

## QUICK EPIDEMIOLOGICAL SUMMARY

# Hospitalizations and Deaths among COVID-19 Cases in Ontario by Age: Waves 1, 2, 3, 4 and 5

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## Purpose

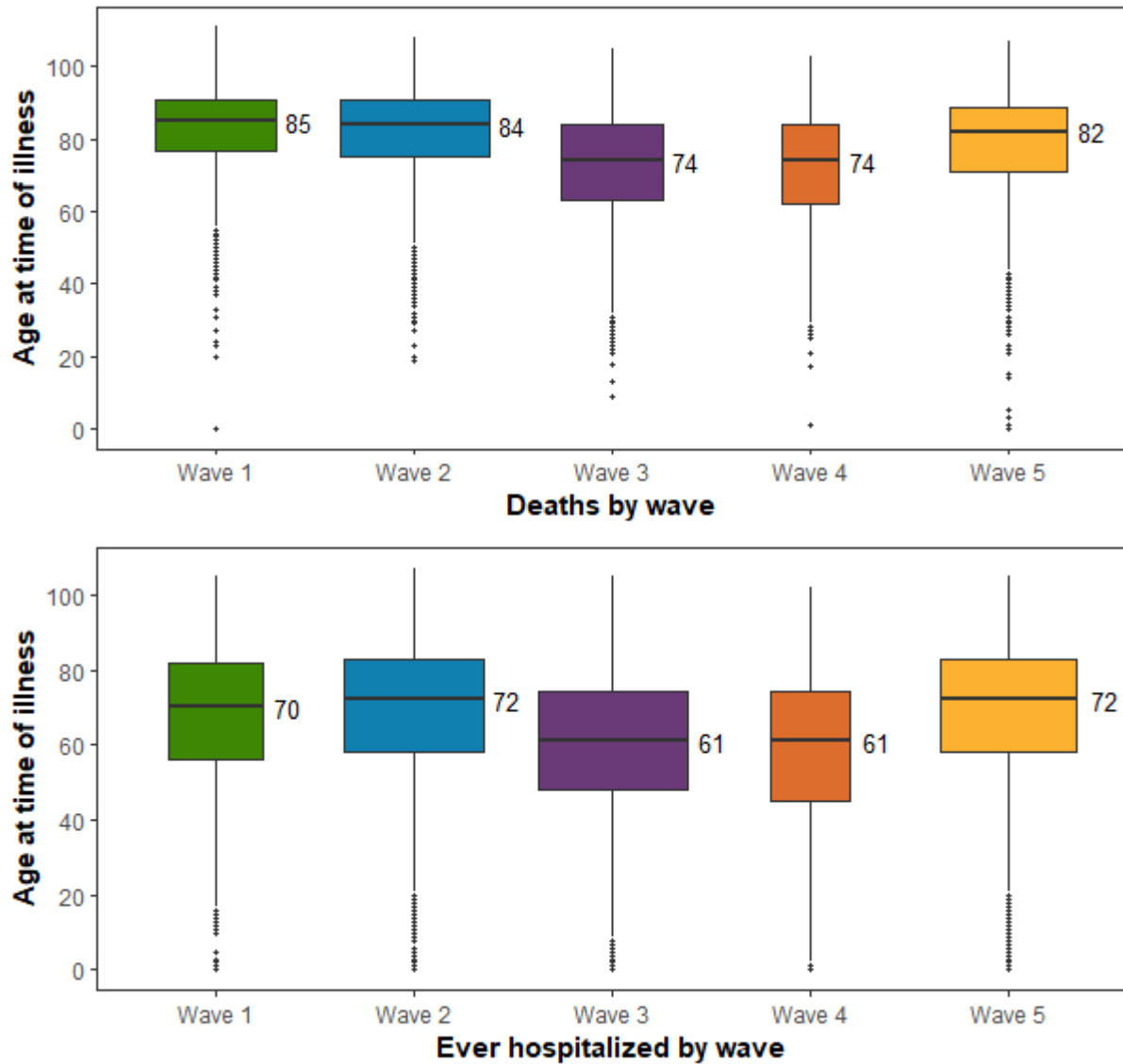
This brief report presents information on COVID-19 cases with a focus on severe outcomes. It examines differences over time and between the various waves. For the purposes of this analysis severe outcomes are defined as COVID-19 cases who were ever hospitalized or died. For more information on severe outcomes among COVID-19 cases by wave, refer to the [Hospitalizations and Deaths among COVID-19 cases in Ontario: Waves 1, 2, 3 and 4](#)<sup>1</sup> brief report and the weekly [COVID-19 Cases with Severe Outcomes](#)<sup>2</sup> report.

