

CONTINUOUS MORTALITY INVESTIGATION

MORTALITY OF IMMEDIATE ANNUITANTS

1949-64

EXPERIENCE AT DURATIONS 0-4

In the recent report on the experience in the annuitants' investigation for the four years 1959-62 (*T.F.A.* vol. 29, p. 223 and *J.I.A.* vol. 91, p. 71), the percentages of actual to expected deaths were set out in individual durations for the years of experience 1948 to 1962. The basis for expected deaths was the table published on page xviii of the preface to *The a(55) Tables for Annuitants*.

In the present report, the data are re-grouped according to years of entry. Thus deaths at duration 0 in 1949 can be regarded as relating to year of entry 1948-49; similarly deaths at duration 1 in 1950 can also be related to year of entry 1948-49, while those for duration 0 in 1950 can be related to 1949-50 and so on. As statistics for years of experience 1963 and 1964 are now available it has been possible to carry the present analysis two years beyond the previous report.

Although from 1963 the select period for recording data in the annuitants' investigation is being progressively extended, for prior years we are restricted to the data for individual durations from 0 to 4. Clearly, results in the "5 and over" group cannot be fully subdivided by year of entry and they are accordingly considered separately in a later section.

The results are shown in Tables 1 and 2. It was originally intended to group the eight years of entry from 1948-49 to 1955-56 as "pre-Finance Act 1956" business and the eight years from 1956-57 to 1963-64 as "post-Finance Act 1956" business. However, inspection of the statistics for individual years of entry brought to light two noteworthy features. It appeared that the male experience for year of entry 1951-52 had been exceptionally heavy at each duration from 1 to 4. Further investigation of the data revealed that an office had written a block of more than 200 annuities of the "Hancock" type in 1952 and had included them in their returns. These annuities had shown exceptionally heavy mortality, sufficiently so to distort the results for all offices combined. More recently (in 1960) instructions have been issued to the offices to exclude "Hancock" annuities (i.e. annuities purchased on the lives of retired employees) so that this form of distortion should not recur.

The other feature brought to light by an analysis of the data by year of entry was that the effect of the Finance Act 1956 was not felt immediately. Table 5 shows the "in force" at duration 0 on 1st January of each year under review. These figures will be very close to the new annuities written in the preceding year. From this it can be seen that, while new business showed some increase in 1956, there was a very much bigger increase in 1957 and further increases in 1958 and 1959. In other words, year of entry 1956-57 was a transitional year in which the effect of the Finance Act 1956 had barely begun to be felt.

In view of the foregoing facts revealed by the data, it was decided that the two years of entry 1951-52 and 1956-57 should be omitted when comparing pre- and post-Finance Act 1956 results. To include the former year would exaggerate the fall in mortality between the two blocks of business; while to include the latter year would result in understating it. Although the 1951-52 feature affected only the male experience, it was decided to make a similar adjustment to the female experience so that the two sets of results should be comparable. The percentages of actual to expected deaths for the two groups of entry years, modified as described above, are as follows :

Group	Duration					
	0	1	2	3	4	Mean of 1-4
<i>Males</i>						
Pre-Finance Act 1956	66	85	86	92	88	88
Post-Finance Act 1956	59	70	70	76	76	73
<i>Females</i>						
Pre-Finance Act 1956	61	74	82	95	81	83
Post-Finance Act 1956	52	65	69	76	79	72

It will be appreciated that as the latest year of experience included in the data is 1964, the post-Finance Act 1956 results are deficient in the longer durations. For this reason the final column in the above table shows a simple average of the percentages for durations 1-4, since a comparison of weighted means would not be valid. Durations 1-4 have been chosen in preference to 0-4 because, whereas there is a sharp jump from duration 0 to duration 1, the progression from duration 1 to duration 4 is much more gradual. The result brings into a sharper light the earlier conclusion that there has been a change in mortality since the Finance Act 1956. For male lives the fall has

been from 88% to 73% and for female lives it has been from 83% to 72%.

