

## *Mortality Study*

# Canadian Standard Ordinary Life Experience 2014–2015 Using 86–92 Tables

Research Executive Committee –  
Experience Studies Subcommittee

July 2017

Document 217077

*Ce document est disponible en français*  
© 2017 Canadian Institute of Actuaries

## **Mortality Under Canadian Standard Ordinary Insurance Issues Studied Between the 2014 and 2015 Anniversaries Using 86–92 Tables**

This is the 66<sup>th</sup> annual report of the intercompany mortality experience for Canadian standard ordinary life insurance policies. This study covers the one year period between policy anniversaries in 2014 and 2015 on an age nearest birthday basis. It has been approved by the CIA Research Executive Committee. This is the 22<sup>nd</sup> year that we have collected data in a seriatim format.

Exposures are calculated using the “actuarial exposure” method, in which a full year of exposure is credited in the year of death. For data with attained age less than 16, the expected mortality rates are based on the aggregate CIA 86–92 table. For data submitted without classification by sex, the male table was used.

The CIA 86–92 tables do not contain mortality rates for issue ages beyond 80. For this study, the expected select mortality rates for issue ages 81+ are set equal to the rate for the previous issue age, shifted by one duration. For example, the expected mortality rate for issue age 81 at duration 1 is set equal to the mortality rate for issue age 80 at duration 2.

The following data were excluded from the study: substandard lives, joint lives, group conversions, simplified issue, and guarantee issue policies. Note that policies in the post renewal term period are included.

This is the 10<sup>th</sup> year that participating companies provided a preferred basis indicator (yes, no) according to the type of underwriting. Where the preferred indicator is yes, the companies also specified the underwriting class and whether the business is standard or preferred and smoker, non-smoker, or cigar-smoker. If the underwriting type is preferred, the underwriting class is either Preferred (better than Standard) or Standard (residual) class.

We asked the contributing companies to provide data for converted policies separately. We requested that the date of conversion be provided in addition to the original policy issue date. Unfortunately, not all companies were able to provide adequate data on conversions, so it was decided not to include the experience for converted policies when the issue date was the same as the conversion date. Note that at least one company was not able to separately identify converted policies, so this group of policies with unknown conversion status is still included in the study.

This year we also added two termination type codes: In-force on waiver and In-force with waiver unknown. For the second year we were unable to present results by “Evidence”, i.e., medical, nonmedical and paramedical, as too few companies contributed data for this field. There were also inconsistencies among companies in terms of how business was classified into the evidence categories.

Two years ago we asked each contributing company whether it reports lapse terminations at the beginning or the end of the grace period. More than half of the contributing companies set the effective date of lapse to the beginning of the grace period. No adjustments were made to the termination dates.

Throughout the report we include the standard deviation (S.D.) for each of the mortality results. The S.D. provides estimates of the standard deviation of the ratios of actual to expected

mortality based on the numbers of deaths. The S.D. measures the degree of confidence in the mortality ratios. The formula used to calculate the standard deviations is:

$$S.D. = \frac{(\text{actual number of deaths})^{1/2}}{\text{expected number of deaths}}$$

There is considerable variation in the A/E results by age, sex, and issue age. For this reason, summaries of A/E for other variables are most useful for fixed segments by age, sex, and issue age.

The results of the 2014–2015 mortality study are presented in the following tables. The table numbering is consistent with previous reports.

- **Table 1** The total experience for the select period by groups of duration and by groups of ages at issue and for the ultimate period by groups of attained ages
- **Table 2** Table 1 classified by sex
- **Table 8** Total experience by smoking status, sex, and band
- **Table 9** Total experience by type of insurance
- **Table 10** Total experience by smoking status, sex, band, and preferred status
- We also show **tables 1, 2, and 8** based on **five-year aggregate** data (2010–2015).
- We have also included **tables 1, 2, and 8** broken down by the following **face amount bands**:
  - < \$10,000
  - \$10,000–\$49,999
  - \$50,000–\$99,999
  - \$100,000–\$249,999
  - \$250,000–\$499,999
  - \$500,000–\$999,999
  - \$1,000,000 and over

The above tables are appended in Excel format; they have indices at the tops of the files with links to each of the individual tables below the indices.

