

Research report

**Canadian Individual Life Experience:
Interim Study to 2020Q2**

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1 Executive Summary

This is an interim study of the mortality experience of individual insurance policies. It uses data in the same form as for the annual mortality study, but rather than including the full policy year from the anniversary in 2019 to the anniversary in 2020, experience is cut off at June 30, 2020 if the anniversary in 2020 is later in the year. Only four of the eight companies that submitted data for the last annual study were able to submit data for this interim study.

Overall, experience to June 30, 2020 suggests that the actual-to-expected ratio for the full year of experience will be similar to what was reported in the last annual mortality study.

The main reason for doing an interim study was to get an early indication of the impact of COVID-19 on mortality experience. Insurance companies report a higher prevalence of COVID-19 deaths than the population at large, but there are some mitigating factors. The exposure in the study has a significantly higher average age than the population. The average size of a COVID-19 death claim is less than the average for all deaths. There are many deaths for which a cause is not identified; it is possible that COVID-19 deaths are more likely to have that cause reported to the insurance company.

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3 Introduction

3.1 Purpose of study

This interim mortality study is an extension of the annual individual life insurance mortality study, which has a 70-year history. The purpose of this mortality study is to get an early indication of the impact of COVID-19 on insurance company experience and to assess the prevalence of COVID-19 deaths. The study was initially conceived as a quarterly study, but because of the way the pandemic has progressed it is unlikely that there will be subsequent studies of a quarterly nature. Four companies have submitted data on an interim basis. That is, the data submitted cover experience from the policy anniversary in 2019 to the earlier of the anniversary in 2020 and June 30, 2020. Because the heaviest impact of COVID-19 was in the fourth quarter of 2020, this study will leave some questions unanswered.

3.2 Expectations for study

The request for data indicated that data were to be submitted on a cumulative basis. That is, any policy that would be included in one quarter should also appear in the next. The only change would be to indicate a termination, if one had occurred.

Data for the annual study have always been submitted on a policy-year basis. That is, the exposure for a particular policy begins on the policy anniversary in the prior year and it ends the day before the next anniversary. To keep the task simpler for contributing companies, this study is also on a policy-year basis. The only difference is that exposure may stop at a quarter end rather than at a policy anniversary if the quarter end comes earlier.

Policy-year studies were natural many years ago when valuations were performed on grouped data rather than seriatim as is the case now. Policy-year studies are less intuitive than calendar-year studies, and when cutting off the study at a calendar quarter, policy-year studies are more complex and much more difficult to visualize.

Aside from the complexity, the main disadvantage of a policy-year study compared to a calendar-year study is that policy-year data are less current than calendar-year data. With a policy-year study, if the anniversary in the current year comes before the designated quarter end, some experience is known at the time but excluded from the study.

Table 1 compares a policy-year study with a calendar-year study, assuming a uniform distribution of issues and terminations, and a stationary population.¹ (In the table, *Q0* means the study period ends on December 31 of the prior year, *Q1* means the study

¹ In a stationary population, terminations are exactly offset by new entrants; there is no growth in the population, and the distribution stays the same each year. In fact our “population”, the standard individual business of the contributing companies, is growing. Therefore, the exposure will shift some to later in the year. As will be observed in later tables, deaths are not uniform throughout the year, but are slightly more prevalent in the first quarter.

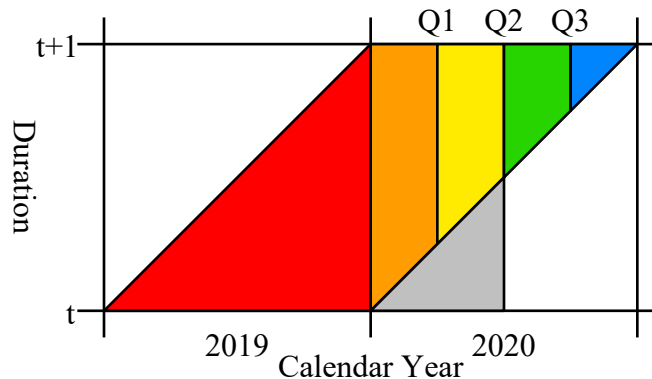
ends on March 31 of the current year, etc. The exposure for a policy always begins on the policy anniversary in the prior year.)

Quarter end	Policy year study		Calendar year study	
	Proportion of annual study	Proportion in current year	Proportion of annual study	Proportion in current year
Q0	1/2	0	-	-
Q1	23/32	7/23	1/4	1
Q2	7/8	3/7	1/2	1
Q3	31/32	15/31	3/4	1
Q4	1	1/2	1	1

With a policy-year study, most of the information is already in by Q2, and there is very little additional information after Q3.

