

# Report of the Group Annuity Experience Committee Mortality Experience for 2001 - 2002

## Overview

The Group Annuity Experience Committee performs biennial mortality studies of insurance company annuity experience under group pension contracts issued primarily in the United States. This experience is predominantly based on retired lives, which includes benefit payments made under ongoing pension plans, terminated plans (“pension closeouts”), partially guaranteed arrangements, such as certain Immediate Participation Guarantee contracts and non-guaranteed arrangements.

The results for 2001-02 are included with those of 1999-2000 and 1997-1998 to show mortality trends over time. Overall results for the six-year period 1997-2002 by Expected Basis are as follows:

Expected Basis	Actual to Expected Ratios		Mortality Improvement <sup>1</sup>	
	By Lives	By Income	By Lives	By Income
1983 GAM	111.2%	97.4%	0.1%	1.4%
1994 GAM Basic with Projection	120.2%	108.6%	-0.6%	0.5%
1994 GAR	129.2%	116.8%	-0.6%	0.5%

Since the 1983 GAM is a static table, mortality improvement results represent absolute changes in the level of mortality – 0.1% per year by lives and 1.4% by income during the period. Both the 1994 GAM Basic with Projection and the 1994 GAR are projected, so mortality improvement results for these tables represent changes in the level of mortality relative to Scale AA – negative 0.6% by lives and 0.5% by income.

Results are presented in pivot table format for the first time to allow readers to easily customize their analyses to suit their individual purposes.

Results for the four prior biennial years (1999-2000, 1997-1998, 1995-1996 and 1993-1994) are found on the SoA website. Results for the prior six biennial periods are found in the Transactions, the Society of Actuaries – Reports:

Period	TSA - Reports	Period	TSA - Reports
1991-92	1995-96 Reports	1989-90	1993-94 Reports
1987-88	1988-89-90 Reports	1985-86	1985-86-87 Reports
1983-84	1984 Reports	1981-82	1983 Reports

<sup>1</sup> Quoted results for mortality improvement are based on the loglinear regression of results over the six-year period. Results using Arithmetic Average Improvement are also available in the pivot table.

## Format of the Data

All Experience is available by Lives and by Income. The data are available with the following breakdowns:

Experience Years (6):	1997, 1998, 1999, 2000, 2001, 2002
Experience Periods (3):	1997-1998, 1999-2000, 2001-2002
Gender:	Male, Female
Attained Age: <sup>2</sup>	0-54, 55-59, 60-64, 65-69, ... , 90-94, 95+
Retirement Date:	Before Normal Retirement Date, On/After NRD, Other
Certain Option:	Life Only, Life and Period Certain, Cash Refund
Survivor Option:	0% Single Life, 1-50% J&S, 51-75% J&S, 76-100% J&S, Unknown
Guarantee Status:	Guaranteed, Non-Guaranteed
Duration:	0-1 years, 2-5 years, 6-10 years, Ultimate (11+)

To ensure reported deaths are reliable, the data reflect annuitants who are receiving life contingent payments or, in some cases, who are past normal retirement date but not currently receiving payments. Data from trustee/reimbursement contracts (where a third party maintains the benefit records) may not be included in some cases. For Joint and Survivor annuities, only the person in payment status is counted in the exposure and death statistics. Results for 1997 – 2000 may have been updated to reflect additional submissions of late-reported deaths and other data adjustment since the prior report. However, any variations are minor and would not impact on reported trends and observations.

The Committee believes that any lags in the reporting of deaths are minimal at this point and that results are generally credible in the formats provided. Results at the very low and very high ages may not be credible. Users who create their own pivot tables from the data should be careful to ensure there is adequate exposure in the resulting cells.

Expected Results and Actual-to-Expected ratios are available using the 1983 GAM (the statutory basis for most of the inforce) and variants of the 1994 GAR (the current valuation standard). All of these tables are applied on a sex-distinct basis. These tables may be downloaded from the Table Manager Database on the Society of Actuaries website.<sup>3</sup> The table below shows the five mortality bases that are available in the data.

Mortality Table	Valuation Margin	Projection
<b>1983 GAM</b>	<b>Included</b>	<b>None</b>
1994 GAM Basic	None	None
1994 GAM Static	Included	None
<b>1994 GAM Basic with Projection</b>	<b>None</b>	<b>Scale AA</b>
<b>1994 GAR</b>	<b>Included</b>	<b>Scale AA</b>

<sup>2</sup> Age is defined to be age nearest birthday as of January 1<sup>st</sup> of the calendar year of exposure.

<sup>3</sup> <http://www.soa.org> – enter “Table Manager” in the Quick Search box

The mortality tables shown in bold font above are already present in each of the pivot tables. The 1983 GAM and 1994 GAR were selected as prescribed valuation bases. The 1994 GAM Basic with Projection was selected as a best-estimate version since valuation margin is not included and projection is included. The other 1994 GAR variants<sup>4</sup> may be easily added to any pivot table by any users who wish to see results on those bases.

