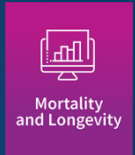


Developing a Consistent Framework for Mortality Improvement: MIM-2021 Status Report, Spring 2022



MIM-2021 Advisory Group

June 2022

As an aid to practitioners who project mortality improvement (MI), the Society of Actuaries (SOA) released MIM-2021 in April 2021. When it was released, the SOA anticipated updating MIM-2021 and associated tools at least annually. The first update, MIM-2021-v2 Application Tool, which was released in October 2021, incorporated the following enhancements:

- the inclusion of one additional year (2019) of historical U.S. population mortality experience in both the Social Security Administration (SSA) and National Centers for Health Statistics (NCHS) databases,
- the ability for practitioners to use a slightly smoother two-dimensional graduation of the selected historical mortality experience, and
- the ability for practitioners to incorporate the effect of COVID-19.

In section V of the MIM-2021-v2 Report,¹ the Advisory Group listed several items under consideration for future updates and enhancements to the MIM-2021 tools. The purpose of this status report is to advise practitioners about subsequent research and analysis conducted by the Advisory Group regarding these items. At this time, there are no new enhancements to the MIM-2021 tools.

Practitioners are encouraged to submit comments and suggestions on the MIM-2021 tools and/or this status report. Please send feedback to research@soa.org. *Include MIM-2021 in the subject line.*

The current statuses of the “under consideration” items referred to in the preceding paragraphs are as follows:

1. **General insights on various types of significant fluctuations in historical mortality experience and how those fluctuations might be reflected in a framework such as MIM-2021.** The United States—in fact, almost any

¹ See *Developing a Consistent Framework for Mortality Improvement*, SOA Research Institute, April 2021, rev. October 2021, <https://www.soa.org/globalassets/assets/files/resources/research-report/2021/2021-mim-consistent-framework-v2.pdf>.

population or its segments—has experienced a series of significant spikes and waves in mortality over the years, using the following definitions:

- A spike is a sudden change in mortality of limited duration that include pandemics such as COVID-19 and armed conflicts.
- A wave is a longer-lasting period of mortality different from a benchmark mortality table, such as an unusual period of drug overdoses or a long-lasting epidemic such as AIDS.

These mortality fluctuations do not usually affect long-term mortality trends. Rather, they tend to dissipate totally or have a relatively small residual effect. Their reflection in a mortality projection depends on several factors, some of which the actuary may need to consider regarding their applicability to a particular situation, such as in pricing (premiums or contributions), reserving/financial reporting, risk management, or capital assessment. These factors include:

- analysis of the nature of the spike or wave, particularly its drivers and the effectiveness of mitigation techniques applied to control its adverse effects;
- when the spike or wave began, its severity, its trajectory, and when it has completed its course;
- its effect by sociodemographic characteristic, e.g., age, gender, employment, or disability status;
- where in the spike or wave period the evaluator sits, e.g., in the initial rise or decline stage;
- if in the midst of a spike or wave, the prognosis and uncertainty regarding its future course, especially regarding its duration, severity, and expected effects on the population being evaluated;
- whether it has a period and/or cohort effect;
- how it (or its mitigation) affects other causes or drivers of mortality;
- reliability and accuracy of the supporting data considered or used, given the difficulties in attributing deaths to particular causes and the nature of the spike or wave; and
- its residual effects—in particular, whether it will establish a “new normal.”

Currently, at least two of these fluctuations may be relevant to many actuaries:

- **COVID-19.** This pandemic materially affected population mortality during at least 2020 through 2022. It has affected all ages, with a larger impact at the older ages, but there has also been a decreasing average age at death over the course of the pandemic. The number of reported COVID-19 deaths may not be completely accurate or complete, due to the difficulty in attributing of causes of death in some cases. As a result, a more reliable measure may be “excess deaths” over an expected benchmark. The extent of its effect on future mortality rates due to long COVID, delayed care, and any consequential effects on other causes of death is not yet clear.
- **Drug overdoses.** Although drug overdoses have been a cause of death for more than a century, deaths due to opioids and certain synthetic drugs such as fentanyl have adversely affected mortality for the last two decades and increased again during the COVID-19 pandemic. Drug overdoses are a significant part of the so-called deaths of despair (those due to alcohol abuse, drug overdose, and suicide) that have mostly affected those in their twenties through fifties. These deaths have contributed to recent deterioration in all-cause mortality. The future course of this cause of death is currently uncertain.

Typically, the mortality from a spike or wave is included in historical mortality experience. If deemed appropriate, an adjustment could be made to the mortality experience from which a projection is based to explicitly remove the historical effect of a significant spike or wave. This may be even more important if the population being assessed is different from the source of the historical experience used or if the period to which the projection is to apply is not expected to have the same type of exposure to the spike or wave. The actuary may wish to reduce (or increase) or eliminate its effect in the historical and/or future projection, depending on the circumstances and application. The method applied may depend on the specific application and available data.² In any case, an estimate of the future trajectory of the spike or wave may be needed. If the mortality of the spike or wave has been eliminated from the historical mortality experience, any expected remaining portion of the spike would be added onto the “normal” expected future mortality.