So far, no attention has been paid to normal secular trend. If mortality has been falling steadily from year to year, it would be expected that a comparison between two successive groups of years of entry would show a definite decline from the first to the second period without any need to invoke an external influence to account for the fact. Accordingly, the results derived in Tables 1 and 2 have been standardized to eliminate secular trend by applying the comparative indices for the general population of Great Britain aged 65 and over published by L. V. Martin in successive volumes of *J.I.A.* Martin's index for each year of experience was applied to the expected deaths at the appropriate duration for each year of entry. This produced "trend corrected" percentages of actual to expected deaths. The results are shown in Tables 3 and 4 and are summarized below in the same form as the results given earlier before correction for trend.

Group	Duration					
	0	1	2	3	4	Mean of 1-4
<i>Males</i>						
Pre-Finance Act 1956	68	88	88	97	92	91
Post-Finance Act 1956	62	74	73	79	80	76
<i>Females</i>						
Pre-Finance Act 1956	64	79	87	105	90	90
Post-Finance Act 1956	59	75	79	88	92	83

For male lives aged over 65 in the general population there has been virtually no change in mortality during the period 1948-64. Consequently the differential between the pre- and post-Finance Act 1956 results is unchanged, the fall now being from 91% to 76% instead of from 88% to 73%. For female lives, however, mortality has been declining over the period and elimination of the secular trend reduces the differential between pre- and post-Finance Act 1956 mortality, the fall now being from 90% to 83% instead of from 83% to 72%.

(Applying Martin's indices has the effect of *reducing* the expected deaths and hence of *increasing* the percentages of actual to expected deaths. This feature is more marked for females than for males. What matters, however, is not the percentages themselves but the comparative fall between the two groups of entry years.)

Reference has already been made to Table 5 and to the evidence which it provides of a substantial increase in new annuities written since 1956. If it is correct that a new class of annuitant is entering the experience, there may have been an increasing degree of heterogeneity and the annuitant population might now be regarded as an amalgam of "heavy" and "light" mortality risks. As the new and lighter class of business is probably for higher amounts of annuity, it seems quite possible that an experience based on "amounts" would show an even lighter mortality than the present experience based on "lives".

One further point should perhaps be made. In recent years there has been a substantial amount of annuity business transacted in association with whole-life assurance at old ages with a view to reducing estate duty. This type of business, which might be expected to exhibit high mortality, is excluded from the Continuous Mortality Investigation and so is not a factor in the results now being considered.

EXPERIENCE AT DURATIONS 5 AND OVER

For annuities entering since the Finance Act 1956 the contributing offices have been extending the range of individual durations for which data are recorded separately. Thus for the year of experience 1963, separate data were submitted for duration 5 and the ultimate experience thus became "6 and over". For 1964, separate data were submitted for durations 5 and 6, the ultimate experience being "7 and over".

Duration	Males				Females			
	Entrants in 1957-58		Entrants in 1958-59		Entrants in 1957-58		Entrants in 1958-59	
	Deaths	100 A/E	Deaths	100 A/E	Deaths	100 A/E	Deaths	100 A/E
0	44	62	42	51	48	47	54	47
1	44	63	52	62	62	57	91	74
2	59	82	62	71	80	71	95	73
3	51	71	68	78	82	70	97	72
4	58	80	62	72	97	80	115	84
5	77	105	79	91	106	87	107	77
6	52	75	—	—	96	78	—	—

The reason for obtaining this additional information was to be able to follow the mortality experience of the "post-Finance Act 1956"

business and to prevent it from being automatically lost in the ultimate experience with the "pre-Finance Act 1956" business. So far there has not been time for enough information to accumulate to enable any firm conclusions to be drawn with regard to the trend of the experience after duration 4, but for the sake of completeness such figures as are available are shown opposite. As before, the basis for expected deaths is the table on page xviii of the preface to *The a(55) Tables for Annuitants*.

Clearly it is impossible to draw any inference from these results and we must wait until a few more years' data have accumulated before forming any views on the course of the mortality at durations over 4.

