

**TRANSACTIONS OF SOCIETY OF ACTUARIES
1991-92 REPORTS**

REPORT OF THE RETIREMENT PLANS
EXPERIENCE COMMITTEE

MORTALITY AMONG MEMBERS
OF UNINSURED PENSION SYSTEMS

This report, the latest in a series published by the Retirement Plans Experience Committee, presents five years of experience on uninsured pension plans. The current report analyzes mortality experience from 28 retirement systems and Medicare between 1985 and 1989. Actual-to-expected (A/E) ratios in the committee's reports are measured against the UP-84 table (set forward one year for males and set back four years for females, unless otherwise indicated). This is the same basis that has been used since 1976. The previous reports in this series were entitled "Mortality among Members of Self-Administered Pension Systems." The change from "self-administered" to "uninsured" was made to clearly distinguish this series of reports from those prepared from the experience of pension plans underwritten by insurers. Experience from insured pension plans appears in reports of the Group Annuity Experience Committee.

The UP-84 mortality rates were based on the mortality experience published by the Committee in the *1976 Reports*. The UP-84 and the Group Annuity Mortality 1983 (GAM-83) tables are the tables most widely used by pension actuaries. These tables are based on nondisabled pensioner mortality. Both tables are currently being reviewed, and a new generation of each is expected in the near future. Mortality rates for both tables are shown in Appendix B.

The participants in this report are covered by the following systems:

- Medicare participants in the U.S. Social Security System (Medicare)
- The U.S. Federal Civil Service Retirement System (CSRS)
- The U.S. Military Retirement System (military)
- Public Service of Canada (Canada)
- Pension plans of 24 private sector systems and one state system (referred to as the private sector).

The participants in the study have varied over the years, but the U.S. Federal Civil Service Retirement System has participated in each study, and trends for that system provide an important historical perspective on mortality among pensioners in the U.S. The Medicare data are included as a

general population backdrop for pensioner mortality. As a national program, Medicare includes almost all the experience of the 27 other U.S. retirement systems in this report.

All the systems provided experience for nondisabled retirees (referred to in this report as "pensioners"). The report includes analysis of mortality experience for disability retirees, survivors, active employees, and law enforcement officers from the systems that provided that information. The report also compares the experience of salaried and hourly workers, Medicare and CSRS by age, and actual-to-expected (A/E) ratios on the UP-84 and GAM-83 tables.

SUMMARY OF FINDINGS

This report finds that the rate of improvement in mortality (as seen in Tables 3 and 4) was much lower in 1985–1989 than during the previous 15 years. The annual rate of improvement for male CSRS pensioners in the last five years was 0.7 percent a year, compared to an average of 1.6 percent a year from 1970 to 1984. Female CSRS pensioners showed no improvement in 1980–1989, compared to an average 1.1 percent improvement in the 1970s. Medicare data show similar long-term trends. Mortality for males and females had decreased at more than 2 percent a year in the late 1970s, but this study shows decreases in the late 1980s of 0.7 percent per year for males and 0.2 percent per year for females.

The rates of improvement are measured from the midpoints of each body of experience. For instance, the rate of improvement from the last study to the current study are from 1982 (the midpoint of 1980 to 1984) to 1987 (the midpoint of 1985 to 1989).

Male CSRS pensioners experienced mortality at 82.6 percent of expected on the UP-84 table from 1985 through 1989 and female pensioners, 82.2 percent (Table 5). As would be expected, active deaths were significantly lower at 44.0/35.1 percent of expected (male/female), and disabled-retiree deaths were significantly higher at 147.3/130.8 percent. The experience of active male law enforcement officers (45.8 percent) was very close to that of other active male employees. Survivors experienced mortality rates of 109.9/92.9 percent of expected.

The Medicare population (Table 6) showed substantially higher mortality than CSRS pensioners at 99.7/95.0 percent of expected on the UP-84 table. Medicare mortality combines pensioner and disability retirees. Pensioner

mortality is expected to be significantly lower than the total population experience, as shown by the Medicare rates, because disabled annuitants are not included in the pensioner experience. Combined pensioner and disabled-annuitant mortality is still lower than Medicare mortality.

Military retirement system pensioners (Table 7) experienced mortality of 86.2 percent for males and 79.9 percent for females when measured on the UP-84 table. The disability experience was 151.2 percent for males and 138.0 percent for females.

The experience for Canadian pensioners (Table 8), 86.4/78.0 percent measured on the UP-84 table, was close to the U.S. civilian and military experience. The disabled-retiree mortality experience, 206.5/153.7 percent, and active life experience, 56.3/52.8 percent, were significantly higher than the U.S. civil servant mortality experience.

The private-sector pensioner experience of 86.2/86.5 percent of expected measured on the UP-84 basis (Table 9) was close to the CSRS experience. Disability experience was much higher than CSRS experience at 231.6/219.4 percent, because the private sector uses a stricter definition of disability than the government systems. Male active life experience was close to CSRS experience, but the female experience was significantly higher.

Hourly workers in the private sector (Table 11) experienced higher mortality than salaried workers both before and after retirement measured on the GAM-83 table. The active life experience for hourly workers of 85.1/75.4 percent was significantly higher than that for salaried workers (60.5/71.4 percent) before retirement. The pensioner experience was 108.1/116.4 percent for former hourly workers, compared to 91.6/108.3 percent for former salaried employees.

