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Canadian Individual Life Experience for Policy Year 2019–2020

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1 Executive summary

This is the 71st annual report of the intercompany mortality experience for Canadian individual life insurance policies. The study covers the one-year period beginning with the policy anniversary in 2019 on an age-nearest-birthday basis for data submitted by seven companies. This report focuses on individual life insurance policies and riders issued in Canada that require full underwriting; however, other individual life insurance segments are also analyzed. More information about the data can be found in Section 3.

Key enhancements:

- Expected mortality is now calculated on the new table, CIA2014. In some cases, expected on the CIA9704 table is also shown.
- New report sections were added, showing experience for simplified issue and converted policies. Note that this data is only provided in the report and not the database. Also note that policy years for conversions are measured from the conversion date rather than the original issue date due to data limitations.
- The database that accompanies this study has been updated to include a field indicating if the product is participating. Databases for the current year and the previous ten are provided with this field added.
- Some errors were found in historical data since the previous study was published. These have been corrected. The corrections are significant for the various types of preferred and for base compared to rider, but there is little change in aggregate.

Key findings:

- It may have been expected that mortality would be up from the previous study overall because of COVID-19, but that is not the case. Mortality experience is down slightly from the previous study. However, only a little over one-quarter of the study exposure was after April 1,2020, when COVID-19 deaths became significant.
- The variation in mortality by policy size remains a very significant factor.
- The study of preferred, residual, and non-preferred experience has been improved, removing some heterogeneity in the comparisons. The A/E ratio for preferred is shown to be 80% of the ratio for residual for males and 85% for females.
- The mortality experience for group conversions and for term policies converted to permanent is significantly higher than for the standard segment, and remains higher in the ultimate period.
- Mortality experience for simplified-issue policies is higher than the standard segment, and this persists into the ultimate policy years.

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3 Data and method

3.1 Overview

This is the 71st annual report of the intercompany mortality experience for Canadian individual life insurance policies. The study covers the one-year period beginning with the policy anniversary in 2019 and ending a day before the next anniversary. Age is presented on an age-nearest-birthday basis; data submitted as age last birthday is split, with half going to the specified age and half to the next age.

This study is called "individual life." Prior to last year it was called "standard ordinary." The main part of this study continues to show experience exclusively for standard individual life insurance policies and riders issued in Canada that required full underwriting. This group of records is referred to as "the standard segment" and sometimes simply as "standard." For clarity, the standard segment excludes records for business issued as joint, converted, substandard, simplified, and guaranteed issue.[1] Records for attained ages over 100 are also excluded.[2]

Although excluded from the main study, this report includes an analysis of experience for substandard issues, converted policies, simplified issue, and records for attained ages over 100.

Records were submitted by seven companies, one fewer than last year. Including records excluded from the main study, there was a total of 10.9 million records submitted for the 2019–2020 policy year, with a total face amount of $2.16 trillion. Included in the total was $0.19 trillion of insurance on new issues of 2019. By way of comparison, CLHIA reported $3.2 trillion of face amount in force, and LIMRA reported $0.27 trillion of new business in 2019 in their survey, which includes most of the individual insurance industry.

Table 1 shows the quantity of data, both exposure and deaths, included in the main part of this study and in the previous four.

Table 1. Totals included in the study

Policy year of study	Exposure		Deaths	
	Policies	Amount k$	Policies	Amount k$
2015–2016	9,027,106	1,565,230,017	68,458	3,095,533
2016–2017	8,497,821	1,493,924,827	68,056	2,980,574
2017–2018	9,058,918	1,730,483,682	72,229	3,572,599
2018–2019	9,239,230	1,819,121,331	71,756	3,550,382
2019–2020	8,619,217	1,692,805,292	71,895	3,453,200
Total	44,442,291	8,301,565,148	352,393	16,652,289

The numbers for the previous studies have changed because of errors corrected in the data for prior years. More detail on the method can be found in Appendix 1.

[1] The text of the request for data that was sent to the companies is available from the CIA on request.
[2] See the 2019 report, rp221113, Section 4.9 for more detail on experience at older ages. The analysis is not repeated in this report, but the conclusions are the same: raw mortality rates over age 100 appear to be severely understated. The observed experience from the current year is shown in Appendix 2.

3.2 Contributing companies

Table 2 lists the contributing companies to the current and previous studies. The percentages shown are the proportion of the total exposure that was submitted by each company, calculated by amount.

On behalf of the CIA, we thank these companies for their willingness to contribute, for the effort expended, and for their care to maintain the quality of the study.

Of course, not all companies have the same experience. This year, the actual-to-expected (A/E) ratios on CIA2014 by company were between 95% and 105% of the aggregate A/E for only two of seven companies. Last year, the experience was less diverse: five of eight companies were within 5%.

Table 2. Contributing companies

Company	Exposure %, by amount	
	2018–2019	2019–2020
Canada Life	23.4%	25.0%
Desjardins	4.8%	5.6%
Equitable Life	5.4%	6.3%
Industrial-Alliance	12.3%	14.0%
ivari	10.1%	0.0%
Manulife	20.9%	23.2%
RBC Life	6.2%	7.2%
Sun Life	16.8%	18.8%
Total	100.0%	100.0%

4 Experience for policy year 2019–2020

4.1 Overall results

Table 3 shows the overall results for all lives included in the study. Note that this table is comprised of three sections: select experience by policy year, select experience by issue age, and ultimate experience (based on 20-year select)[3] by attained age. Thus, the first two sections cover the same experience but group the data differently. A/E ratios are shown for both CIA2014 and CIA9704. Standard deviations are calculated on CIA2014 only; if calculated on CIA9704, they would be proportionately smaller because of the A/E ratios being smaller on CIA9704. Tables 4 and 5 present the same data as Table 3, but split between females in Table 4 and males in Table 5 (in alphabetical order).

[3] The select period was set at 20 years because CIA2014 is a 20-year select table. For expected on CIA9704, the mortality rates for policy years 16–20 were taken from the ultimate of that table.

Table 3. Experience for all data included in the study for policy year 2019–2020										
	CIA2014				CIA9704		Exposure		Deaths	
	A/E		Std dev		A/E					
	Pols	Amt	Pols	Amt	Pols	Amt	Pols k	Amt m$	Pols	Amt k$
Select by policy year										
1st	104.0%	61.5%	9.1%	24.5%	76.0%	44.3%	309.5	138,342	112	26,107
2nd	110.6%	63.1%	8.4%	26.1%	63.9%	38.0%	290.5	127,114	140	30,237
3rd	127.1%	76.9%	7.3%	19.9%	76.4%	47.6%	297.8	126,153	214	43,621
4th	119.3%	80.4%	6.4%	18.0%	72.9%	50.8%	327.0	138,800	262	62,416
5th	97.3%	65.5%	6.3%	17.4%	59.7%	42.0%	282.7	113,732	220	49,485
6–10th	107.4%	78.4%	2.3%	6.1%	67.4%	50.2%	1,310.7	465,168	1,856	382,069
11–15th	107.1%	90.2%	2.1%	6.9%	70.2%	59.0%	903.0	214,193	2,056	320,590
16–20th	106.8%	90.4%	1.6%	5.2%	73.2%	59.8%	810.0	129,184	3,598	395,396
Subtotal	107.5%	82.9%	1.1%	3.3%	70.6%	53.8%	4,531.1	1,452,686	8,458	1,309,921
Select by issue age										
0–9	113.9%	69.6%	11.3%	39.2%	82.4%	48.4%	507.7	54,099	83	4,708
10–19	114.4%	204.6%	10.2%	42.8%	97.2%	170.9%	247.6	38,406	100	24,937
20–29	104.2%	94.5%	5.5%	12.9%	74.0%	64.0%	756.3	205,446	305	62,894
30–39	93.4%	77.2%	3.3%	6.0%	66.0%	53.8%	1,274.2	548,251	783	219,617
40–49	101.5%	84.3%	2.4%	6.1%	65.5%	55.7%	976.5	405,226	1,513	364,919
50–59	104.6%	77.4%	2.1%	7.2%	61.6%	45.6%	541.0	162,111	2,072	293,627
60–69	114.9%	89.8%	2.1%	9.2%	76.5%	55.7%	195.5	34,422	2,281	212,452
70–79	114.7%	78.9%	2.9%	14.8%	83.9%	56.7%	30.3	4,480	1,127	112,894
80–100	144.1%	72.9%	7.8%	23.0%	112.3%	55.9%	2.0	245	197	13,873
Subtotal	107.5%	82.9%	1.1%	3.3%	70.6%	53.8%	4,531.1	1,452,686	8,458	1,309,921
Ultimate by attained age										
20–29	105.3%	97.0%	9.3%	18.0%	93.8%	82.8%	229.4	12,681	113	5,415
30–39	107.6%	119.9%	6.2%	12.7%	103.0%	113.0%	347.5	16,041	259	12,631
40–49	119.3%	104.0%	4.1%	9.8%	114.3%	94.8%	439.4	24,909	646	29,683
50–59	103.2%	91.5%	2.0%	4.3%	81.6%	72.3%	832.2	67,589	2,326	152,921
60–69	100.5%	94.6%	1.1%	2.9%	67.3%	62.0%	1,038.0	72,286	7,231	414,840
70–79	99.0%	91.2%	0.8%	2.7%	75.3%	64.3%	734.7	33,045	14,271	512,576
80–89	100.5%	99.2%	0.6%	3.1%	92.0%	85.8%	369.4	11,278	23,633	656,242
90–100	91.6%	97.5%	0.7%	3.3%	77.2%	80.0%	97.4	2,290	14,959	358,973
Subtotal	98.2%	95.6%	0.4%	1.4%	80.8%	72.9%	4,088.1	240,120	63,437	2,143,280
Total	99.2%	90.3%	0.3%	1.6%	79.4%	64.2%	8,619.2	1,692,805	71,895	3,453,200

