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MORTALITY EXPERIENCE UNDER THE OLD-AGE AND SURVIVORS INSURANCE SYSTEM

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THE United States old-age and survivors insurance system under the Social Security Act has often been called the largest public insurance program in the world. As a result of the 1950 Amendments, there are 45 million jobs covered during an average week, and approximately 60 million persons have insured status (including those already retired). Even before the 1950 Amendments the system had a very broad scope, with about 36 million covered jobs during an average week of 1950.

Quite naturally, with such a large coverage, a very extensive mortality experience has developed. It is the purpose of this paper to present the results of a mortality investigation of the insured under this system. Unfortunately (or perhaps fortunately), there are no strict legal requirements as to valuation, so that data on the insured population exposed to risk of death are only approximate, being estimated on the basis of sample studies. On the other hand, the number of deaths among the insured population is known only in so far as claims are filed, and there are thus the dual difficulties of nonfiling of claims and lag in filing and in making awards.

The investigation covers the 10-year period 1940–49, and so reflects entirely the operations of the previous law without regard to the extension of coverage and the liberalization of eligibility requirements made by the 1950 Amendments. The actual deaths during this period are derived from the deaths reported in awards of survivor benefits in the years 1940–49, with the deaths allocated to the year of death. On the basis of previous experience, adjustments have been made for the lag in filing and in awarding claims so as to bring in the estimated claims awarded after 1949 in respect to deaths during 1940–49 (obviously most of such adjustment involved 1949 deaths). Deaths were available in 5-year birth groups, which were converted to 5-year age groups by the use of Glover's second order osculatory interpolation formula.[1]

The magnitude of the experience is indicated by Table 1, which shows the actual deaths of insured men and women in each year under consideration (including estimated adjustments for lag in filing and in awarding

[1] *American Statistical Association Quarterly*, Vol. 12, p. 90.

claims). In the decade, there were over 2¼ million deaths, of which 375,000 were among primary beneficiaries (retired workers), for whom survivor benefit claims are almost invariably filed, since death is known to the administrative agency and accordingly eligible survivors are notified.

"Expected" deaths for each calendar year were computed from the estimated mean insured population subdivided by sex into quinquennial age groups. As a basis of "expected" mortality, we used the various life tables for each calendar year, prepared through 1944 by the Metropolitan

TABLE 1

ACTUAL DEATHS OF INSURED

YEAR OF DEATH	TOTAL DEATHS*		DEATHS OF PRIMARY BENEFICIARIES	
	Males	Females	Males	Females
1940	110,803	12,823	3,942	285
1941	127,272	14,186	9,936	582
1942	150,057	15,899	15,559	1,133
1943	180,965	17,187	20,851	1,484
1944	242,937	20,777	25,520	1,875
1945	246,695	25,842	32,649	2,506
1946	228,000	29,113	41,550	3,320
1947	245,664	31,146	53,540	3,915
1948	259,009	31,723	68,164	5,135
1949	265,819	34,551	78,207	6,758
Total	2,057,221	233,247	349,918	26,993

* Includes deaths of primary beneficiaries.

Life Insurance Company from United States vital statistics data and thereafter by the National Office of Vital Statistics and the Metropolitan. The mortality rates for white lives were used, giving somewhat of an allowance for the more favorable anticipated mortality of individuals with recent work experience. Since the coverage is largely urban, it would perhaps have been more logical to use urban life tables, but these are available only for 1940.

Table 2 shows the ratios of actual to expected deaths for men, while Table 3 is for women. For men, unusually high mortality was evident at the younger ages during the war years 1943–45, so an arbitrary adjustment was made to exclude the effect of war deaths. The resulting figures for totals of rows and columns are shown in parentheses. On the whole, actual mortality has been somewhat below expected, since in relatively

few cells is the ratio above 100%. The low ratios are undoubtedly due to nonfiling of claims, especially where only a small lump-sum death payment was due. Thus, in the early years for all ages combined, the ratio was only about 80%, but it slowly increased until in 1949 it was 93%. Considered by age, there is apparently a somewhat higher ratio for the younger ages, with a leveling off for ages 50 and over.