In addition, we have provided the data as a comma-delimited text file that can be downloaded from the CIA website. The file is [IndLifeMDB.1415.zip](#). A description of the included fields is in the appendix to this report.

The 2014–2015 study is based on data from eight contributing companies. The contribution percentages in table C1 below are based on exposures by dollar amounts. Percentages may not add up to 100% due to rounding.

**Table C1. Companies that Participated in the 2013–2014 and 2014–2015 Studies**

Company	Includes	Contribution	
		2013–2014	2014–2015
Desjardins Laurentian Life	Imperial Life; Laurier	3.5%	3.3%
Equitable		4.7%	4.3%
Great-West Life	London Life; Canada Life	27.3%	24.4%
Industrial Alliance		13.0%	11.8%
Manulife	Maritime Life	25.4%	23.7%
RBC		7.4%	6.2%
Sun Life		18.7%	16.5%
Transamerica/ivari		0.0%	9.9%
Total Exposures		100.0%	100.0%

In Table C2 we show the Percentage Departure, which represents the absolute relative deviation of the company-specific A/E by amount from the overall A/E by amount (first line of table C4). The absolute relative deviation is calculated as:

$$\text{abs}[(\text{Company A/E}) / (\text{Overall A/E}) - 1]$$

The median relative Percentage Departure is 4.8%.

**Table C2. Company Experience Ratio Variability**

Percentage Departure	Number of Companies	Actual Claims	Percentage of Claims
5% or less	5	\$1,855,644,050	60.0%
Over 5%	3	\$1,234,968,405	40.0%
Total	8	\$3,090,612,455	100.0%

Tables C3(a–d): comparison of 2014–2015 total exposures, death claims, average claim, and average exposure with previous studies.

**Table C3a. Total Exposures**

<b>Exposures</b>	<b>2010–2011</b>	<b>2011–2012</b>	<b>2012–2013</b>	<b>2013–2014</b>	<b>2014–2015</b>
By Number	8,937,129	8,779,040	8,917,330	8,104,149	8,509,835
By Amount (Millions)	\$1,217,823	\$1,270,814	\$1,384,280	\$1,301,344	\$1,512,191

**Table C3b. Death Claims**

<b>Death Claims</b>	<b>2010–2011</b>	<b>2011–2012</b>	<b>2012–2013</b>	<b>2013–2014</b>	<b>2014–2015</b>
By Number	63,901	63,269	65,611	64,722	68,583
By Amount ('000)	\$2,320,143	\$2,427,673	\$2,566,749	\$2,560,849	\$3,090,612

**Table C3c. Average Claims**

<b>Average Claim</b>	<b>2010–2011</b>	<b>2011–2012</b>	<b>2012–2013</b>	<b>2013–2014</b>	<b>2014–2015</b>
By Amount	\$36,308	\$38,371	\$39,121	\$39,567	\$45,064

**Table C3d. Average Exposures (Sum Assured)**

<b>Average Exposures</b>	<b>2010–2011</b>	<b>2011–2012</b>	<b>2012–2013</b>	<b>2013–2014</b>	<b>2014–2015</b>
Males	\$154,464	\$163,491	\$174,962	\$180,663	\$199,878
Females	\$115,397	\$123,431	\$133,040	\$138,159	\$153,142
Combined	\$136,266	\$144,755	\$155,235	\$160,578	\$177,699

