CONTINUOUS MORTALITY INVESTIGATION:
ASSURED LIVES 1944–1948

THE last note published on the assured lives experience appeared in *J.I.A.* LXXII, 516 and *T.F.A.* XVIII, 167, and related to the period 1939–43. Statistics are now available for 1944–48 and are, perhaps, of more interest than usual because the last two years of this period, being free from the disturbing feature of war mortality, afford an opportunity of assessing the effects on the assured lives experience of the decline in mortality that has occurred in recent years.

I. PUBLICATION OF BASIC DATA

Statistics are in course of publication giving for each year of the period 1944–48 the 'in force' and 'deaths' at each age for each year of duration 0 to 4 and for durations 5 and over. The particulars will be given separately for the medical and non-medical sections and for each of the four classes of assurance. These statistics will be in a different form from those published for the first twenty years of the investigation, which consisted of 'exposed to risk' and 'deaths' for quinquennial periods but not for individual calendar years. With statistics in the new form it will be possible for anyone to investigate the mortality experience in any one of the five years 1944–48. In future it is intended to publish similar statistics year by year.

2. CHARTS ILLUSTRATING SECULAR TREND

In order that the contributing offices might have some broad indication of mortality changes from year to year since the beginning of the continuous investigation, a series of graphs has recently been sent to them illustrating in quinary age-groups the rates of mortality, for durations 5 and over, experienced in each calendar year from 1924 to 1948 inclusive by all classes of assured lives (medical and non-medical) combined. The group rates of mortality on which the graphs were based are given in Appendix I of this note.

3. RATES OF MORTALITY DURING THE PERIOD

Following the precedent established in earlier notes, rates of mortality in quinary age-groups for durations 0, 1 and 2, and for combined durations 3 and over, have been calculated for the quinquennium 1944–48 and are reproduced in Appendix II. This information is given separately for medical and non-medical business and is subdivided according to the four standard classes of policy. In order to indicate the weight of the statistics on which the mortality rates are based, the actual deaths are also shown in the tables.

The most significant and interesting information is that which relates to the post-war years 1947 and 1948. Tables corresponding to those in Appendix II have therefore been prepared for these two years combined and are to be found in Appendix III.

4. RATIOS OF ACTUAL TO EXPECTED DEATHS

In accordance with customary practice a table has been prepared, and is reproduced in Appendix IV, showing ratios of actual deaths to those expected by the A 1924–29 table in various groups of assured lives for each year of the period under review. These groups are not standardized for age and, in view of variations in the age distribution between one group and another, caution is required when interpreting the resultant ratios. Thus, the 'in force' under non-medical business has a much younger age-distribution than under medical business. As the proportionate improvement over the A 1924–29 table has been greatest at young ages, it is to be expected that the over-all ratio for non-medical business would be lower than for medical business. And in fact this was so for the post-war years, that is to say when the effects of war mortality had ceased to operate. For the war years the heavy toll of the war on young lives produced a contrary result. In neither case, however, do the over-all ratios provide a reliable guide to the relative mortality of medical and non-medical business. Similar considerations apply to comparisons between any other of the groups into which the data are divided.

It is hoped in future notes on the mortality of assured lives to avoid the shortcomings of Appendix IV by presenting a closer analysis of each class of assurance. Improved methods of comparison are now under consideration by the Joint Mortality Committee.

5. CURRENT LEVEL OF ASSURED LIVES MORTALITY

In order to give some general indication of the current level of the mortality of assured lives, the data for all classes of business at durations 3 and over have been combined for the two years 1947–48 and a set of mortality rates has been derived. The rates were graduated by Spencer's 21-term formula, with adjustments at the young and old ages, and a comparison between the resultant values of q_x and the corresponding values from the A 1924–29 ultimate table will be found in Appendix V.

Inspection of these results reveals some interesting features. The ratios in the final column, while showing a broad tendency to increase with advancing age, *do not by any means progress uniformly. In fact, the relative improvement at age 40 is greater than at age 20*; and at age 70 it is greater than it is anywhere over the range 50–65. A graph of these ratios is reproduced in Appendix V.

On a general over-all view it may be said that for purposes of summarizing current mortality in relation to the A 1924–29 table, the data may be divided into three broad age-groups, viz. under 45, 45–74 and 75 and over. In the first of these groups current experience is about 60 % of the A 1924–29 table; in the second group it is about 80 %; and in the third group it approximates to 90 %.

6. MONETARY EFFECTS OF IMPROVED MORTALITY

The Committee is of the opinion that the experience of a few more post-war years should be collected before new tables are prepared for general use. But in order to give some indication of the monetary effect of the marked changes

in mortality during the past twenty years, annuity and assurance values and pure premiums have been calculated on a 3 % basis on the graduated mortality rates for 1947–48 described in section 5. They are reproduced in the table in Appendix VI and the corresponding A 1924–29 ultimate values are shown alongside for comparison.