## **Principal Observations**

### **General Commentary**

This section of the report will describe each of the pivot tables that have been provided and includes relevant observations. Each topic is referred to by the Tab Name and discussed in the order that they appear in the Excel file. The pivot table data appears in the last tab on the right.

For those readers unfamiliar with pivot tables, a good introduction on how to create and use pivot tables can be found in the Microsoft Excel Online Help by searching on “Create Pivot Tables.” In addition, there are many popular Microsoft Excel books such as the *Microsoft Excel Bible*, *Mr Excel on Excel* and *Excel for Dummies* that contain excellent reference guides for using pivot tables. For those who would like to create their own pivot tables, an attachment (Pivot Table Fields.xls) documents that structure of the data.

The discussion uses the 1994 GAM Basic Table with Projection Scale AA as the primary basis for expected deaths. Note that the prior study used the 1983 Group Annuity Table as the primary basis for expected deaths.

Actual-to-Expected Ratios provide simple reference values for comparison of mortality experience data with established mortality tables. The exact reference values are quantitatively significant only to the extent that underlying exposure is similar for the current experience data and the tables. U.S. and Canadian population, workforce, retiree and beneficiary populations have undergone significant demographic changes since the experience data was originally obtained to construct the 1983 GAM and 1994 GAR tables. In addition, as noted earlier, data reported in this study derive primarily from retirees in group annuity contracts in pay status. The 1983 GAM and 1994 GAR tables, in contrast, were derived from blended populations of active workers and retirees. However, blending was not significant at older ages. Interpretations of data in terms of A/E ratios below should nevertheless be adopted only with these factors taken into consideration.

---

<sup>4</sup> IRS Ruling 2001-62 refers to a BASIC 1994 GAM (unloaded) that is projected from 1994 through 2002. This version of the “IRS 1994 GAR” table is not present in the data.

## Summary Tab

Exposures, actual deaths and actual-to-expected ratios are shown for each of the six years in the study period. Experience by Lives is on top; Experience by Income, below.

- Exposures: Exposures dropped significantly between 1998 and 1999 as one of the contributing companies stopped submitting data beyond its 1999 experience. The increase in 2002 experience reflects new group annuities liabilities written by the nine currently contributing companies. Thus, some care should be exercised when applying these results as the exposures are not necessarily comparable over the six-year period.
- Trends: With our six-year study period, overall A/E ratios based on lives and income remained relatively flat. By lives, ratios varied between 116.6% in 1997 to 122.5% in 2000, averaging 120.2% overall. By income, ratios varied between 105.9% in 2002 to 110.1% in 1997, averaging 108.6% overall.
  - For males, 2001-02 A/E ratios by lives decreased from the 1999-2000 levels and returned to 1997-98 levels. By income, biennial A/E ratios trended downward during the period.
  - For females, 2001-02 A/E ratios decreased from the 1999-2000 levels, but were higher than the 1992-98 levels. By income, biennial A/E ratios trended upward during the period.
- Sufficiency: A/E Ratios by Lives are above 100% for all three mortality bases in all years. However, by Income, the margin in the 1983 GAM has been eliminated by mortality improvement over the years. There is significant overall margin in the 1994 GAM Basic with Projection in all years.
- Lives vs. Income: Actual-to-Expected Ratios (A/E Ratios) by Lives exceeded the A/E Ratios by Income by 6.4 percentage points in 1997 to 14.5 percentage points in 1999, averaging 11.6 percentage points. This supports the notion that individuals with higher income exhibit higher longevity.
- Gender: By lives, female A/E ratios were generally higher than male A/E ratios, averaging 122.5% for females vs. 119.1% for males. By income, female A/E ratios were higher than male A/E ratios in each year, averaging 117.2% for females vs. 106.6% for males. This disparity between male and female actual-to-expected ratios by income is consistent with past studies.

### **Attained Age Tab**

This tab shows attained age results for males and females individually and combined. Experience by Lives is on the left; by Income, on the right. Results are shown for all six years. Results for an individual experience year or experience period can be obtained by changing the selections in rows 3 and 4, respectively.

- **Results by Age**: There is modest experience below age 55 and at ages 90 and above. In the main portions of the tables, A/E Ratios tend to be saddle-shaped with minimums around Attained Ages 80-84 by lives and Attained Ages 60-69 by Income. Maximums occur at the younger attained ages and Attained Age 85-89. Under the 83 GAM, the worst deficiencies are at male Attained Ages in the 75-79 by Income.
- **Gender**: As noted earlier, A/E Ratios tend to be higher for females than males. This occurs at virtually every age group. This disparity between male and female actual-to-expected ratios by income is consistent with past studies.
- Both patterns have been generally consistent over time.