To further clarify, consider two cases for the Q2 study: Case J has its anniversary on January 15, and Case D on December 15. Case J will have an entire policy year in the study, running from January 15, 2019 to January 14, 2020. Case D will have about 6.5 months in the study, running from December 15, 2019 to June 30, 2020.

For those who relate better to pictures, the following diagram portrays the period of exposure included in the study.



The horizontal axis represents the time on the calendar, and the vertical axis represents the duration from issue. The exposure for duration t in the next annual study can be thought of as the coloured parallelogram. If the quarterly study were cut off at Q0 (the beginning of 2020), it would be represented by the red triangle. The Q1 study (cut-off on March 31, 2020) is represented by the red triangle plus the orange trapezoid. The Q2 study, which is covered in this document, is represented by the red, orange and yellow shapes. Note that each quarterly study includes the previous quarterly studies; it is cumulative. The green and blue shapes are added for Q3 and the full year, respectively. The grey triangle represents the exposure that was known at the time that the

submission to the Q2 study was created, but was excluded because it applies to the next policy year.

Note the data in the Q2 study are about 7/8 of the data in the full annual study.

3.3 Late reported deaths

In the interest of getting information to members sooner, the cut-off for the data was set only three months after the end of the quarter being studied. For the annual study some companies wait at least six months after the end of the previous calendar year before submitting data. Therefore, one expects more deaths that have been incurred but not reported for the quarterly study than for the annual study. The policy-year study has an advantage in this regard. Some policies will have passed the most recent anniversary some months before the designated quarter end, and therefore their reporting of claims will be more nearly complete. It seems unlikely that raw mortality rates will be under-reported by more than 1–2%, but further study may be needed.

3.4 Contributing companies

Only four of the eight companies in the annual study were able to contribute data for the 2020Q2 study, but they are four of the larger companies, representing 73% of the last annual study by amount. The Canadian Institute of Actuaries (CIA) thanks those companies for their work in preparing and submitting their data. Table 2 shows the proportion of the Q2 data for each company, measured by face amount exposed.

Table 2. Contributing companies. Distribution of exposure by amount	
Company	2020Q2
Canada Life	30.9%
Industrial-Alliance	17.2%
Manulife	28.7%
Sun Life	23.1%

3.5 COVID-19 impact

Unfortunately one of the four companies was not able to submit cause of death, and the three that did do not have a cause for all deaths. One must recognize that cause of death is not nearly as objective as the fact of death, and that the assignment of a cause of death is subject to judgement. There is also the problem that 42% of deaths for which a cause is given (and 33% of death claims) list the cause as “Unknown”.² In any case, this study is limited to using data as submitted and signed-off by the companies.

² That is, unknown to the insurance company, probably because it was not disclosed in the proof of death. It is likely that a cause of death other than “Unknown” was reported to the relevant authorities.

3.6 Quarterly development of experience

Each quarterly or annual submission can be used to infer the prior quarters because each record has the date of issue and, if there is a termination, the date of termination. Any record that has a termination date after the date of the quarter to be inferred can be marked as in-force, and the termination date blanked out.

That process was used on the 2018 and 2019 data³ to infer what quarterly studies would have looked like. This allows a form of back-testing. It is important to have a sense of how exposure and deaths were distributed by quarter in the past before forming a judgement on whether the observations of 2020 are noteworthy or routine. The results are shown in Table 3 for the 2017–2018 policy year, and in Table 4 for the 2018–2019 policy year. It is important to note that the quarters shown are cumulative. For example, all of the exposure and deaths shown for Q0 also appear in Q1; Q1 is increased by the exposure and deaths attributed to the first quarter of the current calendar year, but not beyond the anniversary in the year. The rightmost column shows the theoretical proportion of the annual study that would appear to the end of each quarter; these numbers are the same as appeared in column of Table 1 labelled “Proportion of annual study”, under “Policy-year study”.

	Expected on CIA9704				Ratio to all of policy year				
	Act/Exp		Std Dev		Exposure		Deaths		Theoretical proportion
	Pols	Amt	Pols	Amt	Pols	Amt	Pols	Amt	
Q0	79.3%	67.6%	0.4%	1.6%	50.5%	49.9%	49.2%	48.0%	50.0%
Q1	83.7%	69.5%	0.3%	1.4%	72.2%	71.6%	73.8%	70.8%	71.9%
Q2	83.1%	69.9%	0.3%	1.3%	87.6%	87.2%	88.5%	86.8%	87.5%
Q3	82.7%	70.3%	0.3%	1.2%	97.1%	96.8%	97.2%	97.0%	96.9%
Q4	82.6%	70.2%	0.3%	1.2%	100.0%	100.0%	100.0%	100.0%	100.0%