Table 4. Experience for all females included in the study for policy year 2019–2020										
	CIA2014				CIA9704		Exposure		Deaths	
	A/E		Std dev		A/E					
	Pols	Amt	Pols	Amt	Pols	Amt	Pols k	Amt m$	Pols	Amt k$
Select by policy year										
1st	95.1%	80.9%	16.4%	38.4%	67.3%	55.2%	147.8	55,999	32	7,479
2nd	93.9%	54.5%	14.3%	41.3%	48.4%	29.1%	140.8	53,137	42	6,913
3rd	137.6%	86.9%	12.1%	34.5%	76.8%	50.9%	144.8	53,736	85	14,346
4th	125.4%	85.6%	10.3%	28.7%	73.3%	52.4%	159.8	59,807	107	21,033
5th	85.9%	66.2%	9.9%	28.4%	51.6%	42.0%	138.5	48,784	79	16,299
6–10th	103.5%	75.2%	3.5%	9.8%	65.3%	48.7%	645.3	196,020	746	121,814
11–15th	104.4%	89.3%	3.2%	10.4%	70.2%	60.1%	464.2	95,934	937	123,355
16–20th	104.4%	94.1%	2.3%	6.9%	75.9%	66.7%	415.3	56,006	1,750	170,555
Subtotal	104.6%	84.7%	1.6%	4.9%	70.9%	56.3%	2,256.5	619,423	3,778	481,794
Select by issue age										
0–9	136.7%	77.7%	19.9%	73.5%	91.7%	49.4%	250.2	27,232	32	1,783
10–19	95.7%	163.3%	18.7%	71.3%	89.3%	151.6%	119.4	18,759	25	6,015
20–29	94.9%	88.7%	8.7%	16.9%	72.8%	65.9%	406.9	105,640	115	22,253
30–39	93.3%	80.3%	5.1%	8.6%	67.3%	58.1%	636.8	240,989	324	79,358
40–49	102.3%	83.9%	3.8%	9.9%	66.3%	55.1%	463.8	154,820	643	116,081
50–59	97.9%	71.8%	3.3%	11.3%	58.7%	41.2%	257.2	55,839	830	79,948
60–69	115.6%	92.5%	3.1%	12.2%	81.1%	60.2%	102.7	13,321	1,098	84,258
70–79	106.3%	96.6%	3.8%	16.9%	79.8%	71.1%	18.3	2,628	620	79,899
80–100	107.7%	78.0%	9.7%	25.4%	84.1%	59.9%	1.2	195	93	12,198
Subtotal	104.6%	84.7%	1.6%	4.9%	70.9%	56.3%	2,256.5	619,423	3,778	481,794
Ultimate by attained age										
20–29	57.5%	47.3%	17.1%	32.9%	52.3%	41.9%	113.8	6,471	18	815
30–39	98.5%	126.2%	10.4%	21.9%	103.6%	130.5%	170.0	7,936	84	4,788
40–49	101.3%	89.3%	6.3%	15.7%	99.1%	83.6%	218.4	12,313	232	10,792
50–59	97.9%	88.5%	3.0%	6.4%	76.5%	69.3%	411.1	29,576	964	55,980
60–69	93.2%	93.2%	1.8%	4.2%	63.2%	62.0%	478.0	26,539	2,647	122,143
70–79	100.7%	92.6%	1.3%	4.3%	85.5%	73.0%	317.4	10,573	5,174	130,449
80–89	100.9%	106.8%	1.0%	6.1%	102.1%	101.4%	160.5	3,844	8,865	199,993
90–100	95.5%	96.5%	1.0%	4.7%	85.2%	84.2%	49.4	982	7,088	135,028
Subtotal	98.3%	97.1%	0.6%	2.4%	86.9%	79.2%	1,918.6	98,235	25,071	659,988
Total	99.1%	91.4%	0.5%	2.6%	84.4%	67.6%	4,175.2	717,658	28,849	1,141,783

Table 5. Experience for all males included in the study for policy year 2019–2020										
	CIA2014				CIA9704		Exposure		Deaths	
	A/E		Std dev		A/E					
	Pols	Amt	Pols	Amt	Pols	Amt	Pols k	Amt m$	Pols	Amt k$
Select by policy year										
1st	108.0%	56.1%	11.0%	29.5%	80.1%	41.1%	161.7	82,342	80	18,628
2nd	119.8%	66.3%	10.4%	32.2%	74.0%	41.8%	149.7	73,977	98	23,324
3rd	121.0%	72.8%	9.1%	24.3%	76.2%	46.2%	153.0	72,417	129	29,275
4th	115.5%	78.0%	8.1%	22.7%	72.6%	49.9%	167.1	78,994	155	41,383
5th	105.2%	65.1%	8.1%	21.8%	65.5%	41.9%	144.2	64,948	141	33,186
6–10th	110.1%	79.9%	3.0%	7.8%	68.8%	51.0%	665.4	269,148	1,110	260,254
11–15th	109.5%	90.8%	2.9%	9.2%	70.1%	58.4%	438.8	118,258	1,119	197,235
16–20th	109.2%	87.7%	2.3%	7.4%	70.8%	55.5%	394.6	73,179	1,848	224,841
Subtotal	110.1%	81.8%	1.4%	4.4%	70.4%	52.4%	2,274.5	833,262	4,680	828,126
Select by issue age										
0–9	103.0%	65.5%	13.8%	45.8%	77.4%	47.8%	257.5	26,867	51	2,924
10–19	122.5%	222.5%	12.2%	53.0%	100.2%	178.1%	128.2	19,647	75	18,922
20–29	110.8%	98.0%	7.2%	18.0%	74.7%	63.0%	349.4	99,805	190	40,641
30–39	93.5%	75.6%	4.2%	7.9%	65.1%	51.7%	637.4	307,262	459	140,258
40–49	100.9%	84.5%	3.2%	7.6%	65.0%	56.1%	512.6	250,406	870	248,837
50–59	109.6%	79.7%	2.8%	9.1%	63.7%	47.5%	283.8	106,271	1,242	213,680
60–69	114.3%	88.1%	2.9%	12.8%	72.6%	53.0%	92.8	21,102	1,183	128,194
70–79	126.8%	54.7%	4.6%	26.3%	89.6%	38.0%	12.0	1,852	507	32,995
80–100	206.0%	49.5%	12.9%	54.8%	159.9%	37.5%	0.8	50	104	1,675
Subtotal	110.1%	81.8%	1.4%	4.4%	70.4%	52.4%	2,274.5	833,262	4,680	828,126
Ultimate by attained age										
20–29	125.1%	119.2%	11.0%	21.6%	110.4%	100.2%	115.6	6,210	95	4,600
30–39	112.6%	116.3%	7.7%	15.6%	102.7%	104.5%	177.5	8,105	175	7,843
40–49	132.6%	114.9%	5.4%	12.5%	125.0%	102.6%	221.0	12,596	414	18,891
50–59	107.2%	93.4%	2.7%	5.7%	85.7%	74.2%	421.1	38,013	1,362	96,940
60–69	105.3%	95.2%	1.4%	3.7%	69.9%	62.0%	560.1	45,747	4,584	292,696
70–79	98.1%	90.7%	1.0%	3.3%	70.5%	61.8%	417.3	22,472	9,098	382,127
80–89	100.3%	96.2%	0.8%	3.6%	86.8%	80.4%	208.9	7,434	14,768	456,249
90–100	88.4%	98.1%	0.9%	4.6%	71.2%	77.6%	48.0	1,307	7,871	223,944
Subtotal	98.2%	94.9%	0.5%	1.8%	77.2%	70.4%	2,169.5	141,885	38,366	1,483,292
Total	99.3%	89.8%	0.4%	2.0%	76.4%	62.7%	4,444.0	975,147	43,046	2,311,418

A few of the numbers in the above tables are influenced by very large death claims. There are three female death claims in attained ages 80–89, each for more than $10 million. There are three large claims for issue age 15, two for males totalling over $11 million and one for females of almost $4 million.

Later tables in this report show A/E ratios on CIA2014 only, and not on CIA9704. However, all tables in the Excel workbook associated with this study calculate A/E on both mortality tables.

4.2 Distinguishing by smoking status

Table 6 shows the experience for each sex and each smoking status

All of the A/E ratios are within a reasonable range except for smoking unknown in the select period. The large A/E ratio by amount for select male unknown is accounted for by the same two claims for issue age 15 mentioned in the previous subsection.

For attained ages under 16, all experience is included under smoking unknown. For all issue ages, smoking is shown as submitted when attained age exceeds 15.

