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as on 31st December 1990

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INTRODUCTION

THE Executive Committee of the Continuous Mortality Investigation Bureau of the Institute of Actuaries and the Faculty of Actuaries has pleasure in presenting this, the eleventh number of its Reports.

This number contains several papers on a variety of topics, prepared by the different Sub-Committees through which the work of the Bureau is now carried out.

For a long time there has been a P.H.I. Sub-Committee, responsible for the investigations into permanent health insurance carried out by the Bureau. This Sub-Committee has been responsible for many reports already in C.M.I. Reports. The present Chairman is Robert Plumb.

The Bureau set up an investigation into assured impaired lives in 1982 under another Sub-Committee, which is now chaired by Hugh Jarvis. A brief note on the volume of data in the impaired lives investigation appeared in C.M.I.R., **8,** but this is the first occasion on which a report on the mortality experience of impaired lives has been prepared.

The detailed work relating to mortality investigations, formerly carried out by the Executive Committee of the Bureau, is now carried out by the Mortality Sub-Committee, under the chairmanship of Colin Kirkwood.

The membership of each of these Sub-Committees is shown in the inside front cover of this number, along with a list of the members of the Executive Committee.

Since the last number of C.M.I. Reports there have been several changes in personnel. Mr H. A. R. Barnett, Secretary of the Committee since 1972, retired from this post at the end of May 1990, and was immediately appointed to the Executive Committee of the Bureau as an Institute representative. Mrs Jillian Evans was appointed Secretary with effect from 1 June 1990.

It has long been the custom for the Presidents of the Institute and of the Faculty to be members of the Executive Committee of the Bureau. This convention has now been broken on the part of the Institute by the appointment of Bernard Brindley as an ordinary member of the Executive Committee, replacing the former President of the Institute, Roger Corley.

Because of the tragic death of Jim Souness, President of the Faculty, his successor as President, Alistair Neill, has succeeded him on the Committee.

The work of each of the three Sub-Committees noted above is represented in this number of C.M.I. Reports. The first, and longest, piece reports on the mortality experience of assured lives, annuitants, and pensioners for the quadrennium 1983–86. This follows the style of previous quadrennial reports, but it covers a larger number of investigations than ever before.

There follows a short note on the causes of death of annuitants and pensioners,

reporting on an investigation carried out by the Bureau for the limited period 1979–84. Investigation into recorded causes of death has been a particular interest of Rodney Barnett, who has carried out the preliminary drafting of this report, for which, however, the whole Executive Committee takes responsibility, as is the case for all the reports published.

Two papers prepared by the Impaired Lives Sub-Committee follow: one showing the mortality experience of impaired lives for 1983–86, the first quadrennium for which there are sufficiently many deaths to make a report worth while; and the second discussing the causes of death of these impaired lives. The Committee is grateful to those offices who have contributed data to this investigation, and it hopes that more offices will be inspired by these reports to take the trouble to contribute.

The final report originates from the P.H.I. Sub-Committee and is a routine report on the experience of individual policies for 1983–86. I should like to take the opportunity to thank, not only the present members of the P.H.I. Sub-Committee, but also Frank Martin and Roger Sansom, members of the P.H.I. Sub-Committee since 1978 and 1979 respectively, both of whom contributed greatly to its work during their period of service.

As always, it gives me great pleasure to thank all those involved in the work of preparing these reports, starting with those in contributing offices who prepare and submit the data, through the Secretariat of the Bureau in the firm of Barnett Waddingham and Co, who are also now responsible for the computing work in respect of the mortality investigations and the impaired lives investigation, the staff of Pensions and Insurance Computing Services, who carry out the computing for the P.H.I. investigation, the Alden Press who transform a variety of word-processing systems into uniform printed text, and all the members of the Committee and its Sub-Committees who give considerable amounts of their professional time to the service of the profession.

Finally, I should like to pay tribute to the service of Miss Una Archer, an employee of the Bureau, who worked within the offices of the Secretariat. She first retired after a full period of service with a certain life office in 1972, joined the staff of the Bureau at that time, and has retired again after a further 18 years full-time work, at what can only be described as 'at or after the normal pension age'. If all employees were like her, the volume of data in the pensioners experience would be substantially reduced. We wish her a long and happy second retirement.

A. D. Wilkie

December, 1990 — Chairman, Executive Committee

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THE MORTALITY OF ASSURED LIVES, PENSIONERS AND ANNUITANTS EXPERIENCE FOR 1983–86

THIS report covers the main mortality experiences for the quadrennium 1983-86. The last such report related to the years 1979-82 and was published in *C.M.I.R.* **8**. This report discusses the following experiences:

1. *Policies of assurance issued in the United Kingdom*
   - 1.1 Whole life and endowment assurances on male lives;
   - 1.2 Whole life and endowment assurances on female lives;
   - 1.3 Temporary assurances;
   - 1.4 Linked contracts;
   - 1.5 Joint life first death assurances;
   - 1.6 Guaranteed acceptance assurances;
   - 1.7 Minimum evidence assurances.

2. *Policies of assurance issued in the Republic of Ireland*
   - 2.1 Whole life and endowment assurances;
   - 2.2 Linked contracts.

3. *Pension and annuity policies issued in the United Kingdom*
   - 3.1 Pensioners under life office pension schemes;
   - 3.2 Relicts of pensioners;
   - 3.3 Retirement annuities issued under the provisions of Section 620 of the I.C.T.A. 1988, formerly Section 226 of the I.C.T.A. 1970;
   - 3.4 Immediate annuity contracts.