Turning now to the ultimate or "5 and over" section of the data, the results for each individual year of experience from 1949 to 1964 are given in the following table (all ages combined) :

Year of experience	Males		Females	
	Deaths	100 A/E	Deaths	100 A/E
1949	802	95	2,700	100
1950	869	103	2,922	107
1951	897	108	3,117	113
1952	758	91	2,775	100
1953	835	99	2,839	100
1954	817	95	2,924	100
1955	919	105	3,053	102
1956	838	99	3,256	109
1957	747	89	2,879	97
1958	847	102	3,020	102
1959	888	110	3,105	106
1960	706	92	2,838	98
1961	703	93	2,997	105
1962	772	101	2,921	103
1963	828	106	3,067	109
1964	684	87	2,552	92
Total 1949-64	12,910	99	46,965	103

The closeness of the mortality to the 1947 experience table used in calculating the expected deaths is noteworthy. The results show no discernible trend, but it should be remembered that up to 1962 the "5 and over" experience consists entirely of pre-Finance Act 1956 business. From 1962, the post-Finance Act 1956 begins to enter the "5 and over" section of the data, but it is still swamped by the earlier class. Only time will tell whether the changes noted at

durations 0-4 are eventually to be reflected in the "5 and over" section. But from the results obtained at those earlier durations it seems possible that as the proportion of post-Finance Act 1956 business increases within the "5 and over" section of the data, the experience will grow progressively lighter.

TABLE 1

Actual deaths and percentages of actual to expected deaths according to the table on page xviii of the preface to "The a(55) Tables for Annuitants"

Male lives

Year of entry	Duration									
	0		1		2		3		4	
	Deaths	100 A/E	Deaths	100 A/E	Deaths	100 A/E	Deaths	100 A/E	Deaths	100 A/E
1948-49	22	55	37	89	38	90	47	112	40	95
1949-50	24	64	37	94	34	87	26	69	32	82
1950-51	26	73	42	114	33	89	39	106	34	93
1951-52	27	66	55	133	57	135	60	145	50	126
1952-53	31	76	26	64	39	96	36	91	24	63
1953-54	25	75	30	88	26	76	30	88	31	89
1954-55	25	74	34	99	26	75	31	87	35	100
1955-56	18	49	20	52	33	82	36	89	37	93
1948-56	198	66	281	92	286	92	305	99	283	93
1948-56 excluding 1951-52	171	66	226	85	229	86	245	92	233	88
1956-57	24	44	54	95	56	98	47	84	58	102
1957-58	44	62	44	63	59	82	51	71	58	80
1958-59	42	51	52	62	62	71	68	78	62	72
1959-60	42	48	56	61	59	63	80	84	72	77
1960-61	46	53	60	66	69	75	65	71	—	—
1961-62	53	56	84	85	62	63	—	—	—	—
1962-63	90	80	89	78	—	—	—	—	—	—
1963-64	67	58	—	—	—	—	—	—	—	—
1957-64	384	59	385	70	311	70	264	76	192	76

TABLE 2

Actual deaths and percentages of actual to expected deaths according to the table on page xviii of the preface to "The a(55) Tables for Annuitants"

Female lives

Year of entry	Duration									
	0		1		2		3		4	
	Deaths	100 A/E	Deaths	100 A/E	Deaths	100 A/E	Deaths	100 A/E	Deaths	100 A/E
1948-49	55	65	88	99	68	74	91	94	79	79
1949-50	43	57	62	78	79	95	76	88	81	91
1950-51	43	59	59	77	63	78	75	89	78	90
1951-52	41	65	44	65	50	71	65	88	49	66
1952-53	31	50	38	57	57	82	73	102	44	61
1953-54	42	59	68	91	61	79	74	93	64	79
1954-55	49	71	37	52	66	86	88	112	70	89
1955-56	45	64	43	58	62	79	72	90	62	78
1948-56	349	62	439	73	506	81	614	94	527	79
1948-56 excluding 1951-52	308	61	395	74	456	82	549	95	478	81
1956-57	47	53	72	76	89	90	88	88	81	79
1957-58	48	47	62	57	80	71	82	70	97	80
1958-59	54	47	91	74	95	73	97	72	115	84
1959-60	71	55	76	56	102	72	137	93	110	73
1960-61	60	47	100	73	83	59	99	68	—	—
1961-62	75	55	85	58	104	69	—	—	—	—
1962-63	89	53	127	71	—	—	—	—	—	—
1963-64	103	55	—	—	—	—	—	—	—	—
1957-64	500	52	541	65	464	69	415	76	322	79

