

2009-2013 Individual Life Insurance Mortality Experience Report



October 2017



2009-2013 Individual Life Insurance Mortality Experience Report

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Society of Actuaries

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Preface

October 2017 Updates

References to Appendices J, K, L and M in Section 4.2 have been updated to refer to Appendices I, J, K and L. A couple other wording clarifications have also been updated.

Section 1: Purpose of the Study

This study and report have the following primary purposes:

1. Compare recent mortality experience relative to standard industry mortality tables, primarily at a broad level.
2. Provide a comparison of recent mortality experience gathered from required Statistical Agent data submissions (VM-51) to that gathered from prior voluntary SOA data contributions.
3. Provide the actuary with relevant insights into the current experience and industry changes, which have impacts on this experience.
4. Provide the underlying data in spreadsheet pivot tables format for further investigation by qualified actuaries. Provide data also in CSV (comma delimited) format for use with other software tools.

Any comparison of mortality trends should be considered carefully and evaluated with attention to all underlying factors. Results observed may reflect impacts of variables not included in the current analysis, and frequently a deeper dive is necessary for understanding. Multivariate predictive modeling techniques are well suited to help the actuary understand results.

An actuary using this report should make his/her own determination concerning the applicability of this information to his/her individual purpose and use.

Section 2: Acknowledgements and Resources

2.1 Individual Life Experience Committee

The SOA extends its gratitude to the Individual Life Experience Committee (ILEC). The ILEC designed the project, completed/oversaw the analyses and authored and peer reviewed the report. The ILEC members are:

- Dieter Gaubatz (Chair), FSA, MAAA
- Tony Phipps (Vice-chair), FSA, MAAA
- Mary Bahna-Nolan, FSA, MAAA, CERA
- Tatiana Berezin, FSA, MAAA
- Chris Condon, FSA, MAAA
- Jeff Dukes, FSA, MAAA
- Roland Fawthrop, FSA, MAAA
- Brian Holland, FSA, MAAA
- Ed Hui, FSA, MAAA, CFA
- Doug Ingle, Underwriter
- Kevin Larsen, ASA, MAAA
- Hezhong (Mark) Ma, FSA, MAAA
- Steve MacDonald, Underwriter
- Mark Rosa, ASA, MAAA
- Nikolai Serykh, FSA, FCIA
- Frans Te Groen, FSA, MAAA
- Maureen Shaughnessy, FSA, MAAA
- Ed Wright, FSA, MAAA

2.2 Other Resources

The SOA contracted with MIB's Actuarial and Statistical Research Group to collect, validate, and compile the data underlying this report. Mervyn Kopinsky (SOA Experience Studies Actuary), Cindy MacDonald (SOA Experience Studies Actuary), and Korrel Rosenberg (SOA Senior Research Administrator), supplied SOA staff support.

Section 3: Overview

3.1 Background

This section of the report describes the data that was compiled for the SOA's Individual Life Experience Committee (ILEC) to use in the development of the latest mortality study, the 2009-2013 Individual Life Experience Report. Data from four prior ILEC studies have been appended to the new experience data to create a composite data set for all years 2003-2013. The four prior ILEC studies were the 2002-2004 Individual Life Experience Report, the 2004-2005 Individual Life Experience Report, the 2005-2007 Individual Life Experience Report, and the 2008-2009 Individual Life Experience Report. Each of these reports is available on the SOA website (www.soa.org).

The data used in this study is available in Excel pivot tables and also in CSV (comma delimited) files. More details on the use and format of these files can be found in Section 5 of this report. With these data files, the reader may pursue their own detailed analysis as desired.

This data can be used to reproduce data used for various past analyses:

- 2002-2004 Individual Life Experience Report
- 2004-2005 Individual Life Experience Report
- 2005-2007 Individual Life Experience Report
- 2007-2009 Individual Life Experience Report

3.2 Scope

As with the prior studies of the ILEC, this report examines mortality under standard individually underwritten life insurance and excludes rated, converted, and guaranteed or simplified issued business. For the data underlying this report, the ILEC has relied upon the data integrity of the individual company submissions and the data validation performed by the statistical agent on behalf of those companies and regulators. It should be noted that the definition of simplified issue has become increasingly blurred in recent years and may not be consistent across companies.

The data includes experience on direct written business in the U.S. and no assumed reinsurance business is included. The number of companies contributing in the new data is significant. The following table lists the number of companies in each calendar study year 2009-2013:

Calendar Year	# Companies	Source
2009	58	NY required, KS voluntary
2010	64	NY required, KS voluntary
2011	82	NY required, KS required
2012	84	NY required, KS required
2013	84	NY required, KS required

3.3 Methodology

Most of the data for each of the new study years 2009-2013 have been gathered through the required experience reporting of New York Department of Financial Services (NYDFS) and the Kansas Insurance Department (KID). These mandatory submissions utilized the VM-51 record format in the Valuation Manual. NYDFS began requiring VM-51 data submissions in 2009 and forward for companies licensed to write business in New York. KID began requiring VM-51 data submissions in 2011 and forward for companies licensed to write business in Kansas.

Companies who were required to submit data in 2011 for the KID data call were requested on a voluntary basis to provide their experience data for 2009 and 2010 as well. This data has been included. Some companies did provide this voluntary data, but not all. The result is somewhat lower exposure counts and amounts in 2009-2010.

Unlike previous studies of the ILEC, the data for each of the five new study years 2009-2013 are organized on a calendar-year basis. Previous studies were on a policy year or anniversary-to-anniversary basis. This results in 2009 potentially containing overlap data from each data source (for companies who contributed in both). The potential redundancy comes from policy year exposures on anniversaries initiated during 2008 and completed in 2009. To address this issue, the data isolates, and counts only once, claims and exposures occurring for policy years that complete sometime in 2009. In the pivot tables and CSV files, these exposures are referred to as “ILEC LSS 09.” Throughout this report, study years 2009-2013 include that overlap data, even though it was also included and reported in the prior study. To summarize, the “Source_Name” field in the data contains these three possible values:

- “ILEC 02-09”
 - o Data from prior studies
 - o Anniversary-to-anniversary basis
 - o Excludes any exposures in calendar year 2009 for companies that contributed to both sources
- “ILEC LSS 09”
 - o Overlap data
 - o Includes exposures prior to policy anniversary in 2009 for companies
- “LSS 09-13”
 - o Data from new study years
 - o Calendar-year basis
 - o Excludes any exposures prior to policy anniversary in 2009 for companies that contributed to both sources

With the calendar-year method, exposure formulas were used that are consistent with the Balducci assumption. This approach is commonly used in the industry for life insurance mortality studies. The Balducci assumption is used for convenience in the tabulation of exposures. It may, in some situations, produce nonsensical results, but these situations tend to occur only at very high attained ages and/or where there are limited exposures.