The number of investigations undertaken by the Bureau has increased in recent years in response to the expansion in the range of policies being offered in the market place by the contributing offices. In particular there have been major changes in the quadrennium under review in the medical criteria required for the acceptance of business. For the quadrennium 1983–86 there are, therefore, a number of new experiences for which reports are being made for the first time. These are: joint life first death assurances, guaranteed acceptance assurances and minimum evidence assurances written in the U.K.; and linked assurances written in the Republic of Ireland. In addition the reports on the experience of temporary assurances and of whole life and endowment assurances written in the Republic of Ireland include female data for the first time; the report on the experience of pensioners' relicts includes male data for the first time.

When studying the tables it is necessary to bear in mind the statistical significance of the results, particularly those shown in the form of the ratio $r = 100A/E$. A good approximation for the standard deviation of r is $10\sqrt{r}/\sqrt{A} = 100/\sqrt{E}$. A less accurate approximation is $100/\sqrt{A}$.

When comparing different investigations, their relative sizes should be borne in mind; a comparison of the sizes of the various investigations may be made by reference to Table 1, which shows the total sizes of the investigations in the quadrennium under review, together with the crude mortality rate per 1,000 of the exposed to risk in each investigation. It should be remembered that each crude rate is dependent upon the age distribution of the investigation to which it relates. These rates, therefore, are not reliable indicators of the relative mortality levels in different investigations.

This report has been prepared simultaneously with the report: 'Standard Tables of Mortality based on the 1979–82 Experiences', which appears in *C.M.I.R.* **10** (1990). A comparison of the mortality experience in the 1983–86 investigations with that expected using the new standard tables will form the subject of a separate report to appear in a later number of *C.M.I.R.*

The list of investigations run by the Bureau is a long one. The Committee is conscious of the enormous amount of work put in by those in the contributing offices who prepare the data upon which reports such as these are based, and records its thanks to all concerned.

Table 1. *CMI Investigations* 1983–1986: *total sizes of investigations*

Assurances (combined, all durations)

Investigation	*Sex*	*Exposed to risk*	*Actual deaths*	*Crude death rate per 1,000*
U.K. Whole life & endowment	*M*	*23,133,593*	*91,910*	*4·0*
U.K. Whole life & endowment	*F*	*5,506,923*	*9,715*	*1·8*
**R.I. Whole life & endowment*	*M*	*842,891*	*3,868*	*4·6*
**R.I. Whole life & endowment*	*F*	*122,847*	*203*	*1·7*
U.K. Level temporary	*M*	*1,877,484*	*2,618*	*1·4*
U.K. Level temporary	*F*	*619,317*	*338*	*·5*
U.K. Decreasing temporary	*M*	*2,927,977*	*6,631*	*2·3*
U.K. Decreasing temporary	*F*	*538,201*	*360*	*·7*
U.K. Linked	*M*	*1,492,111*	*5,077*	*3·4*
U.K. Linked	*F*	*516,719*	*2,095*	*4·1*
**R.I Linked*	*M*	*616,176*	*1,285*	*2·1*
**R.I Linked*	*F*	*206,105*	*188*	*·9*
U.K. Joint life first death	*M*	*741,224*	*873*	*1·2*
U.K. Joint life first death	*F*	*741,019*	*363*	*·5*

Table 1. *(Continued)*

U.K. Guaranteed acceptance business	*M*	*261,106*	*391*	*1·5*
U.K. Guaranteed acceptance business	*F*	*77,463*	*69*	*·9*
U.K. Whole life and endowment minimum evidence	*M*	*279,147*	*260*	*·9*
U.K. Whole life and endowment minimum evidence	*F*	*56,352*	*17*	*·3*
+ *U.K. Joint life first death minimum evidence*	*M*	*300,414*	*165*	*·5*
+ *U.K. Joint life first death minimum evidence*	*F*	*300,186*	*81*	*·3*
Total assurances		*41,157,255*	*126,507*	*3·1*

Annuities (lives, all durations)

U.K. Pensioners normal and late	*M*	*1,393,540*	*84,267*	*60·5*
U.K. Pensioners normal and late	*F*	*392,184*	*12,266*	*31·3*
U.K. Pensioners early	*M*	*704,014*	*29,041*	*41·3*
U.K. Pensioners early	*F*	*133,216*	*2,496*	*18·7*
U.K. Pensioners relicts	*M*	*703*	*33*	*46·9*
U.K. Pensioners relicts	*F*	*78,404*	*1,803*	*23·0*
U.K. Retirement annuities in deferment	*M*	*4,791,497*	*17,235*	*3·6*
U.K. Retirement annuities in deferment	*F*	*681,572*	*1,547*	*2·3*
U.K. Retirement annuities in payment	*M*	*410,740*	*15,563*	*37·9*
U.K. Retirement annuities in payment	*F*	*74,227*	*1,451*	*19·5*
$ *U.K. Immediate annuities*	*M*	*53,405*	*4,066*	*76·1*
$ *U.K. Immediate annuities*	*F*	*118,723*	*8,566*	*72·2*
Total annuities		*8,832,225*	*178,334*	*20·2*
Grand total assurances and annuities		*49,989,480*	*304,841*	*6·1*

* *R.I. = Republic of Ireland*

\+ *Investigation started as from 1st January 1985. The figures therefore relate to 1985 and 1986 only*

$ *Annuities issued after 1956 only*

1. POLICIES OF ASSURANCE ISSUED IN THE UNITED KINGDOM

1.1 WHOLE LIFE AND ENDOWMENT ASSURANCES ON MALE LIVES

As measured by the number of policies covered this is by far the largest investigation run by the Bureau. Comparison of the exposed to risk for this investigation, shown in Table 1, with the corresponding figure for 1979–82, shown in Table 1 of *C.M.I.R.* **8**, indicates a fall of some ten per cent in exposure between the two quadrennia. At the same time the crude mortality rate per 1,000 has risen from 3·7 in 1979–82 to 4·0 in 1983–86.