Table 6. Summary of experience, by sex and smoking, policy year 2019–2020. Expected mortality on CIA2014

Risk class	A/E		Std dev		Exposure		Deaths	
	Pols	Amt	Pols	Amt	Pols k	Amt m$	Pols	Amt k$
Select experience								
Female non-smoker	101.9%	84.7%	1.8%	5.3%	1,783.0	555,242	2,845	420,797
Female smoker	104.1%	84.9%	3.4%	13.7%	227.0	35,064	786	59,374
Female unknown	225.4%	68.0%	11.9%	82.5%	246.5	29,118	147	1,623
Male non-smoker	107.6%	80.5%	1.7%	4.8%	1,724.4	736,392	3,397	702,347
Male smoker	105.4%	82.6%	3.0%	10.3%	294.3	68,028	1,014	111,048
Male unknown	202.7%	323.9%	8.4%	55.5%	255.9	28,843	269	14,732
All	107.5%	82.9%	1.1%	3.3%	4,531.1	1,452,686	8,458	1,309,921
Ultimate experience								
Female non-smoker	105.2%	99.3%	1.0%	3.6%	888.3	67,160	8,588	421,321
Female smoker	92.3%	91.8%	1.4%	3.2%	351.7	15,167	3,788	110,807
Female unknown	95.9%	94.9%	0.8%	2.2%	678.7	15,907	12,696	127,860
Male non-smoker	106.0%	95.3%	0.9%	2.9%	898.8	97,764	10,443	853,059
Male smoker	93.8%	96.2%	1.4%	3.6%	351.2	18,041	4,367	196,294
Male unknown	95.9%	93.6%	0.6%	1.7%	919.5	26,080	23,556	433,939
All	98.2%	95.6%	0.4%	1.4%	4,088.1	240,120	63,437	2,143,280
All experience								
Female non-smoker	104.3%	91.4%	0.9%	3.3%	2,671.3	622,402	11,433	842,117
Female smoker	94.1%	89.3%	1.3%	5.4%	578.7	50,231	4,574	170,181
Female unknown	96.5%	94.4%	0.8%	2.6%	925.2	45,025	12,843	129,484
Male non-smoker	106.4%	88.0%	0.8%	2.8%	2,623.2	834,155	13,840	1,555,406
Male smoker	95.8%	90.8%	1.2%	4.6%	645.4	86,069	5,381	307,342
Male unknown	96.4%	95.9%	0.6%	1.8%	1,175.4	54,923	23,825	448,671
All	99.2%	90.3%	0.3%	1.6%	8,619.2	1,692,805	71,895	3,453,200

4.3 Distinguishing by preferred underwriting

Table 7 shows the experience for different classes of preferred, separately for males and females. The three classes presented are non-preferred (preferred rates were not available for this plan), residual (preferred rates were available, but the life insured did not qualify), and preferred (the life insured qualified for preferred rates).

Because of extending the select period to 20 years, there is now very little exposure in the ultimate period other than for the non-preferred class. The non-preferred class, measured by amount exposed, is the smallest class in the select period for males, although largest by count.

The A/E ratios in the select period by amount are directionally as one would expect. Preferred has the lowest A/E ratios of the three classes, and residual the highest. However, the differences between classes are not statistically significant except for male preferred and residual. It is surprising that the difference between preferred and residual is not much larger. See Section 5.3 for a similar analysis but on the last five years of data.

Table 7. Summary of experience, by sex and preferred class, policy year 2019–2020. Expected mortality on CIA2014

Risk class	A/E		Std dev		Exposure		Deaths	
	Pols	Amt	Pols	Amt	Pols k	Amt m$	Pols	Amt k$
Select experience								
Female non-preferred	109.1%	87.9%	2.0%	8.1%	1,036.9	179,189	2,345	231,442
Female residual	100.7%	81.2%	2.8%	7.9%	847.2	255,153	1,179	157,786
Female preferred	86.7%	83.0%	5.6%	8.4%	372.5	185,082	254	92,566
Male non-preferred	117.4%	82.2%	1.9%	8.3%	988.8	215,127	2,753	311,010
Male residual	107.2%	84.1%	2.4%	6.4%	939.9	414,318	1,600	370,380
Male preferred	78.9%	76.1%	4.6%	7.8%	345.8	203,817	327	146,737
All	107.5%	82.9%	1.1%	3.3%	4,531.1	1,452,686	8,458	1,309,921
Ultimate experience								
Female non-preferred	98.2%	97.2%	0.6%	2.4%	1,912.8	97,506	25,042	658,374
Female residual	129.1%	81.6%	20.6%	31.4%	4.1	424	27	1,364
Female preferred	50.6%	37.9%	48.0%	60.8%	1.7	305	2	250
Male non-preferred	98.2%	95.0%	0.5%	1.8%	2,163.8	140,869	38,332	1,479,717
Male residual	107.9%	69.8%	18.6%	29.8%	4.3	660	27	2,225
Male preferred	121.8%	104.0%	38.9%	60.5%	1.5	355	7	1,350
All	98.2%	95.6%	0.4%	1.4%	4,088.1	240,120	63,437	2,143,280
All experience								
Female non-preferred	99.1%	94.6%	0.6%	2.8%	2,949.7	276,695	27,387	889,816
Female residual	101.2%	81.2%	2.7%	7.8%	851.3	255,577	1,206	159,150
Female preferred	86.2%	82.7%	5.5%	8.3%	374.1	185,387	256	92,816
Male non-preferred	99.3%	92.5%	0.5%	2.2%	3,152.6	355,997	41,085	1,790,727
Male residual	107.2%	84.0%	2.4%	6.3%	944.2	414,979	1,627	372,605
Male preferred	79.5%	76.2%	4.6%	7.8%	347.3	204,172	334	148,087
All	99.2%	90.3%	0.3%	1.6%	8,619.2	1,692,805	71,895	3,453,200

4.4 Distinguishing by size

Table 8 shows the experience for eight size bands of face amount, separately for females and males. Note that each band is closed-open; that is, it begins with the specified amount and ends less than the second specified amount.

The findings in this table are particularly significant. There is a very strong downward trend in A/E ratios with increasing size, except for first two bands.

Table 8. Summary of experience, by sex and size, policy year 2019–2020. Expected mortality on CIA2014

Size band	A/E		Std dev		Exposure		Deaths	
	Pols	Amt	Pols	Amt	Pols k	Amt m$	Pols	Amt k$
Female								
0–10k	93.7%	101.8%	0.9%	1.1%	329.3	1,230	9,809	36,149
10k–50k	106.6%	104.7%	0.8%	0.9%	1,171.6	27,181	13,500	251,193
50k–100k	96.3%	95.9%	1.8%	1.8%	727.9	42,223	2,626	150,405
100k–250k	90.6%	91.6%	1.9%	2.0%	1,017.3	136,483	2,121	273,029
250k–500k	91.8%	92.7%	4.0%	4.0%	498.4	151,231	514	155,510
500k–1m	81.5%	80.0%	6.0%	6.0%	315.6	181,638	203	114,871
1m–2m	62.0%	61.4%	10.2%	10.3%	94.8	105,915	53	59,595
2m+	83.0%	91.7%	17.4%	25.2%	20.2	71,757	24	101,030
All	99.1%	91.4%	0.5%	2.6%	4,175.2	717,658	28,849	1,141,783
Male								
0–10k	92.4%	100.4%	0.8%	0.9%	364.1	1,537	13,124	57,333
10k–50k	105.2%	104.3%	0.7%	0.8%	1,166.6	27,155	18,687	383,625
50k–100k	101.0%	100.4%	1.3%	1.4%	719.6	42,708	5,076	303,348
100k–250k	99.9%	99.1%	1.4%	1.5%	1,049.1	140,473	4,305	549,052
250k–500k	98.5%	96.9%	2.8%	2.8%	528.9	160,360	1,089	323,609
500k–1m	88.2%	89.0%	3.9%	3.9%	388.1	223,022	507	294,435
1m–2m	80.6%	80.2%	5.8%	5.9%	173.9	194,266	208	234,464
2m+	56.7%	49.3%	9.7%	13.7%	53.6	185,628	52	165,552
All	99.3%	89.8%	0.4%	2.0%	4,444.0	975,147	43,046	2,311,418

4.5 Distinguishing by policy type

Table 9 shows the experience for various policy types (also known as plans of insurance or products),[4] separately by sex. For females, the experience for no policy type appears to be significantly different from the overall experience. For males, mortality appears to be significantly lower for universal life–level cost of insurance, and significantly higher for other term.

[4] The table uses abbreviations for each policy type to save space. “Whole life” means a permanent plan that does not expire but may include endowments. “T100” is term to 100 and similar products with reduced non-forfeiture values and priced with lapse support. “UL-YRT” means universal life with cost of insurance generally varying each year. “UL-LCOI” means universal life with level cost of insurance and generally priced with lapse support. “UL-LP” means universal life with cost of insurance level for a limited period of years and zero thereafter; it typically is lapse-supported. “T10” means 10-year renewable term; typically, the premium rates for successive terms are much higher than for a newly issued T10 at the same attained age. “T20” is similar for 20-year terms. “Other term” means other lengths of renewable term and any other product design which is properly considered term insurance but not T10 or T20. “Other” means all other product designs that do not reasonably fit in any of the preceding types.

Note that T10 and T20 include both the initial term and renewal terms. Initial and renewal terms are distinguished in Section 4.10.

