and refugees who landed in Ontario after May 31, 2017; therefore, the number of immigrants and refugees currently residing in Ontario is underestimated and the newcomer group is heterogeneous.

Appendix 9.0 Data Sets

The following data sets from the ICES Data Repository were used to compile this report.

Asthma Database

The Ontario Asthma Database is an ICES-derived cohort that is created using a definition of 2 or more physician billing claims with a diagnosis of asthma (OHIP diagnosis code: 493) and/or 1 or more inpatient hospitalization or same-day surgery records with a diagnosis of asthma (ICD-9 diagnosis code 493; ICD-10 diagnosis codes J45, J46; in any diagnostic code space) in a 2-year period applied to hospitalization (DAD), same-day surgery (SDS) and physician billing claims (OHIP) data to determine the diagnosis date for incident cases of asthma in Ontario.

Canadian Organ Replacement Register (CORR)

The Canadian Organ Replacement Register (CORR) is the national information system that records and analyzes the level of activity and outcome of vital organ transplantation and renal dialysis activities. At ICES, we have access only to the data of donors and recipients treated in Ontario. Ontario residents receiving treatment outside Ontario would not appear in our data cut.

Census Area Profiles

The Census of Population, which is conducted by Statistics Canada every 5 years, provides sociodemographic information used to plan public services such as health care and education. Data are presented at multiple levels of geography, including census division, census metropolitan area, census tract and dissemination area. The main data elements and topics include families, households and

housing; language; ethnicity diversity; immigration and citizenship; education and training; labour; income; and Indigenous peoples.

CHF Database

The Ontario Congestive Heart Failure Database is an ICES-derived cohort that was created using a definition of 2 or more physician billing claims with a diagnosis of CHF (OHIP diagnosis code 428) and/or 1 or more inpatient hospitalization or same-day surgery records with a diagnosis of CHF (ICD-9 diagnosis code 428; ICD-10 diagnosis code I50; in the primary diagnostic code space) in a 2-year period applied to hospitalization (DAD), same-day surgery (SDS) and physician billing claims (OHIP) data to determine the diagnosis date for incident cases of CHF in Ontario.

COPD Database

The Ontario COPD Database is an ICES-derived cohort that is created using two separate algorithms applied to inpatient hospitalization (DAD), same-day surgery (SDS) records, and physician billing claims (OHIP) data to determine the diagnosis date for incident cases of COPD in Ontario. In an algorithm which maximizes sensitivity, the definition for COPD is any physician billing claim with a diagnosis of COPD (OHIP diagnosis codes 491, 492, 496) or any inpatient hospitalization or same-day surgery record with a diagnosis of COPD (ICD-9 diagnosis codes 491, 492, 496; ICD-10 diagnosis codes J41–J44; in any diagnostic code space).

Discharge Abstract Database (DAD)

The DAD is compiled by the Canadian Institute for Health Information and contains administrative, clinical (diagnoses and

procedures/interventions), demographic and administrative information for all admissions to acute care hospitals and rehabilitation, chronic care and day-surgery institutions in Ontario. At ICES, consecutive DAD records are linked together to form ‘episodes of care’ among the hospitals to which patients have been transferred after their initial admission.

HIV Database (HIV)

The Ontario HIV Database is an ICES-derived cohort that is created using a definition of 3 or more physician billing claims with a diagnosis of HIV (OHIP diagnosis codes 042, 043, 044) in a 3-year period applied to physician billing claims (OHIP) data to determine the diagnosis date for incident cases of HIV in Ontario.

Hypertension Database (HYPER)

The Ontario Hypertension Database is an ICES-derived cohort and created using a definition of 2 or more physician billing claims with a diagnosis of hypertension (OHIP diagnosis codes 401-405) and/or 1 or more inpatient hospitalization or same-day surgery records with a diagnosis of hypertension (ICD-9 diagnosis codes 401-405; ICD-10 diagnosis codes I10-I13, I15; in any diagnostic code space) in a two-year period applied to hospitalization (DAD), same-day surgery (SDS), and physician billing claims (OHIP) data to determine the diagnosis date for incident cases of hypertension in Ontario. Physician claims and hospitalizations with a diagnosis of hypertension occurring within 120 prior to and 180 days after a gestational hospitalization record are excluded.