COMPARISON AMONG SYSTEMS

Table 1 shows the total exposure, actual deaths and type of experience for the groups included in the current report. There were sufficient data to produce valid results for each of the groups and most of the subgroups. The text notes instances for which less than 1,000 deaths were included in the subgroup experience. Most of the data were for the calendar years 1985–1989. Data for other periods were adjusted to the midpoint of the 1985–1989 period. Table 2 summarizes the current pensioner mortality. Tables 3 and 4 show the historic trend in mortality experience.

TABLE 1
TOTAL EXPOSURE, ACTUAL DEATHS AND TYPE OF EXPERIENCE
FOR GROUPS INCLUDED IN REPORT

Exposure 1985-1989	Number of Deaths 1985-1989	Description of Group	Experience Included
141,634,077	7,340,880	Medicare from Social Security System	Pensioner and disabled combined
20,066,316	390,137	Civil Service Retirement System	Pensioner, disabled, active, survivor
7,639,897	134,455	U.S. military	Pensioner, disabled
1,049,113	13,661	Public Service of Canada 1984 to 1986	Pensioner, disabled, active
7,326,400	91,119	24 Private-sector systems and 1 public-sector system	Pensioner for all systems. Disabled and active for some systems

As noted below, one major difference in mortality among the groups is for disabled-retiree lives, and much of this difference arises from varying definitions of disability. Table 2 compares the experience by type of participant as well as in total. The subtotals and totals for the private sector are not fully comparable to those for the other groups because not all the firms reported disabled and active life mortality. There were 32 sets of pensioner

TABLE 2
1985-1989 ACTUAL DEATHS COMPARED TO UP-84 EXPECTED

	Medicare	U.S. CSRS	Canada	Private Sector	U.S. Military
Males					
Pensioners	N/A	82.6%	86.4%	86.2%	86.2%
Disabled retirees*	N/A	147.3	206.5	231.6	151.2
Subtotal retirees	99.7%	93.2	93.6	88.3	93.8
Active employees*	N/A	44.0	56.3	47.1	N/A
Total	N/A	86.5	85.2	80.7	N/A
Females					
Pensioners	N/A	82.2%	78.0%	86.5%	79.9%
Disabled retirees*	N/A	130.8	153.7	219.4	138.0
Subtotal retirees	95.0%	90.5	83.6	88.0	87.2
Active employees*	N/A	35.1	52.8	49.1	N/A
Total	N/A	83.0	80.0	82.0	N/A

*Not all the private-sector groups reported disabled and active experience.

mortality including both hourly and salaried data for some of the 24 private-sector employers. Twenty-nine of those reported active data, and 13 reported disabled data.

Pensioner mortality is fairly consistent for the four groups of nondisabled experience shown in Table 2. The disabled-retiree experience varies widely, but, when combined with pensioner experience, the difference between male experience for the U.S. and Canada civil services narrows to less than 0.5 percent. The relatively higher female pensioner experience widens when all retirees are included. Combined private-sector male pensioner experience is significantly lower than CSRS experience, but that may be partly due to the fact that not all participants reported their disability experience. Medicare data, which include all disabled annuitants, are significantly higher than the nondisabled pensioner experience from the other groups. The gap narrows when all retirees are combined.

Because the probability of death for actives is much less than that for pensioners, combination of active and pensioner data has little impact on the relative differences in mortality.

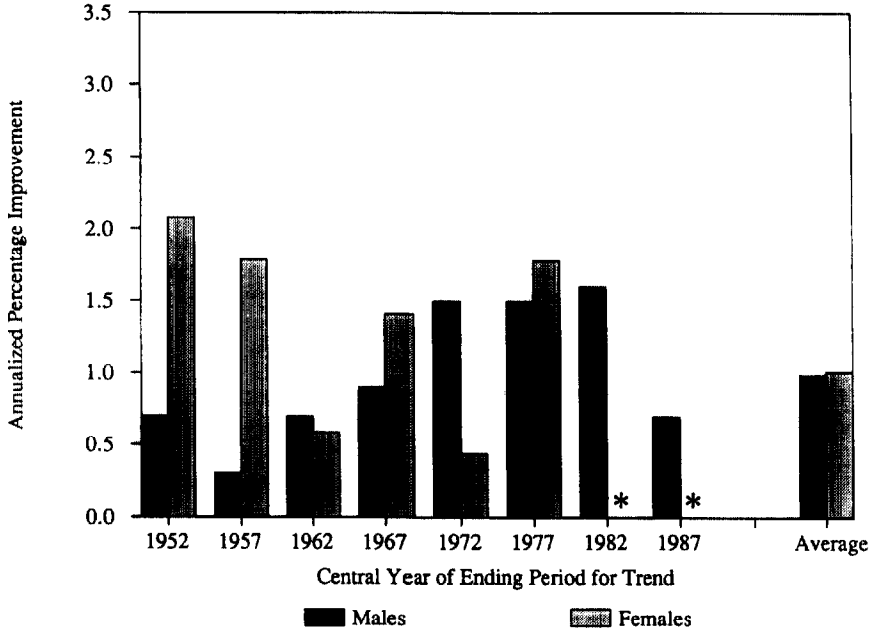
Some of the combinations show apparently anomalous results. For instance, Canadian male experience is higher than CSRS for both groups of retirees, but the combination narrows the gap. The anomalies result from differences in the relative mix of types of experience. For instance, there are proportionately fewer disability retirees in the Canadian experience, so the addition of disabled experience has less impact for Canada than for the U.S.