TABLE 3

Actual deaths and percentages of actual to expected deaths corrected for secular trend (for basis see text)

Male lives

Year of entry	Duration									
	0		1		2		3		4	
	Deaths	100 A/E	Deaths	100 A/E	Deaths	100 A/E	Deaths	100 A/E	Deaths	100 A/E
1948-49	22	58	37	92	38	85	47	118	40	100
1949-50	24	66	37	89	34	92	26	72	32	87
1950-51	26	69	42	120	33	94	39	112	34	95
1951-52	27	70	55	139	57	142	60	148	50	130
1952-53	31	80	26	67	39	99	36	94	24	67
1953-54	25	79	30	90	26	79	30	94	31	93
1954-55	25	76	34	102	26	81	31	91	35	105
1955-56	18	50	20	55	33	86	36	94	37	100
1948-56	198	68	281	95	286	95	305	104	283	97
1948-56 excluding 1951-52	171	68	226	88	229	88	245	97	233	92
1956-57	24	47	54	99	56	104	47	91	58	106
1957-58	44	64	44	66	59	89	51	74	58	83
1958-59	42	54	52	67	62	74	68	80	62	72
1959-60	42	51	56	63	59	65	80	84	72	85
1960-61	46	55	60	68	69	75	65	78	—	—
1961-62	53	58	84	85	62	69	—	—	—	—
1962-63	90	80	89	86	—	—	—	—	—	—
1963-64	67	63	—	—	—	—	—	—	—	—
1957-64	384	62	385	74	311	73	264	79	192	80

TABLE 4

Actual deaths and percentages of actual to expected deaths corrected for secular trend (for basis see text)

Female lives

Year of entry	Duration									
	0		1		2		3		4	
	Deaths	100 A/E	Deaths	100 A/E	Deaths	100 A/E	Deaths	100 A/E	Deaths	100 A/E
1948-49	55	66	88	101	68	69	91	102	79	85
1949-50	43	59	62	73	79	103	76	95	81	101
1950-51	43	56	59	83	63	84	75	98	78	96
1951-52	41	70	44	70	50	78	65	94	49	71
1952-53	31	54	38	64	57	88	73	110	44	70
1953-54	42	66	68	97	61	85	74	107	64	88
1954-55	49	76	37	56	66	99	88	125	70	100
1955-56	45	69	43	67	62	88	72	101	62	90
1948-56	349	64	439	78	506	86	614	104	527	88
1948-56 excluding 1951-52	308	64	395	79	456	87	549	105	478	90
1956-57	47	61	72	85	89	102	88	102	81	88
1957-58	48	52	62	64	80	82	82	78	97	91
1958-59	54	52	91	85	95	81	97	82	115	93
1959-60	71	64	76	62	102	81	137	104	110	91
1960-61	60	52	100	82	83	66	99	84	—	—
1961-62	75	62	85	65	104	85	—	—	—	—
1962-63	89	59	127	88	—	—	—	—	—	—
1963-64	103	68	—	—	—	—	—	—	—	—
1957-64	500	59	541	75	464	79	415	88	322	92

TABLE 5

Annuities in force at duration 0 on 1st January of each year from 1949 to 1965

Year	Males	Females
1949	822	3,184
1950	755	2,504
1951	674	2,375
1952	630	2,161
1953	801	1,680
1954	633	1,993
1955	585	2,174
1956	604	1,819
1957	725	1,972
1958	1,093	2,738
1959	1,269	2,772
1960	1,600	3,391
1961	1,450	3,452
1962	1,498	3,280
1963	1,701	3,830
1964	2,098	4,830
1965	1,856	4,542