ICES Physician Database (IPDB)

The IPDB provides information about all physicians who have practiced in Ontario and is comprised of data contained in the OHIP Claims History Database, the OHIP Corporate Provider Database (CPDB), and the Ontario Physician Human Resource Data Centre (OPHRDC) Database. The database contains information on demographics (age, gender, year of graduation, school of graduation), specialty (functional and certified), location of practice, and measures of physician activity (billings and workload data).

Immigrant, Refugees and Citizenship Canada Permanent Resident Database

The Ontario portion of the IRCC Permanent Resident Database includes immigration application records for people who initially applied to land in Ontario since 1985. The data set contains permanent residents’ demographic information such as country of citizenship, level of education, mother tongue and landing date. Immigrants and refugees currently residing in Ontario but originally landed in another province are not captured in this data set.

National Ambulatory Care Reporting System (NACRS)

NACRS is compiled by the Canadian Institute for Health Information. It contains administrative, clinical (diagnoses and procedures), demographic and administrative information for all patient visits made to hospital- and community-based ambulatory care centres (emergency departments, day-surgery units, hemodialysis units and cancer care clinics). At ICES, NACRS records are linked with other data sources (DAD, OMHRS) to identify transitions to other care settings, such as inpatient acute care or psychiatric care.

Ontario Crohn's and Colitis Cohort (OCCC)

The Ontario Crohn's and Colitis Cohort Database includes all Ontario patients identified with Crohn's disease or ulcerative colitis (i.e., inflammatory bowel disease) when they were younger than 105 years.

Ontario Diabetes Database (ODD)

The Ontario Diabetes Database is an ICES-derived cohort created by using algorithms applied to inpatient hospitalization (DAD) records, same-day surgery (SDS) records, and physician billing claims (OHIP) data to determine the diagnosis date for incident cases of diabetes in Ontario. For adults aged 19 years and older, the definition for diabetes is 2 physician billing claims with a diagnosis of diabetes (OHIP diagnosis code 250) or 1 inpatient hospitalization or same-day surgery record with a diagnosis of diabetes (ICD-9 diagnosis code 250; ICD-10 diagnosis codes E10, E11, E13, E14; in any diagnostic code space) within a 2-year period. Physician claims and hospitalizations with a diagnosis of diabetes occurring within 120 days prior to and 180 days after a gestational hospitalization record were excluded.

Ontario Health Insurance Plan (OHIP)

The OHIP claims database contains information on inpatient and outpatient services provided to Ontario residents eligible for the province's publicly funded health insurance system by fee-for-service health care practitioners (primarily physicians) and "shadow billings" for those paid through non-fee-for-service payment plans. The main data elements include patient and physician identifiers (encrypted), code for service provided, date of service, associated diagnosis and fee paid.

Ontario Laboratories Information System (OLIS)

The Ontario Laboratories Information System contains laboratory information collected from eHealth Ontario, submitted from all Public Health Ontario laboratories. As of August 2016, OLIS had completed connections with additional hospital laboratories in 13 of the 14 Local Health Integration Networks (LHINs). The OLIS data set consists of information on lab orders, test requests and observations.

Ontario Marginalization Index (ONMARG)

ONMARG is a geographically (census) based index developed to quantify the degree of marginalization occurring across the province of Ontario. It is comprised of four major dimensions thought to underlie the construct of marginalization: residential instability, material deprivation, dependency and ethnic concentration. The data set contains census divisions (CDs), census tracts (CTs), census subdivisions (CSDs), consolidated municipal service managers (CMSMs), public health units (PHUs), Local Health Integration Networks (LHINs), sub-LHINs and dissemination areas (DAs).

Ontario Mother-Baby Linked Data (MOMBABY)

The ICES MOMBABY Database is an ICES-derived cohort that links the DAD inpatient admission records of delivering mothers and their newborns. From 2002 onward, this linkage is performed deterministically using a maternal-newborn chart matching number. Prior to 2002, mothers were linked to their children by matching on the institutions to which they were admitted, their postal codes, and their admission and discharge dates.