TRENDS IN MORTALITY

Figure 1 and Table 3 show the period-to-period trends for male and female nondisability pensioners from the CSRS system. The average improvement over the series of eight reports covering the periods 1945–1989 was approximately 1 percent per year for males and females, but there are distinct differences for individual periods. Female mortality had improved significantly throughout the 1950s, but the improvement slowed in the 1960s and 1970s and there has been no improvement in the last 10 years. Male mortality had improved at a much slower rate than female mortality through the 1960s, but the average yearly improvement had increased to 1.6 percent from 1970 through 1984. In the last half of the 1980s, however, the improvement slowed to 0.7 percent per year.

FIGURE 1

ANNUAL RATE OF MORTALITY IMPROVEMENT BETWEEN FIVE-YEAR PERIODS
FOR CSRS NONDISABLED PENSIONERS



*No improvement.

TABLE 3

HISTORY OF CSRS PENSIONER MORTALITY:
ACTUAL DEATHS COMPARED TO UP-84 EXPECTED

Year	Males	Females
1945-49	124%	125%
1950-54	120	112
1955-59	118	102
1960-64	114	99
1965-69	109	92
1970-74	101	90
1975-79	93	82
1980-84	86	82
1985-89	83	82

Table 4 compares the average annual improvement in mortality between 1975 and 1989 for each of the groups reported in two or more studies. The Medicare trends had the same general pattern as the CSRS trends, but there have been significant differences in the individual observations. The Medicare male rate of improvement began to slow in the first half of the 1980s, while the CSRS improvement did not slow until the last half of the 1980s. Female Medicare mortality continued to show improvement in the 1980s, albeit at a much slower rate than in the late 1970s. Military mortality improved significantly more than the other systems in 1985–1989.

The data in this series of reports show that mortality improvement among the elderly slowed and, in some cases, stopped, in the 1980s. Similar trends have been noticed in other studies. Since the pattern of the trend is critical, CSRS provided information for 1990 through 1992 as a preview for the next study. That data show that rate of improvement may be increasing. Male mortality for 1990–1992 was 6 percent lower than that for 1985–1989. Female mortality dropped 3 percent in the same period.

TABLE 4
COMPARISON OF ANNUAL IMPROVEMENT IN MORTALITY

Period	CSRS	Medicare	Military
Males			
1975–1979	1.5%	2.1%*	N/A
1980–1984	1.6	1.0	N/A
1985–1989	0.7	0.7	1.7%
Females			
1975–1979	1.8%	2.8%*	N/A
1980–1984	0	0.8	N/A
1985–1989	0	0.2	N/A

*Medicare data for 1975–1979 is the annual rate of improvement between the 1972 and 1977 experience. All other data are for the annual rate of improvement between five-year groupings of experience. For instance, the CSRS rate of 1.5 percent is the annual rate of improvement between 1970–1974 and 1975–1979.

Civil Service Retirement System

Table 5 compares the mortality experience of the CSRS participants. Active mortality experience is about half of the pensioner mortality experience. Among disabled lives, actual-to-expected ratios are 78 percent higher for

TABLE 5
U.S. CIVIL SERVICE RETIREMENT SYSTEM:
1985-1989 ACTUAL DEATHS
COMPARED TO UP-84 EXPECTED

	Males	Females
Pensioners	82.6%	82.2%
Disability Retirees	147.3	130.8
Survivors	109.9	92.9
All Active	44.0	35.1
Employees		
Active Law	45.8*	N/A
Enforcement		

*Less than 1,000 deaths.

males and 59 percent higher for females. The active law enforcement mortality experience is very close to that of all active males. The law enforcement category includes the FBI and federal firefighters. Survivor experience is substantially higher than pensioner mortality experience, and the difference between survivor and pensioner mortality would widen if differences in ages were removed.

CSRS employees can retire on full benefits as early as age 55 with 30 years of service, and there are a significant number of involuntary retirees from age 50 to age 55. Therefore, the span of ages from 50 to 70 provides extensive comparable data on the mortality experience of all three groups. These are shown in Figures 2 and 3 for males and females, respectively. Retirements in the early 50s are largely involuntary, and there is little difference between active and pensioner mortality. After age 55 there is a natural selection of retirement by the less healthy employees and of continued employment by the most healthy employees. This trend creates a significant and growing difference in mortality after age 55. By the late 60s, the mortality for retirees is more than twice that for employees. Disability retirement mortality is, as expected, much greater than either pensioner or active mortality at all ages.

Medicare

Table 6 shows the annual improvement in Medicare as reported by the Social Security Administration. Medicare covers almost all residents of the U.S. including the great majority of those reported in the other 27 U.S. systems. Medicare experience has always been higher than the mortality experience of pensioners from the other systems because it includes disabled