The number of policies included in the investigation has been falling steadily for a number of years. For those offices who contributed throughout the quadrennium the number of policies in force at 31st December 1986 was some 15% lower than the corresponding in force at 1st January 1983. The fall in the number of policies at duration 0 (an indication of new business) was about 30%, reflecting the switch of new business away from the traditional fully medically underwritten whole life and endowment policy to unit linked and, more recently, to minimum evidence and to joint life policies. The fall in new business has led to an increase in the average age of the exposed to risk which would explain the increase over the two quadrennia in the observed crude mortality rate per 1,000 which has been noted above.

Tables 1.1.1a, 1.1.1b and 1.1.1c relate respectively to the combined data, the medically examined data and the non-medical data. They show the actual deaths in 1983–86, which are then compared with the deaths expected using the A 1967–70 table by giving the ratios of actual to expected deaths, together with the corresponding ratios for each quadrennium back to 1967–70. As is the practice in the Bureau, the investigations are based on policies rather than lives although offices are requested to exclude simultaneous duplicate policies and, where possible, all duplicate policies where the life assured is over age 80.

Table 1.1.1a shows that for the combined data at durations 2 and over the overall mortality experienced has fallen steadily over the five quadrennia listed. Similarly, for each individual age group from 31–35 through to 86–90 consistent falls over the five quadrennia have been observed, the extent of the fall varying from age group to age group with the largest falls lying in the age groups 41–45 to 66–70 (61–65 being an exception). At ages 26 to 40 the improvement in the experienced mortality has been smaller and the rates may be showing signs of stabilizing. At ages up to 25, a high proportion of deaths are attributed to accidents and this makes any trend in non-accidental mortality difficult to discern. At ages above 90 or so, where offices may have difficulty in maintaining contact with the life assured, the statistics could be unreliable.

It can be inferred from the above that both the general level of mortality and the shape of the underlying mortality curve relating to this class of business have

changed since the A 1967–70 tables were prepared, and are continuing to change. This raises the question as to how far such changes are likely to go and whether such changes can be predicted.

At duration 1 the overall pattern of the ratios over the five quadrennia is similar to that shown at durations 2 and over, as is the general progression through the age groups in the quadrennium 1983–86. The improvement in mortality has been less than at durations 2 and over. It would be interesting to speculate as to whether, as the overall level of mortality reduces, the effect of selection might be expected to remain the same, to become stronger or to become weaker. The movement of the ratios for individual age groups fluctuates over the quadrennia and individual patterns are less easy to discern.

At duration 0 the indications are that the overall pattern is similar to that observed in other durations but the experience does seem to fluctuate from quadrennium to quadrennium. Duration 0 tends to suffer from its own peculiarities in that returns to the Bureau indicate that policies are not always entered into the relevant files immediately the risk is accepted so that a proportion of new business misses the duration 0 census date.

Tables 1.1.1b and 1.1.1c show that for the medical and non-medical data the patterns are broadly similar to those exhibited by the combined data. As would be expected, the medically examined lives suffer generally lighter mortality than the corresponding lives accepted on a non-medical basis.

Table 1.1.2 shows the central rates of mortality for the combined data at durations 5 and over in individual years from 1967 to 1986 inclusive. The figures for age groups 25–29 to 35–39 reinforce the view that ultimate rates over these ranges are stabilising. These are, of course, the groups where mortality rates are lowest so that scope for further major improvement is necessarily limited.

The question has been raised as to whether there is any evidence of additional mortality due to AIDS in the C.M.I. experience. The only age group where there appeared to be any additional mortality was the group 36–40 where the ratio of actual deaths to those expected using the A 1967–70 table was 72% in 1984, 78% in 1985 and 83% in 1986. The slight rise in the central rates at duration 5 and over shown in table 1.1.2 appeared to point in a similar direction. However the experience of this age group in 1987, recently available, shows a 100A/E ratio at durations 2 and over using the A 1967–70 table of 69 which suggests that more time is needed before any real conclusions can be drawn.

In 1986 there were 31 deaths in the cause of death experience returned as related to AIDS, spread over 19 contributing offices. This was out of a total of 19,236 cases in the investigation. While, for a variety of reasons, the number of cases returned to the cause of death investigation as related to AIDS. is almost certainly an underestimate, it does support the view that there is no evidence of significant additional AIDS mortality in the experience during the period covered by this report.

Table 1.1.3 shows the ratio (as a percentage) of the central rates of mortality from the assured lives experience, shown in Table 1.1.2, to the corresponding

Table 1.1.1a. *Whole life and endowment assurances, males, 1983–86, medical and non-medical combined*: actual deaths and ratios of actual deaths to those expected using the A 1967–70 table*

Age group (nearest ages)	Actual deaths 1983–86	100 A/E 1983–86	100 A/E 1979–82	100 A/E 1975–78	100 A/E 1971–74	100 A/E 1967–70
Duration 0						
-20	51	81	92	119	104	103
21–25	84	88	103	98	105	100
26–30	97	126	94	97	103	96
31–35	89	105	90	93	110	99
36–40	121	90	89	105	94	105
41–45	135	79	81	100	88	102
46–50	176	74	94	90	105	95
51–55	276	86	82	102	80	105
56–60	192	86	100	82	92	91
61–65	131	90	76	104	74	117
66–70	99	109	96	83	90	78
71–	95	151	137	73	70	131
All ages	1,546	91	91	98	97	100
Duration 1						
-20	37	79	119	115	102	100
21–25	91	89	88	79	89	99
26–30	84	83	96	81	95	102
31–35	103	91	91	89	110	98
36–40	128	73	80	93	100	107
41–45	186	85	83	92	98	94
46–50	227	75	94	98	95	107
51–55	324	72	95	105	102	98
56–60	279	81	93	95	105	95
61–65	188	90	82	98	78	97
66–70	153	99	83	85	102	90
71–	122	116	98	105	127	146
All ages	1,922	84	91	93	98	100
Durations 2 and over						
-20	61	91	98	96	118	104
21–25	300	76	89	87	93	103
26–30	698	87	84	87	100	98
31–35	1,386	83	85	88	93	97
36–40	3,074	76	80	91	94	100
41–45	4,604	71	78	86	93	102
46–50	7,770	71	78	85	95	101
51–55	12,115	69	81	89	95	99
56–60	17,282	72	81	85	92	100
61–65	17,363	77	82	88	93	101
66–70	5,225	71	78	84	90	98
71–75	5,472	74	85	90	98	103
76–80	5,730	81	91	97	98	101
81–85	4,118	86	92	94	98	100
86–90	2,111	85	87	96	99	99
91–95	883	79	83	95	89	94
96–100	226	57	54	75	85	93
101–	24	31	39	39	37	N/A
-45	10,123	75	81	87	95	100
46–60	37,167	71	81	87	94	100
61–75	28,060	75	82	87	93	100
76–	13,092	82	89	95	97	99
All ages	88,442	74	82	88	94	100