Ontario Rheumatoid Arthritis Database (ORAD)

The Ontario Rheumatoid Arthritis Database is an ICES-derived cohort created using a definition of 3 or more physician billing claims (at least 1 of which was billed by a musculoskeletal specialist) with a diagnosis of rheumatoid arthritis (OHIP diagnosis code 714) and/or 1 or more inpatient hospitalization or same-day surgery records with a diagnosis of rheumatoid arthritis (ICD-9 diagnosis code 714; ICD-10 diagnosis codes M05, M06; in any diagnostic code space) in a 2-year period applied to hospitalization (DAD), same-day surgery (SDS), and physician billing claims (OHIP) data to determine the diagnosis date for incident cases of rheumatoid arthritis in Ontario.

Postal Code Conversion File (PCCF)

The PCCF database will link to postal codes within a given cohort and determine other census geographic identifiers, such as dissemination/enumeration area, census division, longitude/latitude, urban/rural flag and neighbourhood income quintile.

Registered Persons Database (RPDB)

The RPDB provides basic demographic information (age, sex, location of residence, date of birth, and date of death for deceased individuals) for those issued an Ontario health insurance number. The RPDB also indicates the time periods for which an individual was eligible to receive publicly funded health insurance benefits and the best-known postal code for each registrant on July 1 of each year.

Same Day Surgery (SDS)

The SDS is compiled by the Canadian Institute for Health Information and contains administrative, clinical (diagnoses and procedures), demographic and administrative information for all patient visits made to day-surgery institutions in Ontario. The main data elements include patient demographics, clinical data (diagnoses, procedures, physician), administrative data (institution/hospital number, etc.), financial data, and service-specific data elements for day surgery.

The following external data sets were imported and linked to the ICES Data Repository for this report.

Integrated Public Health Information System (iPHIS) and other local data entry systems (iPHIS Plus)

The iPHIS is the information system used in Ontario for reporting case information on all reportable communicable diseases for provincial and national surveillance, as described in the *Health Protection and Promotion Act*. Each public health unit (PHU) is responsible for conducting case and contact management, collecting case and contact information on reportable communicable diseases occurring within their boundaries, and entering information into iPHIS. Certain PHUs enter data into their own local system, and then the data are integrated into a combined data set, which includes both iPHIS and local system data (i.e., iPHIS Plus). The PHUs that use their own local system include the Toronto Public Health Coronavirus Rapid Entry System (CORES), the Ottawa Public Health COVID-19 Ottawa Database (The COD) and the Middlesex-London COVID-19 Case and Contact Management Tool (CCMtool).

DL and PHO Labware

Distributed Testing Lab data include testing data from laboratories in the COVID-19 Diagnostic Network, and PHO Labware includes all COVID-19 tests performed by a Public Health Ontario laboratory to April 13, 2020.

Appendix 10.0 Definitions Used in This Report

Variable	Definition	Data Source (Latest Data Availability)	Reference
Sociodemographic Characteristics			
Age	<p>Age was calculated as of index (date of testing or death, if before March 31, 2020, or March 31, 2020, for those not tested during the reporting period).</p> <p>Age was reported for all residents, immigrants and refugees and for second-generation children and youth aged 19 years and younger by the following groups:</p> <ul style="list-style-type: none"> • 0–9 years • 10–19 • 20–29 • 30–39 • 40–49 • 50–59 • 60–69 • 70+ 	<p>Registered Persons Database (March 31, 2020)</p> <p>Dates of birth and death are available up to March 31, 2020. Due to delays in reporting deaths to the Ministry of Health, this information will change with subsequent RPDB updates. Infants born after March 31, 2020, are not included.</p>	
Sex	<p>Sex was determined using the RPDB</p> <ul style="list-style-type: none"> • Female • Male 	Registered Persons Database (March 31, 2020)	
Neighbourhood income quintile	Neighbourhood-based income was determined using methods developed by Statistics Canada, where income was adjusted for household and community size so that each dissemination area (DA) would have 20% of its population in each income quintile. Individuals' postal codes were	<p>Registered Persons Database (March 31, 2020)</p> <p>Postal Code Conversion File (PCCF)</p>	