## Summary

- The lowest median ages for cases ever hospitalized (age 61) and for deaths (age 74) were seen in waves 3 and 4. In contrast, the highest median age for cases ever hospitalized was seen in waves 2 and 5 (age 72) and the highest median age of death was seen in wave 1 (age 85).
- Individuals aged 80 years and older had rates of severe outcomes notably higher than all other age groups throughout waves 1 through 5 of the pandemic. The hospitalization rate was 18 times higher and the death rate was 354 times higher among those aged 80 years and older compared to 20–39 years old. On the other hand, individuals 19 years old and younger were the only age group with rates of severe outcomes lower than 20–39 year olds consistently over all five waves of the pandemic.
- Estimated case fatality adjusted for censoring was highest for the 80 years and older age group (15.3% overall) across each of the first five waves of the pandemic and lowest for the 19 and under age group (<0.1% overall).

# Results

Figure 1. Age distribution of COVID-19 hospitalizations and deaths by wave: Ontario, February 26, 2020 to February 28, 2022



**Notes:** The median age at time of illness for each of the waves is indicated in the graph for each variable. The width of each box is proportionate to the number of cases associated with each wave for each variable. Dots indicate cases that are more than one and a half times the height of the box from either end (outliers).

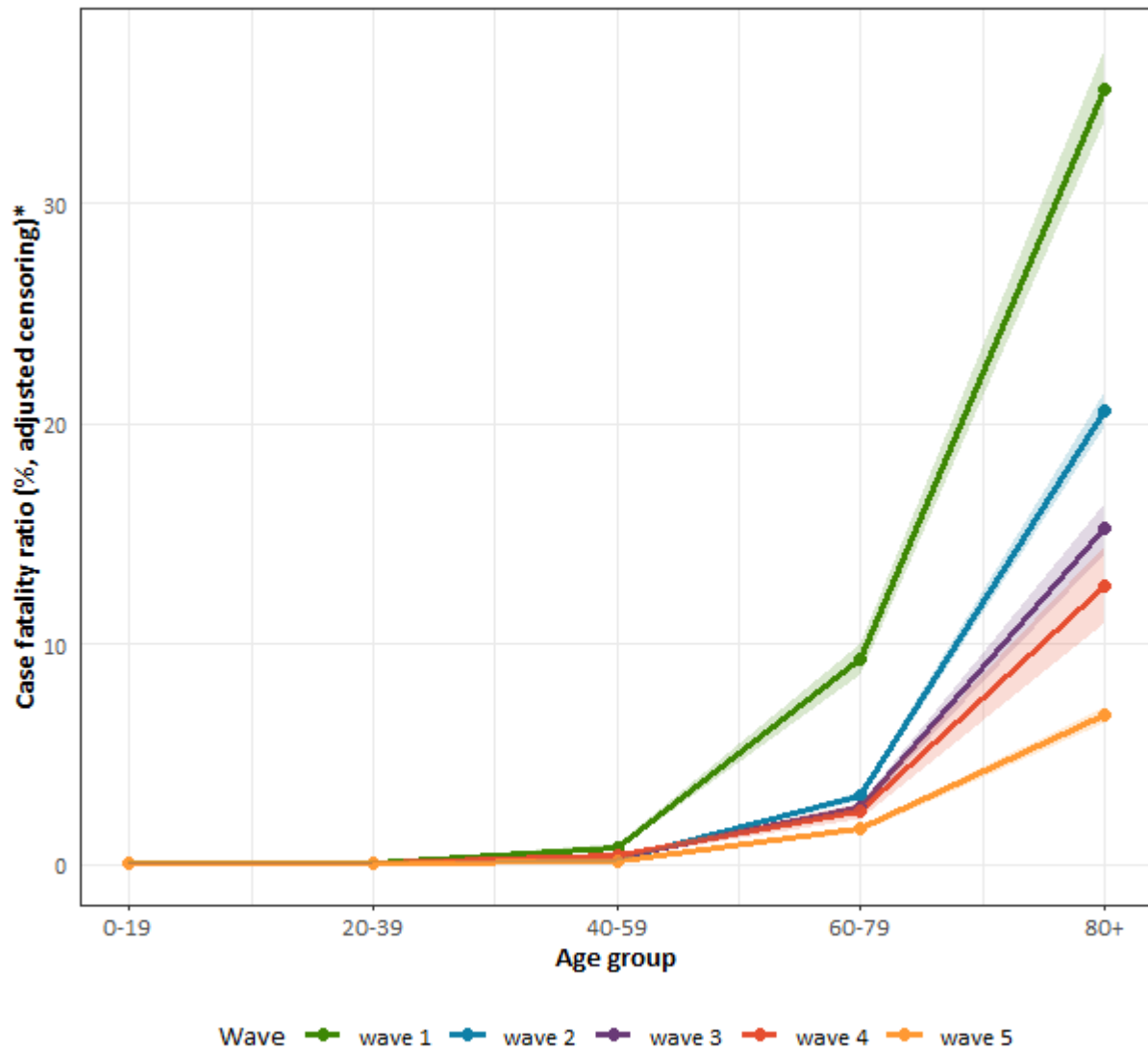
**Table 1. Risk for COVID-19 hospitalizations and deaths by age group compared to 20–39 years old: Ontario, February 26, 2020 to February 28, 2022**