7. MORTALITY INDICES FOR INDIVIDUAL OFFICES

It will be evident, from what has already been said with regard to the relative improvement in mortality at different ages, that, owing to the differences between the age distributions of individual offices, no valid comparison can be made between the over-all ratio of actual to expected deaths for any particular office and the corresponding ratio for all offices combined. The Committee is therefore considering alternative methods of giving offices a broad indication of how their mortality compares with the general experience, and it is hoped in due course to evolve suitable indices for this purpose.

8. CHILDREN'S DEFERRED ASSURANCES

The data for the five years 1944–48 are shown in the following table:

Children's deferred assurances

Calendar year	Exposed to risk	Actual deaths	Expected deaths by A 1924–29 ultimate	$(A-E)/E$ %
1944	23,373	366	66	+455
1945	25,238	289	71	+307
1946	27,100	117	78	+50
1947	29,778	63	86	−27
1948	32,501	65	95	−32
1944–48	137,990	900	396	+127
1947–48	62,279	128	181	−29

Since most of the lives exposed in this class of assurance are young, war mortality has a very pronounced effect on the ratios of actual to expected deaths for 1944–46. The experience for 1947–48 is analysed in age-groups in the following table, where the actual deaths are compared with those expected on the basis of the experience during the same period for the main classes of assurance at durations 3 and over.

Children's deferred assurance

Comparison of the actual deaths with the expected deaths on the basis of the 1947–48 experience of assured lives, durations 3 and over.

Age-group	Actual deaths	Expected deaths
21–25	37	38
26–30	34	27
31–35	14	13
36–40	12	13
41–45	12	12
46–50	7	10
51–55	7	5
56–	5	4
	128	122

This table suggests that there may be no significant difference between the mortality experience of children's deferred assurances after vesting and that of the main body of assured lives.

CONTINUOUS INVESTIGATION INTO THE MORTALITY OF ASSURED LIVES

Rates of mortality in quinary age-groups for durations 5 and over in each of the 25 years 1924-48

Year	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66-70	71-75	76-80	81-85	86-90	91 and over
1924	·00211	·00249	·00299	·00387	·00470	·00617	·00970	·01584	·02588	·04245	·06797	·10375	·15956	·24024	·30796
1925	·00266	·00248	·00283	·00343	·00521	·00619	·00966	·01577	·02572	·04046	·06742	·10556	·15105	·20179	·29675
1926	·00213	·00260	·00256	·00333	·00460	·00612	·00980	·01471	·02580	·03938	·06572	·10081	·14211	·21234	·26331
1927	·00234	·00249	·00276	·00336	·00450	·00664	·00944	·01538	·02520	·04045	·06819	·10656	·15560	·21162	·29216
1928	·00298	·00213	·00247	·00286	·00491	·00586	·00905	·01521	·02587	·04080	·06403	·10016	·15417	·20295	·30650
1929	·00248	·00243	·00278	·00351	·00479	·00684	·01048	·01577	·02496	·04246	·07340	·11119	·16557	·22238	·33333
1930	·00240	·00239	·00228	·00327	·00453	·00616	·00918	·01475	·02451	·03948	·06582	·09756	·15045	·21762	·33877
1931	·00204	·00232	·00250	·00303	·00416	·00616	·00960	·01402	·02487	·04283	·06771	·10096	·15341	·21881	·33464
1932	·00247	·00264	·00223	·00282	·00392	·00628	·00928	·01459	·02610	·04017	·06544	·10379	·15532	·20558	·30716
1933	·00247	·00227	·00235	·00328	·00445	·00646	·00917	·01488	·02370	·03943	·06501	·10392	·16329	·20496	·31540
1934	·00220	·00194	·00225	·00290	·00390	·00562	·00915	·01541	·02355	·03938	·06686	·10153	·15359	·20356	·24525
1935	·00209	·00200	·00234	·00293	·00384	·00595	·00904	·01390	·02386	·03671	·06645	·10131	·14465	·21252	·28787
1936	·00208	·00205	·00214	·00277	·00371	·00565	·00874	·01498	·02321	·04114	·06247	·10722	·14855	·22249	·33683
1937	·00179	·00203	·00212	·00277	·00397	·00586	·00962	·01467	·02442	·03907	·06451	·10249	·15262	·21828	·30034
1938	·00188	·00153	·00196	·00254	·00379	·00539	·00896	·01451	·02281	·03709	·06160	·09750	·14553	·19987	·27603
1939	·00251	·00182	·00184	·00246	·00339	·00568	·00900	·01502	·02335	·03659	·05965	·09706	·14841	·20674	·24307
1940	·00543	·00361	·00291	·00329	·00449	·00626	·00971	·01598	·02479	·03879	·06148	·09774	·15777	·21767	·32444
1941	·00922	·00595	·00352	·00373	·00455	·00610	·00919	·01429	·02243	·03680	·06101	·09818	·15277	·20215	·27542
1942	·01167	·00744	·00426	·00322	·00404	·00558	·00859	·01415	·02167	·03241	·05262	·08453	·13623	·21352	·31024
1943	·01242	·00856	·00547	·00341	·00414	·00497	·00833	·01267	·01920	·03252	·05405	·08744	·14051	·19457	·27772
1944	·01622	·01101	·00720	·00373	·00363	·00557	·00818	·01278	·02079	·03320	·05335	·08752	·14049	·22440	·30564
1945	·01590	·00966	·00576	·00346	·00324	·00492	·00809	·01330	·02000	·03259	·05190	·08981	·13356	·20037	·28704
1946	·00581	·00444	·00288	·00230	·00320	·00502	·00813	·01298	·02029	·03366	·05196	·09355	·14321	·21649	·26466
1947	·00218	·00166	·00171	·00191	·00297	·00486	·00826	·01345	·02099	·03493	·05421	·09120	·14878	·20576	·29902
1948	·00157	·00138	·00130	·00180	·00276	·00482	·00751	·01286	·02059	·03345	·04950	·08394	·12793	·18899	·24925