Variable	Definition	Data Source (Latest Data Availability)	Reference
	<p>matched to DAs, and individuals were categorized based on the corresponding neighbourhood income quintile of that DA.</p> <ul style="list-style-type: none"> • Quintile 1 (lowest) • Quintile 2 • Quintile 3 • Quintile 4 • Quintile 5 (highest) • Missing information 		
Residential Instability ¹¹	<p>A dimension of the Ontario Marginalization Index (ON-MARG) that is measured at the DA level, consistent with neighbourhood income quintile, using information from the census and weighted using weights obtained to calculate factor scores, which are standardized across Canada. Quintiles are created by placing 20% of the geographic units in the province into each quintile.</p> <ul style="list-style-type: none"> • Quintile 1 (least marginalized) • Quintile 2 • Quintile 3 • Quintile 4 • Quintile 5 (most marginalized) • Missing information <p>The census variables and indicators used to define the Residential Instability dimension include the following:</p> <ul style="list-style-type: none"> • Proportion of the population living alone • Proportion of the population who are not youth (age 5–15 years) • Average number of persons per dwelling 	<p>Registered Persons Database (March 31, 2020)</p> <p>Postal Code Conversion File</p> <p>Ontario Census Area Profiles (2016)</p>	<p>Matheson FI, van Ingen T. <i>2016 Ontario Marginalization Index: User Guide</i>. Toronto, ON: St. Michael's Hospital; 2018. Joint publication with Public Health Ontario. Available at https://www.publichealthontario.ca/-/media/documents/o/2017/on-marg-userguide.pdf.</p>

Variable	Definition	Data Source (Latest Data Availability)	Reference
	<ul style="list-style-type: none"> Proportion of the dwellings that are apartment buildings Proportion of the population that is single/divorced/widowed Proportion of dwellings that are not owned Proportion of the population that moved during the past 5 years 		
Persons per dwelling ¹¹	<p>A census variable measured at the DA level which is part of the residential instability dimension of ON-MARG. The average number of persons per dwelling indicator is used to describe neighbourhoods by average number of individuals living in a private household.</p> <ul style="list-style-type: none"> Quintile 1 (least marginalized) Quintile 2 Quintile 3 Quintile 4 Quintile 5 (most marginalized) Missing information 	<p>Registered Persons Database (March 31, 2020)</p> <p>Postal Code Conversion File</p> <p>Ontario Census Area Profiles (2016)</p>	<p>Matheson FI, van Ingen T. 2016 <i>Ontario Marginalization Index: User Guide</i>. Toronto, ON: St. Michael's Hospital; 2018. Joint publication with Public Health Ontario. Available at https://www.publichealthontario.ca/-/media/documents/o/2017/on-marg-userguide.pdf.</p>
Neighbourhood diversity (Ethnic concentration) ¹¹	<p>A dimension of ON-MARG that is measured at the DA level, consistent with neighbourhood income quintile, using information from the census and weighted using weights obtained to calculate factor scores, which are standardized across Canada. Quintiles are created by placing 20% of the geographic units in the province into each quintile.</p> <ul style="list-style-type: none"> Quintile 1 (least marginalized) Quintile 2 Quintile 3 	<p>Registered Persons Database (March 31, 2020)</p> <p>Postal Code Conversion File</p> <p>Ontario Census Area Profiles (2016)</p>	<p>Matheson FI, van Ingen T. 2016 <i>Ontario Marginalization Index: User Guide</i>. Toronto, ON: St. Michael's Hospital; 2018. Joint publication with Public Health Ontario. Available at https://www.publichealthontario.ca/-/media/documents/o/2017/on-marg-userguide.pdf.</p>

Variable	Definition	Data Source (Latest Data Availability)	Reference
	<ul style="list-style-type: none"> • Quintile 4 • Quintile 5 (most marginalized) • Missing information <p>The Ethnic Concentration dimension was used as a proxy for neighbourhood diversity. Census variables and indicators used to define include the following:</p> <ul style="list-style-type: none"> • Proportion of the population who are recent immigrants (arrived in the past 5 years) • Proportion of the population who self-identify as a visible minority 		
Public health unit of residence	Public health unit associated with the residence was determined based on the individual's postal code recorded in the RPDB and in the PCCF, which maps postal codes regional areas.	Registered Persons Database (March 31, 2020) Postal Code Conversion File (PCCF)	
Chronic Conditions			
Respiratory conditions	<p>Asthma³³</p> <p>Individuals were diagnosed with asthma based on an algorithm of 2 or more physician billings within 2 years, or one hospitalization with an asthma diagnosis code prior to the index date.</p> <p>In accordance with available data, individuals with an asthma diagnosis date prior to March 31, 2019, were identified as having this comorbidity. The reported prevalence of asthma in these cohorts is likely underestimated.</p>	Ontario Asthma Database (March 31, 2019).	Gershon AS, Wang C, Guan J, Vasilevska-Ristovska J, Cicutto L, To T. Identifying patients with physician-diagnosed asthma in health administrative databases. <i>Can Respir J</i> . 2009; 16(6):183–8.