The uncertainty associated with possible future spikes or waves and the future trajectory of a current one would be in addition to the uncertainty associated with the other elements of the mortality estimates, such as future trends. It may be beneficial to keep these projections separate for future auditability and/or future adjustments as more becomes known.

Although for insurance purposes it is generally believed that capital should reflect significant adverse fluctuations of mortality, the extent to which a current spike or wave should be reflected in required capital or liabilities (reserves) may need to be addressed. In general, the expected effect of a past or current spike should be reflected in an insurer’s reserves (liabilities), while capital should reflect the effect of significant future spikes or waves—or at least those that have not yet been observed to be significant at the valuation date. An alternative approach would be to ignore the period of a spike in the analysis, as it may not be representative of the underlying mortality, or the available data may not be sufficiently reliable.

2. **Further guidance on how to navigate and calibrate MIM-2021-v2.** The Advisory Group recognizes the complexity presented to practitioners when using the tool, especially for the first few times. In an attempt to make the process less intimidating, the Advisory Group is considering adding an interactive flow chart to the MIM-2021-v2 Application Tool. Not only would such a flow chart provide practitioners with a clearer sense of where key parameters are to be entered, it would include helpful information regarding the selection and potential interactions of model parameters. The timetable to include a flow chart is to be decided.
3. **Specific insights/adjustments for pension and retirement practitioners on how to make provisions for COVID-19.** The Retirement Plans Experience Committee (RPEC) developed a component for MIM-2021-v2 to enable practitioners to model the impact of COVID-19 in mortality improvement projections. Through 2022, the RPEC team will decide what adjustments, if any, for COVID-19 will be suggested for its treatment in historical mortality data. It is anticipated a final decision will be included in the version of MIM-2021 to be released in October 2022.
4. **Development of preselected parameter sets designed for individual life insurance and individual annuity practitioners.** The report accompanying the release of the RPEC_2014 model discussed how a practitioner could create a mortality projection scale using the RPEC-selected parameter sets. One feature of the MIM-2021 Application Tool allows the practitioner to replicate RPEC’s most recently released MI scales with the

² For example, if a spike is estimated to increase base mortality by 20% in a year and the population is expected to experience about half the effect, then for the demographic factors affected, the historical mortality would be reduced by 8.33% [that is, $-(1 - 1/120\%)/2$].

click of a single button.³ To assist non-pension practitioners, the Advisory Group anticipates releasing a range of preselected parameter sets that provide a convenient starting point from which practitioners are encouraged to review and fine-tune as necessary to reflect different target markets, underwriting strategies, products, and other uncertainties. The Advisory Group will be assisted in the development of these parameter sets by a small group of actuaries from a variety of practice disciplines, each of whom has experience in the projection of future mortality (and improvement) rates. The full SOA membership will have the opportunity to review and comment on the preselected parameter sets before they are finalized and incorporated as enhancements to the MIM-2021-v2 Application Tool.

5. **Guidance on relationship between base mortality table and MI assumptions and their impact on valuation of pension plans or blocks of group annuity in-force business.** Base mortality tables can be customized to the population represented by the pension plan or the group annuity in-force block of business to be assessed or valued. However, determining the appropriate mortality improvement assumption applicable to the population being assessed is more subjective. The key parameters from which MIM assumption sets are developed include (1) the short-term rates of improvement, (2) the assumed long-term rates of improvement, and (3) the period of time to attain the long-term rates. The Advisory Group is currently analyzing the sensitivities of these key MIM parameters on life expectancies and the corresponding impact on various insurance/annuity products.
6. **Add functionality to adjust SSA and NCHS data sets if pension plan or insured/annuity cohort data suggests better (or worse) historical mortality.** This issue requires additional analysis and research. It will remain an issue for future consideration.
7. **More insight/research on differences between SSA and NCHS data sets and when to use one over the other.** In section 2.2 of the MIM-2021-v2 Report, the Advisory Group recognized that the SSA data and the NCHS data, although both are based on U.S. population data, were derived from different sources for ages 65 and older. As a result, the two data sets may not produce the same national-level rates of mortality improvement. In reviewing the NCHS results, the Advisory Group observed that when all deciles are combined to form a national population, the data show slightly faster rates of mortality improvements across the period 1982 to 2019 than did the SSA data. The report issued guidance to practitioners to be aware of these differences, particularly at ages older than 65. This is an important issue, and a separate SOA research project has been established for analysis of it.
8. **Analysis to determine whether some loosening of the two-year step-back at the jumping-off point is appropriate.** This issue requires additional analysis and research. It will remain an issue for future consideration.
9. **How to create projection MI scales for select and ultimate mortality periods and different risk classifications (e.g., smoker and nonsmoker, preferred and standard).** This issue requires additional analysis and research. It will remain an issue for future consideration.

³ Based on MIM-2021's original methodology and structure, the objective for MIM-2021-v2 Application Tool was to reproduce Scale MP-2021 and its order-2 counterpart, O2-2021, using RPEC's committee-selected assumptions.

10. **More insight/research on required credibility size for user-supplied historical insured or pensioner data for mortality improvement projections.** This issue requires additional analysis and research. It will remain an issue for future consideration.



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