Notes. (a) The above rates have been derived from the experience of all four classes of assurance, medical and non-medical, combined. For age-groups 76-80 and onwards the experience of the with-profit classes only has been used where the rates so brought out are higher than those of the experience of all classes. It is known that the experience includes numbers of paid-up policies where the life assured is dead and death has not been notified. The distortion thus produced in the rates of mortality is to some extent reduced by the use of the experience of with-profit classes only.

(b) The stated ages are half a year more than the correct ages; thus '21-25' should be read as relating to exact ages '20½-24½' and so on.

Tables of deaths and group rates of mortality

Age group	Actual deaths				Group rate of mortality			
	Duration 0	Duration 1	Duration 2	Durations 3 and over	Duration 0	Duration 1	Duration 2	Durations 3 and over
Life—with profits								
20½–24½	11	8	8	86	·00486	·00676	·01144	·01970
25½–29½	8	6	10	188	·00200	·00208	·00559	·00989
30½–34½	2	4	4	268	·00049	·00125	·00198	·00570
35½–39½	4	4	6	208	·00142	·00155	·00300	·00319
40½–44½	6	4	6	215	·00268	·00200	·00364	·00312
45½–49½	5	4	3	361	·00265	·00253	·00370	·00510
50½–54½	10	7	6	683	·00516	·00408	·00400	·00820
55½–59½	10	24	25	1469	·00515	·01313	·01415	·01358
60½–64½	12	22	35	3022	·00840	·01391	·02035	·02237
65½–69½	7	16	17	5409	·01282	·02062	·01704	·03583
70½–74½	—	6	5	7267	·00000	·05021	·02525	·05404
75½–79½	1	—	—	8207	·13333	—	—	·08892
80½–84½	—	—	—	6660	—	—	—	·13920
85½–89½	—	—	—	3883	—	—	—	·20815
90½–94½	—	—	—	1157	—	—	—	·27505
95½–99½	—	—	—	183	—	—	—	·31909
100½–	—	—	—	16	—	—	—	·46377
Life—without profits								
20½–24½	6	7	6	30	·00289	·00643	·00994	·01288
25½–29½	7	8	7	104	·00164	·00269	·00364	·00888
30½–34½	7	9	2	163	·00157	·00275	·00092	·00453
35½–39½	—	8	1	178	·00000	·00267	·00046	·00313
40½–44½	3	7	1	200	·00110	·00290	·00050	·00319
45½–49½	6	7	3	350	·00309	·00422	·00199	·00592
50½–54½	4	6	7	487	·00239	·00393	·00524	·00833
55½–59½	5	15	10	835	·00424	·01278	·00786	·01350
60½–64½	3	12	14	1310	·00485	·01556	·01580	·02157
65½–69½	1	3	6	1710	·00419	·01040	·01613	·03275
70½–74½	—	1	2	1875	—	·01852	·02597	·05001
75½–79½	—	—	—	1619	—	—	—	·08063
80½–84½	—	—	—	982	—	—	—	·12548

Endowment assurance—with profits

Age group								
$20\frac{1}{2}$–$24\frac{1}{2}$	82	75	83	501	·00218	·00344	·00579	·00962
$25\frac{1}{2}$–$29\frac{1}{2}$	54	58	59	1114	·00095	·00145	·00249	·00647
$30\frac{1}{2}$–$34\frac{1}{2}$	47	44	43	1658	·00076	·00095	·00144	·00407
$35\frac{1}{2}$–$39\frac{1}{2}$	53	54	55	1623	·00088	·00128	·00162	·00259
$40\frac{1}{2}$–$44\frac{1}{2}$	74	95	84	2178	·00156	·00230	·00258	·00310
$45\frac{1}{2}$–$49\frac{1}{2}$	66	78	102	3046	·00216	·00277	·00398	·00481
$50\frac{1}{2}$–$54\frac{1}{2}$	85	101	117	4195	·00399	·00470	·00554	·00762
$55\frac{1}{2}$–$59\frac{1}{2}$	64	85	105	5169	·00726	·00843	·00880	·01224
$60\frac{1}{2}$–$64\frac{1}{2}$	36	35	55	4339	·01216	·00998	·01292	·01889
$65\frac{1}{2}$–$69\frac{1}{2}$	13	20	35	1981	·01657	·01848	·02533	·02898
$70\frac{1}{2}$–$74\frac{1}{2}$	2	1	4	576	·05797	·01242	·02721	·04133
$75\frac{1}{2}$–$79\frac{1}{2}$	—	—	—	74	—	—	—	·05638
$80\frac{1}{2}$–	—	—	—	10				·04926

