

**REVISED REPORT OF THE INDIVIDUAL LIFE INSURANCE
EXPERIENCE COMMITTEE**

**MORTALITY UNDER STANDARD INDIVIDUALLY
UNDERWRITTEN LIFE INSURANCE
BETWEEN 1990 AND 1991 ANNIVERSARIES**

ABSTRACT

This report is a revision of an earlier publication of the "Mortality Under Standard Individually Underwritten Life Insurance Between 1990 and 1991 Anniversaries. This revision corrects previous mortality ratios for all 1986-91 and 1985-90 experience and 1990-91 smoker/nonsmoker experience.

This study is the latest in continuing annual reports on intercompany mortality experience under standard individually underwritten life insurance. Nineteen companies contributed their data to this study, as listed in Appendix A. Of the 19 contributing companies, 18 of them contributed to the 1989-90 study. Due to changes in the list of contributing companies from year to year, direct comparisons with previous studies are affected to a minor degree.

The ratios in the report of actual to expected mortality are based on the 1975-80 Basic Tables. For purposes of comparison with previous reports, overall results are also given based on the 1965-70 Basic Table in Tables B, 1 and 2 for select experience (policy years 1-15) and in Tables B and 22 for ultimate experience (policy years 16 and over).

The overall mortality ratio based on the 1975-80 Basic Tables in Tables B, 1, 2 and 5 for select experience between 1990 and 1991 anniversaries is 79.6%, down 1.1% from the 1989-90 study and continuing the ongoing trend. The improvement occurs for medical and paramedical business, although the ratio increased for nonmedical business in both the 1989-90 and 1990-91 studies.

The overall mortality ratio in Tables 7, 8 and 14 for select experience between 1986 and 1991 anniversaries is 81.9%, down 1.6% from the 1985-90 study. For males mortality decreased by 1.6% to 81.8% and for females mortality decreased by 1.9% to 82.4%.

The overall ratio of smoker to non-smoker mortality in Tables 16 and 17 in policy years 1-11 for experience between 1990 and 1991 anniversaries is 2.80, down from 2.62 in the prior one-year study. For experience between 1986 and 1991 anniversaries, the overall ratio in Tables 18 and 19 is 2.26, up from 2.25 in the prior five-year study. (Both the 1985-1990 and the 1986-1991 study ratios reflect unusually high actual deaths among smokers at issue ages 40-49 in the medical experience from the 1989-90 study.)

The overall mortality ratio in Tables B and 22 for ultimate experience between 1990 and 1991 anniversaries is 84.2%, up 0.2% from the 1989-90 study. The comparable mortality ratios using expected deaths based on the 1980 CSO tables and the 1979-81 U.S. Population Tables are 64.1% and 64.5%, respectively.

INTRODUCTION

This report covers the intercompany (U.S.) mortality experience by amount of life insurance under standard individually underwritten issues between 1990 and 1991 anniversaries. The report also combines experience between 1986 and 1991 anniversaries in order to provide a larger volume of data so that broader comparisons of results can be made, particularly for males-females, for smokers-nonsmokers, and for medical-paramedical-nonmedical issues.

The report is divided into four primary sections:

- I. Select Experience (first 15 policy years) between 1990 and 1991 anniversaries for issues of 1976-1990 (Tables 1-6).
- II. Select Experience (first 15 policy years) between 1986 and 1991 anniversaries for issues of 1976-1990 (Tables 7-15).
- III. Smoker-Nonsmoker Experience (first 11 policy years) between 1990 and 1991 anniversaries and between 1986 and 1991 anniversaries for issues of 1980-1990 (Tables 16-21).
- IV. Ultimate Experience (policy years 16 and over) between 1990 and 1991 anniversaries and between 1986 and 1991 anniversaries for issues of 1975 and prior (Tables 22-25).

Each section subdivides experience by insurance issued subject to a medical examination (medical), insurance issued subject to a paramedical examination (paramedical), and insurance issued without a paramedical or medical examination (nonmedical).