FIGURE 2
 MALE MORTALITY BY STATUS FOR CIVIL SERVICE RETIREMENT SYSTEM

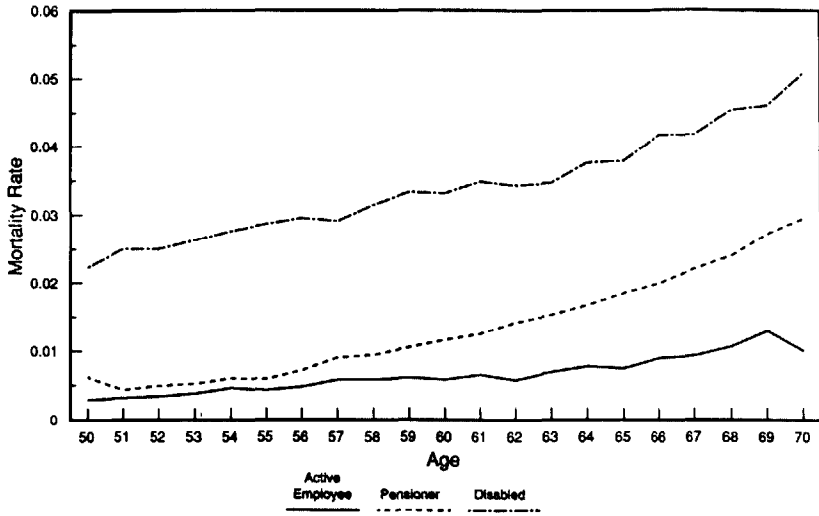


FIGURE 3
 FEMALE MORTALITY BY STATUS FOR CIVIL SERVICE RETIREMENT SYSTEM

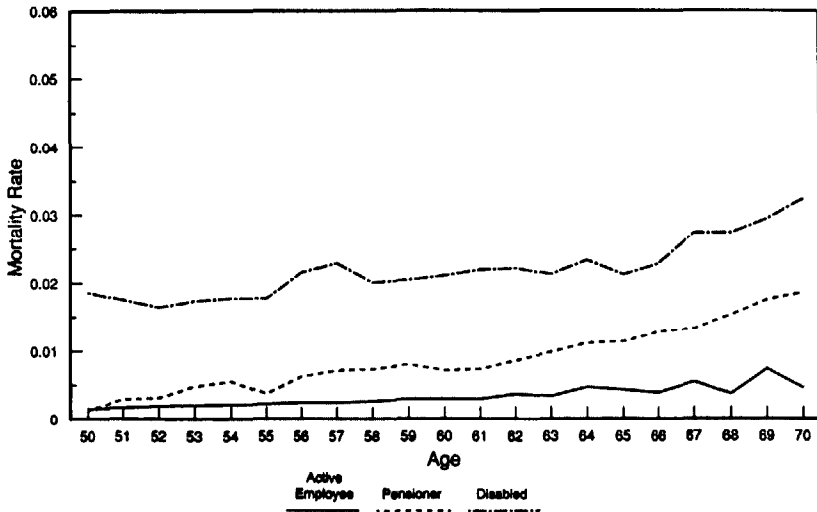


TABLE 6
TREND IN MEDICARE MORTALITY:
1972-1989 ACTUAL DEATHS
COMPARED TO UP-84 EXPECTED

Year	Male	Female
1972	120.2%	113.9%
1973	118.7	111.8
1974	114.2	107.6
1975	111.0%	102.7%
1976	110.4	102.2
1977	108.0	98.8
1978	107.7	98.8
1979	104.5	95.7
1975-1979	108.3%	99.5%
1980	106.5%	98.8%
1981	103.8	96.0
1982	101.1	93.4
1983	103.0	95.6
1984	101.9	95.2
1980-1984	103.2%	95.8%
1985	102.7%	96.2%
1986	101.0	95.4
1987	99.4	94.7
1988	99.6	95.7
1989	96.1	93.1
1985-1989	99.7%	95.0%

annuitants. Medicare mortality is about 15 percent higher than pensioner mortality. When disabled retirees are included, Medicare experience is 5 percent higher than CSRS and 10 percent higher than private-sector experience. This difference is probably attributable to the fact that the working population is healthier, on average, than the total population. This difference carries over into retirement even when those who became disabled while working are included.

Military Retirement System

Table 7 shows the pensioner and disabled experience reported for the U.S. military retirement system. As would be expected and consistent with data from other systems, the mortality for disabled retirees is significantly higher than that for pensioners. For males, pensioner mortality is somewhat higher than civil servant mortality in the U.S. For females, pensioner mortality is

TABLE 7
MILITARY RETIREMENT SYSTEM:
1985-1989 ACTUAL DEATHS
COMPARED TO UP-84 EXPECTED

	Males	Females
Pensioners	86.2%	79.9%*
Disability Retirees	151.2	138.0*

*Less than 1,000 deaths.

somewhat lower than civil servant, but there are still few female military retirees so the difference is probably not significant.

Public Service of Canada

Table 8 shows the mortality experience of the Public Service of Canada. As with the other bodies of experience, active mortality is much lower and disability mortality much higher than pensioner mortality. Male Canadian pensioners have slightly higher, and female pensioners slightly lower, mortality than their U.S. counterparts. Mortality among active and disabled Canadian civil servants is much higher than that among comparable U.S. civil servants.

TABLE 8
PUBLIC SERVICE OF CANADA:
1984-1986 ACTUAL DEATHS
ADJUSTED TO 1985-1989
COMPARED TO UP-84 EXPECTED

	Males	Females
Pensioners	86.4%	78.0%
Disability Retirees	206.5	153.7*
Actives	56.3	52.8*

*Less than 1,000 deaths.

Private Sector

Table 9 shows the experience for the private-sector systems. The private-sector pensioner mortality is 4 percent greater than CSRS mortality. Disability experience is much higher than that for any of the governmental plans, since the private-sector definition of disability is typically much more restrictive than that of the governmental plans. However, because there are

TABLE 9
PRIVATE-SECTOR RETIREMENT SYSTEMS:
1985-1989 ACTUAL DEATHS
COMPARED TO UP-84 EXPECTED

	Males	Females
Pensioners	86.2%	86.5%
Disability Retirees	231.6	219.4*
Actives	47.1	49.1

*Less than 1,000 deaths.

proportionately far fewer disability retirees in the private sector than in the government plans, the total retiree mortality for the private sector is somewhat lower than that for the governments. Active employee mortality is slightly higher than CSRS mortality for males and much higher for females.