Except where noted otherwise, the expected mortality basis used in the calculation of Actual-to-Expected (A/E) ratios in this report is the 2015 Valuation Basic Table (2015 VBT), RR 100. Life insurance writers in the U.S. issue policies on both an Age Last Birthday (ALB) basis and an Age Nearest Birthday

(ANB) basis. The calculation of A/E ratios utilized the version of the expected table consistent with how the company indicated their data was organized. Similarly, the application of smoker-distinct versus composite (uni-smoke) tables relied on the indication made by the submitting company. However, composite tables were used as the expected basis for all business issued prior to 1980, regardless of smoking status indicated, as the ILEC believes smoking as a distinct policy status to be rare prior to that period. When smoker distinct rates were first introduced, the smoking status field was added to databases. Many companies filled in this field for their entire portfolio of previously issued composite smoking policies as smokers. Others defaulted all of that business to non-smokers.

Section 4: Discussion

The following sections of this report discuss in more detail analysis and trends for particular segments within the data. As noted previously in this report, A/E results are shown with the 2015 VBT table as the expected table. Please note the 2015 VBT table relied heavily on the experience from 2002-2009, with adjustments and improvement applied as appropriate. Company participation between the two study periods (2002-2009 and 2009-2013) is quite different and some results may be reflective of that difference.

The term “improvement” has been used generically within this document when comparing changes or trends in mortality results between study periods or by study year. The reader should understand the use of this term does not imply any connection to a formal mortality improvement measure as the mortality trends observed through the 2002-2013 study years are greatly influenced by differences in mix of business, changes in underwriting, and changes in the companies that contributed data.

4.1 2009-2013 Study Years vs Prior Years

Comparing the data submitted voluntarily to the SOA for anniversary years ending in 2009 to the new data for calendar year 2013:

- Number of companies participating increased 138% (from 37 to 88)
- Number of claims increased 53%
- Claim amounts increased 186%
- Exposure policy years increased 66%
- Exposure amount years increased 142%

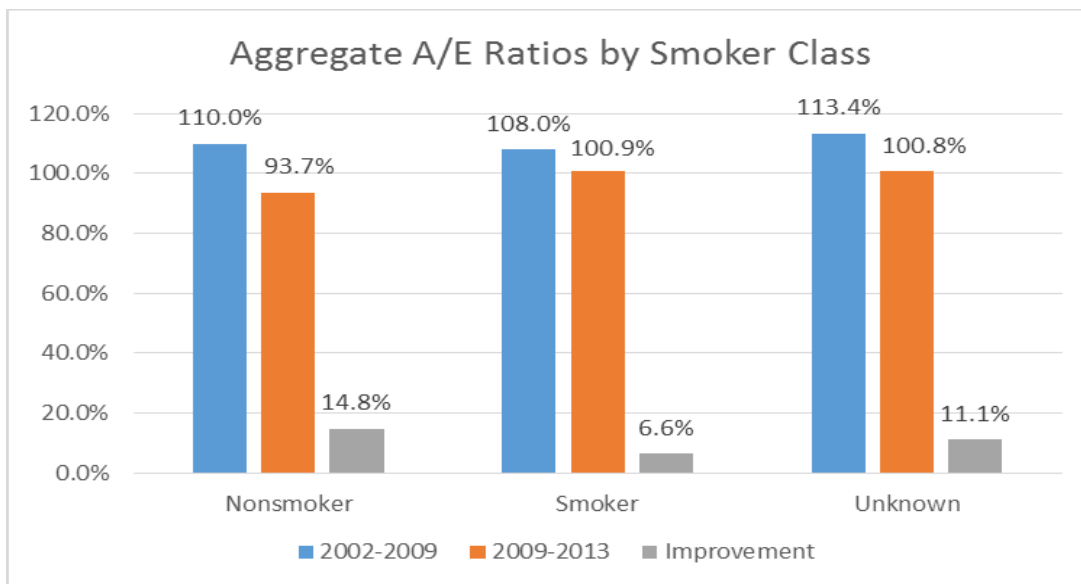
When comparing aggregate mortality data from the prior mortality studies observation periods (2002-2009) to the current observation periods (2009-2013), there are clear improvements exhibited. The following results are based upon looking at the data with the following filters:

- Issue ages 18+
- Term policies excluded in the post-level premium period
- ET/RPU (Extended Term/Reduced Paid-Up) excluded