Endowment assurance—without profits

Age group								
$20\frac{1}{2}$–$24\frac{1}{2}$	4	14	20	68	·00083	·00477	·00764	·00611
$25\frac{1}{2}$–$29\frac{1}{2}$	6	16	19	156	·00049	·00201	·00360	·00611
$30\frac{1}{2}$–$34\frac{1}{2}$	27	24	24	208	·00154	·00192	·00263	·00329
$35\frac{1}{2}$–$39\frac{1}{2}$	12	19	22	253	·00067	·00134	·00188	·00228
$40\frac{1}{2}$–$44\frac{1}{2}$	19	16	26	353	·00142	·00137	·00238	·00263
$45\frac{1}{2}$–$49\frac{1}{2}$	16	31	29	607	·00196	·00385	·00344	·00484
$50\frac{1}{2}$–$54\frac{1}{2}$	25	21	39	792	·00485	·00372	·00578	·00738
$55\frac{1}{2}$–$59\frac{1}{2}$	5	14	31	847	·00279	·00568	·00855	·01111
$60\frac{1}{2}$–$64\frac{1}{2}$	5	9	12	579	·01264	·01354	·01054	·01651
$65\frac{1}{2}$–$69\frac{1}{2}$	1	1	9	213	·01504	·00735	·03303	·02500
$70\frac{1}{2}$–$74\frac{1}{2}$	—	—	—	60	—	—	—	·03727
$75\frac{1}{2}$–	—	—	—	12				·04958

Note. In each column the last rate of mortality shown is the group rate applicable to all ages for which there are exposed to risk from the youngest age in that group upwards.

APPENDIX II (*cont.*)

Tables of deaths and group rates of mortality

1944–48   Non-medical

Age-group	Actual deaths				Group rate of mortality			
	Duration 0	Duration 1	Duration 2	Durations 3 and over	Duration 0	Duration 1	Duration 2	Durations 3 and over
Life—with profits								
20½–24½	5	3	3	25	·00384	·00480	·00770	·01750
25½–29½	2	4	8	58	·00108	·00302	·00941	·00820
30½–34½	4	3	3	148	·00212	·00209	·00314	·00734
35½–39½	—	3	3	84	·00000	·00219	·00278	·00257
40½–44½	3	1	3	109	·00228	·00082	·00297	·00310
45½–49½	2	1	7	163	·00340	·00148	·01075	·00553
50½–54½	2	2	3	239	·00661	·00563	·00766	·00906
55½–59½	2	6	2	396	·01055	·02395	·00758	·01534
60½–64½	4	2	1	470	·03791	·01613	·00719	·02171
65½–69½	1	1	4	548	·06250	·02298	·06154	·03682
70½–74½	—	1	—	512	—	·28571	—	·05287
75½–79½	—	—	—	524	—	—	—	·10258
80½–84½	—	—	—	270	—	—	—	·13889
85½–89½	—	—	—	107	—	—	—	·18838
90½–94½	—	—	—	31	—	—	—	·25203
95½–	—	—	—	7	—	—	—	·32558
Life—without profits								
20½–24½	6	2	2	40	·00596	·00409	·00556	·01772
25½–29½	3	1	5	58	·00143	·00080	·00736	·00848
30½–34½	3	3	2	83	·00129	·00190	·00190	·00420
35½–39½	2	5	2	82	·00096	·00315	·00164	·00265
40½–44½	1	1	6	106	·00065	·00081	·00572	·00338
45½–49½	1	4	2	137	·00146	·00560	·00272	·00506
50½–54½	1	2	4	172	·00515	·00748	·01120	·00803
55½–59½	—	3	2	220	·00000	·01161	·01163	·01396
60½–64½	1	—	1	214	·01739	—	·01058	·02180
65½–69½	2	—	1	176	·18182	—	·02564	·03151
70½–74½	—	—	—	185	—	—	—	·05752
75½–79½	—	—	—	126	—	—	—	·08471
80½–84½	—	—	—	56	—	—	—	·13176

Endowment assurance—with profits

Age								
20½–24½	170	152	240	1257	·00230	·00313	·00597	·00734
25½–29½	104	137	109	2041	·00129	·00230	·00279	·00567
30½–34½	80	110	118	2256	·00101	·00175	·00252	·00352
35½–39½	109	136	102	2196	·00135	·00198	·00182	·00261
40½–44½	134	158	182	2894	·00192	·00242	·00300	·00324
45½–49½	106	172	190	3957	·00247	·00388	·00435	·00510
50½–54½	65	129	159	4707	·00404	·00640	·00704	·00823
55½–59½	49	71	111	5072	·00683	·00798	·01144	·01358
60½–64½	12	45	57	3016	·00622	·01540	·01561	·02075
65½–69½	5	6	15	857	·03390	·01338	·01934	·03097
70½–74½	1	—	—	181	·13333	—	—	·04502
75½–79½	—	—	—	35	—	—	—	·08092
80½	—	—	—	2	—	—	—	·33333