Outcomes	<20 years old	20–39 years old	40–59 years old	60–79 years old	80+ years old
All waves					
Ever hospitalized	<1x	Reference Group	3x	6x	18x
Deaths	<1x	Reference Group	7x	46x	354x
Wave 1					
Ever hospitalized	<1x	Reference Group	3x	7x	27x
Deaths	<1x	Reference Group	11x	90x	1,016x
Wave 2					
Ever hospitalized	<1x	Reference Group	3x	8x	29x
Deaths	<1x	Reference Group	9x	91x	869x
Wave 3					
Ever hospitalized	<1x	Reference Group	2x	4x	8x
Deaths	<1x	Reference Group	7x	28x	96x
Wave 4					
Ever hospitalized	<1x	Reference Group	2x	3x	7x
Deaths	<1x	Reference Group	5x	16x	55x
Wave 5					
Ever hospitalized	1x	Reference Group	2x	9x	31x
Deaths	<1x	Reference Group	7x	49x	349x

**Notes:** All rates are relative to the 20-39 age group, which has the largest cumulative number of COVID-19 cases compared to other age groups. A rate of <1x indicates lower rates compared to the reference group and a rate of 1x indicates no difference.

Sample interpretation: In wave 1, compared to the 20-39 year age group, the rate of death was 11 times higher in the 40-59 year age group.

Figure 2. COVID-19 case fatality by age group: Ontario, February 26, 2020 to February 28, 2022



**Note:** Shaded regions represent 95% confidence intervals.

\*Case fatality ratio estimates are presented at 30 days since symptom onset date.

