

Expert Report

Due to its relatively young population, Alberta also has a relatively low overall death rate of 570/100,000 population (last reported 2014).¹ This means every year approximately 1 in 175 persons die in Alberta. As of April 27, 2021, 2074 COVID-related deaths were recorded with a population rate of 46.9/100,000 (Figure 1). In other words, 1 in 2132 persons died in connection with COVID-19.

Figure 1. <https://www.alberta.ca/stats/covid-19-alberta-statistics.htm#severe-outcomes>,

Assessed April 27.04.2021

Table 3. Total Hospitalizations, ICU admissions and deaths (ever) among COVID-19 cases in Alberta by age group

Age Group	Cases		Hospitalized		ICU			Deaths		
	Count	Count	Case rate	Pop. rate	Count	Case rate	Pop. rate	Count	Case rate	Pop. rate
Total	183301	7601	4.1	171.9	1311	0.7	29.6	2074	1.1	46.9
Under 1 year	1039	49	4.7	94.7	13	1.3	25.1	0	0.0	0.0
1-4 years	6129	28	0.5	12.9	5	0.1	2.3	0	0.0	0.0
5-9 years	8704	23	0.3	8.3	11	0.1	4.0	0	0.0	0.0
10-19 years	23801	111	0.5	20.8	15	0.1	2.8	0	0.0	0.0
20-29 years	33806	393	1.2	66.4	43	0.1	7.3	10	0.0	1.7
30-39 years	34578	656	1.9	91.7	76	0.2	10.6	10	0.0	1.4
40-49 years	28774	838	2.9	137.7	172	0.6	28.3	32	0.1	5.3
50-59 years	21680	1172	5.4	212.8	276	1.3	50.1	79	0.4	14.3
60-69 years	12876	1341	10.4	282.7	370	2.9	78.0	229	1.8	48.3
70-79 years	5862	1308	22.3	501.9	251	4.3	96.3	419	7.1	160.8
80+ years	5960	1679	28.2	1197.0	78	1.3	55.6	1294	21.7	922.5
Unknown	92	3	3.3	NA	1	1.1	NA	1	1.1	NA

Note:

Based on total hospitalizations and ICU admissions ever.

Row percent is out of the number of cases in each age group.

Each ICU admission is also included in the total number of hospitalization

Case rate (per 100 cases)

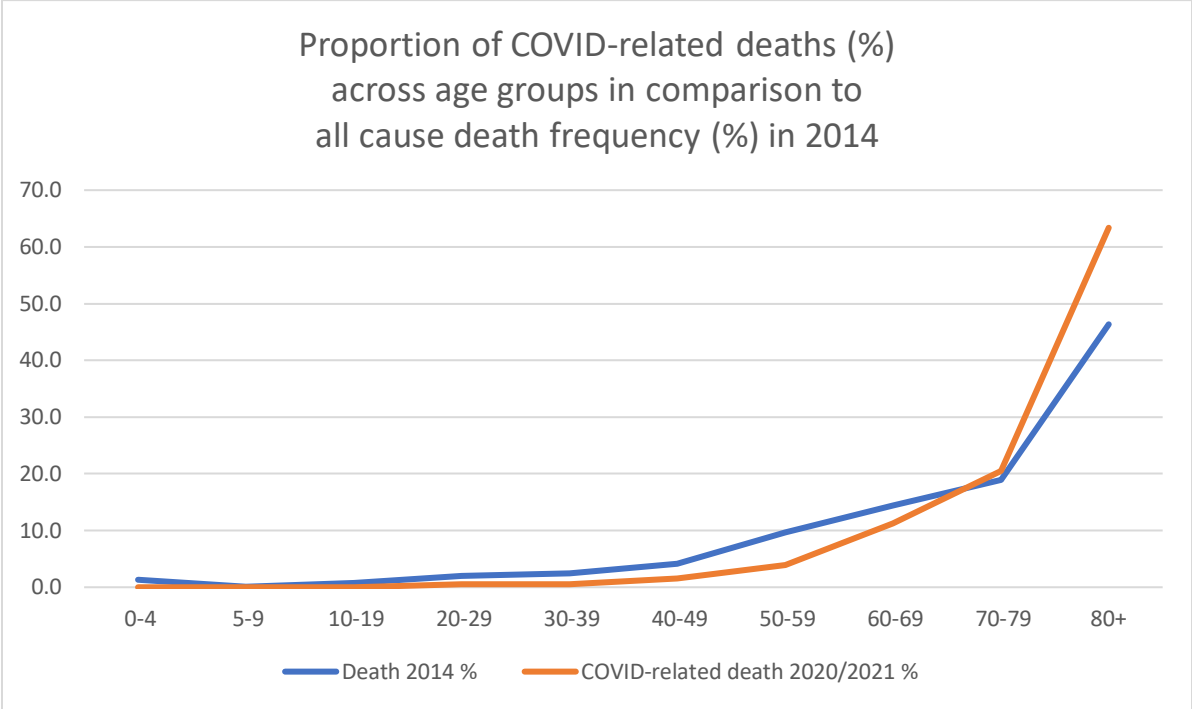
Population rate (per 100,000 population)