Most of the tables in this report show actual amounts of death claims (to the nearest \$1,000) and mortality ratios of actual-to-expected death claims based on the 1975-80 Basic Tables for Male and Female Lives. Tables B, 1, 2 and 22 also show mortality ratios based on the 1965-70 Basic Tables. In addition, Tables 1, 2, 7, 8, and 16-22 show amounts exposed to risk (to the nearest \$1,000,000) and Tables 1 and 2 show expected deaths (to the nearest \$1,000).

The 1990-91 select and ultimate experience is derived from the contributions of 19 companies, 18 of which contributed to the 1989-90 study. The 1986-91 select and ultimate experience is derived from the contributions of 21 companies, 17 of which contributed data for the entire 1986-91 period. The 1990-91 smoker-nonsmoker experience is derived from the contributions of 17 companies, and the 1986-91 smoker-nonsmoker experience is derived from the contributions of 19 companies. Appendix A gives the names and proportionate contributions of companies that contributed 1990-91 experience. Appendices B, C, and D, which are not published here but can be obtained from the Society Research Department, contain detailed medical, paramedical, and nonmedical experience, respectively, by ages at issue for each year of issue, for males and females separately, as well as data in smoker and nonsmoker categories.

The following summary tables show some interesting trends. Table A shows the change in proportions of policies issued by type of underwriting and reflects the substantially decreased use of medical examinations and increased use of nonmedicals since 1980. However, there is a reversal of this trend for 1987 - 1990 issues, indicating that there may be more medicals and paramedicals used in connection with an increased use of blood testing.

Table B shows mortality ratios by exposure years since the introduction of the 1965-70 Basic Tables. The decrease in the ratios is a continuation of the trend that has continued almost without exception since these annual studies were started.

Table C shows the proportions of medical, paramedical, and nonmedical exposures in policy year 1 and policy years 1-15 by issue age groups. This indicates that the use of nonmedical predominates at issue ages under 30 and that medicals still account for about half of the exposures (which are based on amount of insurance) at issue ages 50 and over.

It would be desirable for the comparisons of medical, paramedical, and nonmedical experience to be based on strictly comparable policies, but such comparisons are not possible. Medically underwritten business generally includes larger amounts of insurance issued to persons at higher socio-economic levels than nonmedical and paramedical business. However, medical business also includes policies issued to individuals within nonmedical or paramedical amount limits who were not acceptable on these bases because of medical histories. Similarly, paramedical policies include persons not acceptable on a nonmedical basis. In addition, there are considerable variations in amount limits and proportions of medical, nonmedical, and paramedical policies among contributing companies. In this comparison and throughout this report, the difference in the mix of companies from that in previous studies may account for some of the differences in the 1990-91 and 1986-91 mortality ratios.

Note also that some of the more recent nonmedical issues are likely based on applications with limited medical history even though such simplified underwritten cases are ordinarily excluded from this study. In addition, nonmedical issues over age 50 often arise from business issued under pension trust and salary allotment plans. Also included in nonmedical issues for some companies are issues on the basis of a medical examination within the previous 6 or 12 months.

I. 1990-91 SELECT EXPERIENCE (MALES AND FEMALES COMBINED)

The experience between 1990 and 1991 anniversaries during the first 15 policy years presented in Tables 1-6 includes exposures of \$1.031 trillion and actual deaths of \$1.568 billion. The 1989-90 amounts were \$912 billion and \$1.342 billion, respectively. Nineteen companies contributed data for 1990-91.

The experience for the first 15 policy years compared by issue age group is shown in Table 1 and by policy year in Table 2. Separate data for medical, paramedical, and nonmedical are shown by issue age group in Table 3 and by Policy Year in Table 4. Tables 5 and 6 present the data by issue age and policy year groupings for each underwriting classification.

Note that the totals of the actual deaths as classified by underwriting basis in Tables 3 and 4 are nearly equal to the total actual deaths in Tables 1 and 2. Any differences are due to business not identified as medical, paramedical, or nonmedical. Subtotals for the business, which has been classified by underwriting basis, are not shown.