TABLE 2

RATIOS OF ACTUAL TO EXPECTED DEATHS*—INSURED MALES
(In Percent)

Age Last Birthday	Year of Death										
	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1940–49†
15–24.....	81	87	117	144	311	347	129	107	97	66	155 (100)
25–29.....	81	84	101	118	219	283	124	113	108	81	132 (99)
30–34.....	85	86	94	95	158	149	107	107	102	93	108 (96)
35–39.....	85	85	89	90	102	107	101	97	103	100	96 (94)
40–44.....	83	84	84	85	89	94	101	95	99	95	91
45–49.....	80	82	80	80	85	89	90	95	99	100	88
50–54.....	77	78	81	79	79	83	87	88	89	92	84
55–59.....	80	81	81	78	79	81	86	91	91	95	85
60–64.....	82	80	79	76	75	76	81	85	88	89	82
65–69.....	84	79	81	78	75	78	81	84	86	91	82
70–74.....	74	74	79	76	77	77	79	82	87	98	83
75 and over	72	74	76	81	80	83	82	81	88	94	85
All...	81	81	84	85	102	99	89	89	91	93	90
All†..	.....	.....	.....	(82)	(83)	(84)	.....	.....	.....	.....	(86)

* Expected deaths are according to United States Life Tables for White Males for each calendar year shown.

† Figures in parentheses exclude estimated war deaths. Actual deaths in the four younger age groups for 1943–45 were reduced to the ratio of actual to expected deaths for 1940–42 and 1946–48.

The ratios of actual to expected deaths are much lower for women than for men, further evidence of the effect of nonfiling of claims. (Only about 5% of the female deaths result in the more sizable monthly survivor benefits being available, as against a corresponding figure of about 35% for men.) For all ages combined, the ratio of actual to expected mortality for women increased from less than 60% in the early years to about 70% in 1949. Because of the uncertainty as to the amount of nonfiling, it is impossible to say whether female covered workers actually have lower mortality than the total female population. Considered by age, there is a less definite trend for women than for men, although there

seems to be some evidence that the ratio is lower for ages under 30 than for older ages, while for ages 30–50 there is somewhat of a peak.

Table 4 relates to the mortality experience of primary beneficiaries (retired workers and others who have returned to work, all included as insured in Tables 2 and 3), for whom the results are quite reliable since both the exposures and the deaths are quite accurately known. First, considering men, the ratio of actual to expected deaths for all ages com-

TABLE 3

RATIOS OF ACTUAL TO EXPECTED DEATHS*—INSURED FEMALES
(In Percent)

Age Last Birthday	Year of Death										
	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1940–49
15–24	54	53	50	49	49	52	54	55	57	48	52
25–29	57	60	56	55	50	55	63	59	63	65	58
30–34	60	62	62	54	62	57	69	69	69	73	64
35–39	63	64	63	55	60	65	64	80	79	82	68
40–44	60	63	66	59	55	61	65	72	75	73	65
45–49	63	63	65	54	59	59	62	68	69	76	64
50–54	58	61	62	58	58	60	60	63	59	71	61
55–59	55	58	60	51	50	53	57	60	60	69	58
60–64	52	51	57	44	42	48	53	58	60	64	54
65–69	56	51	60	55	49	52	52	57	60	67	57
70–74	41	53	59	56	55	58	62	60	61	78	63
75 and over	65†	80	86	68	78	74	81	60	73	79	74
All	58	59	60	54	54	56	60	63	64	70	61

* Expected deaths are according to United States Life Tables for White Females for each calendar year shown.

† Less than 100 deaths (but more than 10).

bined has tended to decrease slowly towards 100%; in the first few years the ratio was 134%, and at the end of the decade 107%. This trend is explained largely by the change in distribution by age and duration since retirement. For age group 65–69, the ratio has been about 130% in all years combined, thus indicating the fact, verified by sample case studies, that many individuals retire involuntarily because of ill health. For age group 70–74, the ratio tended to be equally high in the first 5 years of operation, but since then has fallen off and at the end of the decade was close to 100%; apparently in the early years persons in this age group were largely those who had just retired and accordingly experienced relatively high mortality, while at the end of the period the group was com-

posed largely of persons who had survived from earlier retirement and thus were approaching the more normal mortality for that age group.