Table 9. Summary of experience, by sex and policy type, policy year 2019–2020. Expected mortality on CIA2014

Policy type	A/E		Std dev		Exposure		Deaths	
	Pols	Amt	Pols	Amt	Pols k	Amt m$	Pols	Amt k$
Female								
Whole life	99.1%	92.9%	0.6%	3.8%	1,984.3	153,956	20,831	426,704
T100	99.2%	93.0%	2.0%	6.9%	174.0	16,482	2,076	131,223
UL-YRT	103.7%	86.9%	3.8%	13.0%	219.0	30,746	640	51,655
UL-LCOI	97.1%	87.0%	2.1%	8.5%	393.6	52,305	1,884	206,627
UL-LP	101.8%	83.3%	8.2%	30.0%	168.1	21,416	138	12,524
T10	105.2%	94.3%	4.8%	7.5%	335.4	143,794	421	102,012
T20	86.0%	87.7%	4.7%	6.3%	485.2	226,852	348	111,907
Other term	96.8%	94.4%	4.5%	7.8%	212.1	55,479	422	41,086
Other	100.8%	101.9%	2.0%	6.0%	203.6	16,629	2,090	58,046
All	99.1%	91.4%	0.5%	2.6%	4,175.2	717,658	28,849	1,141,783
Male								
Whole life	98.7%	93.0%	0.5%	2.8%	2,164.8	188,610	32,695	999,561
T100	101.8%	92.1%	1.9%	5.9%	155.2	21,746	2,364	237,478
UL-YRT	111.1%	85.1%	3.1%	11.8%	228.0	39,540	981	103,538
UL-LCOI	99.9%	72.0%	2.1%	7.2%	370.8	73,867	1,984	246,958
UL-LP	90.7%	72.0%	7.6%	21.7%	139.3	19,122	137	14,032
T10	121.1%	96.0%	3.3%	6.8%	430.4	249,695	956	291,702
T20	94.3%	84.2%	3.7%	6.0%	520.3	292,158	603	219,248
Other term	106.3%	108.4%	3.4%	6.7%	238.3	71,961	823	105,203
Other	94.6%	98.4%	1.8%	7.2%	196.9	18,448	2,504	93,697
All	99.3%	89.8%	0.4%	2.0%	4,444.0	975,147	43,046	2,311,418

4.6 Distinguishing by province/region

Contributing companies are asked to provide information on province of residence, but not all companies are able to do so. Table 10 shows experience by province (or region) of residence for those companies that do distinguish by province. “Other” includes the territories[5] and business that was issued as Canadian but for which the residence is now outside of Canada. The four Atlantic provinces are combined into one region.

One should interpret this table with caution. The distribution by size and by plan could be quite different between provinces; the differences in A/E ratio may reflect that distribution more than a real difference in mortality.

The exposure and deaths are shown as a percentage of the total reported for those companies that distinguished province. The absolute amounts are not shown to protect the privacy of company-specific information.

[5] There were only 12 deaths for the territories, and as such it is not reasonable to distinguish them in the table.

Table 10. Summary of experience by sex and province, policy year 2019–2020. Excluding companies that could not distinguish provinces. Expected mortality on CIA2014								
Prov/region	**A/E**		**Std dev**		**Exposure dist**		**Death dist**	
	Pols	**Amt**	**Pols**	**Amt**	**Pols**	**Amt**	**Pols**	**Amt**
Female								
Atlantic	104.9%	87.7%	3.0%	11.5%	4.8%	4.1%	6.1%	4.3%
Quebec	100.1%	99.6%	1.1%	4.7%	37.8%	20.2%	46.0%	28.7%
Ontario	101.2%	94.8%	1.3%	5.6%	30.9%	37.2%	32.7%	38.6%
Manitoba	99.9%	89.8%	5.8%	28.3%	2.2%	2.9%	1.6%	2.6%
Saskatchewan	92.2%	79.0%	5.8%	16.5%	1.8%	2.4%	1.5%	2.2%
Alberta	93.3%	88.0%	3.4%	11.7%	7.8%	12.6%	4.4%	8.5%
British Columbia	88.8%	74.1%	2.9%	11.2%	9.8%	16.3%	5.6%	10.5%
Other	88.5%	143.6%	4.7%	25.7%	4.9%	4.4%	2.2%	4.6%
Sum of above	99.3%	93.4%	0.7%	3.3%	100.0%	100.0%	100.0%	100.0%
Male								
Atlantic	112.9%	118.0%	2.3%	8.4%	5.3%	4.3%	7.5%	6.9%
Quebec	100.2%	89.9%	1.0%	4.7%	35.2%	20.5%	36.6%	26.4%
Ontario	100.1%	87.7%	1.0%	4.5%	30.8%	36.0%	33.7%	35.8%
Manitoba	105.1%	89.1%	3.8%	11.6%	2.6%	3.1%	2.6%	2.8%
Saskatchewan	103.7%	94.7%	3.9%	12.7%	2.1%	2.6%	2.4%	2.4%
Alberta	101.3%	96.4%	2.4%	9.0%	8.5%	13.4%	6.5%	10.6%
British Columbia	94.0%	86.2%	2.1%	7.2%	10.2%	15.0%	8.0%	12.2%
Other	78.1%	63.8%	3.3%	21.0%	5.4%	5.1%	2.6%	3.0%
Sum of above	100.0%	89.7%	0.6%	2.7%	100.0%	100.0%	100.0%	100.0%

4.7 Distinguishing by cause of death

Cause of death returned to our mortality study last year. (It was excluded from the data specifications for 2014–2018.) Cause of death is particularly important for COVID-19. There were no deaths by COVID-19 in the prior study because the pandemic did not start until 2020 in Canada.

Table 11 shows the causes of death identified in this study. This table includes the data from only those companies that were able to submit cause of death consistently. The number and amount of death claims (in thousands) are shown in the second and third columns, respectively. The fourth and fifth columns show the distribution of the number of deaths and amount of death claims over those for which the cause of death is identified (neither “No code” nor “Other/unknown”) in the study. “No code” means that no cause of death was provided on the death record; three of the seven companies did not give cause-of-death codes, and a small number of records for the other companies left cause of death blank. Most cases in “Other/unknown” are ones for which the company indicated that it did not know the cause; there are also some for which the company indicated a cause of death not otherwise covered by the 14 codes used by the CIA.

Unfortunately for our study, “unknown” represents a large proportion of the total. However, the proportion does not seem unreasonable when compared to the data published by Statistics Canada; particularly at the older ages, the cause of death is often listed as unknown by Statistics Canada.

COVID-19 numbers seem low, but it must be recognized that because the study follows experience between policy anniversaries, over half of the experience in this study is prior to COVID-19 coming to Canada. See the CIA's publication, *Canadian Individual Life Experience: Interim Study to 2020Q2*, which focuses on experience with COVID-19 especially in the second quarter of 2020.

The ratio to identified by number is generally greater than by amount. The exceptions are malignant neoplasms, accidents, intentional self-harm, liver disease and cirrhosis, and assault. There could be some anti-selection by amount, or it could simply be that these causes tend to occur at younger ages, and the average face amount decreases with attained age.

Compared to the report last year, the ranking of causes by number shows little change except that COVID-19 is now on the list. The only change is that the ranking of influenza and pneumonia has changed places with cerebrovascular by amount, but not by count. The proportion that "Other/unknown" and "No code" are of the total is noticeably lower than last year.

Table 11. Analysis by cause of death for policy year 2019–2020

Cause of death	Number of deaths	Death claims k$	Ratio to number identified	Ratio to amount identified
Malignant neoplasms	12,445	816,082	45.5%	49.0%
Diseases of heart	6,211	349,794	22.7%	21.0%
Accidents	925	92,989	3.4%	5.6%
Influenza and pneumonia	1,803	84,326	6.6%	5.1%
Cerebrovascular	1,691	78,604	6.2%	4.7%
Intentional self-harm	453	58,656	1.7%	3.5%
Alzheimer's	1,200	57,837	4.4%	3.5%
Chronic lower respiratory	983	42,191	3.6%	2.5%
COVID-19	873	33,872	3.2%	2.0%
Liver disease and cirrhosis	260	21,096	1.0%	1.3%
Nephritis, etc.	275	17,812	1.0%	1.1%
Assault	38	5,747	0.1%	0.3%
Diabetes mellitus	177	5,406	0.6%	0.3%
Unintended drug overdose	7	663	0.0%	0.0%
Other/unknown	17,789	628,986	65.1%	37.8%
No code	26,765	1,159,137	97.9%	69.6%
Total	71,895	3,453,200	263.0%	207.4%

4.8 Distinguishing by rating

The data specifications allow the submission of substandard policies for which the mortality rating was a multiple of standard, but not those with flat extras. These policies are excluded from the study in all sections except this one.

Table 12 compares the experience for the standard segment with the records indicated as substandard. The expected is on CIA2014 in both cases, with no adjustment for the rating. The data submitted indicates whether a policy is substandard, but the rating assigned in the underwriting process is not provided.

It is obvious (and expected) that there is much less substandard experience than standard, and accordingly, standard deviations are much higher for substandard. The summaries do not distinguish by smoking status because the standard deviations for substandard are so large, particularly for smokers and unknown, that no inferences can be drawn.

Table 12. Summary of experience by rating, policy year 2019–2020. Expected mortality on CIA2014

	A/E		Std dev		Exposure		Deaths	
	Pols	Amt	Pols	Amt	Pols k	Amt m$	Pols	Amt k$
All								
Standard	99.2%	90.3%	0.3%	1.6%	8,619.2	1,692,805	71,895	3,453,200
Substandard	167.3%	132.5%	2.6%	14.0%	267.5	89,494	2,268	214,679
Female select								
Standard	104.6%	84.7%	1.6%	4.9%	2,256.5	619,423	3,778	481,794
Substandard	157.0%	153.5%	6.1%	23.0%	106.2	30,991	398	62,862
Male select								
Standard	110.1%	81.8%	1.4%	4.4%	2,274.5	833,262	4,680	828,126
Substandard	169.9%	128.1%	5.7%	19.1%	123.4	56,457	497	112,342
Female ultimate								
Standard	98.3%	97.1%	0.6%	2.4%	1,918.6	98,235	25,071	659,988
Substandard	171.0%	142.2%	4.5%	13.9%	20.2	825	752	14,182
Male ultimate								
Standard	98.2%	94.9%	0.5%	1.8%	2,169.5	141,885	38,366	1,483,292
Substandard	168.0%	108.0%	4.9%	51.0%	17.6	1,222	621	25,293

4.9 Distinguishing by par/non-par

The A/E ratio is higher for par compared to non-par in aggregate; however, this relationship reverses when controlling for size bands. As Table 13 shows, the A/E ratio for each size band is lower for par than for non-par, except for the largest band for both select and ultimate and the smallest band for select. Many of the differences appear to be statistically significant. It would likely be wise to study the differences between par and non-par in more depth before concluding that the mortality assumption should be different between par and non-par.