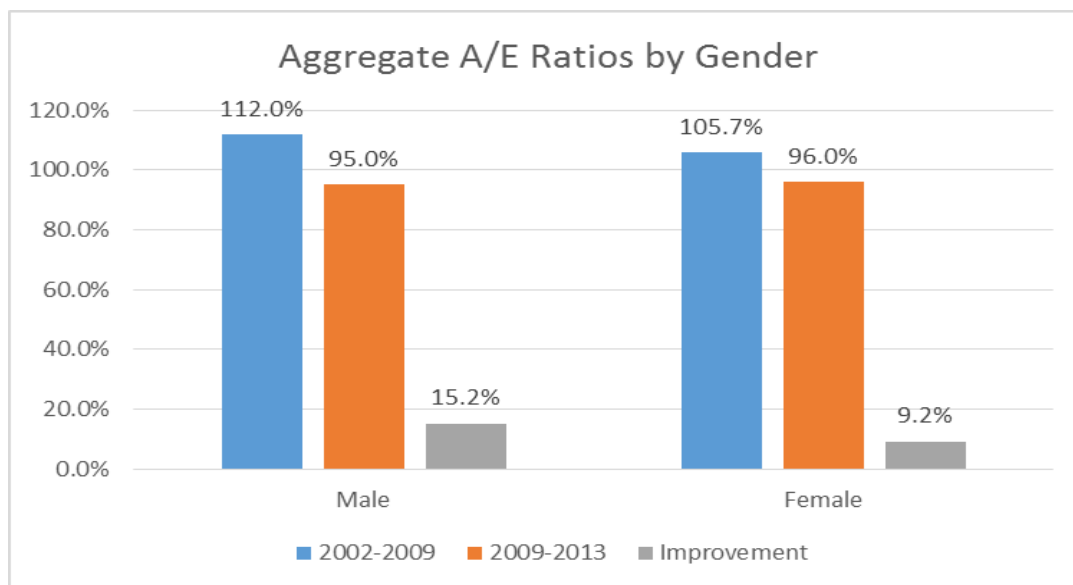
The aggregate actual-to-expected (A/E) mortality ratio for the observation period 2002-2009 was 110.3%, while the A/E ratio for the 2009-2013 period is 95.3%. This is a 14% reduction in mortality experience between the two periods. Similar improvement trends can be seen when looking at more detailed breakouts of the data.

The graphs below compare actual-to-expected mortality ratios using the 2015 VBT as the basis for the expected.

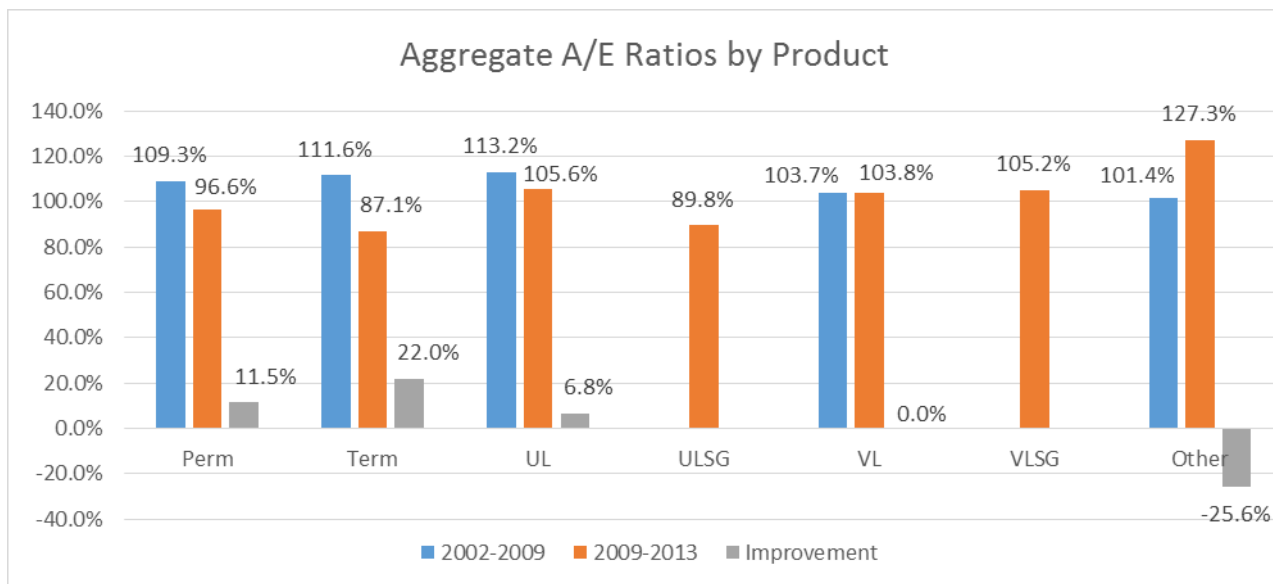
While mortality is lower in all smoking classes, including unknown, the greatest improvement is seen in the nonsmokers. The actual-to-expected (A/E) ratio for the 2009-2013 observation period is 14.9% (1-93.7%/110.0%) lower than what was observed from 2002-2009.



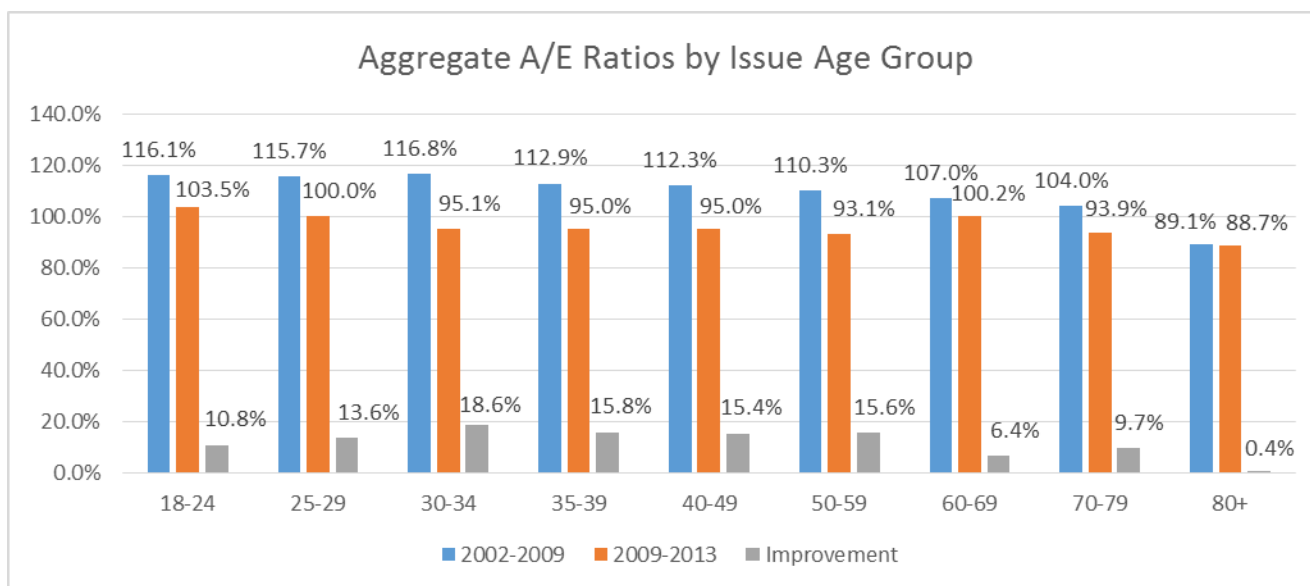
When looking at the data by gender, female mortality A/E ratios decreased by 9.2% compared to the male decrease of 15.2%.



