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Demographic Profile of COVID-19 Cases, Fatalities, Hospitalizations and Recoveries Across Canadian Provinces

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Abstract

In Canada, provincial governments are responsible for COVID-19 epidemic surveillance. They maintain and disseminate the counts of cases, deaths, recoveries and hospitalizations related to the disease, which are used to trace the evolution of the pandemic nationwide. Information on the demographic characteristics of patients infected with COVID-19 is also gathered but varies across provinces due to the lack of national guidelines for data collection. In this paper, we exploit all available data sources at the provincial and national level, and we provide the first comprehensive assessment of the demographic profile of COVID-19 cases, fatalities, hospitalizations and recoveries at the sub-national level in Canada.

Résumé

Au Canada, les gouvernements provinciaux sont responsables de la surveillance épidémiologique pour la COVID-19. Ils ramassent et diffusent toute information sur le nombre de cas, de décès, de guérisons et d'hospitalisations liés à la maladie, ce qui permette de retracer l'évolution de la pandémie à l'échelle nationale. Des informations sur les caractéristiques des patients infectés par COVID-19 sont également collectées, mais elles varient selon les provinces en raison de l'absence de directives nationales. Dans cet article, nous exploitons toutes les sources de données disponibles aux niveaux provincial et national, et nous faisons la première évaluation au niveau sous-national du profil démographique des cas positifs de la COVID-19, des décès, des hospitalisations et des guérisons.

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INTRODUCTION

The new coronavirus disease, first identified in Wuhan, China, in December 2019, has now spread around the globe infecting almost four and half million people, and causing more than 350 000 deaths [*1*]. In Canada, the first two cases of COVID-19 were confirmed in a couple returning to Ontario from Wuhan on January 23 [*2*]. Travellers returning to Québec and Alberta from abroad after spring break ignited transmission in these two provinces as well. By March 28, more than half of all COVID-19 positive cases nationwide were linked to community spread [*3*].

In Canada, provincial governments are responsible for COVID-19 epidemic surveillance. They maintain and disseminate the counts of cases, deaths, recoveries and hospitalizations related to the disease, which are used to trace the evolution of the pandemic nationwide. Information on the demographic characteristics of patients infected with COVID-19 is also gathered but varies across provinces due to the lack of national guidelines for data collection. The Public Health Agency of Canada (PHAC) has the mandate to harmonize the collected information and disseminate it to the federal government. PHAC's epidemiological updates therefore describe the characteristics of the COVID-19 epidemic mainly at the national level [*4*].

In this paper, we exploit individual-level data newly released by Statistics Canada from information shared by PHAC, and we provide the first comprehensive assessment of the burden of COVID-19 at the sub-national level in Canada.

1. BACKGROUND

Demographic characteristics are key for the spread and fatality of COVID-19 across countries [*5*]. Yet there are few large-scale studies about the demographic profile of individuals who are infected with COVID-19, who need to be hospitalized and die or recover because of the disease.

Most demographic studies about COVID-19 to date have focused on the disease fatality [*6*, *7*] and associated mortality burden [*8*]. The demographics of confirmed positive cases have also been suggested to be one of the key variables to understand the potential demand for hospitalization [*9*], perhaps the most important indicator to monitor over the course of the pandemic. Nonetheless the demographic characteristics of individuals who need to be hospitalized because of COVID-19 is one of the topics least studied at the population level [*10*].

Equally understudied are the characteristics of individuals who recover from COVID-19, although age is often indicated as a main factor because the burden of COVID-19-related mortality is concentrated above age 75, especially for men [*11*].

In Canada, research about the demographic profile of COVID-19 has been limited. To date, there is no comparative evidence on the demographics of COVID-19 provincial epidemics. In this paper, we fill this gap and we describe the demographic profile of COVID-19 confirmed positive cases, fatalities, hospitalizations and recoveries at the sub-national level in Canada.

2. METHODS

For the present analysis, we combine the only two accessible sources of provincial-level data on COVID-19 in Canada (see Annex Table 1).

Provincial health ministers make available online bulletins with the total count of COVID-19 confirmed positive cases, deaths, and hospitalizations as well as their distribution by age or gender. This is the least detailed data source about COVID-19 at the sub-national level in Canada, but the most comprehensive one [*13*]. In the first part of the analysis, we use these data to describe age differentials (for men and women combined) in COVID-19 confirmed positive cases, fatalities and hospitalizations across provinces.

The second data source is an individual-level file compiled by Statistics Canada from information shared by PHAC [*12*].[1] On May 24, this file was updated to include several variables on COVID-19 confirmed positive patients' trajectory, from infection to hospitalization and death or recovery. Upon first release this file excluded Québec, which was integrated on June 2, although data still refer to the period prior to May 24 (the 20th week of 2020). This update filled a data gap that has long been highlighted by researchers and the larger community in Québec [*13*]. In this file, coverage of cases and fatalities is between 90 and 100%, with the exception of British Columbia (see Table 1). Coverage of hospitalisations is also between 70 and 100%, whereas recoveries are the variable with the lowest coverage outside Québec.

[1] Alberta and Ontario disseminate an individual-level file containing information on the age and gender of each COVID-19 confirmed positive case. This file covers all individual cases confirmed in each province but does not include information on individuals' hospitalization status.

Table 1. Official count of the cumulative number of COVID-19 confirmed positive cases, deaths, recoveries and hospitalizations and coverage of the individual-level file compiled by Statistics Canada from information shared by PHAC as of May 24, by province

	QC	ON	Prairies	Atlantic	BC	Total
Cases						
Official count[1]	46,838	25,500	7,745	1,457	2,528	84,081
In StatCan's file[2]	42,530	25,500	6,939	1,456	1,982	78,407
	(91%)	(100%)	(90%)	(100%)	(78%)	(83%)
Deaths						
Official count[1]	3,940	2,073	149	61	157	6,380
In StatCan's file[2]	3,846	2,073	146	52	37	6,154
	(98%)	(100%)	(100%)	(87%)	(24%)	(97%)
Hospitalizations						
Official count[3]	3,933	3,262	n/a	n/a	488	n/a
In StatCan's file[2]	3,912	3,238	343	61	342	n/a
	(99%)	(99%)	(n/a)	(n/a)	(70%)	
Recoveries						
Official count[1]	14,044	19,477	6,672	1,370	2,068	43,649
In StatCan's file[2]	11,891	10,425	902	1,340	558	
	(85%)	(54%)	(14%)	(99%)	(27%)	(35%)

Sources: [1] [*4*]. [2] [*12*]. [3] Québec [*12*]; Ontario [*20*]; British Columbia [*21*]; Atlantic and Prairies provinces [*12*].

Note: The individual-level file compiled by Statistics Canada from information supplied by PHAC groups provinces in three regions: Ontario; Prairies and Northwest Territories; British Columbia and Yukon; Atlantic provinces.

In spite of the high coverage of Statistics Canada's individual-level file, it is important to highlight that for approximately a third of COVID-19 confirmed positive cases in each province we do not have any information about individuals' clinical status (hospitalisation, death or recovery) after testing (see Annex Table 2). This is because a combination of delays in reporting and of the evolution of the infection over time.