Table 13. Summary of experience, by par and size, policy year 2019–2020. Expected mortality on CIA2014

Size band	A/E		Std dev		Exposure		Deaths	
	Pols	Amt	Pols	Amt	Pols k	Amt m$	Pols	Amt k$
Non-par select								
0–10k	212.1%	166.9%	6.8%	11.6%	26.6	61	408	526
10k–50k	122.6%	122.0%	2.1%	2.3%	355.0	7,801	2,335	45,985
50k–100k	110.3%	110.0%	3.1%	3.1%	397.2	21,623	1,040	57,406
100k–250k	97.7%	98.3%	2.2%	2.2%	1,121.5	156,530	1,842	245,965
250k–500k	104.3%	104.3%	3.2%	3.2%	813.1	246,362	899	267,300
500k–1m	86.7%	87.6%	4.2%	4.2%	614.7	350,833	431	246,391
1m–2m	76.0%	77.0%	6.6%	6.6%	230.4	253,841	154	172,859
2m+	59.1%	46.8%	11.5%	16.1%	56.1	179,364	39	110,651
All	109.1%	85.7%	1.2%	3.3%	3,614.5	1,216,414	7,148	1,147,083
Par select								
0–10k	115.3%	111.5%	10.0%	10.6%	10.1	59	99	534
10k–50k	110.8%	104.3%	4.0%	4.3%	240.2	7,085	609	14,803
50k–100k	101.2%	102.3%	6.4%	6.5%	187.6	11,934	220	13,969
100k–250k	92.4%	89.6%	5.9%	6.0%	244.8	34,321	236	31,387
250k–500k	82.6%	79.0%	9.1%	9.1%	127.2	39,403	88	26,507
500k–1m	70.3%	72.0%	12.8%	12.9%	62.4	38,655	38	24,668
1m–2m	45.5%	39.1%	18.3%	18.6%	29.2	36,020	12	13,148
2m+	49.1%	49.2%	23.4%	36.4%	15.1	68,793	8	37,822
All	99.9%	67.4%	2.6%	12.1%	916.5	236,272	1,310	162,838
Non-par ultimate								
0–10k	79.6%	94.3%	1.3%	1.7%	95.7	338	3,628	14,238
10k–50k	106.1%	105.7%	1.0%	1.1%	594.7	11,789	9,805	174,839
50k–100k	99.0%	100.0%	1.7%	1.7%	387.9	21,531	2,892	162,500
100k–250k	97.2%	97.7%	1.9%	2.0%	364.6	43,897	2,306	284,115
250k–500k	90.4%	90.5%	4.7%	4.8%	46.1	13,321	346	102,010
500k–1m	86.6%	84.2%	7.0%	7.2%	16.4	9,051	147	80,516
1m–2m	81.9%	82.3%	10.5%	10.7%	5.9	6,373	62	68,830
2m+	66.6%	69.6%	17.5%	22.7%	1.7	5,840	18	65,386
All	97.3%	93.4%	0.7%	2.5%	1,513.1	112,140	19,204	952,434
Par ultimate								
0–10k	94.7%	101.9%	0.7%	0.8%	561.0	2,308	18,798	78,185
10k–50k	103.8%	102.3%	0.7%	0.8%	1,148.3	27,661	19,437	399,190
50k–100k	96.7%	95.4%	1.5%	1.6%	474.9	29,844	3,549	219,879
100k–250k	95.5%	94.5%	2.0%	2.1%	335.6	42,208	2,042	260,614
250k–500k	85.8%	83.9%	5.2%	5.4%	41.0	12,505	270	83,302
500k–1m	91.4%	90.9%	9.1%	9.4%	10.2	6,120	94	57,730
1m–2m	85.5%	82.3%	14.9%	15.2%	3.3	3,947	33	39,223
2m+	97.0%	136.4%	27.5%	36.9%	0.9	3,387	11	52,723
All	98.6%	97.4%	0.4%	1.6%	2,575.1	127,979	44,233	1,190,846

4.10 Term insurance

Term insurance represents over half of the exposure in the study by amount. There are two aspects of term insurance that can influence the experience.

The first is that most renewable term insurance is designed with the expectation that those who can qualify for standard insurance at the end of the first term will choose to do so, and those remaining will exhibit markedly higher A/E ratios than would be experienced for a comparable permanent policy. The second aspect is that term insurance can be used either as a base policy or as rider on another policy, and experience may differ between the two.

Table 14 shows the experience for renewable term plans with a term of 5, 10, 15, or 20 years:[6] base plans compared to term riders, and first term compared to renewal.

Table 14. Experience for term plans, policy year 2019–2020, smoker and non-smoker combined. Expected mortality on CIA2014

Size band	A/E		Std dev		Exposure		Deaths	
	Pols	Amt	Pols	Amt	Pols k	Amt m$	Pols	Amt k$
First term, base policies								
0–100k	108.2%	109.4%	7.7%	8.3%	38.7	1,906	161	7,437
100k–250k	90.1%	91.2%	3.7%	3.9%	358.4	48,341	584	76,894
250k–500k	95.5%	95.0%	4.1%	4.2%	535.4	154,281	497	141,577
500k–1m	86.6%	86.4%	5.3%	5.4%	457.4	253,389	275	151,370
1m+	61.2%	58.5%	7.6%	10.7%	220.6	314,765	93	133,047
All	90.1%	79.4%	2.2%	4.2%	1,610.5	772,683	1,610	510,324
First term, riders								
0–100k	-	112.1%	-	18.6%	-	607	-	1,377
100k–250k	-	102.2%	-	9.2%	-	16,494	-	14,744
250k–500k	-	117.6%	-	11.6%	-	28,458	-	21,227
500k–1m	-	88.3%	-	17.0%	-	29,760	-	13,859
1m+	-	70.7%	-	33.2%	-	22,820	-	9,767
All	-	96.4%	-	9.3%	-	98,138	-	60,974
Renewal terms, base policies								
0–100k	124.2%	123.7%	6.1%	6.6%	44.2	2,159	292	12,708
100k–250k	144.5%	142.5%	4.6%	4.8%	125.5	15,755	604	72,863
250k–500k	172.8%	170.7%	9.7%	9.9%	44.7	12,634	163	45,559
500k–1m	161.6%	162.4%	16.4%	16.7%	16.9	9,101	53	28,774
1m+	171.7%	163.2%	29.8%	35.2%	4.6	5,862	17	20,825
All	142.9%	152.4%	3.3%	5.5%	235.9	45,511	1,129	180,729
Renewal terms, riders								
0–100k	-	139.7%	-	10.6%	-	820	-	4,991
100k–250k	-	144.7%	-	10.3%	-	3,663	-	13,632
250k–500k	-	155.0%	-	23.8%	-	1,976	-	5,735
500k–1m	-	67.1%	-	47.8%	-	1,063	-	1,150
1m+	-	76.6%	-	97.9%	-	669	-	800

[6] The data specifications do not permit identifying any other length of term.

Size band	A/E	Std dev	Exposure	Deaths	Size band	A/E	Std dev	Exposure
	Pols	Amt	Pols	Amt		Pols	Amt	Pols
Renewal terms, riders								
All	-	135.3%	-	9.7%	-	8,190	-	26,308

A/E ratios are markedly higher for renewal terms compared to the initial term for base policies. The same is true for riders overall, but the difference within a size band is not always statistically significant.

A/E ratios are somewhat higher for riders than for base plans in the initial term but lower after the first renewal.

5 Experience for last five (or ten) years

Although it is important to observe the experience of each year closely, one cannot get the full picture of mortality within the Canadian life insurance industry from one year alone. It is better to examine at least five years. Over that time the effect of statistical fluctuation will be of less concern and the trend in mortality may emerge. Detailed tables for the last five policy years are in the Excel workbook associated with this report are available here. Some summary information follows.

However, note that not all companies contributed data in all years. The totals shown reflect the data received.