* A proportion of the data received for this investigation is returned with a combined medical code. The figures in Table 1.1.1a are, therefore, greater than the sum of the corresponding figures from Tables 1.1.1b and 1.1.1c.

Table 1.1.1b. *Whole life and endowment assurances, males,* 1983–86, *medical data: actual deaths and ratios of actual deaths to those expected using the A* 1967–70 *table*

Age group (nearest ages)	Actual deaths 1983–86	100 A/E 1983–86	100 A/E 1979–82	100 A/E 1975–78	100 A/E 1971–74	100 A/E 1967–70
Duration 0						
–20	2	250	164	122	150	73
21–25	2	108	87	113	90	81
26–30	3	135	152	118	94	102
31–35	3	100	106	74	93	119
36–40	0	–	138	112	103	133
41–45	2	26	82	101	89	68
46–50	12	103	82	60	92	78
51–55	20	89	69	91	64	89
56–60	21	82	84	70	61	62
61–65	27	68	45	93	56	96
66–70	27	80	74	50	44	70
71–	32	120	120	88	88	137
All ages	151	84	86	87	78	87
Duration 1						
–20	3	461	189	142	100	103
21–25	3	138	76	55	96	98
26–30	3	90	159	80	98	111
31–35	3	62	53	130	111	81
36–40	4	50	105	103	107	101
41–45	12	104	101	97	105	74
46–50	15	90	86	82	87	87
51–55	25	78	74	93	85	83
56–60	29	72	74	68	82	71
61–65	38	75	61	60	53	70
66–70	34	69	42	55	70	76
71–	55	104	118	67	106	94
All ages	224	82	81	83	88	83
Durations 2 and over						
–20	3	261	45	197	25	75
21–25	10	112	90	87	96	113
26–30	31	86	77	86	106	91
31–35	131	102	90	95	98	105
36–40	379	90	83	93	92	97
41–45	632	73	78	82	87	99
46–50	1,256	68	76	82	91	96
51–55	2,213	66	78	80	87	94
56–60	3,690	67	74	78	83	93
61–65	4,655	68	74	79	83	94
66–70	2,365	66	73	81	88	96
71–75	3,044	71	82	87	98	103
76–80	3,747	79	89	96	97	101
81–85	2,886	86	90	93	96	99
86–90	1,541	85	89	96	98	97
91–95	697	79	86	94	88	95
96–100	190	57	56	76	86	95
101–	20	30	41	37	34	N/A
–45	1,186	81	81	87	91	99
46–60	7,159	67	75	79	86	94
61–75	10,064	68	76	81	88	97
76–	9,081	81	88	94	95	99
All ages	27,490	72	79	84	89	96

Table 1.1.1c. *Whole life and endowment assurances, males, 1983–86, non-medical data: actual deaths and ratios of actual deaths to those expected using the A 1967–70 table*

Age group (nearest ages)	Actual deaths 1983–86	100 A/E 1983–86	100 A/E 1979–82	100 A/E 1975–78	100 A/E 1971–74	100 A/E 1967–70
Duration 0						
–20	49	79	91	119	103	104
21–25	82	88	104	97	107	102
26–30	93	124	90	95	104	95
31–35	86	106	89	95	114	94
36–40	120	93	86	104	92	98
41–45	132	81	80	100	88	111
46–50	163	73	95	94	108	100
51–55	253	85	84	107	93	118
56–60	171	87	104	90	119	116
61–65	103	98	87	111	93	140
66–70	72	129	107	112	143	86
71–	63	180	161	45	-	118
All ages	1,387	91	91	100	102	104
Duration 1						
–20	34	74	118	115	102	100
21–25	88	88	88	81	88	99
26–30	81	83	92	81	95	101
31–35	100	92	94	83	109	103
36–40	124	74	77	92	98	109
41–45	173	84	81	91	97	99
46–50	211	74	95	101	97	113
51–55	298	77	99	110	112	108
56–60	250	82	98	114	125	117
61–65	145	92	90	132	104	127
66–70	117	112	103	111	129	104
71–	65	130	73	183	183	246
All ages	1,686	84	92	96	101	106
Durations 2 and over						
–20	57	87	99	94	122	106
21–25	286	74	89	87	93	102
26–30	661	87	84	87	99	99
31–35	1,245	81	85	87	92	95
36–40	2,680	75	80	90	95	101
41–45	3,922	70	78	86	96	103
46–50	6,445	71	79	86	96	104
51–55	9,789	70	82	92	99	102
56–60	13,397	73	84	89	98	105
61–65	12,473	80	87	93	101	107
66–70	2,775	76	83	90	94	104
71–75	2,301	78	90	97	100	101
76–80	1,821	87	93	98	103	103
81–85	1,058	87	99	98	103	103
86–90	467	84	81	98	102	110
91–95	155	80	72	98	99	90
96–100	30	53	43	66	69	48
101–	3	30	27	78	67	N/A
–45	8,851	74	81	87	95	101
46–60	29,631	72	82	90	98	103
61–75	17,529	79	87	93	100	106
76–	3,534	86	91	98	102	103
All ages	59,545	75	84	91	98	104