By exploiting Statistics Canada's individual-level file, in the second part of the analysis we describe with age pyramids the age and gender profile of COVID-19 confirmed positive cases, fatalities, hospitalizations and recoveries across provinces. For Québec and Ontario, we also estimate the case fatality risk (CFR), or the proportion of confirmed cases who result in fatalities, by hospitalization status. We do so with event history modelling to take into account censoring that arises because, at the time of observation, the outcome is unknown for a nonnegligible portion of infected individuals, as indicated above. In this framework, the CFR coincides with

the cumulative incidence (CI) of mortality, with recovery as a competing risk.[2] The CI and its standard error are estimated controlling for gender and hospitalization status with *stcrreg* in Stata/SE (version 12.0, StataCorp, LLC).

3. RESULTS

3.1 Age differentials in COVID-19 confirmed positive cases, fatalities and hospitalizations

As of May 24, 84,081 positive cases of COVID-19 were confirmed nationwide. Québec and Ontario account for more than 80 percent of these cases (approximately 50 and 30 percent, respectively; see Annex Table 1). At the other end of the spectrum, the Atlantic provinces have been the least affected by COVID-19 and recorded less than 2 percent of the total number of confirmed positive cases in Canada.[3] COVID-19 outbreaks did not occur in Yukon, Northwest Territories, and Nunavut. These governments, fearing for the health of Indigenous peoples, closed borders to inter-provincial travel after the first few cases were confirmed, between the end of March and early April.[4] Not only do Québec and Ontario have the highest absolute number of COVID-19 cases, but also the highest number relative to population size (565 and 173 per 100,000 people, respectively; see Annex Table 1). Alberta has less than 10 percent of all COVID-19 cases nationwide, but a number of positive infections relative to population size similar to Ontario (157 per 100,000 people).

Figure 1 plots the age distribution of the cumulative number of COVID-19 confirmed positive cases per 100,000 people in each province as of May 24 (the corresponding figures can be found in Annex Table 3). As indicated earlier, in order to include Québec in this comparison, we cannot make a distinction by gender. Across age groups, the number of COVID-19 confirmed positive cases is highest in Québec, especially above age 80. Ontario has a slightly lower number

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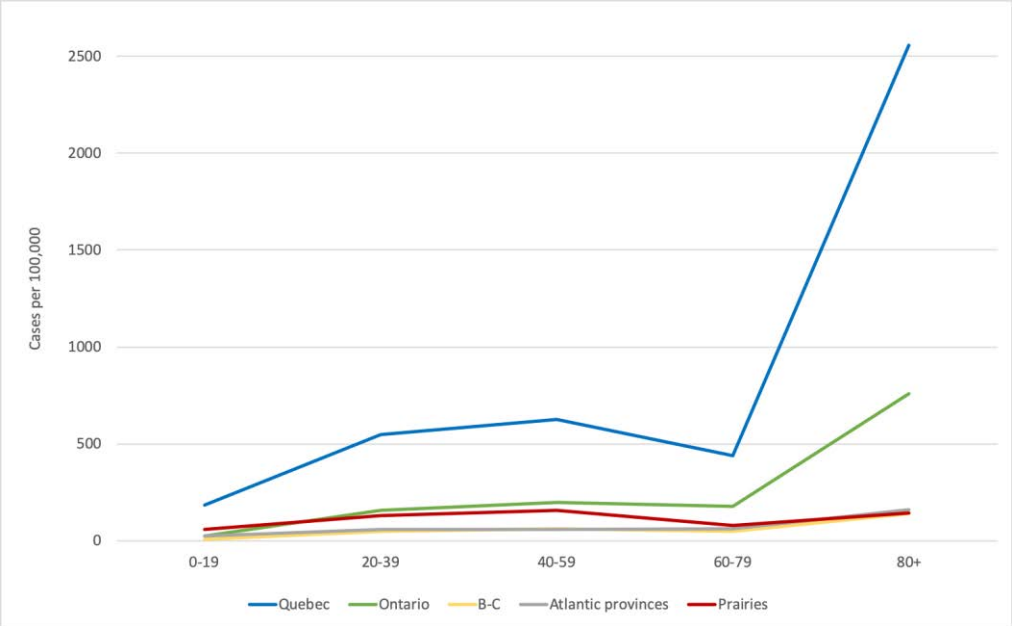
[2] When calculated from aggregate data on confirmed cases and deaths, the CFR is a simple ratio between the former and the latter, which is prone to numerous biases [*10*; *14-17*]. With individual-level data, the CFR can be estimated as a true measure of risk as the proportion of incidence for the disease.

[3] Prince Edward Island declared the state of emergency on March 16, which restricted inter-provincial travel to essential reasons only, and did not experience COVID-19 community transmission. Travel-related imported cases in P.E.I. reached the current level of 27 on April 28, and the province has reported no new cases since that moment.

[4] The Northwest Territories closed their borders on March 21, after the first case of COVID-19 was identified. Nunavut restricted incoming travel to residents and critical workers on March 23, before any case of COVID-19 was identified. Yukon installed border checkpoints on April 6, after the 7th case of COVID-19 was confirmed.

of positive cases under age 60 than the Prairie provinces, but a much higher number above age 60. This is not due to differences in the overall population age structure across provinces. Indeed, in Québec, Ontario and British Columbia an identical proportion of the population (5 percent) is age 80 years and above. In Alberta, this proportion is slightly lower (3 percent). Rather, age differentials for COVID-19 confirmed positive cases across Canada are mainly due to differential testing strategies that were adopted in each province, and which also changed over time. Until the end of March, Québec and Ontario primarily tested symptomatic individuals for COVID-19, whereas in April their governments focused testing on health care workers and elderly patients in the attempt to contains outbreaks in nursing homes that had already infected a large proportion of residents and staff. Alberta, on the contrary, tested health care workers and nursing home personnel in early March when there were few confirmed positive cases in health facilities, and then expanded testing to all symptomatic individuals and, recently, asymptomatic ones as well.[5]

Figure 1. Age distribution of the cumulative number of COVID-19 confirmed positive cases per 100,000 people (both sexes combined) as of May 24, by province

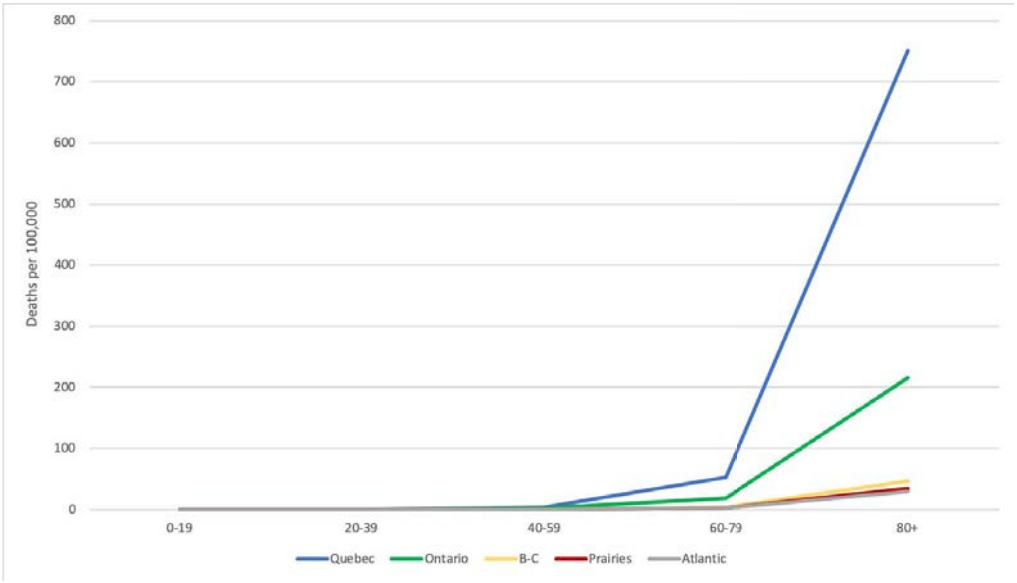


Sources: Québec [*19*]; Ontario [*20*]; British Columbia [*21*]; Atlantic and Prairies provinces [*12*].