**Data Source:** CCM

## Methods: Case fatality ratio (CFR)

- The case fatality ratio is the proportion of identified cases that succumb to the infection within a specified time. For more information regarding CFR, refer to [COVID-19 Case Fatality, Case Identification, and Attack Rates in Ontario](#)<sup>3</sup>.
- Estimates of case fatality adjusted for censoring were calculated from Kaplan-Meier cumulative hazard estimates with days since symptom onset as the time scale. Cases were censored at their death date or after 30 days since symptom onset.
  - For cases with missing symptom onset date (N=398,583; 35.8%), date was imputed using a Generalized Additive Mixed Model based on case reported date, sex, and a random intercept for public health unit.
  - Fatal cases whose death date preceded their reported symptom onset date (N=111), or fatal cases who were missing a death date (N=15), were censored at their symptom onset date.

## Data source and Caveats

- The data for this report were based on information successfully extracted from the Public Health Case and Contact Management Solution (CCM) for all PHUs by PHO as of:
  - **May 2, 2022 at 1 p.m.** for cases reported from December 1, 2021 onwards;
  - **May 2, 2022 at 9 a.m.** for cases reported from January 1, 2021 to November 30, 2021
  - **April 29, 2022 at 9 a.m.** for cases reported up to December 31, 2020.
- Ontario population estimate data were sourced from Statistics Canada. Population estimates 2001-2020: Table 1 annual population estimates by age and sex for July 1, 2001 to 2020, health regions, Ontario [unpublished data table]. Ottawa, ON: Government of Canada; 2021 [received April 22, 2021].
- For information on COVID-19 data, refer to the [Ontario COVID-19 Data Tool](#)<sup>4</sup>.
- COVID-19 waves refer to COVID-19 cases reported week using the following dates:
  - Wave 1: February 26, 2020 to August 31, 2020 (length of wave 188 days)
  - Wave 2: September 1, 2020 to February 28, 2021 (length of wave 181 days)
  - Wave 3: March 1, 2021 to July 31, 2021 (length of wave 153 days)
  - Wave 4: August 1, 2021 to December 14, 2021 (length of wave 136 days)
  - Wave 5: December 15, 2021 to February 28, 2022 (length of wave 76 days)

## References

1. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Hospitalizations and deaths among COVID-19 cases in Ontario by wave: waves 1, 2, 3 and 4 [Internet]. Toronto, ON: Queen's Printer for Ontario; 2022 [cited 2022 May 13]. Available from: [https://www.publichealthontario.ca/-/media/Documents/nCoV/epi/2022/04/covid-19-hospitalizations-deaths-ontario-quick-epi-summary.pdf?sc\\_lang=en](https://www.publichealthontario.ca/-/media/Documents/nCoV/epi/2022/04/covid-19-hospitalizations-deaths-ontario-quick-epi-summary.pdf?sc_lang=en)
2. Ontario Agency for Health Protection and Promotion (Public Health Ontario). COVID-19 cases with severe outcomes: December 12, 2021 to April 30, 2022 [Internet]. Toronto, ON: Queen's Printer for Ontario; 2022 [cited 2022 May 13]. Available from: [https://www.publichealthontario.ca/-/media/Documents/nCoV/epi/covid-19-cases-severe-outcomes-epi-summary.pdf?sc\\_lang=en](https://www.publichealthontario.ca/-/media/Documents/nCoV/epi/covid-19-cases-severe-outcomes-epi-summary.pdf?sc_lang=en)
3. Ontario Agency for Health Protection and Promotion (Public Health Ontario). COVID-19 case fatality, case identification, and attack rates in Ontario [Internet]. Toronto, ON: Queen's Printer for Ontario; 2020 [cited 2022 May 13]. Available from: [https://www.publichealthontario.ca/-/media/documents/ncov/epi/2020/06/covid19-epi-case-identification-age-only-template.pdf?sc\\_lang=en](https://www.publichealthontario.ca/-/media/documents/ncov/epi/2020/06/covid19-epi-case-identification-age-only-template.pdf?sc_lang=en)
4. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Ontario COVID-19 data tool [Internet]. Toronto, ON: Queen's Printer for Ontario; 2022 [cited 2022 May 13]. Available from: <https://www.publichealthontario.ca/en/data-and-analysis/infectious-disease/covid-19-data-surveillance/covid-19-data-tool?tab=summary>

## Citation

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