By Age and Sex

Table 10 and Figures 4 and 5 show the actual-to-expected ratios by age for CSRS based on the UP-84 table with its recommended sex-distinct adjustments for females and males, respectively. The ratios shown are five year moving averages. Pensioner mortality is at or less than 75 percent of

TABLE 10
CIVIL SERVICE RETIREMENT SYSTEM BY AGE:
1985-1989 ACTUAL DEATHS COMPARED TO UP-84 EXPECTED

Age	Five-Year Moving Average					
	Actives		Pensioner		Disabled	
	Male	Female	Male	Female	Male	Female
22	63.4%	22.0%				
27	67.1	28.1				
32	65.4	37.8				
37	52.8	44.7			1044.5%	1421.0%
42	49.7	46.2			624.9	745.0
47	45.8	40.0			425.5	542.3
52	47.2	35.5	64.2%	74.8%	336.0	347.7
57	44.8	30.0	69.8	76.7	257.3	249.5
62	34.7	26.5	74.7	66.5	187.7	169.3
67	32.9	23.3	75.0	67.3	144.1	123.3
72			79.9	70.2	133.0	112.2
77			84.1	77.0	122.7	105.8
82			89.2	87.5	112.6	107.0
87			93.2	101.6	110.8	104.9
92			91.7	104.9	98.2	113.1
97			86.3	104.5	89.1	111.6

FIGURE 4
 MALE CSRS MORTALITY BY AGE
 FIVE-YEAR MOVING AVERAGE

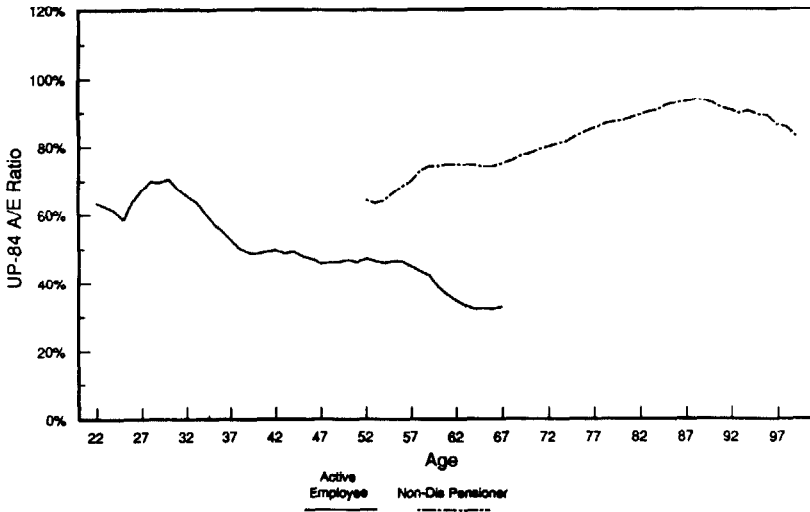
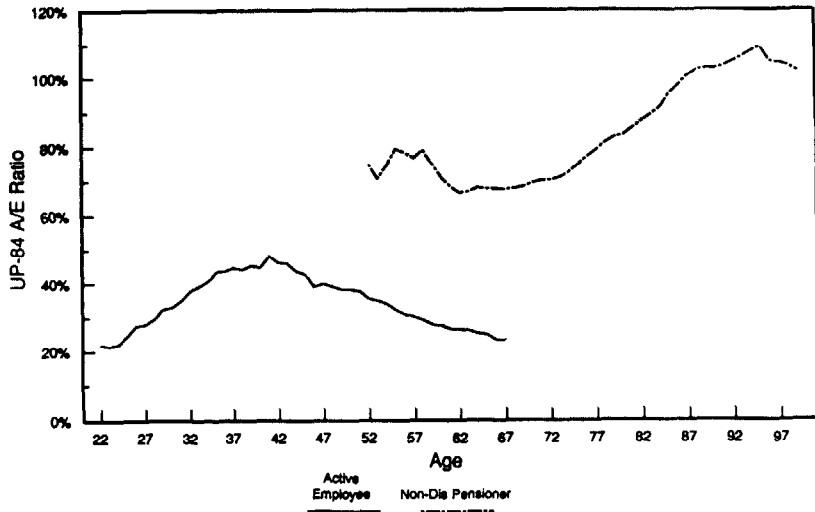


FIGURE 5
 FEMALE CSRS MORTALITY BY AGE
 FIVE-YEAR MOVING AVERAGE



expected through age 67 for males and between ages 60 and 74 for females. The ratios grow by age until they exceed 100 percent for females at age 87 and level out at about 90 percent for males at age 82.

The lower ratios for younger pensioners reflect a greater improvement at the younger ages. The downward tilt in the ratios for actives is probably a result of the fact that the less healthy employees tend to retire at earlier ages.

There is a significant difference in the tilt of the actual-to-expected ratios by age for males and females. This is probably an outgrowth of the use of the "setback" approach to determining female mortality from a unisex table (UP-84) that was primarily based on male experience. The setback approach can be designed to produce annuity values that are reasonable. However, because annuity values are affected by all future mortality rates, the setback does not necessarily reproduce the tilt of the mortality curve by age.