	Expected on CIA9704				Ratio to all of policy year				
	Act/Exp		Std Dev		Exposure		Deaths		Theoretical proportion
	Pols	Amt	Pols	Amt	Pols	Amt	Pols	Amt	
Q0	79.0%	64.6%	0.4%	1.6%	50.6%	49.9%	51.0%	49.9%	50.0%
Q1	80.3%	65.7%	0.3%	1.3%	72.2%	71.6%	73.6%	72.8%	71.9%
Q2	80.1%	64.7%	0.3%	1.2%	87.6%	87.3%	88.7%	87.4%	87.5%
Q3	79.5%	64.4%	0.3%	1.1%	97.1%	96.9%	97.2%	96.7%	96.9%
Q4	79.4%	64.5%	0.3%	1.1%	100.0%	100.0%	100.0%	100.0%	100.0%

³ The data are drawn from the previously published annual studies and not only for the four companies that submitted data for this interim study.

4 Experience to 2020Q2

4.1 Experience for all causes

Table 5 shows the experience by quarter for 2020 on the same basis as Table 3 and Table 4, except that the full policy year is not yet known.

	Expected on CIA9704				Ratio to policy year up to Q2				Theoretical proportion
	Act/Exp		Std Dev		Exposure		Deaths		
	Pols	Amt	Pols	Amt	Pols	Amt	Pols	Amt	
Q0	76.4%	61.8%	0.4%	1.7%	57.8%	57.2%	55.4%	54.3%	57.1%
Q1	78.8%	64.2%	0.3%	1.5%	82.4%	82.1%	81.1%	81.2%	82.1%
Q2	80.4%	64.9%	0.3%	1.4%	100.0%	100.0%	100.0%	100.0%	100.0%

It appears that the overall mortality for the policy year 2019–2020 was running lower than for 2018–2019 for Q0 (61.8% vs 64.6%) and for Q1 (64.2% vs 65.7%). Then mortality increased significantly to bring the policy-year-to-Q2 experience close to that of 2018–2019 (64.9% vs 64.7%). More detailed tables, similar to those in the annual study, are included in the Appendix.

4.2 Experience by cause of death

The main reason for this interim study was to get an early look at the impact of COVID-19. Table 6 shows the deaths separately by cause. Obviously there were no COVID-19 deaths in prior studies, and therefore the deaths from that cause should be seen as excess deaths. The ratios shown in the last two columns (“Ratio to number identified” and “Ratio to amount identified”) are the count or amount of deaths by that cause compared to the total for which there is an identified cause⁴ (not “No code” or “Other/unknown”). The causes are sorted in order of the amount of death claims, except that “Other/unknown” and “No code” come last.

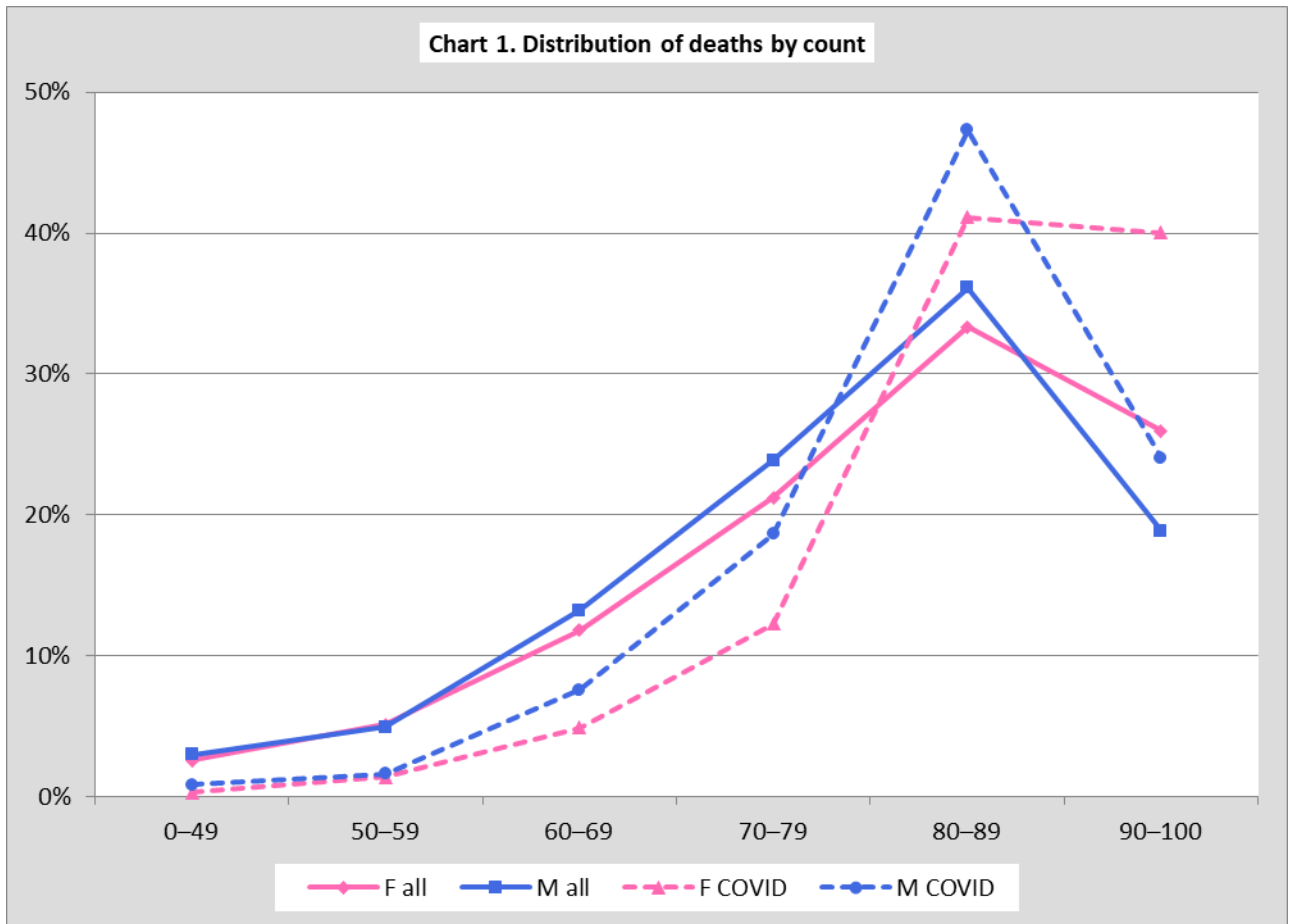
⁴ The CIA study distinguishes 14 causes of death. There is also a code for “Other” (the cause of death is known but does not reasonably fit within any of the 14) and for “Unknown” (the insurer was not notified of the cause of death). Deaths for which the cause of death is left blank are considered “No code”.