### **Mortality Improvement Tabs**

There are two tabs – one by lives and one by income. Results are available for males, females or both. Mortality improvement is discussed below using the loglinear regression slope of the results using the 1994 GAM Basic with Projection as the expected basis. The arithmetic average of the mortality improvement is also shown in the pivot tables for convenience.

- **By Lives** for males and females combined, overall mortality improvement of -0.6% shows that mortality by lives is not improving as fast as projection scale AA. Males improved by 0.1% and females worsened by -2.0%. Results tended to be fairly consistent, except for some of the youngest and oldest attained ages.
- **By Income** for males and females combined, overall mortality improvement of 0.5% shows that mortality is improving faster than projection scale AA. However, males improved by 0.7% while females worsened by -0.5%. Male and female results by age group show rather inconsistent patterns.

Note: The five remaining tabs show results by Income only since these generally represent mortality under various options. A Gender selector was added in addition to the Experience Year and Experience Period selectors to allow users to examine male vs. female experience separately, if desired.

## **Retirement Date Tab**

This tab shows the experience resulting from the first of three annuitant choices – the decision when to retire. However, this decision may be driven by factors beyond their control, such as health-related conditions or corporate downsizing. It compares those who retire early to those who retire on or after the normal retirement date. Also included are lives for which a retirement date was not applicable (e.g., surviving spouse) or unknown.

- **Early Retirement**: More than half of the annuitants (by income) retired early. For males, females and both at every attained age group (except females aged 55 – 59), those who retire early show higher mortality than those who retire on or after their normal retirement date. Overall, those who retired early showed an A/E ratio of 113.5% vs. 99.5% for those who retired on or after their normal retirement date. Interestingly, this result would seem to indicate that the impacts of subsidized early retirement factors may be somewhat offset by higher mortality for those that retire early. It should be noted that this study includes disabled lives, which may have a significant impact on the early retirement results.
- **Normal Retirement**: For those who retire on or after their normal retirement date, overall A/E ratios were 99.5%. However, mortality for ages 65 – 79 appears to be much lower than average, while results for younger and older attained ages tend to be much higher than average.
- **Other**: This experience seems to track the large, early retirement block overall – 112.8% for Other vs. 113.5% for early retirements. However, younger attained ages generally have significantly higher A/E mortality ratios while older attained ages tend to have significantly lower A/E mortality ratios.
- These patterns have been generally consistent over time.

## **Certain Option Tab**

This tab shows the experience resulting under the type of certain option selected. It compares experience under a life only benefit, a life with a certain period and an annuity with a cash refund option.

- Over 80% of the exposure by income reflects a life annuity option, perhaps because it generates a larger monthly benefit amount than the other two choices with death benefits. The overall A/E ratio of 110.3% significantly exceeds those of other two choices. However, annuities with certain periods or a cash refund option may be re-coded as life annuities after the certain period or refund option has expired.
- Approximately 7% of the annuitants (by income) select life annuities with a certain period. With an A/E ratio of 101.4%, this group shows the significantly lower overall mortality than the life annuity group.
- Approximately 9% of the annuitants (by income) have cash refund annuities, which typically arise because of employee contributions. With an overall A/E ratio of 95.6%, these results have the lowest A/E ratios.

- If annuitants intend to select the most valuable overall benefit, then the healthiest lives should select a life annuity option while those with health issues should select a certain period or cash refund annuity. However, the results show this does not seem to occur in practice.
- These results have been consistent over time.

### **Survivor Option Tab**

The tab compares experience under single life annuity forms to various forms of Joint and Survivor Annuities. For convenience, the J&S benefits have been grouped into 1 – 50%, 51-75% and 76-100% options.

- Single Life: These A/E Ratios are substantially higher than those of the joint life annuity forms – 111.7% overall. This might be attributed to lower longevity of singles vs. married people. In addition, it may reflect higher mortality of individuals with lower incomes – for which the joint and survivor benefit reductions appear too great. Some amount of joint life experience may be re-categorized as single life after the first life dies.
- 1% to 50%: This block, which includes the prescribed 50% J&S benefit for married couples, shows the **lowest** A/E Ratios of all the joint life forms – 78.7% overall. A/E Ratios are less than 100% except at the youngest and highest ages.
- 51 – 75%: This block, which includes the  $\frac{2}{3}$  J&S and  $\frac{3}{4}$  J&S options, features the **highest** A/E ratios among the joint life forms – 97.7% overall. Generally, ratios are less than 100% at the younger ages and over 100% at the older ages.
- 76 – 100%: This block, which includes the 100% J&S option, shows results in-between the low A/E Ratio 0-50% group and the high A/E Ratio 51-75% group – 91.85 overall.