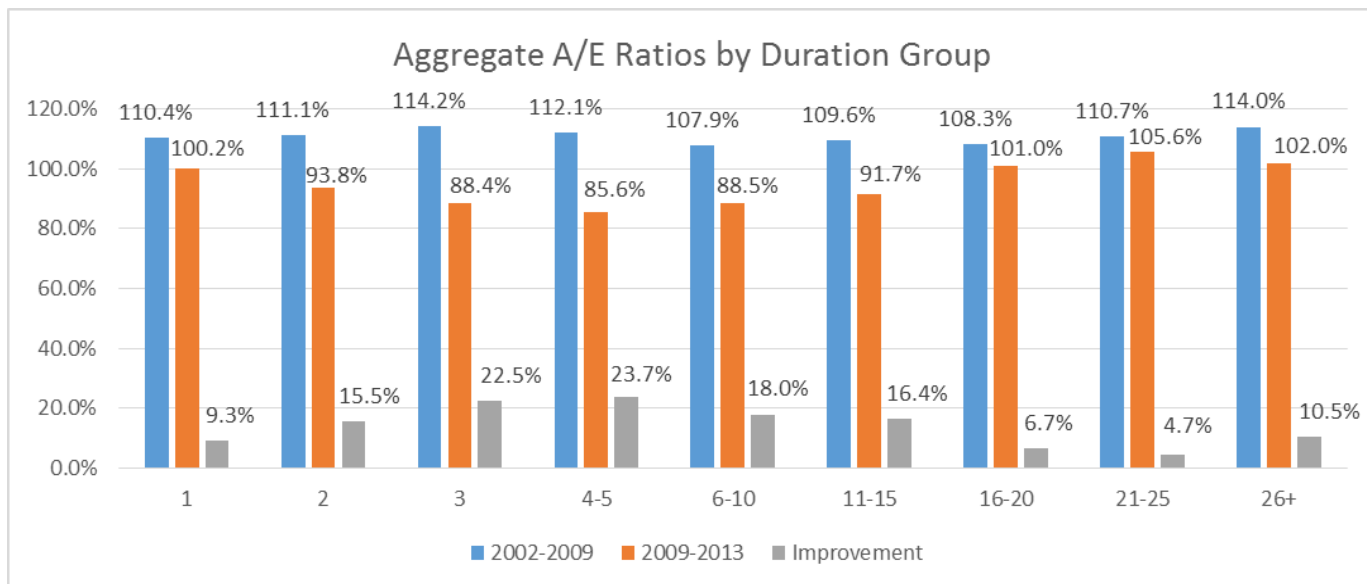
When comparing 2002-2009 to 2009-2013 experience across product types, the data shows significantly lower A/E ratios in 2009-2013 for permanent (whole life) and term insurance. When looking at the universal life (UL) results, it's important to keep in mind that companies were likely not separately identifying their current assumption UL from their secondary no-lapse guaranteed UL (ULSG) for the 2002-2009 study years. With the current data, there is a clear difference in mortality A/E rated seen between these two categories of UL. The lower mortality exhibited in the ULSG products may be attributable to the lower lapse rates being experienced in these products, which would lead to lower post-issue anti-selection.



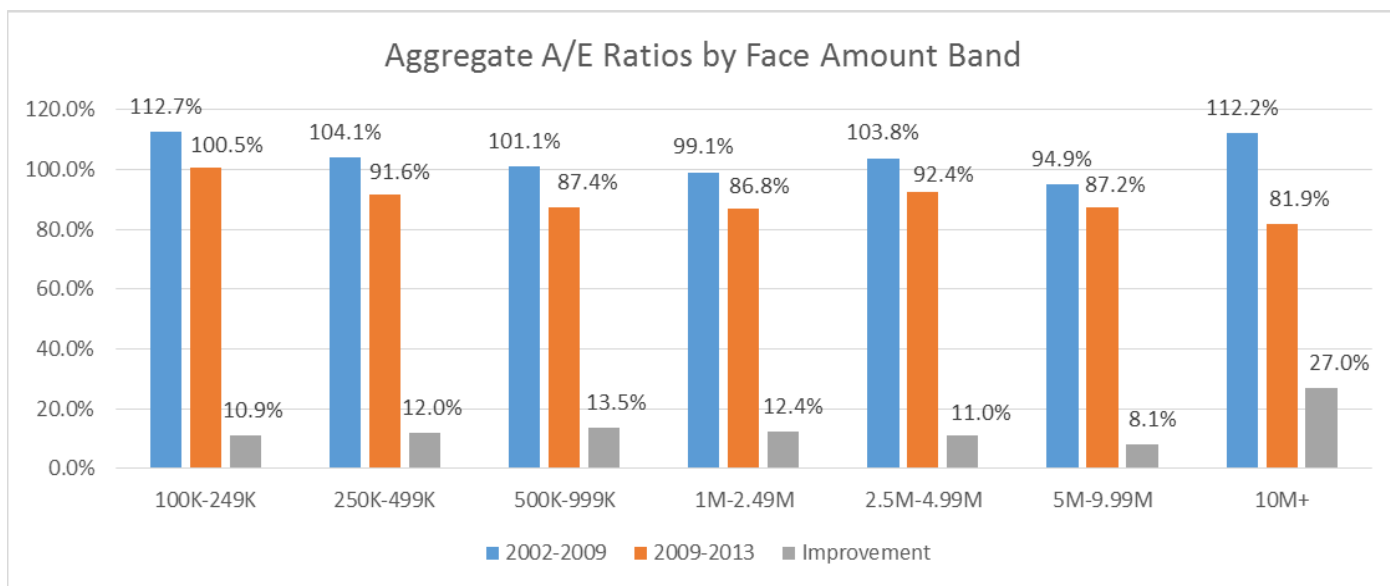
The current data shows uniform improvement over the younger issue ages, less in the 60's and 70's, and worse mortality for policies issues at age 80 and beyond. Please note that credibility gets thin at the oldest issue ages (only 61 claims at issue age 95+ in the most recent observation period).