Figures 6 through 9 compare the mortality rates of the CSRS and Medicare experience to the UP-84 and GAM-83 mortality rates from ages 66 through age 96. The tables begin at age 66, which is the first observation from the Medicare data, and are split at age 81 so that the scale of the figures can be set to show significant differences in experience at all ages from 66 through 96. The CSRS rates are five-year moving averages.

The UP-84 table is less reliable than the GAM-83 table as a predictor of pensioner mortality at the younger pensioner ages; actual rates are about three-fourths of the predicted rates. The UP-84 table becomes a better predictor of mortality as age increases. Conversely, the GAM-83 table is a good predictor at the younger ages, but the rates are increasingly lower than actual as age increases. Both tables overestimate the mortality at the very old ages (after 95), because mortality tables are designed to build to a mortality rate of 1.00 at some age. In fact, studies of the mortality of the very old show that mortality rates probably level off between 0.3 and 0.5 per year. The downward tilt in the Medicare rates may be an underreporting of deaths among the very old.

As mortality has improved, the UP-84 table has become less accurate as a predictor of mortality and the GAM-83 table more accurate. Because the improvement has been greater at the younger retiree ages, the GAM-83 table is most accurate, and the UP-84 table least accurate, at the younger ages. Both tables were based on nondisabled-pensioner experience. However, the UP-84 rates are significantly higher than the GAM-83 rates for two reasons. First, the UP-84 table is based on experience from the late 1960s with a 10