Table 1.1.2. *Central rates of mortality per 10,000 experienced in individual years, whole life and endowment assurances, durations 5 and over, medical and non-medical combined, males* 1967–86

Year of experience	Age last birthday															
	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99
1967	9	8	7	12	18	34	62	107	175	280	483	711	1,189	1,657	2,244	3,729
1968	8	7	7	10	18	34	64	106	177	283	503	830	1,209	1,962	2,510	4,967
1969	8	8	8	11	19	37	62	109	182	297	479	807	1,218	1,922	2,426	2,601
1970	9	7	7	11	20	36	63	103	180	295	507	778	1,164	1,731	2,425	4,108
1971	7	8	7	10	18	36	59	98	169	258	470	717	1,133	1,777	2,553	3,775
1972	11	6	7	11	18	34	62	101	169	289	496	786	1,179	1,827	2,231	3,547
1973	7	7	7	10	18	34	57	101	164	270	456	821	1,216	1,794	2,366	3,582
1974	7	6	7	10	18	31	59	100	165	261	478	710	1,180	1,815	2,647	2,455
1975	7	6	6	9	17	31	58	91	158	252	447	720	1,203	1,838	2,894	3,313
1976	8	6	6	8	17	30	58	86	157	252	433	695	1,151	1,814	2,559	3,241
1977	6	6	6	10	16	29	54	92	157	236	428	712	1,089	1,693	2,323	3,050
1978	8	6	6	10	15	27	54	90	152	244	410	731	1,088	1,763	2,358	2,632
1979	9	6	6	8	15	28	52	86	145	229	417	682	1,054	1,604	2,500	2,742
1980	7	6	6	9	15	27	51	90	149	232	405	711	1,128	1,491	2,005	2,162
1981	7	6	6	8	14	25	49	89	141	219	417	648	1,090	1,578	2,302	2,081
1982	8	6	6	8	14	24	47	81	137	218	380	688	1,078	1,669	2,149	2,203
1983	5	6	6	8	14	26	44	82	138	221	379	637	1,084	1,656	2,148	2,730
1984	6	7	5	8	13	25	43	75	137	207	354	600	976	1,511	2,020	2,070
1985	5	6	6	8	13	23	42	73	134	220	347	606	1,031	1,540	2,000	2,254
1986	7	6	6	9	13	23	41	74	130	191	347	608	973	1,409	2,165	2,165

Table 1.1.3 *Ratios* ($\times 100$) *of C.M.I. central rates of mortality for males from Table* 1.1.2 *to G.B. population mortality*

Year of experience	Age last birthday													
	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89
1967	91	82	61	69	59	65	69	68	66	65	74	74	85	N/A
1968	83	76	64	58	57	64	67	66	66	64	73	80	81	N/A
1969	84	84	70	65	61	65	64	67	65	65	68	79	86	N/A
1970	90	75	60	65	66	65	67	64	67	67	74	77	84	N/A
1971	74	90	63	60	59	66	65	64	66	62	72	73	79	84
1972	111	68	64	65	61	62	66	64	64	67	72	77	79	82
1973	66	74	64	61	61	62	62	63	65	65	69	81	82	83
1974	73	68	64	63	61	58	63	64	66	63	72	72	80	85
1975	70	71	56	58	62	59	63	61	64	62	69	73	82	86
1976	82	68	58	50	62	60	63	57	62	62	66	69	76	82
1977	64	67	61	65	61	59	60	64	65	61	69	74	77	82
1978	80	67	58	61	57	55	60	61	61	62	66	75	76	84
1979	97	65	58	46	57	58	59	58	59	59	67	70	73	75
1980	79	69	62	61	60	59	60	62	64	62	68	76	80	73
1981	80	69	62	58	56	56	60	63	63	60	71	71	79	77
1982	91	71	60	60	59	56	60	58	62	60	65	76	78	81
1983	61	71	61	60	60	61	59	60	62	60	66	72	80	82
1984	71	82	51	61	59	61	60	58	64	59	64	70	75	78
1985	60	76	63	59	57	58	58	57	62	63	62	68	76	76
1986	83	73	60	68	59	58	59	59	61	55	63	70	75	71

rates in the population of Great Britain. For most of the age range 30 to 74 the C.M.I. experience rates are currently around 60 per cent of the population rates. The most consistent improvements in the assured lives data compared to the population rates lie in the age range 45 to 74.

It has been the practice in these reports to give a linear or quadratic relationship between the observed rates at durations 2 and over and the rates according to the latest published standard table. As the time from publication lengthens this tends to become more difficult particularly where, as appears to be the case in 1983–86, the underlying shape of the mortality curve is changing. An approximate relationship for 1983-86 is given by

$$q_x(1983\text{–}86) = (0{\cdot}7 + 0{\cdot}00016(x - 55)^2) \times q_x(\text{A } 1967\text{–}70)$$

All the indications are that mortality at all ages is substantially below the level reflected in A 1967–70. Users should therefore exercise care and make whatever adjustments are appropriate if they use a table which appears to overestimate mortality.

1.2 WHOLE LIFE AND ENDOWMENT ASSURANCES ON FEMALE LIVES

The exposed to risk for this investigation is shown in Table 1. The number of policies included in the investigation grew rapidly between the quadrennium 1975–78 and the quadrennium 1979–82 reflecting in large measure the high volume of new business being written on the lives of women at that time. In both quadrennia the exposed to risk at duration 0 represented about fifteen per cent of the total.

