



Individual Life Insurance Mortality Improvement Scale Recommendation—for Use with AG 38 and VM-20 September 2019

This report outlines the 2019 individual life insurance mortality improvement recommendation.

Background

As part of the work done by the American Academy of Actuaries¹ Life Experience Committee and the Society of Actuaries² Preferred Mortality Oversight Group Valuation Basic Table Team (“Joint Committee”) that developed the 2015 Valuation Basic Table (VBT), the Mortality Improvement subgroup was tasked with reviewing recent mortality improvement levels based on available data for the individual life insurance policyholder population.

As a result of this work, the subgroup presented a recommendation for the development of a set of improvement factors that differ by gender and attained age to be used in conjunction with the 2015 VBT. This recommended methodology was accepted and has been used for year-end 2013–2018 in conjunction with Actuarial Guideline (AG) 38 and Valuation Manual section 20 (VM-20). See Appendix A of this report for additional background on the development of the current methodology.


Since year-end 2014, a Mortality Improvements Life Working Group (MILWG) has been tasked with studying and annually recommending updates to the mortality improvement scales for use with AG 38 and VM-20 work (specific to the individual life insurance product lines).

¹ The American Academy of Actuaries is a 19,500-member professional association whose mission is to serve the public and the U.S. actuarial profession. For more than 50 years, the Academy has assisted public policymakers on all levels by providing leadership, objective expertise, and actuarial advice on risk and financial security issues. The Academy also sets qualification, practice, and professionalism standards for actuaries in the United States.

² The Society of Actuaries (SOA) is an educational, research and professional organization dedicated to serving the public, its members and its candidates. The SOA's mission is to advance actuarial knowledge and to enhance the ability of actuaries to provide expert advice and relevant solutions for financial, business and societal problems. The SOA's vision is for actuaries to be the leading professionals in the measurement and management of risk.

The Society of Actuaries (SOA) Mortality and Longevity Steering Committee is simultaneously working on a general framework for developing product-neutral mortality improvement scales, which will subsequently be used as a guide by the MILWG to revisit the current approach for creating these scales each year.

The recommended scales are intended to be applied to update (“improve”) valuation basic table mortality rates to the end of the current valuation year. As an example, for year-end 2019, the 2015 VBT table mortality would be improved from July 1, 2015, through Dec. 31, 2019 (4.5 years) using the current recommended scale outlined in this document.

Example application:	<u>Attained</u>	2019 Recommendation	
	<u>Age</u>	<u>Males - 2019</u>	<u>Females - 2019</u>
Year-end 2019 valuation	30	0.0064	0.0048
Male, Age 40	31	0.0064	0.0048
	32	0.0064	0.0048
Mortality rate for a male, age 40	33	0.0064	0.0048
= $q_{40} * (1 - MI_{40})^{(4.5)}$	34	0.0064	0.0048
= $q_{40} * (1 - 0.0064)^{(4.5)}$	35	0.0064	0.0048
	36	0.0064	0.0048
q_{40} is mortality rate from 2015 VBT	37	0.0064	0.0048
	38	0.0064	0.0048
MI_{40} is mortality improvement rate	39	0.0064	0.0048
from 2019 recommendation	40	 0.0064	0.0048
	41	0.0064	0.0048
Improvement applied to q_{40} from	42	0.0064	0.0048
the middle of 2015 to the end of	43	0.0064	0.0048
2019 or 4.5 years.			

2019 Mortality Improvement Scale Methodology

The raw, unsmoothed mortality improvement factors are equal to the average of a historical component and a future-looking component as described below:

- Historical component:

The historical component is represented by the 10-year average annual historical mortality improvement levels implied from general population mortality data published by the Social Security Administration (SSA). For each calendar year of data, the SSA results are published more than a year after the Centers for Disease Control and Prevention (CDC) results are available (so for example, for 2019 the published SSA historical data is only available through 2016 even though CDC data is available through 2017). In order to provide the subgroup with as much information as possible for this yearly update process, the SOA applies the SSA methodology to produce a preliminary set of SSA-consistent mortality rates for use in this calculation for attained ages 20 to 100. For the 2019 recommendation, the 2017 historical rates were estimated by the

SOA for ages 20 to 100. For ages under 20 and over 100, the SSA Alternative (Alt) 2 projected rates for 2017 were used as a proxy for actual historical rates.

Although a 5-year period more closely aligns with the period over which mortality rates are improved for the current purpose, a 10-year historical period was selected for use as it results in less volatility from year to year. The most recent 5-year averages (see Appendix B) were examined as part of the update process and have been considered in developing the final recommendation. Although these results indicate negative improvement for certain age groups (specifically 20-45) over the 5-year period, preliminary data for 2018 from the Vital Statistics Rapid Release Reports indicates potential improvements returning in 2018.