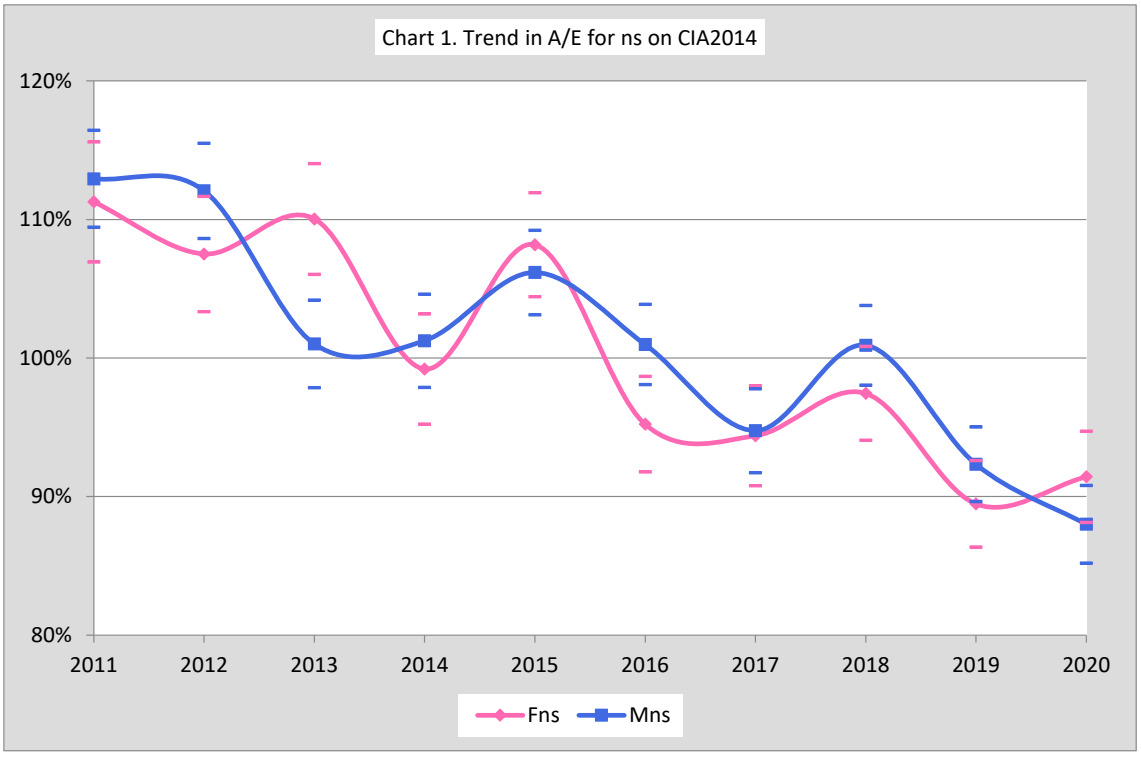
5.1 Trend in A/E ratios

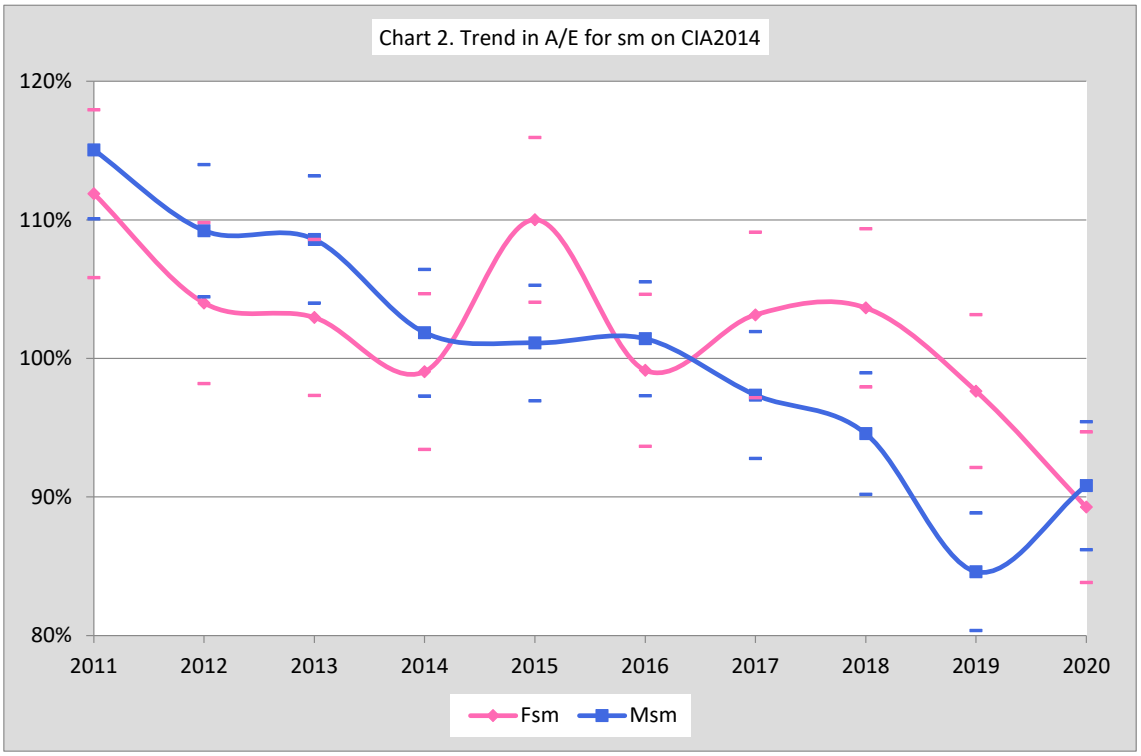
Table 15 shows the A/E ratios for each of the last five years and for the five years combined.

Table 15. Summary of experience by sex, policy years 2015–2020. Expected mortality on CIA2014

Policy year	A/E		Std dev		Exposure		Deaths	
	Pols	Amt	Pols	Amt	Pols k	Amt m$	Pols	Amt k$
Female								
2015–2016	100.5%	96.3%	0.6%	2.6%	4,299.4	646,807	26,152	926,005
2016–2017	101.7%	96.4%	0.6%	2.8%	4,070.2	623,235	26,690	950,832
2017–2018	102.7%	98.5%	0.6%	2.7%	4,359.6	729,158	28,508	1,131,830
2018–2019	98.9%	91.2%	0.5%	2.5%	4,462.0	771,794	28,508	1,135,453
2019–2020	99.1%	91.4%	0.5%	2.6%	4,175.2	717,658	28,849	1,141,783
Last 5 years	100.5%	94.5%	0.3%	1.2%	21,366.3	3,488,652	138,707	5,285,904
Male								
2015–2016	103.5%	100.1%	0.5%	2.0%	4,727.7	918,423	42,306	2,169,528
2016–2017	102.6%	95.8%	0.5%	2.1%	4,427.6	870,690	41,366	2,029,742
2017–2018	103.8%	99.6%	0.5%	2.1%	4,699.3	1,001,326	43,721	2,440,769
2018–2019	99.6%	91.1%	0.4%	2.0%	4,777.2	1,047,327	43,248	2,414,928
2019–2020	99.3%	89.8%	0.4%	2.0%	4,444.0	975,147	43,046	2,311,418
Last 5 years	101.7%	95.0%	0.2%	0.9%	23,075.9	4,812,914	213,686	11,366,385

Chart 1 shows the A/E ratio for non-smokers for each of the last 10 years for females (in pink) and males (in blue). There are pink and blue tick marks above and below the A/E lines that represent one standard deviation above and below the mean. Chart 2 shows comparable ratios for smokers.





The most notable change for the policy year ending 2020 is for female smokers. It shows the largest decrease of all risk classes. Female smokers had shown no improvement for several years, but now we see decreases two years in a row. However, it should be noted the change in the A/E ratio from 2019 to 2020 is not statistically significant.

One may have expected a larger increase in A/E ratios in the most recent year because of COVID-19,[7] but that is not evident. There are increases for female non-smokers and male smokers, but the increases are not statistically significant.

5.2 Size bands

Because the correlation between size and mortality is so significant, it is good to look at the A/E ratios over a five-year period to lessen the effect of fluctuation. Table 16 shows the ratios separately for females and males. (Recall that size bands are closed-open intervals.)

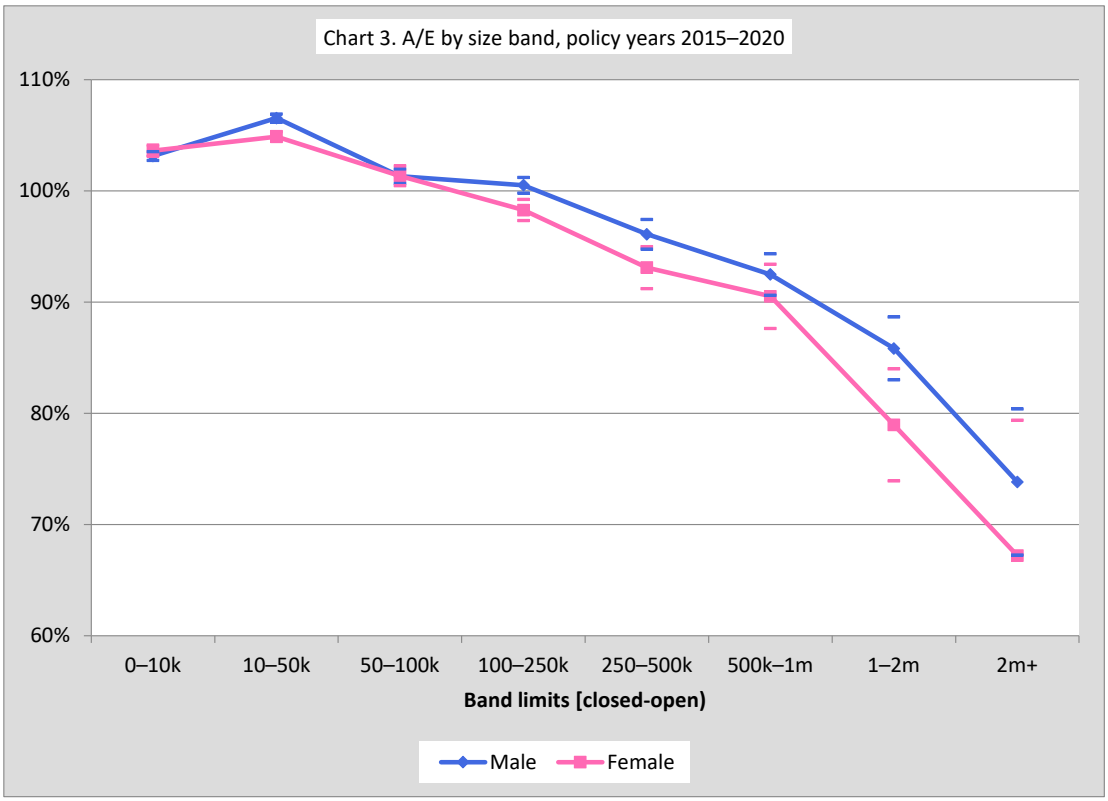
Table 16. Summary of experience, by sex and size, policy years 2015–2020. Expected mortality on CIA2014