Variable	Definition	Data Source (Latest Data Availability)	Reference
	<p>Chronic obstructive pulmonary disease³⁴</p> <p>Individuals were diagnosed with COPD based on an algorithm of 1 or more physician billings within 2 years, or one hospitalization with a COPD diagnosis code prior to index date.</p> <p>Due to current data availability, individuals with a COPD diagnosis date prior to March 31, 2019, were identified as having this comorbidity. The reported prevalence of COPD in these cohorts is likely underestimated.</p>	Ontario Chronic Obstructive Pulmonary Disease Database (March 31, 2019)	Gershon AS, Wang C, Guan J, Vasilevska-Ristovska J, Cicutto L, To T. Identifying individuals with physician diagnosed COPD in health administrative databases. <i>COPD</i> . 2009; 6(5):388–94.
Chronic kidney disease ^{35,36}	Individuals were classified as having a diagnosis of chronic kidney disease (CKD) if they had a physician billing, emergency department visit or hospitalization with a CKD diagnosis code, or if there was evidence of recent chronic dialysis (i.e., dialysis billing code in each of the 3 months prior to index).	<p>Discharge Abstract Database (March 31, 2020)</p> <p>National Ambulatory Care Reporting System (March 31, 2020)</p> <p>Ontario Health Insurance Plan database (March 31, 2020)</p>	<p>Fleet JL, Dixon SN, Shariff SZ, et al. Detecting chronic kidney disease in population-based administrative databases using an algorithm of hospital encounter and physician claim codes. <i>BMC Nephrol</i>. 2013; 14:81.</p> <p>Quinn RR, Laupacis A, Austin PC, et al. Using administrative data sets to study outcomes in dialysis patients: a validation study. <i>Med Care</i>. 2010; 48(8):745–50.</p>
Diabetes ³⁷	Individuals were diagnosed with diabetes based on an algorithm of 2 or more physician billings within a year or 1 hospitalization or 1 diabetes medication prescription (adult definition), or 4 or more physician billings within 2 years with a diabetes diagnosis code or 1 or more physician	Ontario Diabetes Database (March 31, 2019)	Hux JE, Ivis F, Flintoft V, Bica A. Diabetes in Ontario: determination of prevalence and incidence using a validated administrative data algorithm. <i>Diabetes Care</i> . 2002; 25(3):512–6.

Variable	Definition	Data Source (Latest Data Availability)	Reference
	<p>billings with a diabetes fee code (pediatric definition) prior to index date.</p> <p>In accordance with available data, individuals with a diabetes diagnosis date prior to March 31, 2019, were identified as having this comorbidity. The reported prevalence of diabetes in these cohorts is likely underestimated.</p>		
Cardiovascular diseases	<p>Congestive heart failure³⁸ Individuals were diagnosed with congestive heart failure (CHF) based on an algorithm of 1 hospitalization or 1 physician billing or emergency department visit followed by another health care encounter within a year, with a CHF diagnosis code prior to index date.</p> <p>In accordance with available data, individuals with a CHF diagnosis date prior to March 31, 2019, were identified as having this comorbidity. The reported prevalence of CHF in these cohorts is likely underestimated.</p> <p>Hypertension³⁹ Individuals were diagnosed with hypertension based on an algorithm of 1 hospitalization or 1 physician billing followed by another physician billing or hospitalization within 2 years, with a hypertension diagnosis code prior to index date. Due to current data availability, individuals with a hypertension diagnosis date prior to March 31, 2019, were identified as having this comorbidity.</p>	<p>Ontario Congestive Heart Failure Database (March 31, 2019)</p> <p>Ontario Hypertension Database (March 31, 2019)</p>	<p>Schultz SE, Rothwell DM, Chen Z, Tu K. Identifying cases of congestive heart failure from administrative data: a validation study using primary care patient records. <i>Chronic Dis Inj Can.</i> 2013; 33(3): 160–6.</p> <p>Tu K, Campbell NR, Chen Z, Cauch-Dudek K, McAlister FA. Accuracy of administrative databases in identifying patients with hypertension. <i>Open Med.</i> 2007; 1(1):18–26.</p>