- *Future-looking component:*

The future component is represented by the 20-year average annual mortality improvement levels (for 2019, this covers the period from 2017 to 2037), based on the most recent Social Security Administration Trustees' report intermediate assumption (Alt 2). The SSA mortality projection is based on historical data and assumes ultimate average annual percentage reductions in future mortality rates by age and cause of death. These assumptions are used to estimate future central death rates by age, sex, and cause of death. From these estimated central death rates, probabilities of death by single year of age and sex are determined.

For AG 38/VM-20 purposes, the "future projected" component is relatively short (for 2019, historical data exists through 2017, so the "unknown" future component is 2 years). However, applying the 20-year period for averaging (rather than a shorter period) generally results in smoother patterns by age and calendar year. It also provides greater stability in year-over-year results as the longer period lessens the tendency to over-react to short-term fluctuations in historical experience. The determination of the future component will also be reviewed as part of the full methodology update to apply the recommended consistent framework from the SOA Mortality and Longevity Steering Committee work.

The average annual rates calculated as above are then smoothed using simple linear interpolation to produce a final scale by gender and age.

Historical data from the Human Mortality Database (HMD) was also considered in determining the 10-year historical averages, which provided a perspective from multiple sources in examining recent population mortality trends.

Recommendation

Based on a review of the improvement factors resulting from application of the methodology to include the 2019 data updates, it is recommended that the mortality improvement scale be revised for 2019 to reflect mortality deterioration trends that have emerged over the past several years in population mortality. The current methodology does not include an adjustment to reflect differences between the target insured population and the general population on which mortality data is based. From limited data from reinsurers and other sources, there is some indication that insured mortality is generally lower than general population mortality (possibly due to the generally higher socioeconomic status of those buying life insurance). However, there is not yet sufficient consistent, long-range insured data on which to

measure mortality improvement specific to the insured population. Several potential options to reflect adjustments in a future review of the current methodology are under consideration.

This revision will result in a reduction in mortality improvement levels from the 2018 scale of approximately 0.25 percentage points for males and 0.15 percentage points for females.

This decision is supported by an examination of the most recent 5-year historical averages, which show a smaller improvement in mortality than the earlier 5-year period. See Appendix B for historical averages by age and gender for these two historical 5-year periods.

The 2019 recommended improvement rates can be found in the accompanying spreadsheet.

Applicability of Improvement Scale

The above recommendation represents a view of reasonable mortality improvement factors for short- and medium-term projections and is intended to be applied solely for the purposes of updating the mortality assumption from the time of the valuation table publication to the beginning of the current valuation period.

APPENDIX A:

Considerations in developing mortality improvement factors for application with AG 38 and VM-20.

- **Period of Experience Used**—The desire for a methodology that weights the impact of recent historical rates of improvement with a longer-term assumption (i.e., SSA intermediate mortality projections) in determining projected improvement rates. This approach is (at a very high level) consistent with the current U.K. Continuous Mortality Investigation (“CMI”) projection models, as well as methods commonly used to develop other insured mortality projection scales. These methods basically project rates based on past experience, but trend toward a long-term assumed average annual improvement level.
- **Insured Data**—Aggregate insurance company data for the period 2002–2009 from the Society of Actuaries’ regular studies of individual life insurance mortality was initially examined. It was eventually decided that, given (1) the relatively short period over which historical insured experience is available and (2) the year-over-year volatility of results (likely in part the result of both industry-specific factors and changes in underlying mortality rates), general population data is a preferable source for determining both an improvement scale for use in VBT table development efforts and as annual AG 38/VM-20 scale recommendations, at least for the near term.
- **General Population Data Source**—The subgroup examined several sources of general population data, including data from the U.S. Vital Statistics, the Human Mortality Database (HMD), and the SSA. The SSA data was selected as the source for general population analysis for several reasons:
 - The data and reports are strongly vetted.
 - The SSA uses mortality statistics from the Centers for Medicare and Medicaid Services rather than the National Center for Health Statistics for ages 65 and older. A number of studies have questioned the validity of age reporting in the CDC National Statistics data.
 - Using the SSA data allows for consistency in applying the current methodology’s historical and future components (Trustees Report historical data is used as well as the projections of future estimated mortality).
- **Additional Factors Considered (Gender, Attained Age, Smoker Status, Socioeconomic Status, Differences in Cause of Death for Insured vs. General Population)**—In addition to data sources discussed above, the subgroup also researched and considered additional factors that could impact mortality improvement experience. The decision was made to regularly review the use of alternative or further adjustments to population mortality to eliminate potential basis risk at the same time any changes for consistent framework recommendations are incorporated.

APPENDIX B:

5-year annual average mortality improvements by gender and attained age (2007–2012 and 2012–2017)