In the quadrennium 1983–86 the exposed to risk at duration 0 represented just under 12% of the total exposure indicating a falling off in new business. For those offices who contributed throughout the quadrennium the in force at duration 0 at 31st December 1986 was some five per cent lower than the corresponding in force at 1st January 1983. Despite this the total exposure continues to grow since even the reduced volume of new business outweighs losses due to deaths, maturities or lapses.

Tables 1.2.1a, 1.2.1b and 1.2.1c relate, respectively, to the combined, the medical and the non-medical data. They show the actual deaths in 1983–86, which are then compared with the deaths expected using the FA 1975–78 table by giving the ratios of actual to expected deaths together with the corresponding ratios for 1979–82 and, for the combined data only, for 1975–78. Also shown are ratios of actual to expected deaths using the A 1967–70 table with a four-year downward age adjustment for the same three quadrennia. These latter ratios are included as it is known that the A 1967–70 table with an age adjustment is in use in many life offices as a basis for female lives. Since the FA 1975–78 table has been published for some six years, and is becoming more established in use, the Executive Committee has decided that the A 1967–70 table with a four-year age adjustment will no longer be used as a comparison

Table 1.2.1a. *Whole life and endowment assurances, females,* 1983–86, *medical and non-medical combined: actual deaths and ratios of actual deaths to those expected using the FA* 1975–78 *table, and using the A* 1967–70 *table minus four years*

Age group (nearest ages)	Actual deaths 1983–86	100 A/E by FA 1975–78			100 A/E by A 1967–70 minus 4 years		
		1983–86	1979–82	1975–78	1983–86	1979–82	1975–78
Duration 0							
–25	15	44	88	108	16	33	41
26–35	51	88	74	85	60	51	57
36–45	73	71	81	113	65	74	103
46–55	97	60	100	104	46	76	
56–65	111	80	74	87	62	62	76
66–	135	116			119		
All ages	482	79	84	99	61	61	68
Duration 1							
–25	30	105	113	127	34	37	42
26–35	49	80	91	88	48	54	50
36–45	99	87	94	111	73	79	94
46–55	181	96	117	100	69	85	72
56–65	162	96	128	98	68	89	69
66–	141	108	120	89	87	96	
All ages	662	96	111	101	67	74	65
Durations 2 and over							
–20	7	66	44	N/A	29	19	79
21–25	60	78	84	96	25	27	31
26–30	125	69	79	100	38	43	55
31–35	241	68	77	85	61	68	75
36–40	459	71	71	92	80	80	103
41–45	625	79	81	106	87	89	116
46–50	993	90	91	110	87	87	106
51–55	1,291	81	98	104	69	83	88
56–60	1,473	80	92	96	62	71	74
61–65	1,214	85	84	96	62	62	70
66–70	554	72	82	89	51	58	63
71–75	463	75	87	99	54	62	71
76–80	404	77	86	114	57	64	84
81–85	307	98	121	110	79	97	88
86–90	212	112	97	100	103	89	92
91–	143	75	77	90	88	62	91
–45	1,517	74	77	97	67	65	80
46–60	3,757	83	93	102	70	79	86
61–75	2,231	80	84	95	57	61	68
76–	1,066	88	95	105	73	82	88
All ages	8,571	81	88	100	66	72	81

* A proportion of the data received for this investigation is returned with a combined medical code. The figures in Table 1.2.1a are, therefore, greater than the sum of the corresponding figures from Tables 1.2.1b and 1.2.1c.

Table 1.2.1b. *Whole life and endowment assurances, females,* 1983–86, *medical data: actual deaths and ratios of actual deaths to those expected using the FA* 1975–78 *table, and using the A* 1967–70 *table minus four years*

Age group (nearest ages)	Actual deaths 1983–86	100 A/E by FA 1975–78		100 A/E by A 1967–70 minus 4 years		
		1983–86	1979–82	1983–86	1979–82	1975–78
Duration 0						
All ages	59	79	73	88	61	72
Duration 1						
All ages	76	99	116	77	85	59
Durations 2 and over						
–30	6	78	106	38	52	115
31–35	16	95	51	86	45	112
36–40	30	84	84	94	94	140
41–45	44	83	104	91	114	103
46–50	73	86	85	83	82	110
51–55	124	96	93	81	79	86
56–60	130	62	73	48	56	66
61–65	180	67	76	49	55	67
66–70	140	63	71	45	50	61
71–75	158	63	80	45	57	65
76–80	178	66	67	49	50	77
81–85	137	83	116	66	93	92
86–90	120	109	101	100	93	90
91–	85	70	67	83	80	88
–45	96	85	89	84	83	115
46–60	327	77	81	64	66	80
61–75	478	64	76	46	54	65
76–	520	78	86	65	76	87
All ages	1,421	73	81	58	66	79

Table 1.2.1c. *Whole life and endowment assurances, females, 1983–86, non-medical data: actual deaths and ratios of actual deaths to those expected using the FA 1975–78 table, and using the A 1967–70 table minus four years*

Age group (nearest ages)	Actual deaths 1983–86	100 A/E by FA 1975–78		100 A/E by A 1967–70 minus 4 years		
		1983–86	1979–82	1983–86	1979–82	1975–78
Duration 0						
All ages	419	76	85	58	61	67
Duration 1						
All ages	579	95	110	66	72	66
Durations 2 and over						
–20	7	68	45	30	19	80
21–25	60	80	85	26	28	31
26–30	116	67	76	37	42	48
31–35	225	67	78	60	70	70
36–40	425	71	70	79	79	97
41–45	575	79	79	87	87	119
46–50	914	91	91	87	88	105
51–55	1,155	80	98	68	84	89
56–60	1,332	82	96	64	74	77
61–65	1,019	90	87	66	64	71
66–70	394	75	89	53	63	65
71–75	294	85	93	60	66	76
76–80	206	89	107	66	79	92
81–85	155	122	129	98	104	83
86–90	71	121	90	111	83	96
91–	47	89	100	104	115	97
–45	1,408	73	76	66	63	76
46–60	3,401	84	95	70	81	88
61–75	1,707	85	89	61	64	70
76–	479	102	108	83	91	91
All ages	6,995	83	90	68	73	81