Mortality results were lower in the new observation period across all duration groups. The most improvement is seen in durations 3-10, with roughly 20% lower A/E ratios than in the previous observation period (2002-2009).



Comparing across different face amount bands shows a consistent double digit reduction in A/E ratios, with the exception of face amounts at and above \$10 million. In the previous observation periods, this largest face amount band exhibited some of the highest aggregate mortality. This has been theorized as possible pressures on underwriters to make exceptions at higher amounts, or avocation/lifestyle differences. With the new mandatory data, this band now shows the lowest A/E ratios more in line with expectations. While not shown in this graph, face amounts below \$100,000 had A/E ratios around 120% for the 2002-2009 period, and improved to around 110% in the most recent observation period (2009-2013).



Any comparison of mortality trends should be considered carefully and evaluated with attention to all underlying factors. Results observed may reflect impacts of variables not included in the current analysis, and frequently a deeper dive is necessary for understanding. Multivariate predictive modeling techniques are well suited to help the actuary understand results.

4.2 Preferred Class Analysis

A preliminary analysis of the preferred experience was performed by the SOA in 2015 and 2016. The original report, its update (Part 2) and PowerPoint presentation can be found at <https://www.soa.org/research/topics/indiv-mort-exp-study-list/>.

Appendices I-L summarize different aspects of the preferred experience based on the final 2009-2013 industry data. Unlike the preliminary analysis, which is based on expected mortality equal to the 2008 VBT, the appendices show actual experience using the 2015 VBT for the expected basis.

As in prior studies, companies included two pieces of information for each policy underwritten under a preferred risk structure:

1. The total number of preferred classes in their preferred class structure, and
2. The preferred class rank

The preferred class rank of the policy would be “1” if it qualified for the most restrictive preferred class, “2” for the next most restrictive, and so on up to the total number of classes in their preferred structure. The highest rank would be coded for policies that were classified as standard/residual.

Appendices I-L include data for issue years 1990+, issue ages 18+, and face amount \$100K+. For the 2009-2013 observation years, there are \$34.6 trillion of exposure and over 120,000 claims. The underlying data also includes policies with face amounts less than \$100K and policies issued prior to the 1990 calendar year. The majority of these policies has a two-class structure with significant skewness toward the residual class.

Mortality experience from the Post Level Term period was excluded, due to highly anti-selective shock lapse activity. However, the user should be able to analyze mortality deterioration by comparing post-level term mortality with relevant level term or perm results from the provided pivot tables.

Appendix I shows results by policy and amount, split by the following categories: gender, issue age, duration, face amount band, observation year, and risk class structure. Overall, the 2009-2013 actual-to-expected ratios (2015 VBT) are 95.4% by policy and 89.2% by amount.

Appendices J, K and L illustrate various interactions between different risk factors – nonsmoker/observation year/risk class structure/class rank (Appendix J); nonsmoker/face amount band/risk class structure/class rank/duration (Appendix K); and nonsmoker/issue age band/risk class structure/class rank/duration (Appendix L).

There are significant mortality differences between risk classes within each preferred class structure. Table PF1 shows all companies experience by smoking status, risk class rank, and various duration groups.

Table PF1 - 2009-2013 Experience by Risk Class Structure and Rank, All Companies								
Male & Female, Issue Years 1990+, Issue Ages 18+, Face Amount \$100K+								
Expected Basis: 2015 VBT								
Smoking Status	Risk Class		A/E (by Amount)					
	Structure	Rank	Duration					
			1-5	6-10	11-15	16-20	21-25	1-25
Nonsmoker	2	1	68.8%	82.5%	86.8%	88.6%	87.1%	84.4%
		2	115.9%	115.4%	117.5%	128.4%	117.1%	118.7%
		Total	89.2%	98.7%	100.3%	103.0%	98.6%	99.3%
	3	1	64.7%	69.0%	72.6%	61.6%		68.9%
		2	75.0%	77.7%	85.0%	80.8%		78.8%
		3	106.4%	104.1%	102.7%	87.8%		104.2%
		Total	86.8%	87.3%	85.0%	75.2%		86.4%
	4	1	69.4%	68.4%	62.6%			67.7%
		2	85.3%	81.4%	85.4%			83.5%
		3	98.7%	90.1%	105.4%			95.8%
		4	118.8%	121.7%	110.9%			119.0%
		Total	86.9%	81.6%	79.4%			83.3%
Smoker	2	1	77.8%	73.7%	81.0%	102.4%	89.7%	79.0%
		2	95.3%	86.8%	101.2%	108.0%	105.1%	93.9%
		Total	85.0%	79.5%	89.2%	104.6%	96.8%	85.3%

Table PF2 provides the relative experience for preferred plans by risk class structure - how much class specific mortality is better or worse compared to the overall class structure experience. For example, the 77.1% shown for the best nonsmoker class in the two-class structure at durations 1-5 is the ratio of 68.8% (actual A/E ratio for the best class) to 89.2% (overall two-class structure A/E ratio at durations 1-5).