**Table C4. Comparison of Ratios (A/E) by Amount**

	<b>Experience</b>	<b>2010–2011</b>	<b>2011–2012</b>	<b>2012–2013</b>	<b>2013–2014</b>	<b>2014–2015</b>
Male & Female	Select & Ultimate	55.5	54.2	52.3	51.3	53.1
Male	Select & Ultimate	53.7	52.8	49.9	49.7	50.6
Female	Select & Ultimate	60.5	58.1	59.0	55.5	60.0
Male & Female	Select	52.2	50.4	47.9	47.6	49.0
Male	Select	51.3	49.2	45.3	47.1	47.8
Female	Select	54.3	53.1	53.8	48.7	51.7
Male & Female	Ultimate	58.0	57.0	55.4	53.5	55.7
Male	Ultimate	55.4	55.2	52.8	51.1	52.1
Female	Ultimate	66.6	62.7	63.5	60.7	66.3
Male, Smoker	Select	54.4	50.4	51.1	48.5	49.0
Male, Non-smoker	Select	50.7	49.8	44.9	47.6	46.8
Male, Unclassified	Select	50.6	41.4	40.0	40.7	54.9
Female, Smoker	Select	66.7	62.8	62.8	61.7	71.8
Female, Non-smoker	Select	52.7	52.6	54.0	47.1	49.8
Female, Unclassified	Select	48.8	41.9	38.1	45.5	42.4
Male, Smoker	Ultimate	57.7	56.4	56.2	53.2	50.2
Male, Non-smoker	Ultimate	50.7	51.6	47.1	45.8	49.1
Male, Unclassified	Ultimate	62.4	61.3	62.7	60.7	60.4
Female, Smoker	Ultimate	85.9	79.3	78.8	76.3	84.5
Female, Non-smoker	Ultimate	58.5	55.8	57.3	53.7	60.5
Female, Unclassified	Ultimate	74.3	70.2	71.3	71.0	73.4
Male, Smoker, Preferred	Select & Ultimate	49.1	51.4	37.6	38.2	47.2
Male, Non-smoker, Preferred	Select & Ultimate	43.8	46.1	37.0	46.7	43.2
Female, Smoker, Preferred	Select & Ultimate	45.6	45.4	39.1	51.1	75.6
Female, Non-smoker, Preferred	Select & Ultimate	47.8	48.2	40.4	50.0	47.4

**Table C5. Exposures for Policies with Face Amounts  $\geq$  \$1,000,000 Included in the Five Most Recent Studies**

	2010–2011	2011–2012	2012–2013	2013–2014	2014–2015
<b>Exposure #</b>	158,982	174,737	199,553	155,360	189,836
<b>Exposure Amount ('000)</b>	\$252,392,630	\$278,461,795	\$317,479,575	\$315,769,764	\$381,069,916
<b>A/E #</b>	45.1	43.0	43.6	44.6	45.9
<b>A/E Amount</b>	43.0	44.3	40.9	40.1	47.3

**Table C6. Claims for Policies with Death Benefit Amounts  $\geq$  \$1,000,000 Included in the Five Most Recent Studies**

	2010–2011		2011–2012		2012–2013		2013–2014		2014–2015	
	#	\$ (Millions)	#	\$ (Millions)	#	\$ (Millions)	#	\$ (Millions)	#	\$ (Millions)
<b>Select</b>										
<b>Male Smokers</b>	10	13.150	10	13.640	14	21.002	10	15.556	8	14.425
<b>Male Non-smokers</b>	80	142.714	92	164.421	87	133.613	78	156.222	84	207.944
<b>Unclassified Males</b>	13	17.000	5	14.000	17	20.100	11	16.000	21	38.471
<b>Female Smokers</b>	1	1.000	3	3.000	1	1.000	1	1.400	2	6.000
<b>Female Non-smokers</b>	14	16.888	17	26.880	28	50.882	29	46.052	24	39.679
<b>Unclassified Females</b>	2	2.000	0	0.000	2	2.000	3	3.500	4	5.500
<b>Ultimate</b>										
<b>All</b>	68	109.145	70	123.378	77	133.982	74	123.846	126	226.322
<b>TOTAL</b>	188	301.896	197	345.319	226	362.579	206	362.575	269	538.340

In table C6, the Ultimate claims for 2014–2015 were for 99 males (five smokers, 86 non-smokers, eight unclassified) and 27 females (three smokers, 24 non-smokers).