Size band	A/E		Std dev		Exposure		Deaths	
	Pols	Amt	Pols	Amt	Pols k	Amt m$	Pols	Amt k$
Female								
0–10k	95.9%	103.6%	0.4%	0.5%	1,815.8	6,795	51,674	189,531
10k–50k	106.1%	104.9%	0.4%	0.4%	5,983.2	138,241	60,592	1,119,229
50k–100k	100.9%	101.4%	0.9%	0.9%	3,662.4	213,698	12,161	703,765
100k–250k	97.8%	98.3%	0.9%	0.9%	5,337.0	720,832	10,551	1,352,878
250k–500k	92.5%	93.1%	1.9%	1.9%	2,557.4	781,254	2,364	714,901
500k–1m	89.8%	90.5%	2.9%	2.9%	1,508.6	867,100	986	570,451
1m–2m	80.2%	79.0%	5.0%	5.0%	418.1	466,575	293	327,138
2m+	70.6%	67.2%	8.6%	12.2%	83.8	294,156	86	308,011
All	100.5%	94.5%	0.3%	1.2%	21,366.3	3,488,652	138,707	5,285,904
Male								
0–10k	96.2%	103.2%	0.3%	0.4%	2,031.0	8,629	70,332	303,847
10k–50k	107.9%	106.6%	0.3%	0.4%	6,066.2	140,215	90,797	1,835,624
50k–100k	101.8%	101.3%	0.6%	0.6%	3,637.1	216,912	23,174	1,386,444
100k–250k	100.6%	100.5%	0.7%	0.7%	5,578.7	750,815	20,492	2,636,414
250k–500k	95.7%	96.1%	1.3%	1.3%	2,770.4	847,102	5,043	1,532,694
500k–1m	92.1%	92.5%	1.8%	1.9%	1,930.9	1,113,565	2,509	1,449,249
1m–2m	85.3%	85.8%	2.8%	2.8%	820.1	916,779	1,017	1,156,326
2m+	79.9%	73.8%	4.8%	6.6%	241.5	818,897	323	1,065,788
All	101.7%	95.0%	0.2%	0.9%	23,075.9	4,812,914	213,686	11,366,385

Except for the first band, the A/E ratios decrease monotonically both by count and amount.

Chart 3 shows the A/E ratios by amount, the same information as in Table 16. The graphical display shows how strongly size and mortality are related, particularly for males. Note that the tick marks for one standard deviation above and below the observed mean are not evident for the first two bands because the numbers are so close together.

[7] There were few deaths due to COVID-19 prior to April 1, 2020. Because the period of study ends with the anniversary in 2020, only about 9/32 of the total exposure fell after April 1, 2020. Therefore, there would need to be very many COVID-19 deaths for their effect to be noticed in the total A/E ratios.



Although the downward trend by size seems strong for both males and females, we should also check the trend for non-smokers and for smokers. Chart 4 shows that the downward trend is even more clearly established for non-smokers.

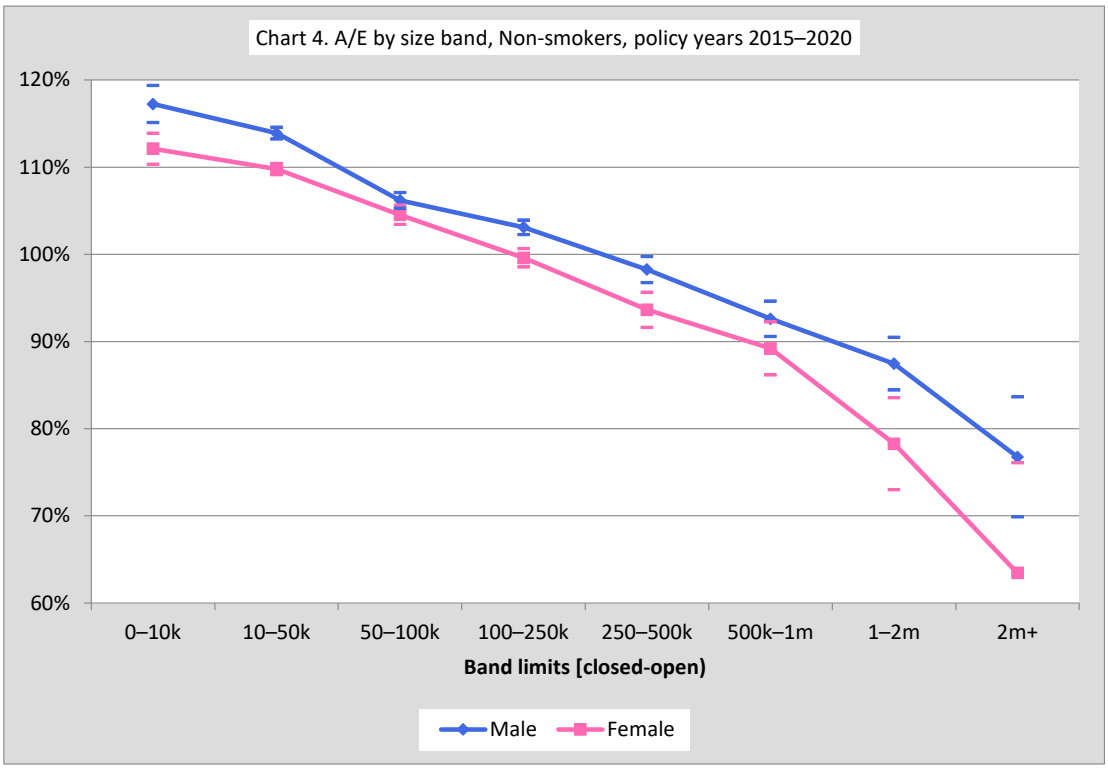
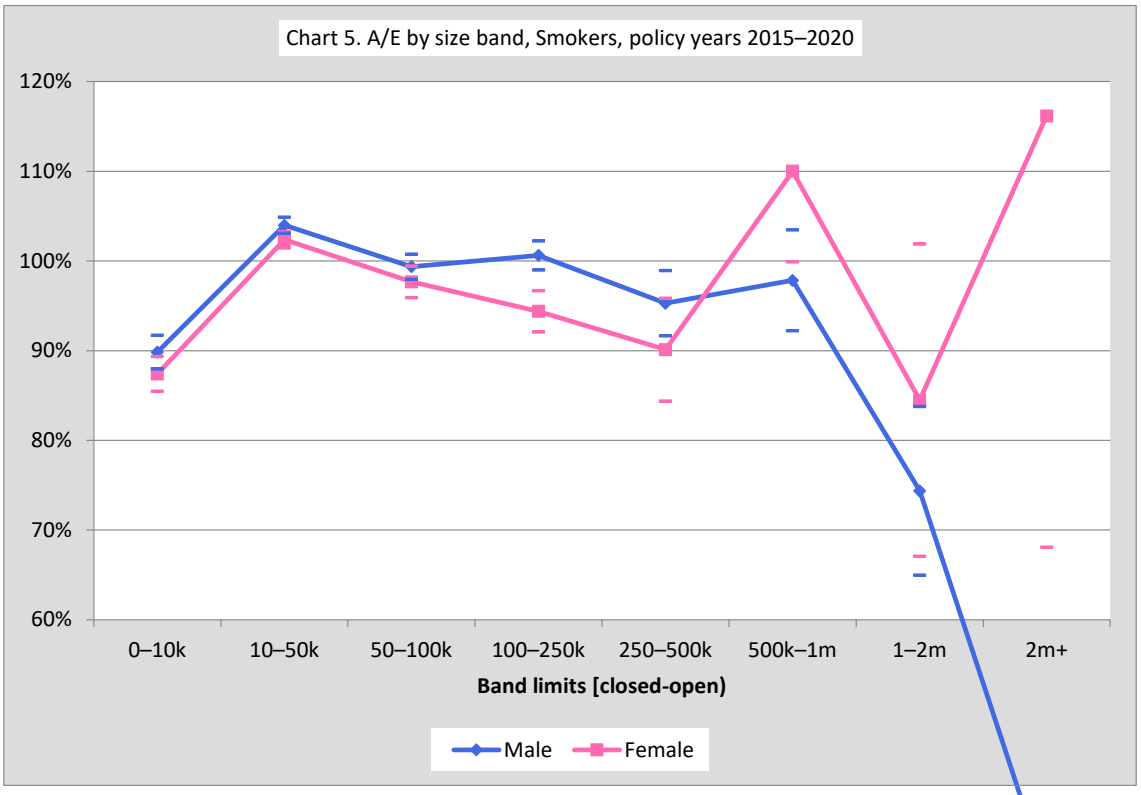


Chart 5 shows comparable information for smokers. The trend is less clear for smokers than for non-smokers. The A/E ratio for the first band is markedly lower than for the second, but thereafter the trend is generally downward. The slope is not as steep as for non-smokers. Incidentally, the average attained age of the first band is much older than for the other bands, mostly more than 20 years older.



5.3 Preferred underwriting

Table 17 shows information comparable to that of Table 7 but for the last five policy years rather than just the current year, and only the select period is shown because there is very little preferred or residual after the first 20 policy years.

With five years of data, we see that the A/E ratios by amount for females are directionally as we expect, and the differences appear to be statistically significant. For males, residual and preferred are as we expect, but the A/E ratio by amount for non-preferred is much higher than both residual and preferred rather than between them.