FIGURE 6
 MALE MORTALITY RATES AGE 66 TO 81
 1985-89

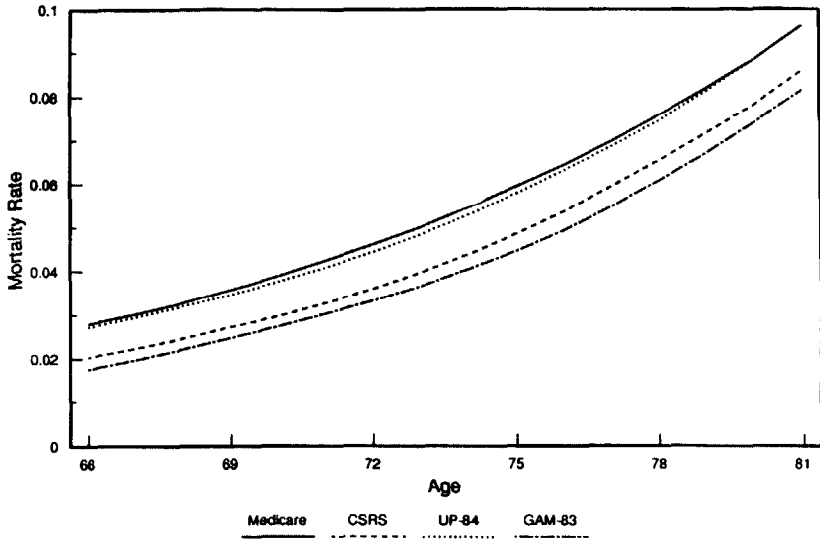


FIGURE 7
 MALE MORTALITY RATES AGE 80 TO 100
 1985-89

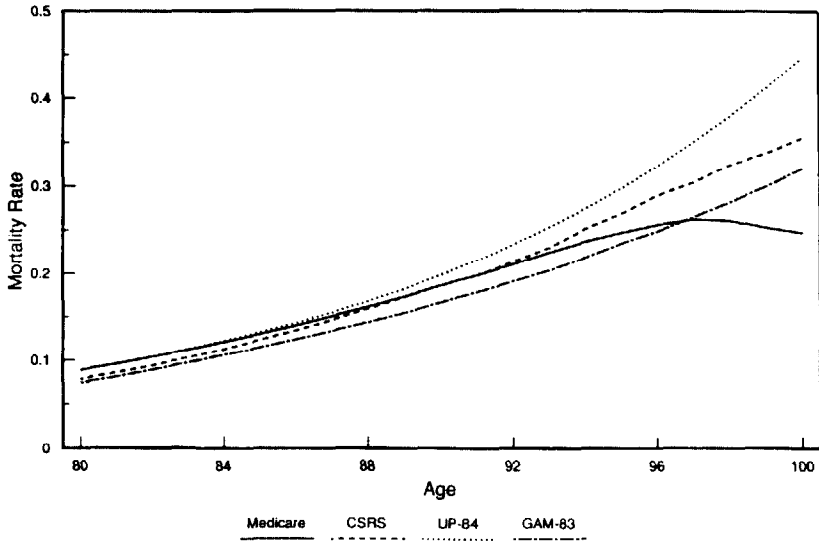


FIGURE 8
 FEMALE MORTALITY RATES AGE 66 TO 81
 1985-89

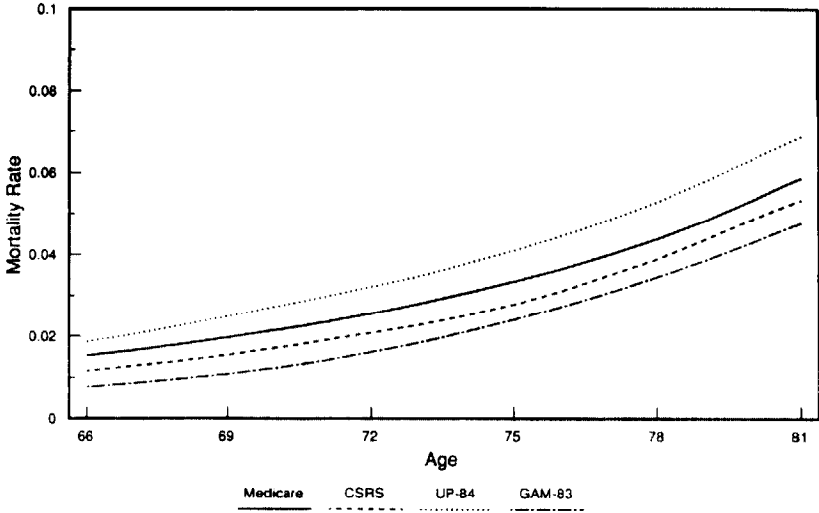
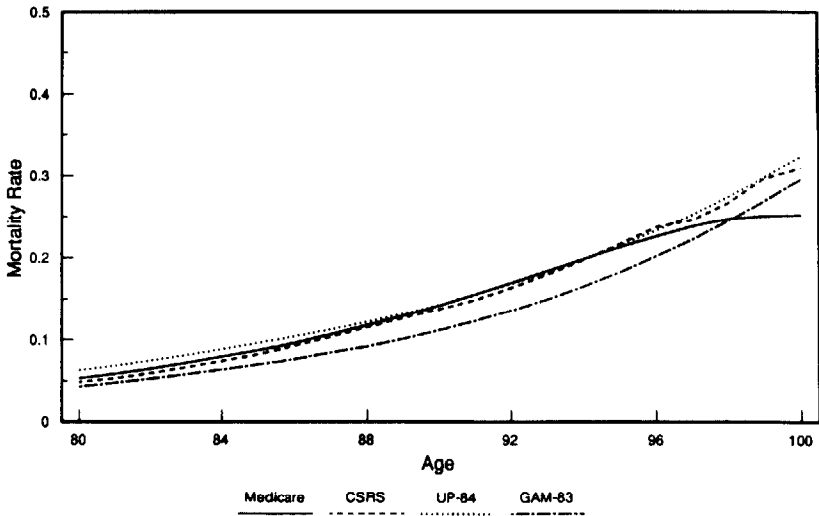


FIGURE 9
 FEMALE MORTALITY RATES AGE 80 TO 100
 1985-89



percent projection to 1984. In fact, mortality in that period improved by much more than 10 percent. Second, the GAM-83 table contains a specific margin for conservatism because it was constructed as an insured life valuation standard.

Hourly and Salaried

Table 11 compares the hourly and salaried experience for the private-sector systems that provided such a split. While both groups exhibit higher mortality after retirement, the hourly experience is significantly higher for both sexes before and after retirement. Table 11 was prepared by using expected rates from the GAM-83 table and is therefore not comparable to earlier tables.

TABLE 11
SALARIED AND HOURLY EXPERIENCE
OF PRIVATE-SECTOR GROUPS
1985-1989 ACTUAL DEATHS
COMPARED TO GAM-83 EXPECTED

	Males	Females
Pensioner		
Salaried	91.6%	108.3%
Hourly	108.1	116.4
Actives		
Salaried	60.5	71.4*
Hourly	85.1	75.4*

*Less than 1,000 deaths.

GAM-83 and UP-84 Tables

Table 12 compares the actual-to-expected experience on the GAM-83 and UP-84 tables. The GAM-83 table rates predict about 10 percent fewer pensioner deaths for males and 20 percent fewer pensioner deaths for females than the actual experience. Conversely, the UP-84 table predicts 15 to 20 percent more deaths than observed for males and females.

TABLE 12
1985-1989 ACTUAL PENSIONER DEATHS COMPARED TO UP-84 AND GAM-83 EXPECTED

	Medicare		U.S. CSRS		Private Sector	
	UP-84	GAM-83	UP-84	GAM-83	UP-84	GAM-83
Male	99.7%	126.6%	82.6%	109.3%	86.2%	112.9%
Female	95.0	133.0	82.2	120.9	86.5	132.9

APPENDIX A

Previous reports of the committee were published in the *1958 Reports* (covering exposure years 1935–57), *1962 Reports* (1935–61), *1966 Reports* (1935–64), *1971 Reports* (1935–70), *1976 Reports* (1945–79), and *1984 Reports* (1945–84).

Data on uninsured retirement plans were provided by the following consulting firms and governmental organizations:

- Alexander & Alexander
- A. Foster Higgins
- Buck Consultants
- Coopers & Lybrand
- Hay/Huggins
- TPF&C
- Military Retirement System, Department of Defense
- Public Service of Canada
- Federal Civil Service, Office of Personnel Management
- Department of Health & Human Services, Social Security.

Additional data and analysis on the governmental programs can be obtained from the respective actuarial offices.

- Reports on Medicare and Social Security experience can be obtained from the Office of the Actuary of the Social Security Administration. Reports include the *Annual Report of the Board of Trustees of the Federal OASDI Trust Funds*.
- Reports on the U.S. Military Retirement System can be obtained from the Office of the Actuary of the Department of Defense. Two published reports are the *Annual Statistical Report on the Military Retirement System* and the *Valuation of the Military Retirement System*.
- Reports on the Civil Service Retirement System can be obtained from the Office of the Actuary of the Office of Personnel Management. Two published reports are the *Compensation Report* and the *Report of the Board of Actuaries of the Civil Service Retirement System*.