The overall mortality ratio for policy years 1-15 for experience between 1990 and 1991 anniversaries based on the 1975-80 Basic Tables is 79.6%. The comparable ratio from the 1989-90 study was 80.7%. The mortality ratios by underwriting basis in the current one-year study are 76.0% for medical, 77.5% for paramedical, and 88.3% for nonmedical. The comparable ratios from the previous study were 78.0%, 79.3%, and 86.6%, respectively. Thus, improvement occurred for medical and paramedical issues, but not for nonmedical issues. These aggregate ratios by underwriting basis are not directly comparable because of the different distributions by issue age.

Factors contributing to improvement in mortality in recent years are likely to include smaller proportions of smokers as the trend towards nonsmoking continues in the United States as well as increased use of lab testing to screen applicants for insurance.

By Issue Age (Table 1 and 3)

The overall select mortality ratio of 79.6% is down from 80.7% in the prior one-year study. Relative to the 1975-80 Basic Tables, favorable mortality occurs in all issue age groups except the 70 and over group.

Overall, nonmedical mortality is 88.3% of expected. Most nonmedical business is issued at issue ages less than 40. For many companies in the study, business initially underwritten as nonmedical but requiring more evidence of insurability are issued and studied as either paramedical or medical. Since these lives requiring more evidence presumably have higher mortality and are shifted out of the nonmedical class, nonmedical mortality is lower than might be expected.

Medical and paramedical mortality is 76.0% and 77.5% of expected, respectively. Medical mortality is more favorable than paramedical mortality for most issue age groups.

By Policy Year (Tables 2 and 4)

The mortality ratios by policy year are lower in the first five years and higher in the remaining ten years of the select period. The pattern of increasing mortality ratios from medical to paramedical to nonmedical generally holds true for the early select durations.

By Issue Age and Policy Year (Tables 5 and 6)

In Table 5, actual deaths and mortality ratios are given by underwriting basis for six issue age groups each subdivided into four policy year groups. This breakdown provides an opportunity to examine the separate medical, paramedical and nonmedical data in more detail than that provided by issue age for all policy years combined in Table 3 or by policy year for all issue ages combined in Table 4. For issue ages 20-29 and in policy years 6-10, mortality ratios are greater than 100% for all medical, paramedical and nonmedical experience. The spread of the AIDS epidemic and delays in implementing screening for antibodies to the AIDS virus in the insurance industry until the late 1980s may have caused this pattern.

Table 6 shows the ratios of mortality ratios: paramedical to medical, nonmedical to paramedical, nonmedical to medical. Each of these ratios is expected to exceed 1.00 because in each case the ratio is that of the less strict underwriting requirement to the more strict. The ratios are greater than 1.00 for all but the younger issue ages. Generally, these distortions were caused by either a small amount of data or by the requirement of a medical or paramedical exam for some history of the impairment.

II. 1986-91 SELECT EXPERIENCE (INCLUDING SEX-DISTINCT DATA)

The experience between 1986 and 1991 anniversaries during the first 15 policy years is presented in Tables 7-15 in the same format as that presented for the 1990-91 experience in Tables 1-6 (Tables 11-14 correspond to Table 5), except that data for males and females is presented separately as well as combined.

This experience includes exposures of \$4.4 trillion and actual deaths of \$6.5 billion. Corresponding 1985-90 figures were \$4.1 trillion and \$6.0 billion, respectively. As previously mentioned, 21 companies contributed to the five-year study.

The overall mortality ratio for policy years 1-15 for experience between 1986 and 1991 anniversaries is 81.9%. The comparable ratio from the 1985-90 study was 83.5%. The mortality for males decreased from 83.4% to 81.8% and the mortality ratio for females decreased from 84.3% to 82.4%. These mortality ratios are based on expected deaths derived from the separate male and female 1975-80 Basic Tables.