For men age 75–79, mortality in the early years was about 20% lower than the expected, but in 1944 and thereafter the ratio was close to 100% in all years. The low ratios for the early years were probably because individuals at these advanced ages, who had recently had sufficient em-

TABLE 4

RATIOS OF ACTUAL TO EXPECTED DEATHS*—PRIMARY BENEFICIARIES
(In Percent)

Age Last Birthday	Year of Death										
	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1940–1949
	Males										
65–69	164	123	116	120	133	141	136	128	130	124	129
70–74	97	150	149	130	120	111	103	100	106	110	110
75–79	72	82	87	92	99	100	99	94	98	98	97
80–84	71†	84	81	77	71	82	79	78	85	84	81
85 and over	‡	34†	44†	68	60	74	64	67	82	80	73
All	134	121	118	114	115	114	109	103	107	107	109
	Females										
65–69	127	69	89	78	86	96	98	90	89	101	92
70–74	70	105	112	99	81	81	79	73	74	90	82
75–79	35†	50	49	47	70	81	96	75	84	76	78
80–84	‡	60†	71†	64†	68†	93	73	46	52	60	61
85 and over	‡	‡	‡	‡	‡	‡	45†	22†	39†	57	38
All	107	74	88	79	80	86	87	75	78	86	82

* Expected deaths are those according to United States Life Tables for white lives for each calendar year.
† Less than 100 deaths (but more than 10).
‡ 10 or less deaths.

ployment to be insured, were more hale and hearty than average, whereas the ratios close to 100% in the later years reflected the growth in the benefit roll of individuals moving up into this group after having retired several years previously at younger ages. For those age 80 and over, the mortality ratios have consistently been less than 100%, although a definitely increasing trend with the passage of time is ascertainable. Here again the low ratios may be accounted for by better-than-average

lives (recently in employment), but it may be anticipated that as more and more of those who retired at younger ages survive to these ages the ratio will move toward 100%.

These data admit of another concept. By following along the diagonals of Table 4, we are able to observe the results by cohorts of lives. For example, most of the men at ages 70–74 in 1943 with the relatively high

TABLE 5

RATIOS OF ACTUAL TO EXPECTED DEATHS*—INSURED 65 AND OVER NOT PRIMARY BENEFICIARIES
(In Percent)

AGE LAST BIRTHDAY	YEAR OF DEATH										
	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1940–1949
	Males										
65–69	69	62	63	59	54	57	58	60	56	63	59
70–74	70	52	48	45	49	50	51	52	47	65	51
75 and over	73	71	71	74	68	68	63	64	70	101	71
All	70	60	59	56	54	57	57	58	55	68	59
	Females										
65–69	40	42	38	39	29	35	34	42	44	45	39
70–74	35†	34	28	23	31	32	35	37	34	50	35
75 and over‡	80†	131†	246	142	113	63	69	50	70	220	88
All	41	43	41	38	35	36	37	42	44	53	41

* Expected deaths are those according to United States Life Tables for white lives for each calendar year.

† Less than 100 deaths (but more than 10).

‡ The ratios for women age 75 and over are not reliable because expected deaths were determined from exposures obtained by subtraction and the small residuals resulted in large sampling fluctuation.

mortality ratio of 130% are to be found in the age group 75–79 in 1948 with the mortality ratio of 98%. The latter figure is high compared with those in the earlier years for the same age group.

For women, the same trends are, on the whole, present as for men, except that the ratios of actual to expected deaths are lower in practically each instance, and the general progression of the figures is more sporadic, probably in large part because of the relatively small number of female

primary beneficiaries (less than 15% of the total during the decade under consideration).

Finally, Table 5 gives the ratio of actual to expected deaths for insured persons age 65 and over who are not primary beneficiaries. These figures were obtained by subtracting the experience for the primary beneficiaries from the experience for all insured persons of those ages. The resulting data give some indication of mortality among aged persons who are known to be actively at work (since otherwise they would be receiving primary benefits, except in the cases where the individuals involved are unaware of their rights). However, here the very important factor of nonfiling of claims is also present, and accordingly the very low ratios are not necessarily indicative of the low mortality that would be expected for aged individuals who are active enough to be working.

In summary, the volume of exposures and actual deaths for calendar years 1940–49 was adequate to give satisfactory ratios of actual to expected mortality for practically all cells. Actual deaths were limited to those on whose behalf claims were filed (or will be filed). The ratios of actual to expected mortality indicate that there was widespread nonfiling, especially in the early years. Presumably this was most common in the case of women, and of nonmarried men who usually leave only lump-sum benefits of relatively small amounts. The high ratio for the newly retired indicates that a large percentage of them are disabled. The low ratio for aged men and women not on the benefit roll points to them as a favored class from a mortality standpoint; these were recently wage-earners. Presumably, insured wage-earners of all ages have somewhat more favorable mortality than the nonworking groups in the population.