Cause of death	Number of deaths	Death Claims k\$	Ratio to number identified	Ratio to amount identified
Malignant neoplasms	8,772	558,844	45.9%	48.5%
Diseases of the heart	4,200	248,959	22.0%	21.6%
Cerebrovascular	1,393	62,481	7.3%	5.4%
Accidents	640	58,734	3.3%	5.1%
Influenza and pneumonia	1,362	57,825	7.1%	5.0%
Alzheimer's	809	40,977	4.2%	3.6%
Intentional self-harm	300	32,995	1.6%	2.9%
COVID-19	737	26,194	3.9%	2.3%
Chronic lower respiratory	311	24,745	1.6%	2.1%
Liver disease and cirrhosis	213	16,067	1.1%	1.4%
Nephritis, etc	215	14,718	1.1%	1.3%
Diabetes mellitus	130	4,208	0.7%	0.4%
Assault	26	4,140	0.1%	0.4%
Unintended drug overdose	6	650	0.0%	0.1%
Other/unknown	13,725	577,785	71.8%	50.2%
No code	22,665	928,183	118.6%	80.6%
Total	55,504	2,657,505	290.4%	230.8%

COVID-19 deaths, at 3.9% of those with a cause reported, seem low, because COVID-19 deaths were around 6% of the total in Canada for 2020. However, because only about 18% of deaths in the study are expected in the second quarter of 2020, and because there were very few COVID-19 deaths in the first quarter, our COVID-19 proportion is likely higher than that of the population. See Table 7 and Table 8 below.

The COVID-19 deaths are only 2.3% of the total by amount. This implies that COVID-19 deaths are on average considerably smaller than for other causes. That seems reasonable since the majority of COVID-19 deaths are at high ages, for which the amounts tend to be smaller.

Chart 1 shows the distribution of deaths by count in various age groups. As expected, we see that COVID-19 deaths tend to be older than all deaths combined. The average age at death for COVID-19 is 86.0 for females and 82.9 for males. The average age for all deaths is 79.9 for females and 78.5 for males.



The distribution of COVID-19 deaths was also examined by duration from issue. The distribution was very similar to the distribution of all deaths by duration. In both cases and for both sexes, about 2/3 of deaths by count are after the 30th policy anniversary.⁵ The proportion by amount is much less: about 25% for males and 40% for females.

Because COVID-19 deaths are mostly in the second quarter of 2020, it is helpful to look at causes of death by quarter. Table 7 shows the proportion of deaths by cause in each quarter⁶ from 2019Q2 to 2020Q2. The denominator in the calculation is the sum of all deaths for which a cause is identified and that cause is not COVID-19. (This is done to facilitate a comparison of the proportion across all quarters. Note that the sum is greater than 100% for 2020Q1 and 2020Q2.) Deaths are assigned to the quarter in

⁵ The proportion of COVID-19 deaths after the 30th anniversary to all COVID-19 deaths is 63% for females and 69% for males. The corresponding numbers for all deaths are 61% for females and 72% for males.