[5] A recent study for Ontario [*18*] supports the role of the testing strategy in explaining the high proportion of confirmed positive cases above age 70 in Québec and Ontario observed in Figure 1a. This study finds that individuals who tested negative for COVID-19 are slightly younger than those who tested positive, their median age being 52 and 56 years, respectively. In addition, compared to negative cases, the proportion of COVID-19 confirmed positive cases is higher above age 50 and, especially, above age 80 years (Annex Figure 1).

Similar to confirmed positive infections, the majority of COVID-19-related deaths are found in Québec and Ontario, which account for 95 percent of fatalities nationwide (see Annex Table 1). Figure 2 plots age-specific death rates across all provinces. Death rates are highest in Québec at all ages, and particularly at age 80+. Ontario follows, and death rates are lowest in the other provinces. In the age group 60-79, death rates in Québec are more than twice as high than in Ontario (57.8 vs 18.4 per 100,000), but approximately the same in the other provinces (3 per 100,000). Above age 80, death rates in Québec are more than three times those recorded in Ontario (751.4 vs 215.7 per 100,000), and between 30 and 50 per 100,000 in the other provinces.

Figure 2. COVID-19 age-specific death rates of COVID-19 per 100,000 people (both sexes combined) as of May 24, by province



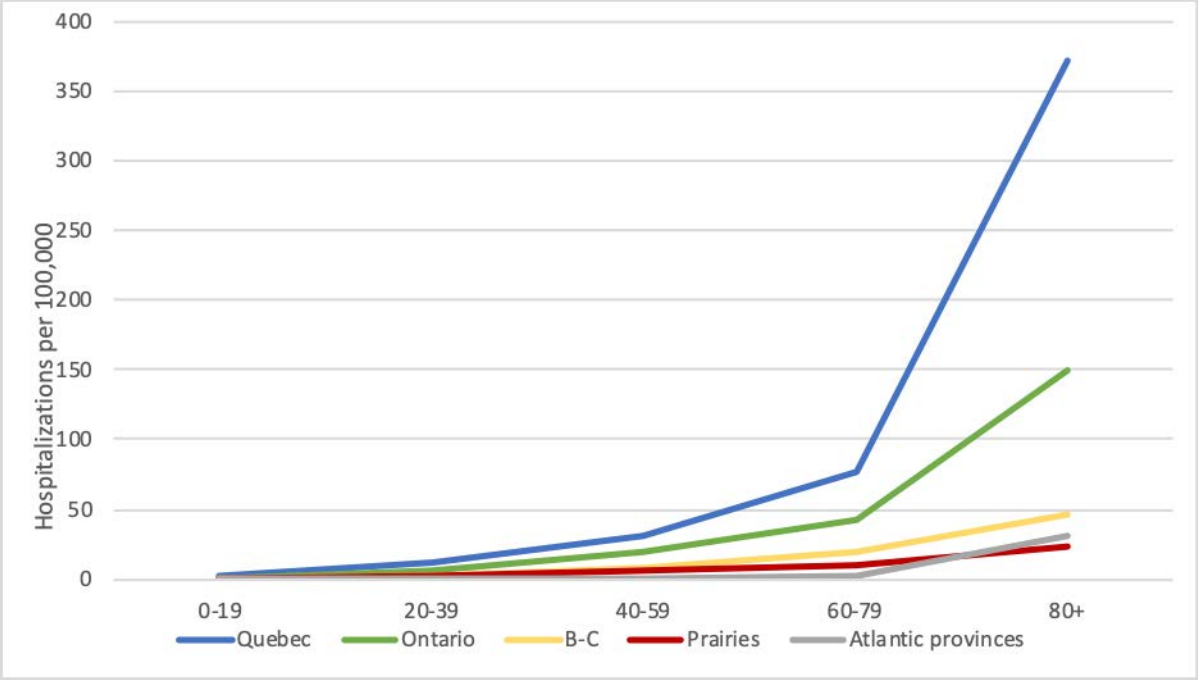
Sources: Québec [*19*]; Ontario [*20*]; British Columbia [*21*]; Atlantic and Prairies provinces [*12*].

Understanding the characteristics of COVID-19 confirmed positive cases requiring hospitalization is key to plan the allocation of health care resources over the course of the pandemic [*22*]. Yet hospitalizations are the outcome of COVID-19 that are most difficult to study. Because of confidentiality, accessible information on COVID-19-related hospitalizations in Canada is scarce. Tracking their trend over time is plagued by problems of definition. The change of definition in Québec a few days before economic activities reopened in Montréal has

attracted particular attention, since the overall count of hospitalizations dropped and their trend changed from being stable to showing a steady decline [*19*].

Figure 3 shows that Québec is the Canadian province that has the highest ratio of hospitalizations for all age groups. Under age 40, hospitalization rations in Québec are more than twice than in Ontario, and between age 40 and 79 years they are 1.5 times higher. Particularly striking is the comparison at age 80+, where the hospitalization ratio in Québec is 372 per 100,000, compared to 179 per 100,000 in Ontario.

Figure 3. Age distribution of the cumulative number of COVID-19-related hospitalizations (including admissions to intensive care) per 100,000 people (both sexes combined) as of May 24, by province



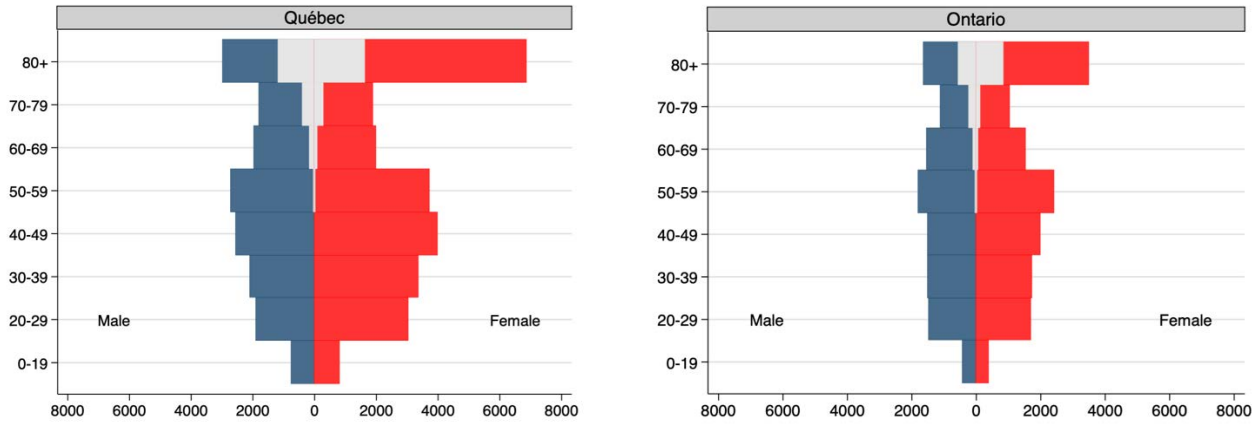
Sources: Québec [*12*]; Ontario [*20*]; British Columbia [*21*]; Atlantic and Prairies provinces [*12*].