Endowment assurance—without profits

Age								
20½–24½	12	10	17	144	·00247	·00357	·00629	·00857
25½–29½	14	10	7	190	·00166	·00511	·00223	·00581
30½–34½	8	9	11	290	·00076	·00126	·00225	·00421
35½–39½	19	15	6	264	·00189	·00198	·00102	·00246
40½–44½	12	13	12	348	·00157	·00202	·00215	·00291
45½–49½	11	15	13	496	·00276	·00401	·00347	·00483
50½–54½	7	4	12	529	·00645	·00314	·00805	·00757
55½–59½	4	5	2	498	·00728	·01198	·00565	·01274
60½–64½	—	3	4	256	—	·03614	·04020	·02196
65½–69½	—	1	—	28	—	·06250	—	·02692
70½–74½	—	—	—	7	—	—	—	·04620
75½	—	—	—	3	—	—	—	·08955

Note. In each column the last rate of mortality shown is the group rate applicable to all ages for which there are exposed to risk from the youngest age in that group upwards.

APPENDIX III

Tables of deaths and group rates of mortality

1947–48   Medical

Age group	Actual deaths				Group rate of mortality			
	Duration 0	Duration 1	Duration 2	Durations 3 and over	Duration 0	Duration 1	Duration 2	Durations 3 and over
Life—with profits								
20½–24½	1	1	—	—	·00069	·00140	·00000	·00000
25½–29½	5	1	1	9	·00194	·00049	·00104	·00182
30½–34½	1	3	2	19	·00040	·00132	·00174	·00127
35½–39½	1	2	2	49	·00054	·00123	·00194	·00204
40½–44½	3	4	1	72	·00249	·00356	·00126	·00266
45½–49½	4	2	—	128	·00387	·00242	·00000	·00456
50½–54½	2	5	5	231	·00767	·00648	·00844	·00759
55½–59½	4	10	13	557	·00219	·01253	·01935	·01407
60½–64½	1	5	14	1116	·00662	·00797	·02324	·02249
65½–69½	—	3	7	2139	·00458	·01045	·02137	·03707
70½–74½	1	3	1	2830	·00000	·05714	·01626	·05308
75½–79½	—	—	—	3240	·22222	—	—	·08768
80½–84½	—	—	—	2629	—	—	—	·13845
85½–89½	—	—	—	1474	—	—	—	·19822
90½–94½	—	—	—	460	—	—	—	·26590
95½–99½	—	—	—	73	—	—	—	·33932
100½+	—	—	—	6	—	—	—	·40000
Life—without profits								
20½–24½	1	1	1	1	·00074	·00164	·00418	·00157
25½–29½	—	1	—	8	·00000	·00051	·00000	·00259
30½–34½	4	5	1	14	·00136	·00223	·00000	·00132
35½–39½	—	4	—	46	·00000	·00208	·00097	·00224
40½–44½	1	3	2	75	·00062	·00214	·00000	·00398
45½–49½	3	5	1	138	·00269	·00571	·00315	·00564
50½–54½	4	2	4	193	·00458	·00263	·00190	·00833
55½–59½	1	7	3	303	·00171	·01417	·00898	·01243
60½–64½	2	2	3	522	·00716	·00673	·01107	·02252
65½–69½	1	1	—	773	·00939	·00758	·02055	·03580
70½–74½	—	—	—	796	—	—	—	·05000
75½–79½	—	—	—	719	—	—	—	·08682

Endowment assurance—with profits

Age group								
20½–24½	23	20	8	29	·00096	·00155	·00122	·00161
25½–29½	21	19	12	79	·00057	·00066	·00084	·00140
30½–34½	24	18	23	205	·00063	·00057	·00141	·00145
35½–39½	30	33	22	449	·00083	·00109	·00123	·00188
40½–44½	45	57	38	787	·00169	·00339	·00230	·00277
45½–49½	42	42	49	1265	·00259	·00282	·00416	·00479
50½–54½	44	43	44	1699	·00437	·00437	·00520	·00763
55½–59½	30	33	42	2188	·00763	·00781	·00923	·01262
60½–64½	14	16	17	1913	·01023	·01106	·01060	·02019
65½–69½	9	5	8	835	·02727	·01193	·01467	·02921
70½–74½	1	1	1	258	·07692	·03030	·01527	·04388
75½–79½	—	—	—	24	—	—	—	·03880
80½–	—	—	—	7	—	—	—	·09589