⁶ The deaths included are those reported in the 2020Q2 file, which covers anniversaries in 2019 to the earlier of anniversary in 2020 and June 30, 2020. There would also be deaths in the quarter which have not yet been reported because they follow an anniversary in 2020. If deaths were uniformly distributed throughout the policy year, and anniversaries uniformly distributed throughout the calendar year, for the annual study we would expect 7/32 of deaths in 2019Q4 and 2020Q1, 5/32 in 2019Q3 and 2020Q2, and 3/32 in 2019Q2. But because we have no experience after June 30, 2020, we lack about 1/8 of the deaths that will appear in the annual study for 2019–2020.

which they occur. In Table 7, the calculation is based on the count of deaths. Table 8 is based on the amount of death claims. One note of caution about Table 8: because most cells have fewer than 100 deaths, statistical fluctuation in the proportions may mask the true trend. Of course, the same note applies to Table 7 but to a lesser extent. The tables show only identified causes. COVID-19 is shown last.

Table 7. Proportion of deaths by cause and quarter to known causes except COVID-19, for the policy year 2019 to 2020Q2					
Cause of death	2019Q2	2019Q3	2019Q4	2020Q1	2020Q2
Malignant neoplasms	51.0%	50.1%	47.8%	44.7%	48.2%
Diseases of heart	19.8%	21.3%	22.8%	24.2%	24.3%
Cerebrovascular	7.5%	7.3%	8.2%	7.2%	7.6%
Influenza and pneumonia	7.1%	6.0%	6.8%	9.3%	6.7%
Alzheimer's	3.7%	3.7%	4.6%	4.9%	4.5%
Accidents	4.4%	4.6%	3.5%	3.1%	2.5%
Intentional self-harm	2.1%	1.7%	1.7%	1.3%	1.4%
Chronic lower respiratory	1.8%	1.5%	1.7%	1.7%	1.9%
Nephritis, etc	1.0%	1.4%	1.2%	1.1%	0.9%
Liver disease and cirrhosis	1.2%	1.2%	0.8%	1.3%	1.2%
Diabetes mellitus	0.4%	0.8%	0.7%	0.9%	0.6%
Assault	0.1%	0.2%	0.2%	0.1%	0.1%
Unintended drug overdose	0.1%	0.0%	0.0%	0.1%	0.0%
COVID-19	0.0%	0.0%	0.0%	0.5%	22.3%
Total	100.0%	100.0%	100.0%	100.5%	122.3%

Cause of death	2019Q2	2019Q3	2019Q4	2020Q1	2020Q2
Malignant neoplasms	53.3%	51.8%	51.0%	46.0%	47.6%
Diseases of heart	20.1%	19.9%	22.1%	24.5%	22.5%
Cerebrovascular	4.5%	4.5%	6.4%	5.5%	5.6%
Influenza and pneumonia	4.0%	3.7%	4.4%	5.6%	8.1%
Alzheimer's	2.5%	2.9%	3.8%	3.4%	4.9%
Accidents	7.5%	7.8%	4.6%	5.3%	2.9%
Intentional self-harm	3.3%	2.7%	3.3%	2.6%	2.8%
Chronic lower respiratory	2.9%	1.5%	1.4%	3.3%	2.1%
Nephritis, etc	0.4%	2.2%	1.8%	0.9%	0.9%
Liver disease and cirrhosis	0.8%	2.1%	0.5%	2.2%	1.5%
Diabetes mellitus	0.3%	0.6%	0.3%	0.2%	0.5%
Assault	0.3%	0.3%	0.5%	0.3%	0.5%
Unintended drug overdose	0.2%	0.0%	0.0%	0.1%	0.0%
COVID-19	0.0%	0.0%	0.0%	0.7%	12.5%
Total	100.0%	100.0%	100.0%	100.7%	112.5%

The proportion of deaths for malignant neoplasms, accidents and intentional self-harm appears to be down in 2020Q2 compared to the quarters of 2019. Diseases of the heart appear to be up.

The proportion of COVID-19 deaths in 2020Q2 is 18.2% by count and 11.1% by amount (22.3% and 12.5%, respectively, of the total identified without COVID-19). The proportion by count is substantially higher than the 10.7% of all deaths reported by StatCan for 2020Q2. However, there are some facts that might mitigate the gap between our insured lives and the Canadian population. The average age of Canadians in the 2016 census was 41.0; the average age in this study for exposure by count is 51.0. The proportion for Canada is relative to all deaths without allowance for "unknown". It is possible that there is among insured lives a greater likelihood of listing a cause of death if the death is from COVID-19 than from other causes. A more accurate comparison between insured lives and the population will have to wait until more detailed information is available on the population.

Tables 9 and 10 are similar to Table 7 (by count, not amount), but Table 9 is for females only, and Table 10 is for males only.