Table 1.2.2. *Central rates of mortality per 10,000 experienced in individual years, whole life and endowment assurances, durations 5 and over, medical and non-medical combined, females* 1975–86

Year of experience	Age last birthday															
	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99
1975	(0)	(1)	4	8	8	16	25	29	54	100	181	319	555	735	1,211	(1,418)
1976	(4)	5	5	7	14	26	37	59	92	129	266	468	624	1,461	1,569	(2,405)
1977	(4)	7	7	9	22	31	44	59	91	130	278	474	921	1,427	2,507	3,724
1978	(3)	3	4	6	11	18	33	46	64	111	211	437	716	1,027	2,022	(1,501)
1979	(4)	5	6	8	11	20	41	50	66	120	239	283	723	1,347	2,036	(1,684)
1980	(4)	3	4	8	11	19	36	44	72	106	187	391	735	1,215	1,691	(1,870)
1981	(2)	3	4	5	14	21	34	55	62	116	197	346	890	1,380	2,349	2,911
1982	(3)	3	4	6	8	17	32	49	87	109	273	392	824	1,162	2,031	(2,500)
1983	(2)	3	3	6	10	22	29	41	71	90	224	291	668	1,526	2,515	(3,556)
1984	(2)	4	3	6	10	19	29	44	70	94	159	260	701	985	2,528	(2,130)
1985	(4)	4	4	7	12	20	27	40	71	110	195	359	715	1,311	2,215	2,561
1986	(1)	2	4	6	10	18	28	44	77	101	166	349	714	1,014	1,585	(1,234)

Note: figures in brackets are based on fewer than 10 deaths

Table 1.2.3. *Ratios* (x100) *of C.M.I. central rates of mortality for females from Table* 1.2.2 *to G.B. population mortality*

Year of experience	Age last birthday													
	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89
1975	0	20	60	71	41	48	47	36	43	50	54	56	56	46
1976	98	104	74	65	73	78	68	74	72	64	79	80	61	88
1977	93	156	109	83	121	97	86	75	74	67	86	86	96	92
1978	71	59	60	55	59	57	62	58	51	56	65	79	75	65
1979	108	104	92	77	62	64	77	63	51	61	74	51	75	84
1980	103	65	66	78	65	65	73	55	59	55	60	73	81	79
1981	57	70	66	54	84	73	70	71	52	62	63	67	99	91
1982	86	71	65	64	51	61	68	64	72	57	88	75	92	77
1983	65	73	52	65	65	82	63	54	60	47	74	58	77	103
1984	65	93	52	67	67	73	66	58	61	50	54	53	85	70
1985	129	105	70	78	80	79	63	54	59	58	64	72	83	89
1986	30	53	69	71	68	71	68	62	67	54	56	71	86	72

basis by the Bureau unless specifically requested by an office for its own returns.

In the combined experience at durations 2 and over the mortality experienced overall has fallen over the three quadrennia observed. Between the ages of 21 and 80 the trend by age group has been generally downwards with only few exceptions. The observed levelling out of the ratios over the age range 36 to 50 between the last two quadrennia may indicate that mortality improvement at these ages is slowing down or ceasing altogether.

It is difficult to discern any consistent trends in the experience at durations 0 and 1.

The medical and non-medical experiences in general mirror the combined experience, the non-medical experience overall being heavier than the medical as would be expected.

Table 1.2.2 shows the central rates of mortality experienced in the combined female data at durations 5 and over in the individual years 1975 to 1986. Although the select period is different the figures show similar patterns to those noted from observation of the results shown in tables 1.2.1a, 1.2.1b and 1.2.1c.

Table 1.2.3 shows the ratio (as a percentage) of the central rates of mortality from the assured lives experience, shown in table 1.2.2, to the corresponding rates in the population of Great Britain. For most of the age groups over 30 the C.M.I. experience rates are currently around 70 per cent of the population rates. It is difficult to find any real pattern of improvement in the C.M.I. rates as compared to the national rates. The C.M.I. experience rates do fluctuate from year to year; in part, particularly in the early years, this may be a function of the relatively limited number of deaths in the experience.

1.3 TEMPORARY ASSURANCES

The male experience

The investigation into the mortality of assured lives holding temporary contracts was, over the period covered by this report, split between level temporary assurances and decreasing temporary assurances. Tables 1.3.1a, 1.3.1b and 1.3.1c show the experience for level temporary assurances and relate respectively to the combined data, the medically examined data and the non-medical data. The corresponding tables for decreasing temporary assurances are 1.3.2a, 1.3.2b and 1.3.2c. Table 1.3.3 shows the experience for all temporary assurances combined. The comparison basis used is the A 1967–70(5) table.

The exposed to risk in the level temporary experience is increasing rapidly, the exposure in the quadrennium 1983–86 being over 50% greater than the exposure in the quadrennium 1979–82. Much of this business is short term, probably 10 years or less. This, coupled with the expansion of new business, results in nearly 70% of the exposure being at durations less than 5 years.

In contrast the exposed to risk in the decreasing temporary investigation is little different between the quadrennium 1979–82 and the quadrennium 1983–86. Two thirds of the exposure in 1983–86 is at durations 5 and over. It is

believed that many of these contracts are family income or mortgage protection policies, with terms of up to 25 years. With the increasing popularity of endowment mortgages, it is possible that this class of business may tend to decline.