Endowment assurance—without profits

Age group								
20½–24½	1	1	1	6	·00033	·00079	·00154	·00141
25½–29½	2	5	1	16	·00024	·00098	·00047	·00162
30½–34½	14	7	6	36	·00121	·00090	·00161	·00153
35½–39½	11	7	9	74	·00096	·00084	·00195	·00165
40½–44½	9	8	7	148	·00110	·00128	·00176	·00259
45½–49½	6	14	7	262	·00131	·00377	·00252	·00473
50½–54½	11	6	10	345	·00425	·00273	·00532	·00735
55½–59½	3	3	10	393	·00352	·00353	·01074	·01129
60½–64½	1	2	5	267	·00613	·00832	·01988	·01648
65½–69½	1	—	3	97	·04762	—	·05217	·02339
70½–74½	—	—	—	36	—	—	—	·04797
75½–	—	—	—	3	—	—	—	·02970

Note. In each column the last rate of mortality shown is the group rate applicable to all ages for which there are exposed to risk from the youngest age in that group upwards.

APPENDIX III (*cont.*)

Tables of deaths and group rates of mortality

1947–48   Non-medical

Age group	Actual deaths				Group rate of mortality			
	Duration 0	Duration 1	Duration 2	Durations 3 and over	Duration 0	Duration 1	Duration 2	Durations 3 and over
Life—with profits								
20½–24½	—	3	—	2	·00000	·00794	·00000	·00471
25½–29½	—	—	2	4	·00000	·00000	·00458	·00212
30½–34½	2	3	1	13	·00174	·00302	·00206	·00210
35½–39½	3	1	2	22	·00000	·00112	·00374	·00181
40½–44½	—	—	2	48	·00428	·00000	·00415	·00331
45½–49½	3	—	4	82	·00000	·00000	·01242	·00645
50½–54½	—	1	1	89	·00000	·00587	·00602	·00832
55½–59½	1	3	2	175	·01681	·02913	·01843	·01703
60½–64½	1	1	1	200	·04651	·01786	·01739	·02178
65½–69½	1	—	1	220	·33333	—	·04444	·03427
70½–74½	—	—	—	229	—	—	—	·05544
75½–79½	—	—	—	210	—	—	—	·09894
80½–84½	—	—	—	117	—	—	—	·14063
85½–89½	—	—	—	47	—	—	—	·18112
90½–94½	—	—	—	14	—	—	—	·32184
95½–	—	—	—	1	—	—	—	·11111
Life—without profits								
20½–24½	1	—	—	6	·00131	·00000	·00000	·01060
25½–29½	1	3	1	5	·00064	·00000	·00297	·00263
30½–34½	2	2	—	9	·00122	·00262	·00000	·00158
35½–39½	1	1	1	10	·00071	·00185	·00183	·00086
40½–44½	1	3	—	42	·00063	·00130	·00000	·00324
45½–49½	—	1	1	47	—	·00808	·00370	·00406
50½–54½	—	1	1	60	—	·00758	·00823	·00647
55½–59½	—	—	2	100	—	·00784	·03419	·01431
60½–64½	—	—	1	93	—	—	·02247	·02086
65½–69½	—	—	—	72	—	—	—	·02838
70½–74½	—	—	—	78	—	—	—	·05520
75½–79½	—	—	—	56	—	—	—	·05396

Endowment assurance—with profits

Age group							
20½–24½	35	25	·00095	112	·00076	27	·00171	·00174
25½–29½	45	51	·00123	195	·00087	26	·00129	·00152
30½–34½	25	51	·00133	358	·00055	32	·00152	·00154
35½–39½	42	53	·00140	637	·00097	31	·00129	·00192
40½–44½	71	73	·00226	1094	·00203	61	·00249	·00299
45½–49½	47	89	·00424	1662	·00228	68	·00370	·00489
50½–54½	29	60	·00677	2013	·00404	63	·00669	·00819
55½–59½	25	28	·00736	2095	·00838	50	·01258	·01342
60½–64½	3	11	·01001	1218	·00425	27	·02020	·01993
65½–69½	2	3	·01807	311	·02878	5	·01764	·03042
70½–74½	—	—	—	68	—	—	—	·04646
75½–79½	—	—	—	14	—	—	—	·08777
80½–	—	—	—	2	—	—	—	·05970

Endowment assurance—without profits

Age group							
20½–24½	2	—	·00000	12	·00060	2	·00234	·00197
25½–29½	7	1	·00027	16	·00111	2	·00145	·00139
30½–34½	2	5	·00105	42	·00027	3	·00142	·00177
35½–39½	11	7	·00145	66	·00161	1	·00040	·00159
40½–44½	10	7	·00184	133	·00199	4	·00181	·00270
45½–49½	7	10	·00491	190	·00280	7	·00490	·00422
50½–54½	6	1	·00144	222	·00860	4	·00694	·00709
55½–59½	2	3	·01165	207	·00544	2	·01270	·01191
60½–64½	—	3	·06000	128	—	1	·02105	·02377
65½–69½	—	1	·08000	6	—	—	—	·01267
70½–74½	—	—	—	4	—	—	—	·07143
75½–	—	—	—	1	—	—	—	·08333

Note. In each column the last rate of mortality shown is the group rate applicable to all ages for which there are exposed to risk from the youngest age in that group upwards.