Cause of death	2019Q2	2019Q3	2019Q4	2020Q1	2020Q2
Malignant neoplasms	54.2%	53.3%	50.9%	48.3%	50.8%
Diseases of heart	16.5%	18.1%	19.6%	18.5%	21.3%
Cerebrovascular	8.1%	8.6%	9.4%	8.7%	9.6%
Influenza and pneumonia	7.7%	6.5%	7.0%	9.6%	5.9%
Alzheimer's	5.1%	4.8%	5.7%	6.7%	5.5%
Accidents	3.2%	3.3%	2.9%	2.4%	1.8%
Intentional self-harm	0.8%	1.0%	0.8%	0.9%	0.8%
Chronic lower respiratory	1.4%	1.7%	1.3%	2.1%	2.0%
Nephritis, etc	1.1%	1.1%	0.9%	0.9%	0.7%
Liver disease and cirrhosis	1.5%	0.9%	0.8%	0.9%	1.1%
Diabetes mellitus	0.3%	0.7%	0.6%	1.0%	0.4%
Assault	0.1%	0.0%	0.1%	0.1%	0.2%
Unintended drug overdose	0.0%	0.0%	0.0%	0.0%	0.0%
COVID-19	0.0%	0.0%	0.0%	0.6%	28.9%
Total	100.0%	100.0%	100.0%	100.6%	128.9%

Cause of death	2019Q2	2019Q3	2019Q4	2020Q1	2020Q2
Malignant neoplasms	49.0%	48.3%	45.8%	42.4%	46.6%
Diseases of heart	21.7%	23.2%	24.9%	27.8%	26.1%
Cerebrovascular	7.1%	6.5%	7.4%	6.3%	6.4%
Influenza and pneumonia	6.8%	5.8%	6.7%	9.1%	7.3%
Alzheimer's	2.8%	3.1%	3.9%	3.7%	3.9%
Accidents	5.1%	5.4%	3.8%	3.6%	3.0%
Intentional self-harm	2.8%	2.1%	2.3%	1.6%	1.8%
Chronic lower respiratory	2.0%	1.4%	1.9%	1.5%	1.8%
Nephritis, etc	1.0%	1.6%	1.5%	1.2%	1.1%
Liver disease and cirrhosis	1.0%	1.5%	0.8%	1.6%	1.2%
Diabetes mellitus	0.4%	0.9%	0.7%	0.9%	0.7%
Assault	0.1%	0.3%	0.2%	0.2%	0.1%
Unintended drug overdose	0.1%	0.0%	0.0%	0.1%	0.1%
COVID-19	0.0%	0.0%	0.0%	0.5%	18.1%
Total	100.0%	100.0%	100.0%	100.5%	118.1%

COVID-19 makes up a larger proportion of deaths in 2020Q2 for females than for males. This is not surprising, because there are more females than males at the highest ages, where COVID-19 has caused most deaths. Note that for females COVID-19 was the second highest cause of death in 2020Q2, and for males the third.

Table 11 for females and Table 12 for males show mortality rates by cause for groups of attained ages (any duration from issue, not just ultimate). These are not annual but quarterly mortality rates, represented by ${}_{1/4}q_x$. The leading three causes are shown in addition to “All causes” and “Unknown” (which also includes causes other than the 14 that are identified). Data for the company that did not include cause of death are excluded. Because of the large proportion of “Unknown”, the mortality rates for the three identified causes are likely understated. One might assume that the three causes are in the “Unknown” in the same proportion, and scale the mortality rates upward accordingly, but there is no way to determine whether the assumption is valid. Note that female mortality rates for COVID-19 are lower for females than males at the younger ages but higher at the older.

Table 11. Female raw mortality rates for 2020Q2 only, per thousand, in groups of attained ages

	All causes		Unknown		Cancer		Heart		COVID-19	
	Cnt	Amt	Cnt	Amt	Cnt	Amt	Cnt	Amt	Cnt	Amt
0–49	0.36	0.23	0.12	0.10	0.13	0.07	0.02	0.00	0.01	0.00
50–59	1.83	1.18	0.48	0.49	0.95	0.40	0.20	0.20	0.07	0.02
60–69	4.74	3.85	0.99	0.85	2.33	2.18	0.59	0.35	0.25	0.08
70–79	16.74	10.67	5.46	2.81	5.74	3.76	1.97	1.20	1.23	0.60
80–89	59.33	42.51	25.23	16.04	8.75	4.92	6.58	3.50	9.76	8.24
90–100	171.66	127.91	98.06	77.09	11.86	8.59	9.63	8.24	36.06	15.64

Table 12. Male raw mortality rates for 2020Q2 only, per thousand, in groups of attained ages