Variable	Definition	Data Source (Latest Data Availability)	Reference
	<p>The reported prevalence of hypertension in these cohorts is likely underestimated.</p> <p>Ischemic heart disease⁴⁰ Individuals were classified as having ischemic heart disease if there was a diagnosis code for angina, chronic ischemic heart disease or myocardial infarction, based on hospitalization records in the previous 5 years or a coronary artery bypass graft or percutaneous coronary intervention procedure in the previous 20 years.</p> <p>History of TIA or stroke Individuals were classified as having a history of transient ischemic attack or acute ischemic stroke code if they had a hospitalization or emergency department visit prior to index date.</p>	<p>Discharge Abstract Database (March 31, 2020)</p> <p>Same Day Surgery Database (March 31, 2019)</p> <p>Discharge Abstract Database (March 31, 2020)</p> <p>National Ambulatory Care Reporting System (March 31, 2020)</p>	<p>Tu JV, Chu A, Donovan LR, et al. The Cardiovascular Health in Ambulatory Care Research Team (CANHEART): Using big data to measure and improve cardiovascular health and healthcare services. <i>Circ Cardiovasc Qual Outcomes</i>. 2015; 8(2):204–12.</p>
Immuno-compromised ⁴¹	<p>Individuals were identified as immuno-compromised if they met any of the following conditions:</p> <ul style="list-style-type: none"> • HIV diagnosis (3 physician billings with an HIV diagnosis within 3 years) • History of a solid organ transplant or allogenic/autologous bone marrow transplant • History of any condition causing immunodeficiency (sickle cell disease, hereditary immunodeficiency, neutropenia, functional disorders of polymorphonuclear neutrophils and genetic anomalies of leukocytes, hyposplenism, hypersplenism and chronic congestive splenomegaly, asplenia) 	<p>Discharge Abstract Database (March 31, 2020)</p> <p>Ontario HIV Database (March 31, 2019)</p> <p>Ontario Health Insurance Plan Database (March 31, 2020)</p> <p>Canadian Organ Replacement Registry (December 31, 2018)</p>	<p>Antoniou T, Zagorski B, Loutfy MR, Strike C, Glazier RH. Validation of case-finding algorithms derived from administrative data for identifying adults living with human immunodeficiency virus infection. <i>PLoS One</i>. 2011; 6(6):e21748.</p>

Variable	Definition	Data Source (Latest Data Availability)	Reference
Inflammatory conditions	<p>Inflammatory bowel disease^{42,43}</p> <p>Individuals were diagnosed with inflammatory bowel disease (IBD) based on one of the following algorithms:</p> <ul style="list-style-type: none"> For individuals aged <18 years, either 1 procedure code for sigmoidoscopy/colonoscopy or 2 hospitalizations or 4 physician billings/emergency department visits with an IBD diagnosis code within 3 years. For individuals aged 18– 64 years, 5 health care contacts with an IBD diagnosis code within 4 years For individuals aged ≥65 years, 5 health care contacts with an IBD diagnosis code within 4 years and one claim with IBD medication. <p>(These algorithms are based on at least 2 years of OHIP eligibility.)</p> <p>In accordance with available data, individuals with an IBD diagnosis date prior to March 31, 2019, were identified as having this comorbidity. The reported prevalence of IBD in these cohorts is likely underestimated.</p>	Ontario Crohn's and Colitis Cohort Database (March 31, 2019)	<p>Benchimol EI, Guttman A, Griffiths AM, et al. Increasing incidence of paediatric inflammatory bowel disease in Ontario, Canada: evidence from health administrative data. <i>Gut</i>. 2009; 58(11):1490–7.</p> <p>Benchimol EI, Guttman A, Mack DR, et al. Validation of international algorithms to identify adults with inflammatory bowel disease in health administrative data from Ontario, Canada. <i>J Clin Epidemiol</i>. 2014; 67(8):887–96</p>
	<p>Rheumatoid arthritis^{44,45}</p> <p>Individuals were diagnosed with rheumatoid arthritis (RA) based on an algorithm of 1 hospitalization or 3 physician billings (1 of which was by a musculoskeletal specialist) within 2 years, with an RA diagnosis code prior to index date.</p>	Ontario Rheumatoid Arthritis Database (March 31, 2019)	Widdifield J, Bombardier C, Bernatsky S, et al. An administrative data validation study of the accuracy of algorithms for identifying rheumatoid arthritis: the influence of the reference standard on