Table PF2 - 2009-2013 Experience by Risk Class Structure and Rank, All Companies								
Male & Female, Issue Years 1990+, Issue Ages 18+, Face Amount \$100K+								
Expected Basis: 2015 VBT								
Smoking Status	Risk Class		Ratio* of A/E to A/E for Risk Class Structure (by Amount)					
	Structure	Rank	Duration					
			1-5	6-10	11-15	16-20	21-25	1-25
Nonsmoker	2	1	77.1%	83.6%	86.6%	86.1%	88.3%	85.0%
		2	129.9%	116.9%	117.1%	124.7%	118.8%	119.5%
		Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	3	1	74.5%	79.0%	85.4%	82.0%		79.8%
		2	86.4%	89.0%	100.1%	107.5%		91.2%
		3	122.6%	119.3%	120.8%	116.7%		120.6%
		Total	100.0%	100.0%	100.0%	100.0%		100.0%
	4	1	79.9%	83.8%	78.8%			81.3%
		2	98.1%	99.7%	107.5%			100.3%
		3	113.6%	110.4%	132.7%			115.1%
		4	136.7%	149.1%	139.6%			142.9%
		Total	100.0%	100.0%	100.0%			100.0%
Smoker	2	1	91.5%	92.7%	90.8%	97.9%	92.7%	92.6%
		2	112.2%	109.2%	113.4%	103.3%	108.5%	110.1%
		Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

*Ratio of the A/E for the risk class rank to the corresponding overall A/E of the risk class structure.

The change in the relative mortality factors above indicates how preferred underwriting wears off. The stability of the class 1 and relatively small movement in class 2 factors of the two-class structure illustrates that the selection effect might persist beyond duration 25. Nonsmoker 3 and 4 class structure results are more volatile and their credibility is limited for durations 16+. Appendix L provides more detailed results split into three issue-age groups: 18-39, 40-59, and 60+.

4.3 Juvenile Business

The juvenile issue age analysis focuses on policies issued to people age 17 and younger for the new study years 2009-2013. For this analysis, the committee has excluded experience for:

- Issue ages 18 and above
- Term Business past its level period (Post Level Term)
- ET/RPU

Overall, the 2015 VBT A/E ratio by amount came in at 105.9%, with little variation by issue age group, implying a generally good fit of the table. By count, the A/E was lower at 99.7% and had a wider range of A/E ratios, with issue age 0 at 118.7% and the issue age 1-4 group at 78.8%. Except for issue age 0, all issue age groups had a higher A/E by amount than by count. See Appendix JA for the detailed results on the 2015 VBT expected basis.

Broken down by gender, the A/E ratio by amount was higher for males at 107.7% than it was for females at 100.5%. The relationship by count was reversed with the A/E for males at 98.3% and the A/E for females at 103.9%.

When looking at claims by duration, roughly 93% of the claims occurred in durations 26+. By count, all duration groups, except the duration 26+ bucket, have A/E ratios over 100%. By amount, the first two durations and duration group 16-20 are the only ones under 100%. Focusing on durations 26+, the attained age pattern generally shows A/E ratios over 100% both by number and by amount for attained ages under 70. For attained ages over 70, both by number and by amount, are generally under 100%. There are separate breakdowns in Appendix JA for the select period experience and the ultimate experience.

By face amount, about 47% of the exposure by amount was over \$100,000, but only 1,856 of the 180,424 claims (or about 1%) was over \$100,000. Experience by amount for face amounts over \$100,000 was better, with A/E ratios generally under 100%.

By observation year, the results by amount were consistent, ranging from 103.5% to 107.7%. The results by count show an increasing pattern, with observation year 2009 having the lowest A/E and observation year 2013 having the highest A/E. A more detailed analysis of younger issue age mortality was published in September 2016 in the report "Younger Issue Age Mortality Analysis." This report can be found on the SOA website at <https://www.soa.org/experience-studies/2016/research-younger-age-mortality/>.

4.4 Older Age Analysis

Older age analysis is often done with regard to the older age markets. For the industry as a whole, this segment of the population was marketed to much more recently, with a significant increase beginning in the early 2000's. For that purpose, it makes sense to focus on policies issued to people age 65 and over. In addition, with the aging of the baby boomer segment, many companies now have a great deal of exposure at older attained ages, which was issued many years ago. This indicates an analysis by attained age. Accordingly, the committee presents analysis on each basis separately.

Issue Ages 65 and over:

For this analysis, the committee excluded:

- Issue ages below 65
- Term business past its level premium period (Post Level Term)
- ET/RPU

Overall, for the study years 2009-2013, the 2015 VBT A/E was 95.2% by amount and 110.4% by count. At a strictly univariate level, many of the behavior patterns relative to the 2015 VBT are reasonably similar between the older issue ages and the entire study. Areas such as a decreasing trend by observation year, decreases at higher face bands, preferred vs residual differentials, and count to amount differences have reasonably similar patterns for similar reasons. Please see Appendix OA1 vs Appendix A for details. For instance, the behavior of lower mortality by amount than by count is a quite common pattern throughout the study, including at the older issue ages. Distributions are often skewed to higher face amounts when measured by amount rather than count. These subgroups often have greater levels of underwriting and, possibly, greater access to their health care needs, thereby lowering the mortality for both core and older issue ages.

Results were further examined across all available years by attained age. A common trend of generally decreasing, but variable mortality, was observed. Multiple factors are included in the changes of mortality over time, including mortality improvement, change in mortality deterioration, changes in the average age within the age group, change in the average duration, changes in underwriting, changes in issuing company, etc.

Table OA1 - A/E Ratios by Observation Year by Amount Issue Ages 65+, All Durations Expected Basis: 2015 VBT					
Observation Year*	Attained Age Groups				
	65-69	70-79	80-89	90+	65+
2003	134.1%	113.9%	106.7%	97.0%	109.6%
2004	90.5%	124.4%	104.0%	76.0%	107.5%
2005	147.7%	104.5%	98.0%	82.7%	100.0%
2006	113.0%	105.3%	104.8%	99.3%	104.5%
2007	109.8%	122.4%	104.3%	99.9%	108.8%
2008	90.3%	104.5%	96.0%	89.8%	97.1%
2009	76.3%	96.6%	97.2%	96.4%	96.5%
2010	84.3%	118.4%	98.6%	91.5%	101.3%
2011	78.7%	100.8%	96.5%	92.0%	96.0%
2012	107.8%	96.0%	99.6%	92.8%	97.5%
2013	76.1%	88.3%	91.2%	88.7%	89.7%

*Includes the ILEC 2002-2009 data

It should be noted, when evaluating the mortality at the older issue ages vs the core ages, that there are at least a few areas to consider further; these are areas where the distribution and underwriting are quite different.