There is almost complete overlap in the proportion of deaths across different age categories between COVID-related deaths and death from all causes (Figure 2). This suggests that COVID-

¹ <https://open.alberta.ca/interact/vital-statistics> 14-Deaths by Sex and Age assessed 24.04.2021

related deaths have not significantly affected the mortality in the 0-69 years age category, but caused some premature mortality in the 70+ years category.

Figure 2



COVID-related deaths show an enormously unequal age distribution. In Alberta, 3% of the population (people 80 years and older) account for 62% of COVID-related deaths (1294/2073, Figure 3).

Figure 3. <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1710006001>, assessed 27.04.2021.



The COVID-19 case fatality rate (percentage of those with COVID-19 that die) between age groups differs by orders of magnitude (0.083% for 0-59 yrs combined versus 21.7% for 80+ yrs).

The group of 0-59-year-olds accounting, for 80% of the total Alberta population, is of minimal risk with case fatality rate of 0.083%. This is in line with WHO Bulletin data of 0.05% for people <70 years based on seroprevalence studies.² The risk for this age group lies within normal life activities.³

The group of the 60-69-year-olds, accounting for 11% of the total Alberta population, is at low risk with a case fatality rate of 1.8%. To put this into perspective, as a pathologist I provide risk assessment for cancers, particularly, endometrial cancers. Approximately half of the 600 women in Alberta annually diagnosed with endometrial cancer at a mean age of 65 years have a low risk of 1.5% risk of dying of the cancer within 5 years due to their disease being low-grade and low

² [Ref Ioannidis J.P.A. The infection fatality rate of COVID-19 inferred from seroprevalence data). [Bulletin of the World Health Organization \(who.int\)](https://www.who.int/bulletin), assessed 29.04.2021

³ Ref: Ioannidis JPA, Axfors C, Contopoulos-Ioannidis DG. Population-level COVID-19 mortality risk for non-elderly individuals overall and for non-elderly individuals without underlying diseases in pandemic epicenters. *Environ Res.* 2020 Sep;188:109890. doi: 10.1016/j.envres.2020.109890. Epub 2020 Jul 1. PMID:32846654; PMCID:PMC7327471.

stage (stage IA). At this low risk, adjuvant treatment in the form of chemo- or radiotherapy outweigh any potential benefit.

The group of the 70–79-year-olds, accounting for 6% of the total Alberta population, is at intermediate risk with a case fatality rate of 7.1%.

The group of 80+ year-olds, accounting for 3% of total Alberta population, is at the highest risk with a case fatality rate of 21.7%. Many deaths occurred in nursing home residents. However, to put this into perspective, the yearly mortality rate in nursing homes is 31.8% with a median survival of 2.2 years according to a study from Norway.⁴ About 12% of total deaths in this age group since the advent of COVID-19 have been linked to COVID. The rest in this group died of other causes, such as ischemic heart or cerebral disease, cancer, or organoid dementia.

It is important to understand that patients within the 80+ years age group are very often afflicted with 1 or more comorbidities and even at post-mortem it is often challenging to attribute a single underlying cause of death.⁵ A German autopsy study addressed this problem by categorizing COVID-related deaths into: “category 1: definite COVID-19 death; category 2: probable COVID-19 death; category 3: possible COVID-19 death with an equal alternative cause of death; category 4: SARSCoV-2 detection with cause of death not associated to COVID-19”.⁶ The

⁴ Vossius C, Selbæk G, Šaltytė Benth J, Bergh S. Mortality in nursing home residents: A longitudinal study over three years. *PLoS One*. 2018 Sep 18;13(9):e0203480. doi: 10.1371/journal.pone.0203480. PMID: 30226850; PMCID:PMC6143238.