APPENDIX IV

Table of ratios of actual deaths to those expected by the
A 1924–29 table

Class and duration	Calendar year				
	1944	1945	1946	1947	1948
All classes and durations (Medical and Non-medical)	·999	·930	·841	·810	·750
All classes and durations (Medical)	·927	·867	·824	·817	·759
All classes and durations (Non-medical)	1·168	1·074	·879	·793	·732
Life P.—all durations (Medical)	·893	·876	·898	·890	·819
Life N.—all durations (Medical)	·885	·814	·807	·845	·734
E.A.P.—all durations (Medical)	·988	·889	·757	·744	·715
E.A.N.—all durations (Medical)	·939	·795	·691	·661	·665
Life P.—all durations (Non-medical)	1·042	·932	·937	·966	·819
Life N.—all durations (Non-medical)	1·045	1·016	·985	·790	·726
E.A.P.—all durations (Non-medical)	1·182	1·100	·868	·777	·734
E.A.N.—all durations (Non-medical)	1·243	1·017	·859	·763	·631
All classes—durations 0–2 (Medical and Non-medical)	1·145	1·023	·706	·613	·572
All classes—durations 0–2 (Medical)	·950	·843	·655	·588	·519
All classes—durations 0–2 (Non-medical)	1·341	1·200	·756	·638	·626
Life classes—durations 3 and over (Medical)	·891	·862	·879	·882	·802
E.A. classes—durations 3 and over (Medical)	·984	·878	·756	·748	·733
Life classes—durations 3 and over (Non-medical)	1·032	·945	·952	·908	·792
E.A. classes—durations 3 and over (Non-medical)	1·170	1·082	·880	·795	·739
All classes and all ages—durations 5 and over (Medical and Non-medical)	·954	·919	·849	·829	·773
All classes ages up to 50—durations 5 and over (Medical and Non-medical)	1·427	1·204	·846	·687	·646
All classes ages from 51–70—durations 5 and over (Medical and Non-medical)	·838	·833	·838	·865	·824
All classes ages from 71—durations 5 and over (Medical and Non-medical)	·864	·837	·868	·829	·789

APPENDIX V

Comparison of (*a*) graduated values of q_x based on data for all classes of assured lives, durations 3 and over, for the two years 1947–48 with (*b*) q_x from the A 1924–29 ultimate table

Age x	q_x 1947–48 (*a*)	q_x 1924–29 (*b*)	(*a*)/(*b*)	Age x	q_x 1947–48 (*a*)	q_x 1924–29 (*b*)	(*a*)/(*b*)
20	·00150	·00235	·638	60	·01652	·01973	·837
21	·00150	·00235	·638	61	·01826	·02176	·839
22	·00150	·00235	·638	62	·02019	·02394	·843
23	·00150	·00235	·638	63	·02230	·02631	·848
24	·00150	·00235	·638	64	·02457	·02893	·849
25	·00150	·00235	·638	65	·02699	·03188	·847
26	·00150	·00235	·638	66	·02956	·03524	·839
27	·00150	·00235	·638	67	·03227	·03908	·826
28	·00150	·00236	·636	68	·03512	·04338	·810
29	·00150	·00238	·630	69	·03811	·04812	·792
30	·00150	·00241	·622	70	·04135	·05327	·776
31	·00151	·00246	·614	71	·04496	·05881	·764
32	·00153	·00253	·605	72	·04913	·06473	·759
33	·00155	·00262	·592	73	·05411	·07104	·762
34	·00159	·00273	·582	74	·06012	·07777	·773
35	·00164	·00286	·573	75	·06728	·08497	·792
36	·00171	·00302	·566	76	·07555	·09268	·815
37	·00180	·00320	·562	77	·08469	·10093	·839
38	·00191	·00341	·560	78	·09437	·10974	·860
39	·00204	·00364	·560	79	·10425	·11913	·875
40	·00220	·00388	·567	80	·11414	·12910	·884
41	·00241	·00413	·584	81	·12392	·13962	·888
42	·00266	·00439	·606	82	·13364	·15066	·887
43	·00296	·00466	·635	83	·14367	·16221	·886
44	·00331	·00495	·669	84	·15457	·17425	·887
45	·00371	·00527	·704	85	·16680	·18676	·893
46	·00414	·00563	·735	86	·18051	·19973	·904
47	·00460	·00604	·762	87	·19549	·21315	·917
48	·00509	·00651	·782	88	·21084	·22702	·929
49	·00561	·00704	·797	89	·22501	·24134	·932
50	·00616	·00764	·806	90	·23584	·25611	·921
51	·00676	·00831	·813	91	·24911	·27133	·918
52	·00743	·00906	·820	92	·26606	·28700	·927
53	·00819	·00990	·827	93	·28181	·30312	·930
54	·00906	·01084	·836	94	·29909	·31970	·936
55	·01003	·01190	·843	95	·32005	·33675	·950
56	·01111	·01311	·847	96	·34222	·35428	·966
57	·01228	·01450	·847	97	·36697	·37231	·986
58	·01355	·01608	·843	98	·39977	·39086	1·023
59	·01496	·01783	·839	99	·44518	·40995	1·086
				100	·51001	·42960	1·187