APPENDIX B
UP-84 AND GAM-83 MORTALITY RATES

Age	UP-84		GAM-83	
	Male*	Female*	Male	Female
20	0.001267	0.001437	0.000377	0.000189
21	0.001219	0.001414	0.000392	0.000201
22	0.001167	0.001385	0.000408	0.000212
23	0.001149	0.001351	0.000424	0.000225
24	0.001129	0.001311	0.000444	0.000238
25	0.001107	0.001267	0.000464	0.000253
26	0.001083	0.001219	0.000488	0.000268
27	0.001058	0.001167	0.000513	0.000283
28	0.001083	0.001149	0.000542	0.000301
29	0.001111	0.001129	0.000572	0.000320
30	0.001141	0.001107	0.000607	0.000342
31	0.001173	0.001083	0.000645	0.000364
32	0.001208	0.001058	0.000687	0.000388
33	0.001297	0.001083	0.000734	0.000414
34	0.001398	0.001111	0.000785	0.000443
35	0.001513	0.001141	0.000860	0.000476
36	0.001643	0.001173	0.000907	0.000502
37	0.001792	0.001208	0.000966	0.000535
38	0.001948	0.001297	0.001039	0.000573
39	0.002125	0.001398	0.001128	0.000617
40	0.002327	0.001513	0.001238	0.000665
41	0.002556	0.001643	0.001370	0.000716
42	0.002818	0.001792	0.001527	0.000775
43	0.003095	0.001948	0.001715	0.000841
44	0.003410	0.002125	0.001932	0.000919
45	0.003769	0.002327	0.002183	0.001010
46	0.004180	0.002556	0.002471	0.001117
47	0.004635	0.002818	0.002790	0.001237
48	0.005103	0.003095	0.003138	0.001366
49	0.005616	0.003410	0.003513	0.001505
50	0.006196	0.003769	0.003909	0.001647
51	0.006853	0.004180	0.004324	0.001793
52	0.007543	0.004635	0.004755	0.001948
53	0.008278	0.005103	0.005200	0.002119
54	0.009033	0.005616	0.005660	0.002315
55	0.009875	0.006196	0.006131	0.002541
56	0.010814	0.006853	0.006618	0.002803
57	0.011863	0.007543	0.007139	0.003103
58	0.012952	0.008278	0.007719	0.003442
59	0.014162	0.009033	0.008384	0.003821

*Male is the UP-84 Unisex rate set forward one year, and female is the UP-84 Unisex rate set back four years.

UP-84 AND GAM-83 MORTALITY RATES—Continued

Age	UP-84		GAM-83	
	Male*	Female*	Male	Female
60	0.015509	0.009875	0.009158	0.004241
61	0.017010	0.010814	0.010064	0.004702
62	0.018685	0.011863	0.011133	0.005210
63	0.020517	0.012952	0.012391	0.005769
64	0.022562	0.014162	0.013868	0.006385
65	0.024847	0.015509	0.015592	0.007064
66	0.027232	0.017010	0.017579	0.007817
67	0.029634	0.018685	0.019804	0.008681
68	0.032073	0.020517	0.022229	0.009702
69	0.034743	0.022562	0.024817	0.010921
70	0.037667	0.024847	0.027530	0.012385
71	0.040871	0.027232	0.030354	0.014128
72	0.044504	0.029634	0.033370	0.016159
73	0.048504	0.032073	0.036680	0.018481
74	0.052913	0.034743	0.040388	0.021091
75	0.057775	0.037667	0.044597	0.023992
76	0.063142	0.040871	0.049388	0.027184
77	0.068628	0.044504	0.054758	0.030672
78	0.074648	0.048504	0.060678	0.034459
79	0.081256	0.052913	0.067125	0.038549
80	0.088518	0.057775	0.074070	0.042945
81	0.096218	0.063142	0.081484	0.047655
82	0.104310	0.068628	0.089320	0.052691
83	0.112816	0.074648	0.097525	0.058071
84	0.122079	0.081256	0.106047	0.063807
85	0.132174	0.088518	0.114836	0.069918
86	0.143179	0.096218	0.124170	0.076570
87	0.155147	0.104310	0.133870	0.084459
88	0.168208	0.112816	0.144073	0.091935
89	0.182461	0.122079	0.154859	0.101354
90	0.198030	0.132174	0.166307	0.111750
91	0.215035	0.143179	0.178214	0.123076
92	0.232983	0.155147	0.190460	0.135630
93	0.252545	0.168208	0.203007	0.149577
94	0.273878	0.182461	0.217904	0.165103
95	0.297152	0.198030	0.234086	0.182419
96	0.322553	0.215035	0.248436	0.201757
97	0.349505	0.232983	0.263954	0.222043
98	0.378865	0.252545	0.280803	0.243899
99	0.410875	0.273878	0.299154	0.268185
100	0.445768	0.297152	0.319185	0.295187
101	0.483830	0.322553	0.341086	0.325225
102	0.524301	0.349505	0.365052	0.358897
103	0.568365	0.378865	0.393102	0.395842
104	0.616382	0.410875	0.427255	0.438360
105	0.668696	0.445768	0.469531	0.487816
106	0.725745	0.483830	0.521945	0.545886
107	0.786495	0.524301	0.586518	0.614309
108	0.852659	0.568365	0.665268	0.694884
109	0.924666	0.616382	0.760215	0.789474
110	1.000000	0.668696	1.000000	1.000000

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