The mortality ratios by underwriting basis in the current five-year study are 79.3% for medical, 81.3% for paramedical, and 86.9% for nonmedical. The comparable ratios from the prior five-year study are 81.0%, 83.8% and 87.3%, respectively. Thus, improvement occurred in all categories. As noted before, these aggregate ratios by underwriting basis are not directly comparable because of the different distributions by issue age and variances in individual company definition of medical, paramedical and nonmedical business.

By Issue Age (Tables 7 and 9)

Actual-to-expected mortality exceeds roughly 100% for males at issue ages 20-24 and 70 and over. This occurs for females at all issue ages 60 and over. Females showed distinctly increased mortality ratios at issue ages 55-69 on paramedical issues and at ages 70 and over for both medical and paramedical issues. Males showed increased mortality at age 70 and over for paramedical issues.

By Policy Year (Tables 8 and 10)

The lowest mortality ratios by duration for both males and females in the 1986-91 experience occur in the first five policy years. There is somewhat of a tendency for the female ratios to increase by duration.

By underwriting basis the only mortality ratios for males in excess of 100% occur for nonmedical business between durations 10-15. For females, the general trend upward by duration noted above can be seen for each underwriting basis, although more irregularly.

Comparison of Medical, Paramedical, and Nonmedical Experience

As mentioned before, caution needs to be exercised in comparing mortality ratios by underwriting basis because of the different distributions by issue age. Although the overall pattern for males (78.6% for medical, 80.5% for paramedical, and 89.8% for nonmedical) conforms with the supposition that higher ratios will occur for the less exacting requirements, but this pattern is nearly reversed for females (84.7% for medical, 85.6% for paramedical, and 78.9% for nonmedical). This might suggest that examinations, which largely identify cardiovascular risk profile characteristics (build, blood pressure and pulse), may be of relatively less value in underwriting females at the older ages where more of the less favorable paramedical and medical experience occurs and where the cancer risk may exceed the cardiovascular risk. At issue ages 50 and up, the mortality ratios on paramedical business are distinctly higher than those on medical business and are more pronounced for females than males.

By Issue Age and Policy Year (Tables 11-15)

Tables 11-14 subdivide the 1985-90 experience into the same six issue age groups and the same four policy year groups as in Table 5, but with the additional breakdown by sex. This provides an opportunity to examine the experience by issue age-policy year cells.

Table 15 summarizes these mortality ratios and gives the ratio of the mortality ratios as in Table 6, again with the additional breakdown by sex. For males, as expected, the ratios of the less exacting underwriting requirement to the more exacting basis generally exceed 1.00, as in Table 6, except where the comparisons are distorted by small amounts of data. For females, these expected results do not hold as often. A possible explanation for this phenomenon was suggested in the previous section.

III. SMOKER-NONSMOKER EXPERIENCE

Tables 16-21 present smoker-nonsmoker experience for issues of 1980 through 1990. Tables 16 and 17 show the experience between 1990 and 1991 anniversaries by issue age and policy year, respectively, separately for medical, paramedical and nonmedical issues, as submitted by 17 of the 19 overall contributing companies. Tables 18 and 19 show the experience between 1986 and 1991 anniversaries but are otherwise identical to Tables 16 and 17. Tables 20 and 21 show the 1986-91 experience subdivided by sex.

For the 1990-91 experience given in Tables 16 and 17, the overall mortality ratio for nonsmokers is 63.8% compared to 150.9% for smokers. The smoker mortality ratio is down from an unusually high level in the 1989-90 study, which was impacted by high actual deaths among smokers at issue ages 40-49. The current smoker mortality ratio is slightly lower than the 1985-86 experience. The current nonsmoker ratio is slightly higher than 1989-90 ratio. Nonsmoker mortality has generally shown improvement over the last several studies. The results from the last six studies are shown below:

	Nonsmoker	Smoker	Ratio
1985-86	69.2%	153.3%	2.22
1986-87	69.2%	146.2%	2.11
1987-88	71.1%	142.0%	2.00
1988-89	66.1%	136.6%	2.07
1989-90	62.4%	163.4%	2.62
1990-91	63.8%	150.9%	2.36

The 1990-91 results by underwriting basis are: for medical underwriting, 57.9% and 162.2%; for paramedical, 62.4% and 140.2%; and for nonmedical, 74.4% and 155.5%. Nonmedical mortality ratios have increased in each of the past several studies for both nonsmokers and smokers, paramedical mortality ratios for both smokers and nonsmokers have been level, and medical mortality ratios show the most variability partly due to the unusual experience mentioned above.