APPENDIX V (*cont.*)
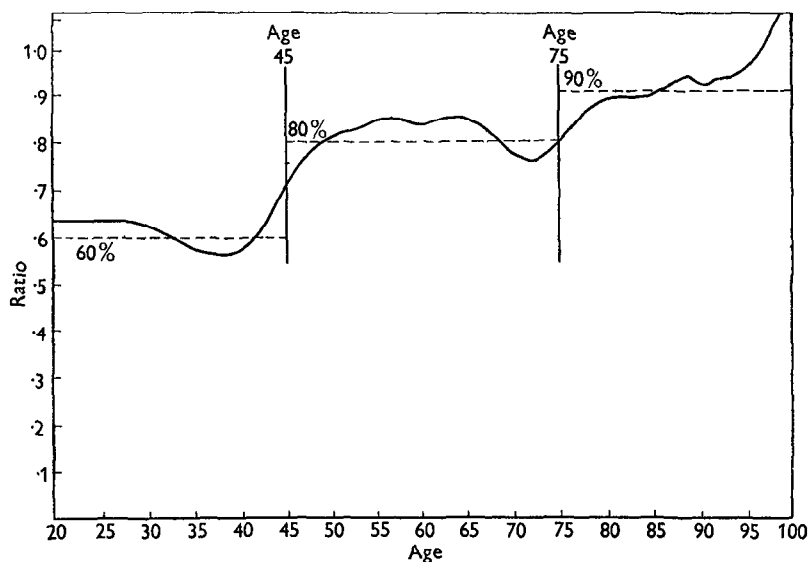
Graph of the ratio of q_x from the 1947–48 experience of assured lives, durations 3 and over, to q_x on the A 1924–29 ultimate table

(*Note.* The 1947–48 values of q_x have been graduated by the same method as was used in constructing the A 1924–29 table.)

APPENDIX VI

Comparison of 3 % monetary functions based on 1947–48 mortality durations 3 and over, with corresponding values by the A1924–29 ultimate table

Whole-life functions

Age x	a_x		A_x		P_x	
	1947–48	A1924–29	1947–48	A1924–29	1947–48	A1924–29
20	25·464	24·681	·22921	·25199	·00866	·00981
30	23·193	22·368	·29535	·31939	·01221	·01367
40	20·136	19·307	·38439	·40854	·01819	·02012
50	16·371	15·560	·49405	·51767	·02844	·03126
60	12·192	11·319	·61581	·64119	·04668	·05205
70	8·084	7·241	·73539	·75998	·08095	·09222

Endowment assurance functions

Age x	Term n	$a_{x\overline{n}|}$		$A_{x\overline{n}|}$		$P_{x\overline{n}|}$	
		1947–48	A1924–29	1947–48	A1924–29	1947–48	A1924–29
				$x+n=45$			
20	25	16·646	16·472	·48604	·49111	·02754	·02811
30	15	11·163	11·071	·64574	·64842	·05309	·05372
40	5	3·695	3·679	·86325	·86372	·18387	·18459
				$x+n=50$			
20	30	18·781	18·540	·42384	·43087	·02143	·02205
30	20	14·077	13·917	·56088	·56552	·03720	·03791
40	10	7·677	7·616	·74727	·74905	·08612	·08694
				$x+n=55$			
20	35	20·572	20·261	·37168	·38075	·01723	·01791
30	25	16·520	16·285	·48972	·49655	·02795	·02873
40	15	11·016	10·893	·65002	·65360	·05410	·05496
50	5	3·655	3·641	·86441	·86483	·18568	·18634
				$x+n=60$			
20	40	22·047	21·666	·32871	·33983	·01426	·01499
30	30	18·532	18·219	·43109	·44022	·02207	·02291
40	20	13·766	13·567	·56990	·57572	·03860	·03952
50	10	7·490	7·430	·75270	·75447	·08866	·08950
				$x+n=65$			
20	45	23·226	22·773	·29437	·30758	·01215	·01294
30	35	20·140	19·742	·38424	·39586	·01818	·01909
40	25	15·964	15·674	·50588	·51435	·02982	·03085
50	15	10·555	10·414	·66343	·66755	·05742	·05849
60	5	3·553	3·522	·86740	·86829	·19053	·19201
				$x+n=70$			
20	50	24·124	23·596	·26823	·28361	·01068	·01153
30	40	21·365	20·874	·34858	·36289	·01559	·01659
40	30	17·638	17·240	·45714	·46874	·02453	·02570
50	20	12·889	12·633	·59548	·60292	·04288	·04423
60	10	7·019	6·884	·76647	·77037	·09558	·09771