3.2 Age and gender profile of COVID-19 provincial epidemics

The comparisons presented earlier give an idea of the magnitude of the COVID-19 pandemic at the provincial level in Canada. Now we exploit the individual-level file compiled by Statistics Canada to give a more precise portrait of the impact of the disease across age and gender groups in each province.

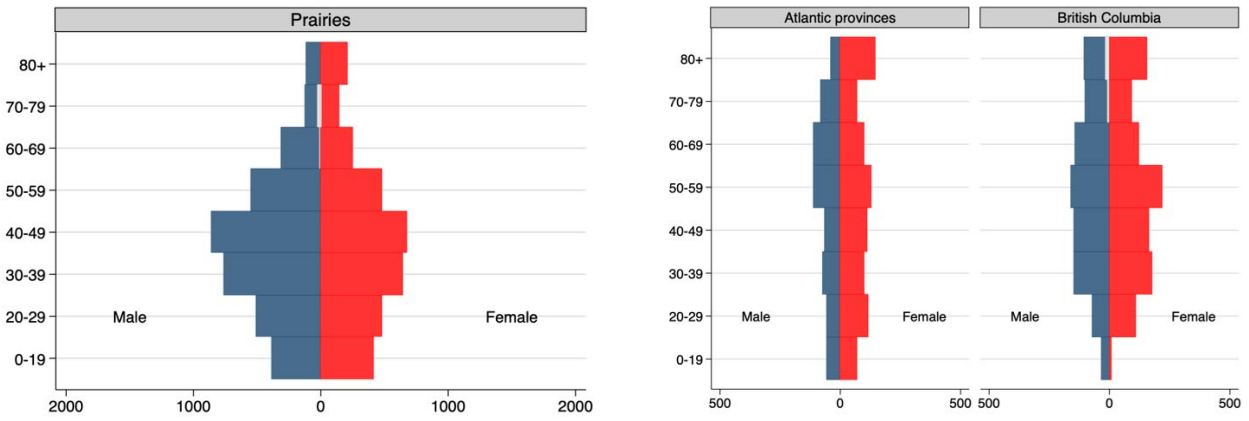
We begin by assessing the profile of COVID-19 confirmed positive cases, fatalities, hospitalizations and recoveries along the age and gender dimensions simultaneously. Figures 4a and 4b present the age pyramids of COVID-19 confirmed positive cases and the number of fatalities within each group across provinces. Consistently with other studies [*18*], the number of women confirmed positive with COVID-19 is higher than the number of men at almost all ages. In spite of the different scale, the shape of the age pyramids is strikingly similar across provinces. The main exception are the Prairie provinces, reflecting the different testing strategy for COVID-19 adopted in Alberta, as we illustrated earlier. Due the small number of deaths recorded outside Ontario and Québec (see Table 1), COVID-19-related mortality is evident only in these two provinces. Fatalities are concentrated above age 50 for both men and women (under age 50, only 25 and 26 deaths have been recorded in Québec and Ontario, respectively), with a higher number of deceased women age 80+ than men.

Figure 4a. Age and gender distribution of the cumulative number of COVID-19 confirmed positive cases (in blue and red) and fatalities (in white) as of May 24, Québec and Ontario



Sources: our calculations from [*12*].

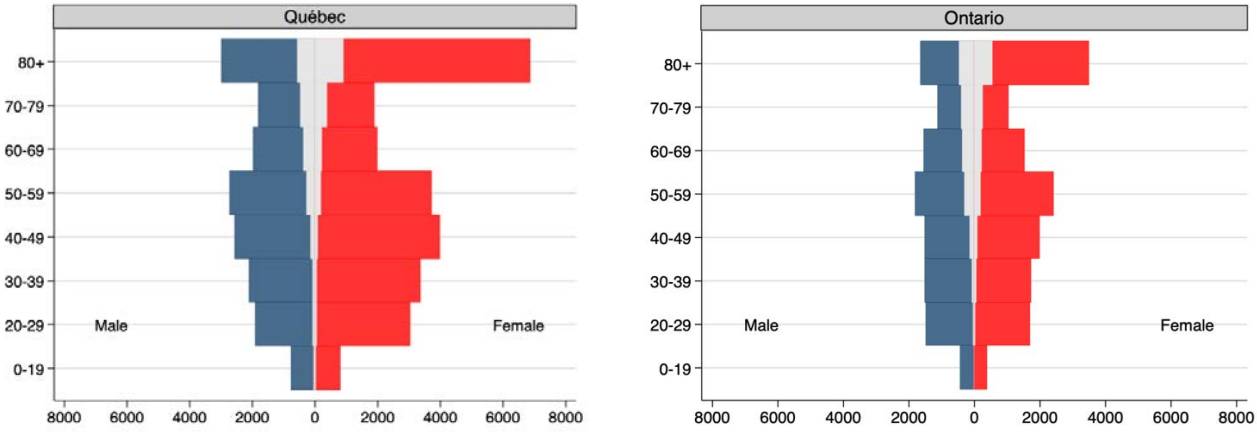
Figure 4b. Age and gender distribution of the cumulative number of COVID-19 confirmed positive cases (in blue and red) and fatalities (in white) as of May 24 in Ontario, the Atlantic provinces, the Prairie provinces and British Columbia



Sources: our calculations from [*12*].