**Table C7. Comparison of Ratios (A/E) by Amount for Five-Year Periods**

	<b>Experience</b>	<b>2006–2011</b>	<b>2007–2012</b>	<b>2008–2013</b>	<b>2009–2014</b>	<b>2010–2015</b>
Male & Female	Select & Ultimate	58.8	56.9	55.4	53.5	53.2
Male	Select & Ultimate	57.0	55.4	53.7	51.8	51.2
Female	Select & Ultimate	64.0	61.5	60.4	58.3	58.6
Male & Female	Select	56.8	54.4	52.3	50.3	49.4
Male	Select	54.9	52.9	50.7	49.2	48.1
Female	Select	61.3	57.8	56.1	52.9	52.3
Male & Female	Ultimate	60.5	59.0	57.8	55.9	55.8
Male	Ultimate	58.5	57.1	55.8	53.6	53.1
Female	Ultimate	67.1	65.3	64.6	63.1	63.9
Male, Smoker	Select	63.9	60.2	58.2	54.5	50.7
Male, Non-smoker	Select	53.0	51.7	49.7	48.7	47.9
Male, Unclassified	Select	50.5	45.9	43.5	42.8	45.5
Female, Smoker	Select	71.8	69.1	66.2	63.2	65.3
Female, Non-smoker	Select	59.5	56.3	55.2	52.0	51.2
Female, Unclassified	Select	55.4	48.3	43.1	43.4	43.0
Male, Smoker	Ultimate	58.9	57.7	57.2	55.6	54.4
Male, Non-smoker	Ultimate	54.1	53.2	51.6	48.8	48.7
Male, Unclassified	Ultimate	64.5	63.0	62.2	61.4	61.4
Female, Smoker	Ultimate	79.6	79.6	79.7	79.3	80.9
Female, Non-smoker	Ultimate	58.6	57.5	57.3	55.9	57.3
Female, Unclassified	Ultimate	77.1	74.4	73.1	72.0	72.0



This report was approved by the CIA Research Executive Committee, the Experience Studies Subcommittee, and the Project Oversight Group:

Faizel Alladina (Research Executive Committee Chair)  
Damien Lapointe Nguyen (Experience Studies Subcommittee Chair)  
Vera Ljucovic (Project Oversight Group Chair)

Donna Mann-Campbell  
Dan (Anh-Khoa) Le  
John Pfeffer  
Nicolas Rochon  
Colin Sproat

The report was prepared by Barbara Thomson of Thomson Data Analysis, Toronto, ON.  
April 2017.

**Appendix:** A description of the fields included in the comma-delimited text file IndLifeMDB.1415.csv.

<b>Year</b>	2015 = Policy Year 2014–2015	
<b>Sex</b>	1 = Male; 2 = Female; 0 = Unknown.	
<b>Smoker</b>	1 = Smoker; 2 = Non-smoker; 3 = Smoking status unknown.	
<b>Type of Insurance</b>	Policy Type:	
	1. Whole Life	
	2. Renewable Term with 10-year renewal term (T10)	
	3. Renewable Term with 20-year renewal term (T20)	
	4. Other Renewable Terms (ART, T5, T15, Other)	
	5. Term Rider with 10-year renewal term (T10)	
	6. Term Rider with 20-year renewal term (T20)	
	7. Other Renewable Term Riders (ART, T5, T15)	
	8. Universal Life with YRT Cost of Insurance (UL YRT)	
	9. Universal Life with Level Cost of Insurance (UL LCOI) or Limited Pay	
	10. Term to 100	
	11. Other Permanent	
	12. Other (includes Other Terms and Other Term Riders)	
<b>Face Size</b>		
	1. < \$10,000	5. \$250,000–\$499,999
	2. \$10,000–\$49,999	6. \$500,000–\$999,999
	3. \$50,000–\$99,999	7. \$1,000,000 and over
	4. \$100,000–\$249,999	
<b>Preferred Class</b>		
	Policy experience is divided between Preferred and Standard underwriting types. If the underwriting type is Preferred, the policy experience is further divided by Preferred Class as either Preferred (better than standard) or Standard (last) class:	
	01 = standard underwriting and N/A for preferred class	
	02 = preferred underwriting and preferred class = standard	
	03 = preferred underwriting and preferred class = preferred	
<b>DB Dur</b>	Policy duration	
<b>DB Issue Age</b>	Issue age	
<b>Sum of # Exposed</b>		
<b>Sum of \$ Exposed</b>		
<b>Sum of # Deaths</b>		
<b>Sum of \$ Claims</b>		
<b>8692 # Exp Deaths</b>	$8692 \text{ QX} \times \text{Sum of \# Exposed} / 1000$	
<b>8692 \$ Exp Claims</b>	$8692 \text{ QX} \times \text{Sum of \$ Exposed} / 1000$	
<b>9704 # Exp Deaths</b>	$9704 \text{ QX} \times \text{Sum of \# Exposed} / 1000$	
<b>9704 \$ Exp Claims</b>	$9704 \text{ QX} \times \text{Sum of \$ Exposed} / 1000$	