Table 17. Summary of experience, by sex and preferred class, policy year 2015–2020. Expected mortality on CIA2014								
Risk class	**A/E**		**Std dev**		**Exposure**		**Deaths**	
	Pols	**Amt**	**Pols**	**Amt**	**Pols k**	**Amt m$**	**Pols**	**Amt k$**
Select experience								
Female non-preferred	112.4%	91.2%	0.8%	3.2%	5,666.8	889,892	14,827	1,259,182
Female residual	109.9%	97.7%	1.3%	3.7%	4,382.8	1,214,814	5,645	837,051
Female preferred	87.2%	84.7%	2.7%	3.9%	1,973.3	934,996	1,141	416,960
Male non-preferred	118.3%	97.7%	0.8%	3.1%	5,430.3	1,099,389	16,832	2,008,332
Male residual	108.0%	94.3%	1.2%	3.0%	4,842.9	1,985,905	7,436	1,894,722
Male preferred	83.0%	81.0%	2.2%	3.6%	1,853.1	1,044,670	1,623	734,839
All	111.2%	92.9%	0.5%	1.4%	24,149.1	7,169,665	47,504	7,151,085

Table 18 shows a subset of the data in the previous table in the interest of making a fairer comparison between the categories shown. Only non-smokers are included because there are typically fewer preferred classes for smokers. Only size bands 4–7 are included (face-amount bands are for $100,000 to less than $2 million) because smaller sizes are rarely offered as preferred and large amounts are very volatile.

Table 18. Summary of experience, by sex and preferred class, face amounts of $100k or more and less than $2m, non-smoker only, policy years 2015–2020. Expected mortality on CIA2014								
Risk class	**A/E**		**Std dev**		**Exposure**		**Deaths**	
	Pols	**Amt**	**Pols**	**Amt**	**Pols k**	**Amt m$**	**Pols**	**Amt k$**
Select experience								
Female non-preferred	100.6%	92.1%	1.6%	2.2%	2,359.3	508,049	3,543	709,327
Female residual	103.1%	101.2%	2.1%	2.6%	2,958.4	1,003,408	2,270	607,386
Female preferred	87.7%	85.8%	2.8%	3.3%	1,866.8	852,363	1,048	371,025
Male non-preferred	105.8%	100.6%	1.5%	2.1%	2,262.9	578,455	4,471	1,071,864
Male residual	103.6%	101.1%	1.6%	2.1%	3,353.9	1,409,659	3,858	1,323,158
Male preferred	82.5%	80.6%	2.4%	2.8%	1,672.8	839,416	1,404	571,046
All	100.1%	95.3%	0.8%	1.0%	14,474.1	5,191,350	16,594	4,653,804

In this case, the differences between preferred and residual look more reasonable. Male non-preferred still looks high compared to residual, but not by as much as in Table 17. The ratio of preferred A/E by amount to residual A/E is 85% for females and 80% for males. These ratios give an estimate of the difference in mortality between preferred and residual, but the ratios should be used with caution. The mix of business may differ between preferred and residual, and the relationship between the two is likely to differ from company to company.

Incidentally, some errors in preferred class were discovered and corrected for two companies. The correction extends to all prior years for which preferred class was distinguished. Accordingly, reports on preferred in prior years should be disregarded.

5.4 Converted policies

Data has been submitted for policies that arise from conversions, but until this year, these policies have been excluded from the mortality report. In this section only, converted policies are included. The data specifications distinguish several types of conversions: term to permanent, term to term, from UL-YRT, from group, from other types of policies, and unknown type of conversion. Table 19 keeps term to permanent and group conversions separate and combines all other types of conversions. Note that only converted policies are included in the table. Expected mortality uses the duration from conversion, not from original issue. The latter would be preferred (except for group conversion, for which it is not applicable), but too few companies are able to provide the date of original issue.

Table 19. Summary of experience for converted policies, policy years 2016–2020. Expected mortality on CIA2014

Policy years	A/E		Std dev		Exposure		Deaths	
	Pols	Amt	Pols	Amt	Pols k	Amt m$	Pols	Amt k$
Converting term to permanent								
1–5	231.9%	176.1%	4.6%	14.5%	473.1	113,547	1,448	162,281
6–10	168.7%	140.6%	3.3%	9.4%	398.5	69,763	2,059	214,283
11–15	144.7%	129.0%	3.0%	8.8%	266.3	38,423	2,042	201,945
16–20	133.1%	122.7%	3.0%	8.7%	182.2	22,480	1,872	165,787
21+	108.0%	107.5%	1.3%	3.6%	417.2	32,923	7,397	428,188
All	128.7%	125.5%	1.0%	3.3%	1,737.3	277,137	14,818	1,172,484
Other individual conversions								
1–5	144.5%	143.8%	7.0%	12.1%	341.2	148,589	395	142,704
6–10	115.8%	97.9%	5.9%	9.4%	264.1	103,101	442	132,442
11–15	124.7%	143.7%	7.1%	13.0%	103.4	21,841	324	64,200
16–20	126.6%	112.2%	5.8%	11.4%	70.5	8,550	484	47,973
21+	116.4%	134.8%	5.9%	10.4%	36.0	4,644	412	56,876
All	124.6%	122.0%	2.8%	5.4%	815.3	286,724	2,057	444,195
Group conversions								
1–5	712.7%	981.7%	10.9%	16.4%	35.6	2,782	770	54,144
6–10	272.2%	287.0%	7.9%	12.0%	32.7	2,453	566	29,691
11–15	224.8%	244.8%	6.8%	10.5%	27.7	2,023	618	31,346
16–20	162.3%	166.0%	6.0%	9.5%	19.1	1,206	547	21,928
21+	137.2%	136.8%	1.9%	3.2%	117.0	3,734	4,242	94,218
All	167.7%	208.9%	1.7%	2.9%	232.1	12,198	6,743	231,328

A/E ratios for conversions from term to permanent are quite high in the initial five policy years, but there is a strong downward trend with increasing duration. The ultimate is closer to what is observed for the standard segment but is still about 12% higher. Term-to-permanent conversions in the ultimate have a higher average face amount when compared to the standard segment ($83k vs. $53k in the current study) and exhibit a higher mortality A/E in each face-size band.

A/E ratios for other individual conversions do not show a clear pattern.

A/E ratios for group conversions are very high initially, but they decrease rapidly. Group conversions have significantly higher mortality than term-to-permanent conversions at all durations. Ultimate group conversion mortality is higher than ultimate standard mortality for all attained ages. Ultimate group conversion mortality A/E decreases by attained age; however, it does not converge to the standard segment mortality A/E by attained ages 90–100.

The difference in mortality between the standard segment and group conversions is not explained by differences in face amount. Almost all group conversion experience has a face amount of less than 250k, and each size band below 250k is roughly 130% to 145% of standard ultimate mortality experience for the same size band.

5.5 Simplified issue

Data has been submitted for simplified-issue policies for seven years. This is the first year that experience on these policies is included in the annual report; they appear in this subsection only.

As stated in the request for data to contributing companies, “Simplified issue refers to products that ask a short list of health questions and require no physical evidence.”

Table 20 shows experience for simplified issue for the last five years. As expected, A/E ratios are much higher than for the standard segment. The differential is less for ultimate than for select. More detail can be found in the supplement to this report here.

Table 20. Summary of experience for simplified issue, policy years 2015–2020. Expected mortality on CIA2014

	A/E		Std dev		Exposure		Deaths	
	Pols	Amt	Pols	Amt	Pols k	Amt m$	Pols	Amt k$
Female select	235.4%	183.5%	3.3%	6.9%	307.5	38,462	2,086	48,235
Male select	252.3%	168.3%	3.7%	6.9%	269.5	36,183	1,732	56,022
Female ultimate	133.1%	143.2%	5.6%	7.8%	11.9	187	376	3,132
Male ultimate	148.8%	147.1%	8.2%	12.7%	10.2	197	198	2,247
All	220.9%	173.2%	2.2%	4.6%	599.1	75,030	4,392	109,636

6 Significant observations

The more significant observations for the study are:

1 There is no indication of a general increase in A/E ratios for 2019–2020 due to COVID-19, but the policy year under study was mostly before the pandemic.
2 The A/E ratios decrease strongly with increasing face amount. Size and mortality are strongly correlated. Size is probably the most significant factor not currently reflected in standard mortality tables.
3 The ratio of A/E ratios between preferred and residual are 80% for males and 85% for females. The difference in A/E ratios between preferred and non-preferred is about what one might expect. The difference between residual and non-preferred is less clear.
4 The mortality experience for group conversions and for term policies converted to permanent is significantly higher than for the standard segment, and remains higher in the ultimate period.

5 Mortality experience for simplified-issue policies is higher than the standard segment, and this persists into the ultimate policy years.

6 Mortality for renewable term riders appears to be higher than for base renewable term in the first period, and lower in renewal periods.

7 For further study

7.1 Additional tables available

More detailed tables for the last five years (not for the current year only) are available in an Excel workbook here. The format of all tables is the same as shown above for Table 3. There is a worksheet called "Index" which list all tables available and provides a hyperlink to each table.

7.2 Database for independent study

The format for the database has changed this year to include a par/non-par indicator. There is a file, in comma-separated-value format, for each of the current year and the prior ten years.[8] The database contains expected fields on CIA2014. There is a supplied Excel workbook which may be used to change the table for expected mortality to any table desired by the member. CIA2014, CIA9704, and CIA8692 are supplied in the workbook. The member may use one of these tables as published or apply a multiple to it, or add a worksheet for a completely different table.

There is a zipped archive containing each of the eleven years, available here. The archive contains the databases, text files with a detailed description of the database and its codes, and said workbook.

8 Credits

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:

Alison Rose (Research Council Chair)
Nicolas Genois (Experience Research Committee Chair)
Colin Sproat (Project Oversight Group Chair)

Project Oversight Group:

Kevin Hu
Aaron Lam
Stella Ma
Donna Mann-Campbell
Simon Martel
Joel Smith
Rita Wu

[8] The new databases differ from those published with the prior report because of corrections to the data. Most notable is the change in the preferred type.

Canadian Institute of Actuaries
360 Albert Street, Suite 1740
Ottawa, ON K1R 7X7
613-236-8196
head.office@cia-ica.ca
cia-ica.ca
seeingbeyondrisk.ca

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