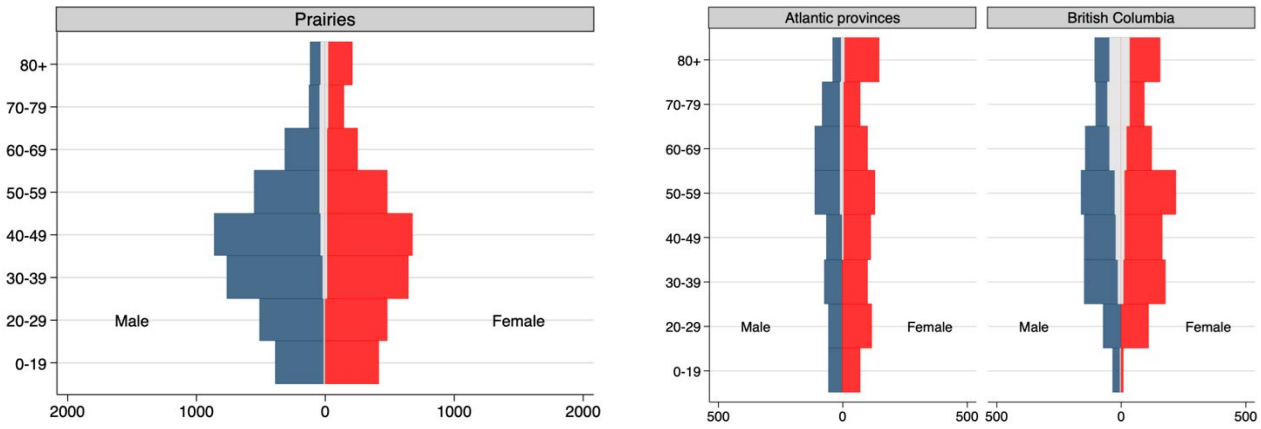
Figures 5a and 5b present the age pyramids of COVID-19 confirmed positive cases and the number of hospitalizations within each group. Consistently across provinces, the number of COVID-19 positive individuals who require hospitalization increases linearly with age. The number of cases hospitalized in Québec and Ontario is similar, even though the total number of cases in the former case is much higher than in the latter.

Figure 5a. Age and gender distribution of the cumulative number of COVID-19 confirmed positive cases (in blue and red) and hospitalizations (in grey) as of May 24 in Ontario and Québec



Sources: our calculations from [*12*].

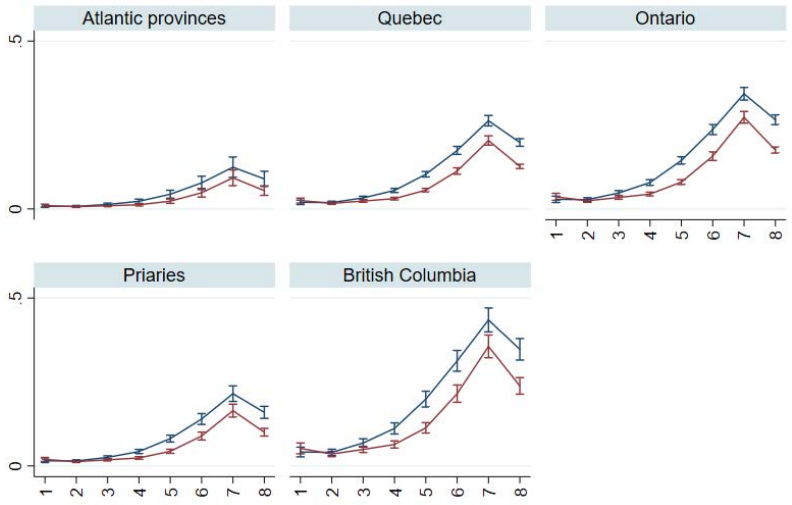
Figure 5b. Age and gender distribution of the cumulative number of COVID-19 confirmed positive cases (in blue and red) and hospitalizations (in grey) as of May 24 in the Atlantic provinces, the Prairie provinces and British Columbia



Sources: our calculations from [*12*].

Indeed, Figure 6 shows the probability of hospitalization is higher in Ontario than in Québec at all ages. In addition, we can appreciate differences by gender: across all provinces, COVID-19 positive men have a 5 to 10 percent higher probability of hospitalization than women at all ages. The probability of COVID-19-related hospitalizations peaks at 70-79 years and declines slightly after age 80.

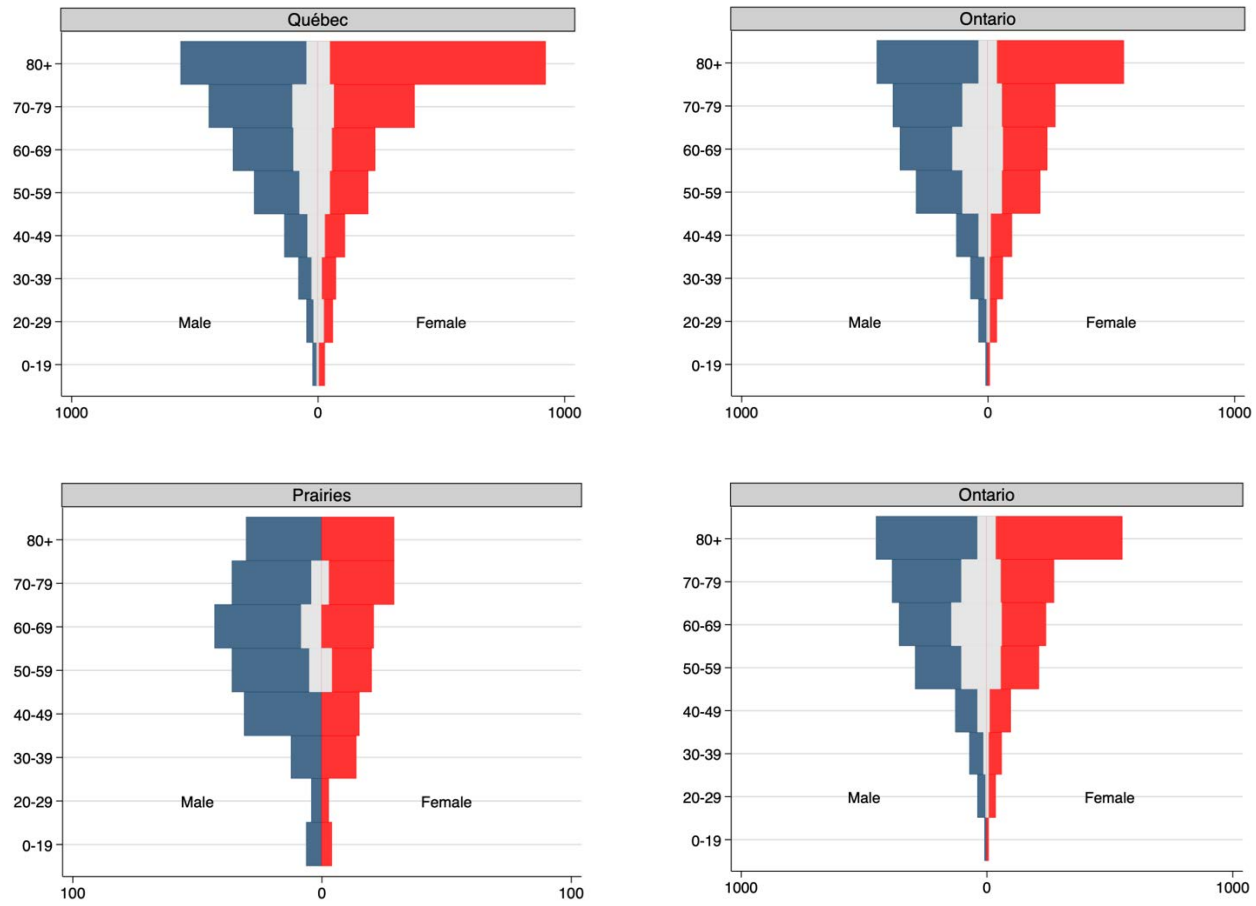
Figure 6. Probability of hospitalization and 95% confidence interval by age, gender and province



Sources: our calculations from [*12*].