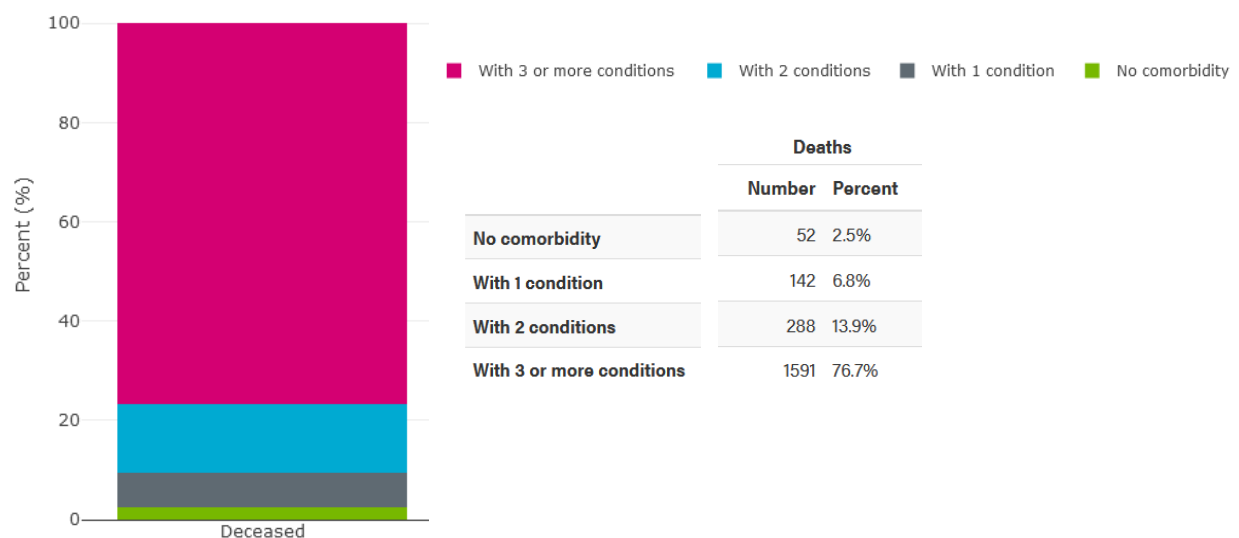
⁵ Wilkins K et al. Multiple causes of death

<https://www150.statcan.gc.ca/n1/en/pub/82-003-x/1997002/article/3235-eng.pdf?st=u0poBUE2>

⁶ Edler C, Schröder AS, Aepfelbacher M, Fitzek A, Heinemann A, Heinrich F, Klein A, Langenwalder F, Lütgehetmann M, Meißner K, Püschel K, Schädler J, Steurer S, Mushumba H, Sperhake JP. Dying with SARS-CoV-2 infection-an autopsy study of the first consecutive 80 cases in Hamburg, Germany. *Int J Legal Med*. 2020 Jul;134(4):1275-1284. doi: 10.1007/s00414-020-02317-w. Epub 2020 Jun 4. Erratum in: *Int J Legal Med*. 2020 Sep;134(5):1977. PMID: 32500199; PMCID: PMC7271136.

distribution of COVID-related deaths into these categories for Alberta remains unknown.⁷ In other words, we do not know in what proportion SARSCoV-2 definitively caused death, by, for example, leading to pneumonia or acute respiratory distress syndrome, contributed to death such as in the scenario where an important pre-existing condition triggers a severe course of COVID-19, or SARSCoV-2 was a mere bystander.⁸ However, what we know is that 97.5% of COVID-related deaths occurred in the context of comorbidities. Conversely, only 2.5% of deaths occurred in previously healthy people (Figure 4).

Figure 4 <https://www.alberta.ca/stats/covid-19-alberta-statistics.htm#comorbidities>, assessed 29.04.2021



In summary, age is the most important risk factor for death related to COVID-19. Older people are more likely afflicted with comorbidities, which contribute to COVID-related deaths in almost all cases.

⁷ Lamontagne F, Rowan KM, Gyatt G. Integrating research into clinical practice: challenges and solutions for Canada. CMAJ 2021. January 25;193:E127-131. doi: 10.1503/cmaj.202397.

⁸ Howdon et al. Death certificate data: COVID-19 as the underlying cause of death - The Centre for Evidence-Based Medicine (cebm.net). <https://www.cebm.net/covid-19/death-certificate-data-covid-19-as-the-underlying-cause-of-death/>