### **Guaranteed vs. Non-Guaranteed Tab**

This tab shows the difference between fully guaranteed and partially guaranteed business. Guaranteed business includes single-premium closeout business, which is usually non-participating, as well as some types of participating business. There may be some noise in the data, as the committee has noted that benefits provided under contracts with an immediate participation guarantee feature are considered as guaranteed by some insurers and non-guaranteed by others.

All analysis has been done based on income exposures. Guaranteed business represents about 63% of the aggregate exposure over all years. The percentage of exposure which is guaranteed has been gradually dropping since the 1999 experience year, though 1999 showed an increase in the guaranteed percentage from 1998. At the younger age groupings, up through age 64, the non-guaranteed exposure is greater than the guaranteed. These results may reflect current trends in which plan sponsors show a declining interest in obtaining insurance company guarantees for participants.

- Overall, A/E ratios are higher under non-guaranteed business than for fully guaranteed business. True for age groupings 55 – 59, 60 – 64, 70 – 74, 75 – 79, 80 – 84, when looking across all experience years. This could indicate that plans have appropriately chosen when to guarantee benefits and when to “self-insure”. However, most insurance contracts do not allow plan sponsors to selectively choose whom to guarantee.
- For male exposures, the A/E ratios are higher under non-guaranteed business at all age groupings except the very oldest age categories of 85 and above.
- Females show the opposite result. In virtually all age groupings, the A/E ratios are higher for guaranteed business than for non-guaranteed.
- Looking at variation across experience periods, on a combined sex basis, the 1997 – 1998 and 2001 – 2002 periods are consistent with the overall pattern described in the first bullet. The 1999 – 2000 period, however, shows almost equivalent A/E ratios for guaranteed and non-guaranteed business, with the guaranteed business ratios actually being slightly higher. This is driven by the guaranteed A/E ratios being higher for not only the older age groupings (85 and above) but also the younger groupings from 0 – 54 and 55 – 59.
- For males, the results are consistent across experience periods, with the non-guaranteed A/E ratios exceeding the guaranteed overall and in all the central age groupings.
- Across experience periods for females, the higher A/E ratios for guaranteed business are driven by the 1997 – 1998 and 1999 – 2000 periods, particularly the latter where the ratio is 119.5% for guaranteed and 110.0% for non-guaranteed (using the 94 GAM Basic projected table). The pattern reverses dramatically in the 2001 – 2002 period, as the A/E ratio for non-guaranteed income increases to 124.9%, while the ratio for guaranteed drops to 116.2%.

### **Years Tab**

The results under this tab are subject to limitations. Duration is intended to be measured as years since retirement. However, significant portions of these liabilities were in payment status prior to being purchased from the insurance company involved. In these cases, the annuity benefit commencement date is likely to be coded as the purchase date of the group annuity contract rather than the original retirement date of the annuitant. While keeping these limitations in mind, the following results can be noted.

- The initial year following retirement/purchase shows higher mortality than all other periods. This may reflect the impact of disability or health-related retirements at a time when mortality would otherwise be expected to be relatively low. The overall result is driven primarily by the younger age groupings.



- The A/E Ratios are lowest in the two to five year period following retirement or purchase. They steadily increase as time progresses since retirement. Thus is true for all the central age groupings, though not for the youngest age grouping (0 - 54) and for those from 80 – 89.
- In general, there are varying patterns exhibited by the different age groupings. The point at which an employee retires is influenced by a number of factors, such as health, corporate actions (layoffs or mandatory retirement ages), financial means to retire early, making it difficult to draw conclusions.
- The overall patterns do not vary significantly by gender or by experience period.

### **Acknowledgements**

Special thanks for the contributing companies, the Society of Actuaries and Knowledge Services Group for their valuable work in bringing this new pivot table report to fruition. We hope you find this new report and the accompanying pivot tables to be useful.

Contributing Companies:

AETNA  
 AXA Equitable  
 Lincoln National  
 Manufacturers Life Insurance Company  
 Metropolitan  
 Mutual of Omaha  
 Nationwide  
 New York Life  
 Principal Financial  
 Prudential

Respectfully submitted by the GAEC Committee:

Beth Baker, Aetna	Kristin Gustafson, Principal Financial
Kathy Wong, AXA Equitable	Rich Wong, Prudential
Christina Lee, AXA Equitable	Daniel Arbid, Prudential
Derek Colinet, Manufacturers Life Insurance Company	Jack Luff, Society of Actuaries
Zachary Granovetter, Metropolitan	Korrel Crawford, Society of Actuaries
Deb Faltin, Mutual of Omaha	Thomas Rhodes, Knowledge Services
Bill Albright, Nationwide	Jane Li, Knowledge Services
Daniel Schroeder, Principal Financial	