The need for intensive care has been one of the most important issues in dealing with the COVID-19 pandemic. Indeed, efforts aimed at 'flattening the curve' of infections, in Canada and around the world, meant to ensure that health care capacity was sufficient to treat severe cases in need of intensive care [*22*]. It is thus important to assess to what extent not only hospital resources, but especially intensive care, have been used since the beginning of the epidemic in Canada. Figure 7 shows that, in the Atlantic and Prairie provinces as well as British Columbia, among the limited number of cases who required hospitalization admission to intensive care has been a rare occurrence, especially for women. In Québec and Ontario, the number of COVID-19 positive individuals admitted to intensive care has been similar for women in all age groups. However, more men age 50 to 69 were admitted to intensive care in Ontario than in Québec.

Figure 7. Age and gender distribution of the proportion of COVID-19 confirmed positive cases who required hospitalizations (in blue and red) and intensive care (in grey) as of May 24, by province



Sources: our calculations from [*12*].

How do the age and gender patterns of hospitalisation in Figures 5-7 are associated with the risk of mortality for COVID-19? In the next two sections, we focus on Québec and Ontario to answer this question.

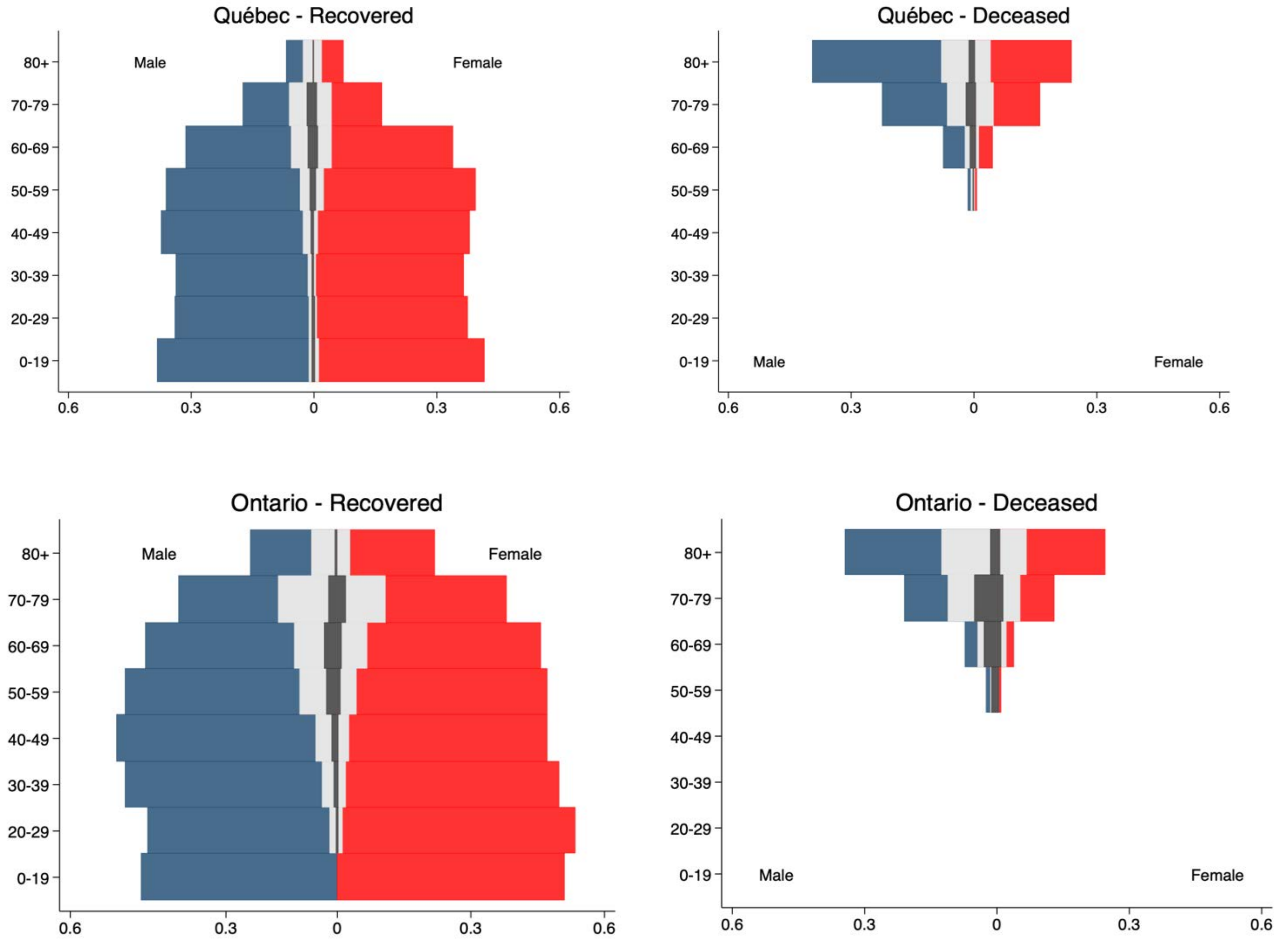
3.3 Who recovers or dies because of COVID-19 in Québec and Ontario?

Overall, almost a third of men and women who tested positive for COVID-19 in Québec recovered from the disease, and 11 and 8 percent did not (see Annex Table 4b). In Ontario, we observe a slightly higher percentage of recoveries (41 percent for men and women) and a slightly lower proportion of fatalities (9 for men and 8 for women) than in Québec.

Figure 8 shows that important differences are found by age and gender. In both provinces, the rate of recovery among confirmed positive cases is similar across age groups until age 60, when it starts declining rapidly. Compared to 60-69 years old, men and women age 80+ infected with COVID-19 have a rate of recovery than is less than half in Ontario and less than a third in Québec. Among those who recover, the need for hospitalization (including intensive care) increases with linearly with age and it is always higher for men than for women. It can also be observed that, consistently with the higher probability of hospitalization in Ontario compared to Québec observed in Figure 6, the rate of hospitalisation is higher in the former than the latter case in all age groups. This cross-sectional comparison, however, is biased by the fact that for a large proportion of cases the clinical status is unknown (see Annex Table 2).

The burden of mortality for COVID-19 is carried by the elderly. The largest proportion of COVID-19 confirmed positive cases who died is found among those age 80+ in both Québec and Ontario. Above age 70, hospitalization rates are higher among cases resulting in fatalities than in recoveries. Fatalities among 70-79 years old are also those with the highest rate of intensive care admission, especially in Ontario. Information on the duration of hospitalization before death or recovery, as well as on patients' presentation and pre-existing conditions, is essential to explore the mechanisms behind these descriptive findings.

Figure 8. Age and gender distribution of the proportion of COVID-19 confirmed positive cases in Québec and Ontario who recovered (to the left) and who died (to the right) as of May 24, by whether they were hospitalized (in light grey) or in intensive care (in dark grey)



Sources: our calculations from [*12*].