- 1) Older issue ages can often have a higher policy size
- 2) Older issue ages can often have shorter duration experience periods
- 3) The value of select underwriting wears off sooner at the older issue ages
- 4) While difficult to quantify, in some cases underwriting at older issue ages has added cognitive and physical function tests beginning in the mid-late 2000's

Attained Ages 65 and over:

For this analysis, the committee chose to exclude experience for:

- Attained ages below 65
- Issue ages below 18
- Term business past its level premium period (Post Level Term)
- ET/RPU

Overall, for this collection of policies, the 2015 VBT A/E ratio by amount is 98.1%, with some variation by attained age group. By count, the A/E ratio was notably higher at 107.2% and the committee saw a wide range of A/E ratios with ages 65-69 at 118.7% and ages 90+ at 95.7%. See Appendix OA for additional results on the 2015 VBT basis, and a comparison on the 2015 VBT, 2008 VBT, 2001 VBT, and 7580E expected bases.

As with the experience by older issue age, results for attained ages 65 and over were further examined across all available years by attained age. A common trend of generally decreasing, but variable, mortality was similarly observed. Multiple factors are included in the changes of mortality over time, including mortality improvement, changes in mortality deterioration, changes in the average age within the age group, changes in the average duration, changes in underwriting, changes in issuing company, etc.

Table OA2 - A/E Ratios by Observation Year by Amount Attained Ages 65+, All Durations Expected Basis: 2015 VBT					
Observation Year*	Attained Age Groups				
	65-69	70-79	80-89	90+	65+
2003	122.1%	118.6%	110.1%	100.4%	115.4%
2004	115.4%	118.0%	108.8%	89.6%	112.6%
2005	111.7%	107.2%	103.8%	90.9%	105.7%
2006	109.9%	110.4%	107.4%	102.6%	108.6%
2007	107.0%	111.2%	105.4%	102.0%	107.6%
2008	112.4%	109.1%	102.2%	95.4%	105.9%
2009	97.7%	100.4%	99.2%	97.5%	99.2%
2010	99.7%	107.0%	99.3%	95.5%	101.3%
2011	99.5%	103.5%	99.4%	93.9%	99.9%
2012	98.0%	98.1%	100.2%	94.7%	98.4%
2013	97.0%	97.8%	96.0%	91.4%	95.9%

*Includes the ILEC 2002-2009 data

4.5 Level Term Products

With the introduction of XXX reserving requirements in the year 2000, the design of term policies changed significantly. Accordingly, differences in mortality experience are expected to emerge by issue year era. Actuaries should be mindful of premium pattern underlying mortality (and persistency) experience, and the resulting anti-selective behavior in the post-level term (PLT) period.

Appendix H provides experience for 10, 15, and 20-year level premium term products during the level premium period by duration and issue-year era. Note the level premium period is the anticipated level premium period, as opposed to the guaranteed level premium period, which was used in the 2008-09 experience report. Anticipated level term period, as used in this report and underlying pivot tables, refers to the level period design of the current (non-guaranteed) premiums. Conversely, guaranteed level term period refers to the level period design of the guaranteed premiums. Some product designs have level premiums guaranteed for a shorter period of time than the current premiums. Anticipated level term periods are available for study years 2012-13, and for some companies for 2009-10. The 2009-10 anticipated level term periods are available from a data call from the SOA to the 2011 KS contributors for the 2009-10 data.

The 2000-2009 issue year A/E ratios are generally higher and fall more steeply than the corresponding A/E ratios in the 2008-2009 experience report. The 2000-2009 issue year segment has much less experience for duration 1 in this segment than the 2010+ issue years, as this study starts in 2009. Also, as noted above, the anticipated level premium period is not uniformly available. It is conceivable that the remaining demand for protection products during the financial crisis tended to be more anti-selective, or that the difference reflects the mix of companies, or both.

Section 5: Pivot Tables and Use

5.1 Pivot Tables

Several Excel files are provided in conjunction with this report, giving the user the ability to examine the experience in multiple characteristic dimensions. Specifically, four Excel files accompany this report:

1. 2003-13 Aggregate 18+ 2017-08-03.xlsx
2. 2003-13 Preferred 18+ 2017-08-03.xlsx
3. 2003-13 Term 18+ 2017-08-03.xlsx
4. 2003-13 Juvenile 2017-08-03.xlsx – unknown smoker mortality rates were used for all durations

These files are located on the SOA website under Research, Life & Annuities, Experience Studies, Individual Life Mortality (www.soa.org/research/topics/indiv-mort-exp-study-list/)

Each file has the following three tabs:

- Pivot Table - generic pivot table with all applicable filters that summarizes the underlying experience at a high level
- Filters - description of the fields included in the underlying data
- Assumptions - key assumptions behind exposure calculation and list of the expected bases

The pivot tables accompanying this report allow the user to analyze experience for the following expected bases:

- The SOA's 1975-80 15-year select and ultimate tables (maximum issue age 70) with mortality rate extensions to issue age 95. The 1975-80 table was extended in two stages. The extension for issue ages 71 to 87 was published with the 2002-04 study, and the further extension for ages 88 to 99 (and attained ages through 120) was published with the 2005-07 study.
- 2001 VBT
- 2008 VBT, Primary table rates
- 2008 VBT, Limited Underwriting table rates
- 2015 VBT, Primary table rates

The mortality tables have different maximum issue ages. When an actual issue age was older than an expected table's maximum issue age, the expected mortality rates for that older age were determined by using the attained age rates for the maximum issue age actually included in that table.

The pivot tables mentioned above include new experience from 2009-2013 and previously published ILEC data. Observation years 2003 to 2009 for ILEC actually refer to the calendar year in which the policy year ends; for the mandatory study data (LSS 09-13), the observation years refer to the calendar year. ILEC LSS 09 refers to the overlap data that is common to both data sources.

Common Company indicator: set equal to 1 if a company contributed to at least four of the seven years in 2003-2009, and at least three of the five years in 2009-2013. This indicator may be used to facilitate a trend analysis with a more uniform set of company contributors.