Variable	Definition	Data Source (Latest Data Availability)	Reference
	Due to current data availability, individuals with an RA diagnosis date prior to March 31, 2019, were identified as having this comorbidity. The reported prevalence of RA in these cohorts is likely underestimated.		algorithm performance. <i>BMC Musculoskelet Disord.</i> 2014; 15(1):216. Widdifield J, Bernatsky S, Paterson JM et al. Accuracy of Canadian health administrative databases in identifying patients with rheumatoid arthritis: a validation study using the medical records of rheumatologists. <i>Arthritis Care Res.</i> 2013; 65(10): 1582–91.
Liver disease ⁴⁶	Individuals were classified as having advanced liver disease (cirrhosis or decompensated cirrhosis) if they met either of the following algorithms: <ul style="list-style-type: none"> • 2 or more outpatient visits (physician billing or emergency department visits) or 1 hospitalization with a cirrhosis diagnosis code • 1 or more outpatient visit and 1 hospitalization or 1 procedure code for decompensated cirrhosis 	Discharge Abstract Database (March 31, 2020) National Ambulatory Care Reporting System (March 31, 2020) Ontario Health Insurance Plan Database (March 31, 2020)	Lapointe-Shaw L, Georgie F, Carlone D, et al. Identifying cirrhosis, decompensated cirrhosis and hepatocellular carcinoma in health administrative data: a validation study. <i>PLoS One.</i> 2018; 13(8): e0201120.
Immigration Characteristics			
Immigrant category	Category under which immigrant or refugee is admitted to Canada among individuals at the time of entry into Ontario, including sponsored immigrants (family class immigrants) economic class immigrants (economic caregivers, economic other), resettled refugees (privately sponsored, government assisted, blended visa office-referred), protected persons in Canada, refugee dependents,	Immigration, Refugees and Citizenship Canada Permanent Resident Database	

Variable	Definition	Data Source (Latest Data Availability)	Reference
	humanitarian and compassionate/public policy cases and other		
Recency of immigration	Measured as the length of time in Canada between landing in Ontario and index date	Immigration, Refugees and Citizenship Canada Permanent Resident Database	
World region of birth⁴⁷	Based on individuals' country of birth, world region country classifications aligned with those of the World Bank with some regions with the following modifications: "Eastern Europe" included Eastern Europe and the USSR (former). "Europe other" included Northern Europe, Southern Europe, the United Kingdom, Western Europe, Yugoslavia (former) and Europe unspecified. "North America" included North America and Western Hemisphere (Others). "Australasia & Oceania" included Australasia, Oceania & Asia Unspecified. If country of birth was missing, country of citizenship was used to identify world region of origin.	Immigration, Refugees and Citizenship Canada Permanent Resident Database	United Nations High Commissioner for Refugees. What is a refugee? https://www.unhcr.org/afr/what-is-a-refugee.html . Updated 2019. Accessed July 15, 2020.
Canadian language ability	Self-declared indicator of knowledge of Canada's official languages (English, French, English and French, or neither) among permanent residents at the time of entry into Ontario.	Immigration, Refugees and Citizenship Canada Permanent Resident Database	
Education level	Level of education among permanent residents who are 15 years of age or older at the time of entry into Ontario, based on the number of years of schooling or the certificate, diploma or degree obtained. Categories included secondary or less, some university (no degree), trade or diploma, bachelor's degree and higher, or none.	Immigration, Refugees and Citizenship Canada Permanent Resident Database	