3.3 Estimates of COVID-19 case fatality risk from individual-level data in Québec and Ontario

The severity profile of a novel pathogen is one of the most critical issues as it begins to spread, when assessing disease course and outcome is crucial for planning health interventions [*14*]. For this reason, an important epidemiological indicator to monitor during the current outbreak of COVID-19 is the case-fatality risk (CFR), the proportion of confirmed cases who result in fatalities, which is an indicator of disease severity. With individual-level data, the CFR can be correctly estimated as the cumulative incidence for COVID-19. Data for Québec and Ontario

thus provide an opportunity to test how the risk of dying if infected with COVID-19 varies across age and gender, and depending on hospitalization status.

Table 2. CFR (cumulative incidence of mortality vs recovery) for COVID-19 confirmed positive cases in Ontario as of May 24, controlling for gender and hospitalization status

	Men				Women			
	Total	ICU	Hosp.	Non-hosp.	Total	ICU	Hosp.	Non-hosp.
				QUÉBEC				
50-59	0.3	0.7	0.5	0.1	0.2	0.5	0.4	0.1
60-69	1.5	3.6	2.6	0.7	1.0	2.7	1.9	0.5
70-79	5.3	13.3	9.5	2.8	3.6	10.1	7.2	2.1
80+	21.9	45.1	34.4	11.1	15.6	36.0	26.9	8.4
				ONTARIO				
50-59	0.4	1.8	0.8	0.2	0.3	1.7	0.8	0.2
60-69	1.7	7.0	3.3	0.8	1.2	6.7	3.1	0.8
70-79	4.9	18.3	8.8	2.3	3.7	17.2	8.3	2.1
80+	18.8	51.2	28.0	7.9	14.3	48.9	26.4	7.4

Sources: our calculations from [*12*].

For men and women, in the first column of Table 2, we present the CFR estimated by adjusting only for gender. This first set of estimates confirm the results of other studies about men's higher risk of dying for COVID-19 at all ages compared to women. Two important insights emerge when we control for the effect of hospitalization and admission to intensive care. Men and women who did not need to be hospitalized because of COVID-19 have a very similar risk of dying because of the disease at all ages, the main exception being men in Québec age 80+. The main factor contributing to gender differences in mortality because of COVID-19 is thus the need for hospitalization and intensive therapy, especially above age 80. This confirms a selection effect of cases requiring hospitalization or intensive care noted in the previous section.

CONCLUSION

In this paper, we provide the first comprehensive assessment of the burden of COVID-19 at the sub-national level in Canada.

By exploiting aggregate data available at the provincial level, we show that, at all ages, Québec has the highest number of COVID-19 confirmed positive cases, deaths and hospitalization per capita at all ages, not just overall.

Individual-level data shed light onto the age and gender profile of COVID-19 infections and highlights the links existing between the different events of patients' trajectories. In all provinces, although a larger number of women test positive for COVID-19, men have a higher probability of hospitalization at all ages and more likely to die for the disease than women do. Overall, not many patients have been admitted to intensive care in Canada, but the examples of Québec and Ontario show that the majority of COVID-19 related fatalities are found among older patients who have required intensive care. At the same time, the need for hospitalisation increases linearly with age, which should be taken into account when planning health care resources allocation over the course of the pandemic.

Our study highlights the advantages and limitations of existing data for an effective epidemic surveillance of COVID-19 in Canada. Public health and epidemic control systems have been redesigned following the 2003 SARS crisis, but there is still no pan-Canadian digital system to track COVID-19 testing, infections, and treatment and their characteristics [*24*]. There are no national guidelines about how to collect this information at the provincial level, which thus varies widely and hinders national-level surveillance carried out by PHAC. The individual-level file compiled by Statistics Canada from information shared by PHAC is thus an essential tool to understand COVID-19 provincial epidemics, especially in Québec where data has been, so far, particularly scant. Nonetheless, information on patients' pre-existing conditions is needed to understand the mechanisms behind the differences across age and gender groups highlighted in this paper. Information on the timing of events in confirmed positive patients' trajectories is also needed to understand the use of health care resources over the course of the pandemic, and plan appropriately for a second wave of infections. Ensuring that these information gaps are filled is an important step in the ongoing fight against COVID-19.

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ANNEX Table 1. Percent of COVID-19 confirmed positive cases as of May 24 nationwide and availability of demographic variables (age and gender) in two accessible data sources, by province

	Community transmission identified on	Percent of cases nationwide[1]	Individual level[2] (PHAC via StatCan)	Aggregate level[3]
National		**84,081**		
Québec	*March 16*	55.7%		C, D, H
Ontario	*March 16*	30.3%	C, D, H, **R**	C, D, H
Prairies		9.2%	C, D, H, **R**	
Alberta	*March 15*	*8.1%*		C, D, H
Manitoba	*March 25*	*0.7%*		C, D
Saskatchewan	*March 24*	*0.3%*		C, H
British Columbia	March 19	3.0%	C, D, H, **R**	C, D, H
Atlantic provinces		1.8%	C, D, H, **R**	
Nova Scotia	*March 30*	*1.3%*		
NFL and Labrador	*March 28*	*0.3%*		
New Brunswick	*March 30*	*0.1%*		
Prince Edward Island	*n/a*	*0.03%*		
Yukon	n/a	0.001%	w/ B.C.	
Northwest Territories	n/a	<0.001%	w/ Prairies	
Nunavut	n/a	0	w/ Ontario	

Legend: C=Cases; D=deaths; H=hospitalizations; R=recoveries
Notes:
[1] Cumulative number of cases as reported in Statistics Canada, COVID-19 in Canada – Daily Epidemiological Update, May 24.
[2] The individual-level file compiled by Statistics Canada from information supplied by PHAC groups provinces in three regions: Ontario; Prairies and Northwest Territories; British Columbia and Yukon; Atlantic provinces.
[3] Aggregate level data include only univariate tabulations by age or gender separately.

ANNEX Table 2. Number of COVID-19 confirmed positive cases as of May 24 and percentage of confirmed positive cases with unknown trajectory (hospitalisation, death or recovery), by age group, in Québec and Ontario

	QUEBEC			ONTARIO		
Number of confirmed positive cases						
	Men	Women	Total	Men	Women	Total
Total	16,651	25,739	42,390	10,896	14,341	25,237
0-19	744	832	1576	413	384	797
20-29	1,883	3,047	4,930	1,461	1,690	3,151
30-39	2,075	3,358	5,433	1,484	1,734	3,218
40-49	2,532	3,994	6,526	1,499	1,996	3,495
50-59	2,703	3,722	6,425	1,789	2,434	4,223
60-69	1,963	2,012	3,975	1,523	1,546	3,069
70-79	1,778	1,890	3,668	1,092	1,063	2,155
80+	2973	6,884	9,857	1,635	3,494	5,129
Percentage of confirmed positive cases in each age group with unknown trajectory						
	Men	Women	Total	Men	Women	Total
Total	31	31	27	38	40	39
0-19	29	26	27	46	40	44
20-29	31	24	24	49	37	43
30-39	28	21	24	44	41	42
40-49	28	21	24	40	43	42
50-59	28	21	30	37	42	40
60-69	30	29	39	33	36	35
70-79	35	42	46	27	33	31
80+	36	50	31	31	41	39

Source: [*12*].