	All causes		Unknown		Cancer		Heart		COVID-19	
	Cnt	Amt	Cnt	Amt	Cnt	Amt	Cnt	Amt	Cnt	Amt
0–49	0.63	0.33	0.17	0.06	0.11	0.07	0.12	0.09	0.02	0.01
50–59	2.47	1.21	0.65	0.32	0.71	0.43	0.59	0.21	0.06	0.02
60–69	7.85	4.67	1.80	1.02	2.86	1.66	1.66	1.09	0.37	0.20
70–79	21.32	17.29	5.40	4.61	7.84	5.83	2.91	1.72	1.66	1.38
80–89	76.32	55.51	32.66	22.77	15.75	12.27	7.99	6.76	9.79	7.16
90–100	179.37	169.33	101.64	91.82	15.22	7.85	20.38	17.65	23.64	10.31

To give a sense of how well supported the mortality rates are, Table 13 shows the count of deaths by cause and the exposure. These numbers are calculated on the same data as underlie Table 11 and Table 12.

	All causes		Unknown		Cancer		Heart		COVID-19		Exposure	
	F	M	F	M	F	M	F	M	F	M	F	M
0–49	65	110	21	30	23	19	4	21	1	3	180,882	175,817
50–59	140	195	37	51	73	56	15	47	5	5	76,552	79,019
60–69	305	549	64	126	150	200	38	116	16	26	64,398	69,961
70–79	586	849	191	215	201	312	69	116	43	66	35,013	39,818
80–89	875	1,318	372	564	129	272	97	138	144	169	14,747	17,269
90–100	695	660	397	374	48	56	39	75	146	87	4,049	3,680

5 Inferences

Overall mortality experience, based on Tables 4 and 5, is likely to turn out similar to that of the policy year 2018–2019. We are not likely to observe mortality improvement, but likely not significant deterioration either. The increase in death claims from COVID-19 may be largely offset by improvement in other causes.

The impact of COVID-19 appears, at first glance, to be heavier for insured lives than for the population, but after adjusting for differences in the distribution by sex and age for insured lives compared to the population and after taking into account the distribution of claims by amount, the impact may be somewhat less than for the population.

6 Acknowledgements

This report was prepared by R.C.W. (Bob) Howard and approved by the CIA Research Council, the Experience Research Committee, and the Project Oversight Group:

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7 References

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Canadian Institute of Actuaries. 2019. *Canadian Standard Ordinary Life Experience 2016–2017 Using 86–92 and 97–04 Tables*, <https://www.cia-ica.ca/docs/default-source/research/2019/219099e.pdf>

8 Appendix

Table 14 shows the experience to the end of 2020Q2 in more detail. The first two sections consider the first 15 policy years only; the same data appear in the first two sections, but the data are organized differently. The last section shows experience after the first 15 policy years (ultimate) by attained age groups. This table is comparable to Table 3 in the last annual report.

Table 14. Experience for all lives: Policy Year 2019–2020Q2										
	CIA9704				CIA86-92		Exposure		Actual deaths	
	Act/Exp		Std Dev		Act/Exp					
	Pols	Amt	Pols	Amt	Pols	Amt	Pols k	Amt m\$	Pols	Amt k\$
<i>Select by policy year</i>										
1st	68.1%	35.8%	8.0%	23.2%	47.5%	25.4%	197.1	85,857	67	13,615
2nd	63.3%	37.2%	6.4%	21.9%	52.6%	29.5%	190.6	82,393	98	20,338
3rd	83.0%	44.7%	5.6%	16.8%	67.6%	34.9%	203.1	83,163	172	28,112
4th	70.7%	53.0%	4.9%	14.8%	57.1%	40.8%	223.5	92,773	187	45,193
5th	61.0%	41.1%	4.8%	14.2%	48.8%	31.2%	202.7	81,734	167	35,890
6–10th	67.3%	51.2%	1.8%	5.0%	51.2%	37.4%	941.5	328,063	1,382	281,204
11–15th	70.1%	61.1%	1.7%	5.4%	50.2%	42.8%	646.8	153,070	1,518	245,186
<i>Subtot</i>	68.8%	52.4%	1.1%	3.4%	51.5%	38.2%	2,605.3	907,053	3,591	669,539
<i>Select by issue age</i>										
0–9	79.2%	35.2%	13.3%	52.7%	48.3%	21.4%	281.6	31,036	34	1,655
10–19	81.6%	202.1%	11.9%	50.3%	53.4%	130.6%	132.9	22,655	39	15,934
20–29	62.8%	50.5%	5.8%	13.2%	45.0%	36.6%	421.7	128,240	119	27,675
30–39	65.1%	52.1%	3.5%	6.2%	45.3%	36.6%	729.3	339,192	331	112,164
40–49	68.6%	57.3%	2.7%	6.2%	48.2%	39.4%	562.3	252,577	626	190,456
50–59	56.9%	46.8%	2.1%	6.8%	45.0%	35.5%	330.3	105,926	832	163,393
60–69	69.9%	50.4%	2.1%	9.1%	53.8%	39.2%	126.1	24,161	972	106,350
70–79	89.8%	51.0%	3.4%	18.1%	66.0%	38.1%	19.6	3,079	495	45,214
80–100	125.4%	43.8%	7.4%	23.4%	107.3%	38.0%	1.5	186	145	6,697
<i>Subtot</i>	68.8%	52.4%	1.1%	3.4%	51.5%	38.2%	2,605.3	907,053	3,591	669,539
<i>Ultimate by attained age</i>										
15–19	141.7%	120.1%	22.5%	54.6%	78.0%	66.2%	46.9	3,189	21	1,162
20–29	87.7%	66.4%	7.8%	20.6%	64.9%	49.1%	227.4	14,127	103	4,780
30–39	101.0%	135.9%	5.5%	20.8%	64.7%	88.3%	326.7	18,954	236	17,674
40–49	100.9%	76.9%	3.4%	7.8%	63.8%	49.4%	474.1	43,891	596	40,801
50–59	79.5%	71.8%	1.6%	3.5%	53.0%	46.0%	804.5	88,833	2,114	186,122
60–69	67.1%	58.8%	0.9%	2.3%	51.6%	43.3%	907.1	73,699	6,157	387,233
70–79	75.6%	63.3%	0.7%	2.3%	53.8%	43.9%	612.9	30,930	11,778	462,435
80–89	92.2%	81.7%	0.6%	2.8%	68.8%	59.4%	297.7	10,313	18,960	560,258
90–100	79.5%	80.7%	0.6%	3.4%	76.6%	78.6%	75.9	2,099	11,949	327,502
<i>Subtot</i>	81.2%	70.7%	0.3%	1.2%	63.0%	52.0%	3,773.1	286,035	51,913	1,987,966
Total	80.2%	64.9%	0.3%	1.4%	62.1%	47.6%	6,378.5	1,193,089	55,504	2,657,505