Variable	Definition	Data Source (Latest Data Availability)	Reference
Health Care Workers			
Health care worker (generic)	Occupation involving caring for patients. Includes health care worker, doctor, nurse, dentist, dental hygienist, midwife, other medical technicians, personal support worker, respiratory therapist and first responder. This list of health care worker occupations entered into iPHIS Plus expanded over the study period.	Integrated Public Health Information System (iPHIS) Plus	
Long-term care worker	Any health care worker (e.g., doctor, nurse, dentist, dental hygienist, midwife, other medical technicians, personal support worker, respiratory therapist and first responder) who was part of an outbreak associated with a long-term care home, using the outbreak number recorded in the case's record.	Integrated Public Health Information System (iPHIS) Plus	

Appendix 11.0 Diagnostic, Procedure and Physician Billing Codes

Comorbidity	ICD-9/ICD-10-CA Diagnostic Codes	CCP/CCI Procedure Codes	OHIP Physician Billing Diagnostic Codes	OHIP Physician Billing Fee Codes
Asthma	493 J45, J46		493	
Chronic kidney disease (including dialysis)	Chronic kidney disease: E102, E112, E132, E142, I12, I13, N08, N18, N19	Dialysis: 1PZ21HPD4, 1PZ21HQBR, 1PZ21HQBS	Chronic kidney disease: 403, 585	Dialysis: G082, G083, G085, G090– G096, G294, G295, G323, G325, G326, G330, G331, G332, G333, G860–G866, H540, H740, R849
Chronic obstructive pulmonary disease	491, 492, 496 J41–J44		491, 492, 496	
Diabetes	250 E10, E11, E13, E14		250	K029, K030, K045, K046, Q040
Heart failure	428 I500, I501, I509		428	Q050
HIV			042, 043, 044	
History of solid organ transplant		1GR85, 1GT85 (Lung) 1HY85 (Heart & lung) 1HZ85 (Heart) 1OA85 (Liver) 1OB85 (Spleen) 1OK85 (Pancreas) 1PC85 (Kidney)		
History of allogenic/autologous bone marrow transplant		530 1LZ19HHU7, 1LZ19HHU8, 1WY19		Z426
History of conditions associated with immunodeficiency	Sickle cell disease: 282.6 D570–D572, D578 Hereditary immunodeficiency:			

Comorbidity	ICD-9/ICD-10-CA Diagnostic Codes	CCP/CCI Procedure Codes	OHIP Physician Billing Diagnostic Codes	OHIP Physician Billing Fee Codes
	279 D80-D84, D898, D899 Neutropenia: 2880 D70 Functional disorders of polymorphonuclear neutrophils and genetic anomalies of leukocytes: 2881, 2882 D71, D72 Hyposplenism, hypersplenism and chronic congestive splenomegaly: 2894, 2895 D730–D732 Asplenia: 7590 Q890			
Hypertension	401–405 I10–I13, I15		401–405	
Inflammatory bowel disease	555, 556 K50, K51			E705, E740, E741, E747, Z535, Z555, Z580
Ischemic heart disease	Angina: I20 Chronic ischemic heart disease: I25	Coronary artery bypass grafting: 481 1IJ76	555, 556	

Comorbidity	ICD-9/ICD-10-CA Diagnostic Codes	CCP/CCI Procedure Codes	OHIP Physician Billing Diagnostic Codes	OHIP Physician Billing Fee Codes
	Myocardial infarction: I21, I22	Percutaneous coronary intervention: 1IJ5, 1IJ50, 1IJ57 4802, 4803		
Liver disease	Cirrhosis: 4561, 5712, 5715 I859, I982, K476, K703, K717 Decompensated cirrhosis: 4560, 4562, 57.2, 5723, 5724, 7824, 7895 I850, I864, I9820, I983, K721, K729, K766, K767, R17, R18	Decompensated cirrhosis: 1006, 6691 1KQ76GP-NR, 1NA13BA-BD, 1NA13BA-FA, 1NA13BA-X7, 1OT52HA	Cirrhosis: 571	Decompensated cirrhosis: J057, Z591
Rheumatoid arthritis	714 M05, M06		714	
History of transient ischemic attack/acute ischemic stroke	TIA: 435, 3623 G450–G453, G458, G459, H340 Acute ischemic stroke: 434, 436 I63 (excluding I63.6), I64, H341			

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