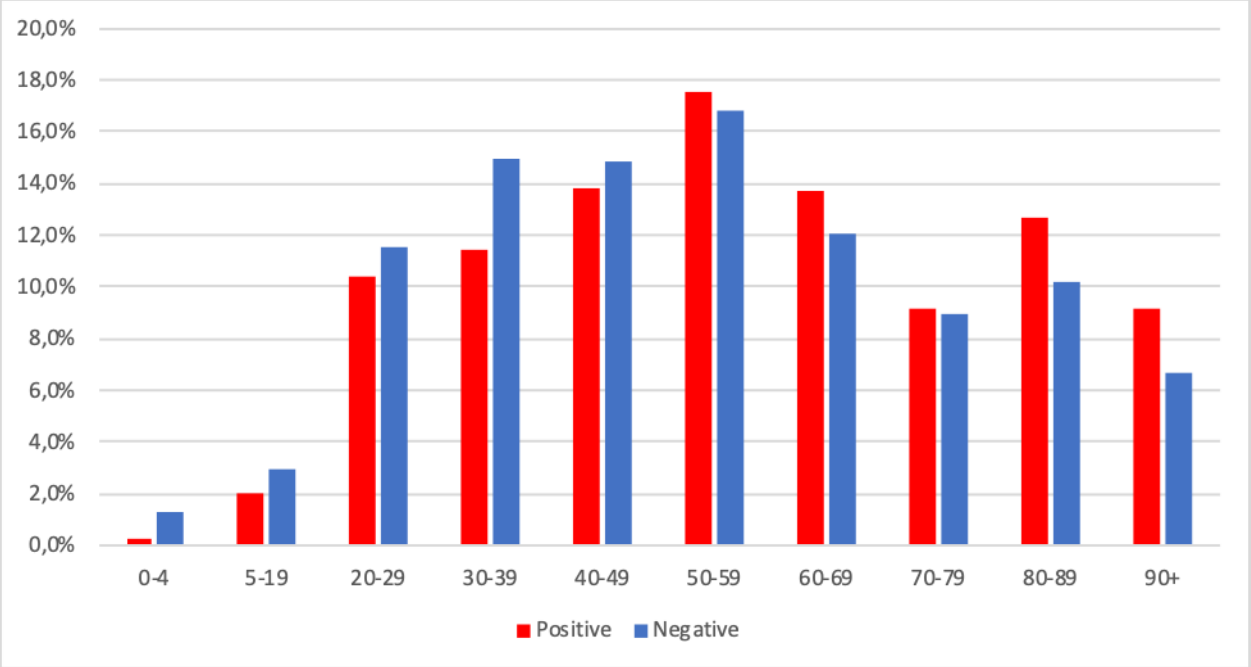
ANNEX Table 3. Ratios of COVID-19 confirmed positive cases, deaths and hospitalizations per 100,000 people, by age group and province, as of May 24

Age group	Québec[1]	Ontario[2,3]	B-C[2,4]	Atlantic[3]	Prairies[3]
			Cases		
Total	565	173	49	59	113
0-19	185	26	7	27	59
20-39	549	157	48	60	132
40-59	625	200	63	60	159
60-79	441	178	50	61	80
80+	2555	759	139	160	143
			Deaths		
Total	48	14	3	2	2
0-19	0	0	0	0	0
20-39	0	0	0	0	0
40-59	4	2	0	0	0
60-79	53	18	4	3	3
80+	751	216	47	30	35
			Hospitalizations		
Total	46	22	10	2	4
0-19	3	1	0	0	1
20-39	12	5	3	0	2
40-59	31	19	9	0	5
60-79	76	43	20	3	10
80+	372	149	47	30	23

Sources:
[1]INSPQ (https://www.inspq.qc.ca/covid-19/donnees)
[2] Ontario Health (https://www.publichealthontario.ca/en/data-and-analysis/infectious-disease/covid-19-data-surveillance/covid-19-data-tool)
[3] Statistics Canada, Table 13-10-0781-01 (https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1310078101)
[4] British Columbia Center for Disease Control (http://www.bccdc.ca/health-info/diseases-conditions/covid-19/data)

Notes: The individual-level file compiled by Statistics Canada from information supplied by PHAC groups provinces in three regions: Ontario; Prairies and Northwest Territories; British Columbia and Yukon; Atlantic provinces. Hospitalizations include cases that required admission to intensive care.

ANNEX Figure 1. Age distribution of COVID-19 confirmed positive and negative cases as of April 30: Ontario



Source: Chung H, Fung K, Ferreira-Legere LE, et al. COVID-19 Laboratory Testing in Ontario: Patterns of Testing and Characteristics of Individuals Tested, as of April 30, 2020. Ottawa: ICES. Accessed online at: https://www.ices.on.ca/Publications/Atlases-and-Reports/2020/COVID-19-Laboratory-Testing-in-Ontario

ANNEX Table 4a. Number of COVID-19 confirmed positive cases who recovered or died, deaths and hospitalizations per 100,000 people, by age group and province, as of May 24 in Québec

	RECOVERED		DIED	
	Men	Women	Men	Women
Percentage of confirmed positive cases who recovered / died				
Total	28	28	11	8
0-19	38	42	0	0
20-29	34	38	0	0
30-39	34	37	0	0
40-49	37	38	0	0
50-59	36	40	1	1
60-69	31	34	7	5
70-79	17	17	22	16
80+	7	7	39	23
Percentage of recovered / died cases who were hospitalized (including ICU)				
Total	11	7	23	20
0-19	3	3	0	0
20-29	3	2	0	0
30-39	4	2	0	0
40-49	7	2	0	0
50-59	9	6	46	29
60-69	17	13	29	28
70-79	35	27	28	30
80+	37	28	20	18
Percentage of recovered / died cases who were admitted to ICU				
Total	3	1	21	2
0-19	1	1	0	0
20-29	1	1	0	0
30-39	1	0.2	0	0
40-49	2	0.5	0	0
50-59	2	1	19	6
60-69	5	3	10	10
70-79	10	4	8	4
80+	2	1	3	2

Source: Our calculations from [*12*].

ANNEX Table 4b. Number of COVID-19 confirmed positive cases who recovered or died, deaths and hospitalizations per 100,000 people, by age group and province, as of May 24 in Ontario

	RECOVERED		DIED	
	Men	Women	Men	Women
Percentage of confirmed positive cases who recovered or died				
Total	41	41	9	8
0-19	44	51	0	0
20-29	42	54	0	0
30-39	48	50	0	0
40-49	50	47	0	0
50-59	48	47	2	1
60-69	43	46	7	4
70-79	36	38	21	13
80+	19	22	34	25
Percentage of recovered / died cases who were hospitalized (including ICU)				
Total	15	9	44	32
0-19	2	3	0	0
20-29	4	2	0	0
30-39	7	4	0	0
40-49	9	6	0	0
50-59	17	9	59	65
60-69	22	15	58	55
70-79	37	28	52	42
80+	29	14	36	28
Percentage of recovered / died cases who were admitted to ICU				
Total	3	1	16	7
0-19	0	0	0	0
20-29	0.3	0.6	0	0
30-39	1	0.5	0	0
40-49	2	1	0	0
50-59	5	2	44	57
60-69	7	2	38	27
70-79	5	5	24	12
80+	2	0.4	4	3

Source: Our calculations from [*12*].