Tables 18, 19, 20 and 21 show mortality experience by underwriting basis and sex over the 5-year period from 1986-1991. The 1986-91 results are summarized below:

	Nonsmoker	Smoker	Ratio
Medical	62.4%	160.3%	2.57
Paramedical	63.6%	142.0%	2.23
Nonmedical	71.7%	143.9%	2.01
Male	65.6%	149.6%	2.28
Female	64.2%	140.4%	2.19
Total	65.3%	147.9%	2.26

The smoker mortality ratio for medical underwriting over the five-year period is highly influenced by the poor medical mortality experience in the 1989-90 study. The ratio of smoker to nonsmoker mortality has increased in each of the last three 5 year studies for medical experience but has remained fairly level for paramedical and nonmedical experience.

As might be expected, the ratios of smoker to nonsmoker mortality generally increase by issue age group.

As in previous studies, the pattern by policy year is irregular. In this regard, it should be noted that the maximum duration is policy year eleven with most of the exposure in the early durations and very little exposure in later durations.

Out of total 1986-91 nonsmoker/smoker exposure, there were 85.1% nonsmokers for males and 84.9% for females. Each proportion is up very slightly from the 1985-90 study (84.7% and 84.4%, respectively). The proportions are surprisingly similar by sex given that more men smoke than women in the general population.

IV. ULTIMATE EXPERIENCE (POLICY YEARS 16 AND OVER)

The experience between 1990 and 1991 anniversaries for policy years 16 and over is shown in Table 22. The overall mortality ratio based on the 1975-80 Ultimate Basic Tables is 84.2%, up from 84.0% in the 1989-90 study. Note that the company mix did not change materially between the two studies. The ratios by attained age group are all between 78.6% and 91.3%, except for attained ages 30-34, 35-39, and 90-95 with ratios of 153.1%, 114.0%, and 97.7%, respectively. Part of the extra mortality at the younger attained ages could be attributed to AIDS deaths.

Table 22 also presents mortality ratios based on the 1965-70 Ultimate Basic Tables, the 1980 CSO Tables, and the 1979-81 U.S. Population Life Tables (Whites and Non-Whites Combined), with overall mortality ratios of 66.4%, 64.1%, and 64.5%, respectively.

The experience between 1986 and 1991 anniversaries for policy years 16 and over is shown in Tables 23-25. In Table 23, the mortality ratio for premium-paying policies is 84.7%, compared to 86.9% for fully paid-up policies (reduced paid-up policies are not included). Corresponding ratios for the 1985-90 experience were 86.3% and 88.5%, respectively. This pattern of lower mortality ratios for premium-paying policies has been a characteristic of the experience for many years, perhaps due to a shorter average duration since selection compared to paid-up policies.

In Table 24, the mortality ratio for medical issues is 82.8%, compared to 97.5% for nonmedical issues. Corresponding ratios for the 1985-90 experience were 84.4% and 97.7%, respectively. This large difference in mortality ratios is most pronounced for attained ages 25-74.

In Table 25, the mortality ratio for males is 85.9%, compared to 88.8% for females. Corresponding ratios for the 1985-90 experience were 87.0% and 89.7%, respectively. In the last column, the female mortality ratios used to calculate the female-to-male ratio of mortality ratios are based on the 1975-80 Ultimate Basic Table for Male Lives, so that male and female mortality ratios can be compared on the same basis. On this basis, the overall ratio of female to male mortality is 0.63, the same as in the prior five-year study.