In the Appendices to this report, which provide statistics on years 2009-2013, the following standard filters and rules were applied:

- Source Name: ILEC LSS 09 and LSS 09-13 (this produces all available calendar year exposures in 2009-2013)
- SOA Post Level Term Indicator: PLT was excluded
- ET/RPU excluded
- Underlying Expected Table: 2015 VBT
- Face Amount Bands: All

Additional filters were used for the specific sections outlined above. For example, preferred experience analysis was limited to issue years 1990+ and face amounts equal to or greater than \$100,000.

5.2 CSV Files

In addition to the pivot tables, we have released two CSV files that contain the data that was used to create these pivot tables. The same variables that have been referenced in this report and used to create the pivot tables are included in these CSV files. These CSV files will provide an actuary with greater flexibility to analyze the data. These CSV files are large and may take some time to download.

Section 6: Future Efforts

The primary goals of the ILEC are to provide both key industry experience data and value added insight of it. As such, a centerpiece is this ILEC report and data. With the experience submission requirements of VM-50 imminent, the goal of this committee is to provide an updated report and data on an annual basis. The committee recognizes the early difficulties of the new mandatory data submissions for companies new to this process, and it looks forward to working closely with the selected statistical agent in continually improving the experience data.

The ILEC has been an active presenter at SOA meetings and will continue to present its findings in those settings that facilitate discussion and questions.

Specific future efforts are focused around providing additional insights into Cause of Death analysis, persistency reporting, and predictive analytic findings when applied to the ILEC data. Other projects for consideration, subject to resource constraints and data availability, are term conversion mortality, mortality improvement, and waiver-of-premium experience.

The ILEC works closely with the SOA to determine where ILEC resources would be put to best use and partnering with other committees and SOA sections as it makes sense.

The committee welcomes any feedback and suggestions for improvement in future work products. Any such suggestions may be made by contacting Dieter Gaubatz (Chair), Tony Phipps (Vice-Chair), or Mervyn Kopinsky (SOA Experience Studies Actuary).

Section 7: Reliance and Limitations

In preparing this report and the accompanying data files, the ILEC has relied on the integrity of the data as submitted by companies through the mandatory data submissions required by NYDFS and KID. Those data submissions were facilitated and coordinated by the selected statistical agent, MIB.

On behalf of NYDFS and KID, the statistical agent worked with each company independently to validate and verify the accuracy of their data submissions. Many companies submitting data were new to the process of such data submissions. Ultimately, responsibility for data accuracy is placed on the individual company submitters, and the ILEC has relied on that process for the accuracy of its data.

In each situation that involves questionable results or flaws in the data, the ILEC must make the determination of whether the results should be published with appropriate disclaimers, or thrown out entirely. In the analysis of the underlying data, some apparent flaws were identified. Except where such flaws produced meaningless results, we have generally chosen to keep the data in this report and identify the anomalies that were observed. In all cases, the individual user of this report and data should apply their own judgment as to the validity of the results.

Some situations encountered, which produced counter-intuitive results, but which were kept in the report and data files, are:

- 1) Paid-Up Additions records are part of the mandatory data submissions. These records were submitted as unique records distinct from the associated base policy, but are not easily separately identified. It is expected that the experience at the lowest face amount bands is impacted by the presence of these records.
- 2) For some juvenile issue ages (1-4), experience at the very high attained ages (90+) showed unreasonable results that were inconsistent with other issue age groups.
- 3) Within face amount bands, the difference between A/E by count versus A/E by amount was larger than expected. Past studies had shown when isolating a particular face amount band, the difference was minimal, and this is what would have been expected.
- 4) Data records with face amounts at or above \$100,000 and early policy durations contained an Unknown smoker status. The impact on overall results should be minimal, but the user should be aware of this in more refined analysis.
- 5) Preferred Risk Class structures were inconsistent in exposures by duration. This suggests lack of uniformity in how preferred class business is defined and classified.
- 6) Preferred Risk Class exposures are in the data for issue years prior to 1990. As noted in this report, we have chosen to exclude these exposures from any preferred class analysis.

The ILEC looks forward to partnering with the statistical agent in continuing to identify these data issues and improve the data validation process for these important industry studies.

About The Society of Actuaries

The Society of Actuaries (SOA), formed in 1949, is one of the largest actuarial professional organizations in the world dedicated to serving 24,000 actuarial members and the public in the United States, Canada and worldwide. In line with the SOA Vision Statement, actuaries act as business leaders who develop and use mathematical models to measure and manage risk in support of financial security for individuals, organizations and the public.

The SOA supports actuaries and advances knowledge through research and education. As part of its work, the SOA seeks to inform public policy development and public understanding through research. The SOA aspires to be a trusted source of objective, data-driven research and analysis with an actuarial perspective for its members, industry, policymakers and the public. This distinct perspective comes from the SOA as an association of actuaries, who have a rigorous formal education and direct experience as practitioners as they perform applied research. The SOA also welcomes the opportunity to partner with other organizations in our work where appropriate.

The SOA has a history of working with public policymakers and regulators in developing historical experience studies and projection techniques as well as individual reports on health care, retirement, and other topics. The SOA's research is intended to aid the work of policymakers and regulators and follow certain core principles:

Objectivity: The SOA's research informs and provides analysis that can be relied upon by other individuals or organizations involved in public policy discussions. The SOA does not take advocacy positions or lobby specific policy proposals.

Quality: The SOA aspires to the highest ethical and quality standards in all of its research and analysis. Our research process is overseen by experienced actuaries and non-actuaries from a range of industry sectors and organizations. A rigorous peer-review process ensures the quality and integrity of our work.

Relevance: The SOA provides timely research on public policy issues. Our research advances actuarial knowledge while providing critical insights on key policy issues, and thereby provides value to stakeholders and decision makers.

Quantification: The SOA leverages the diverse skill sets of actuaries to provide research and findings that are driven by the best available data and methods. Actuaries use detailed modeling to analyze financial risk and provide distinct insight and quantification. Further, actuarial standards require transparency and the disclosure of the assumptions and analytic approach underlying the work.

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