Table 15 shows experience by sex and smoking class. This table needs to be compared with Table 6 in the last annual report. Generally select A/E ratios are down and ultimate A/E ratio are up, but none of the changes are statistically significant.

Table 15. Summary of experience, by sex and smoking, policy year 2019–2020Q2. Expected mortality on CIA9704

Risk Class	Act/Exp		Std Dev		Exposure		Actual Deaths	
	Pols	Amt	Pols	Amt	Pols k	Amt m\$	Pols	Amt k\$
Select experience								
Female non-smoker	60.0%	51.3%	1.9%	5.6%	1,031.6	348,505	1,079	200,458
Female smoker	82.9%	58.1%	4.6%	15.2%	111.0	21,052	321	27,713
Female unknown	168.2%	38.9%	10.7%	82.7%	154.8	18,211	113	896
Male non-smoker	64.8%	51.4%	1.6%	4.7%	995.3	458,541	1,436	371,123
Male smoker	72.4%	50.7%	3.2%	11.2%	152.9	42,751	455	56,784
Male unknown	153.4%	326.3%	7.8%	59.3%	159.7	17,993	187	12,565
All	68.8%	52.4%	1.1%	3.4%	2,605.3	907,053	3,591	669,539
Ultimate experience								
Female non-smoker	81.0%	71.1%	0.8%	2.8%	895.7	87,720	7,287	428,293
Female smoker	106.1%	94.0%	1.7%	4.1%	321.4	16,474	2,944	102,518
Female unknown	87.7%	79.6%	0.8%	2.1%	572.8	14,837	10,410	108,120
Male non-smoker	74.7%	65.1%	0.7%	2.2%	889.4	123,154	8,633	802,011
Male smoker	78.8%	74.8%	1.2%	3.3%	322.2	20,333	3,346	176,650
Male unknown	78.7%	74.2%	0.5%	1.5%	771.8	23,517	19,294	370,373
All	81.2%	70.7%	0.3%	1.2%	3,773.1	286,035	51,913	1,987,966
All experience								
Female non-smoker	77.5%	63.3%	0.8%	2.8%	1,927.2	436,225	8,366	628,751
Female smoker	103.3%	83.1%	1.6%	5.4%	432.4	37,527	3,265	130,231
Female unknown	88.2%	78.9%	0.8%	2.4%	727.6	33,048	10,523	109,016
Male non-smoker	73.1%	60.1%	0.6%	2.2%	1,884.7	581,696	10,069	1,173,134
Male smoker	78.0%	67.1%	1.2%	4.3%	475.1	63,084	3,801	233,434
Male unknown	79.1%	76.2%	0.5%	1.5%	931.5	41,510	19,481	382,938
All	80.2%	64.9%	0.3%	1.4%	6,378.5	1,193,089	55,504	2,657,505



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