In the case of level temporary assurances at durations 5 and over there was a marked improvement in overall mortality over the three quadrennia 1971–74, 1975–78 and 1979–82. Between 1979–82 and 1983–86 there appears to have been very little overall improvement. Looking at broad age ranges however, a different picture emerges. At ages up to 45 there has been continued improvement over the four quadrennia while at ages 46–60 the experience has been relatively stable. At ages over 60 where the exposed to risk is much smaller, there is no clear pattern.

The medically examined experience is relatively small and too much should not necessarily be read into the results. However, it could perhaps be noted that the beneficial effect of medical examination is no longer apparent at durations 5 and over.

At durations under 5 no clear pattern in the level of mortality experienced is readily discernible although there are indications that the overall experience has stabilised at the shorter durations while continuing to improve somewhat at the longer durations. In general the experience of the medically examined group is lighter than that of the non-medical group.

The overall level of mortality at durations 5 and over in the decreasing temporary investigation is higher in all quadrennia studied than that in the level temporary investigation. Some of this difference might be accounted for by the longer duration in force of the decreasing temporary business. However, a similar effect is apparent at durations 2 to 4; at duration 1 the two experiences are not dissimilar while at duration 0 the level temporary experience is currently substantially the heavier.

At durations 5 and over in the decreasing temporary experience, the overall level of mortality experienced has declined markedly, although there had appeared to be a relatively stable period between 1975–78 and 1979–82. In a similar pattern to that shown by the level temporary experience, the younger age groups (in this case 31–45) have exhibited a steadily declining trend while the age groups over 45 have shown a different pattern. At durations less than 5 there has been an overall downward trend (except at duration 0), although the pattern between individual quadrennia and within age groups is not clear cut.

Overall the mortality experience in the medical section is lighter than that in the non-medical section although at durations less than 5 this appears mainly in the last two quadrennia. There is no consistent pattern at individual age groups; the small number of deaths at durations less than 5 makes for wide fluctuations in the experience.

The Executive Committee has decided that in future the level and decreasing temporary investigations will be merged. It is believed that the two experiences are not sufficiently different to merit separate investigation, and that it would be beneficial to have a larger body of data with which to work. The experiences

Table 1.3.1a. *Level temporary assurances, males,* 1983–86, *medical and non-medical combined: actual deaths and ratios of actual deaths to those expected using the A* 1967–70(5) *table*

Age group (nearest ages)	Actual deaths 1983–86	100A/E 1983–86	100A/E 1979–82	100A/E 1975–78	100A/E 1971–74
Duration 0					
–30	59	151	119	131	78
31–45	151	96	92	87	77
46–60	131	75	87	78	58
61–	37	93	55	36	88
All ages	378	92	91	87	71
Duration 1					
–30	29	77	86	66	58
31–45	171	94	74	67	86
46–60	144	66	77	68	83
61–	35	67	65	87	50
All ages	379	77	76	69	76
Durations 2–4					
–25	6	42			
26–30	31	67			
31–35	83	92			
36–40	126	72			
41–45	128	60			
46–50	128	54			
51–55	155	68			
56–60	117	70			
61–65	66	71			
66–	27	68			
–30	37	61	88	74	111
31–45	337	70	66	75	78
46–60	400	63	74	82	53
61–	93	70	69	54	67
All ages	867	66	72	76	71
Durations 5 and over					
–30	12	68			
31–35	48	70			
36–40	123	66			
41–45	155	62			
46–50	179	59			
51–55	172	54			
56–60	157	55			
61–65	106	57			
66–	42	78			
–30	12	68	102	101	200
31–45	326	64	70	89	155
46–60	508	56	55	55	74
61–	148	62	57	77	45
All ages	994	59	61	71	88

• A proportion of the data received for this investigation is returned with a combined medical code. The figures in Table 1.3.1a are, therefore, greater than the sum of the corresponding figures from Tables 1.3.1b and 1.3.1c.

Table 1.3.1b. *Level temporary assurances, males,* 1983–86, *medical data: actual deaths and ratios of actual deaths to those expected using the A* 1967–70(5) *table*

Age group (nearest ages)	Actual deaths 1983–86	100A/E 1983–86	100A/E 1979–82	100A/E 1975–78	100A/E 1971–74
Duration 0					
–30	4	204	134	154	100
31–45	18	98	104	126	58
46–60	31	76	76	75	58
61–	23	89	54	41	71
All ages	76	88	82	88	64
Duration 1					
–30	1	44	110	25	67
31–45	26	113	81	56	58
46–60	37	70	58	74	62
61–	17	51	60	92	45
All ages	81	72	66	70	58
Durations 2–4					
–25	–	–			
26–30	4	98			
31–35	6	51			
36–40	19	70			
41–45	20	53			
46–50	21	46			
51–55	40	71			
56–60	48	72			
61–65	32	60			
66–	22	70			
–30	4	80	145	43	200
31–45	45	59	72	85	65
46–60	109	65	70	78	50
61–	54	63	67	57	50
All ages	212	63	72	74	60
Durations 5 and over					
–30	2	91			
31–35	13	118			
36–40	26	69			
41–45	40	68			
46–50	41	52			
51–55	50	59			
56–60	44	42			
61–65	64	62			
66–	33	76			
–30	2	91	123	240	N/A
31–45	79	74	74	78	200
46–60	135	50	55	55	60
61–	97	66	57	74	44
All ages	313	59	60	68	83

Table 1.3.1c. *Level temporary assurances, males,* 1983–86, *non-medical data: actual deaths and ratios of actual deaths to those expected using the A* 1967–70(5) *table*

Age group (nearest ages)	Actual deaths 1983–86	100A/E 1983–86	100A/E 1979–82	100A/E 1975–78	100A/E 1971–74
Duration 0					
–30	55	149	117	127	74
31–45	133	96	90	74	85
46–60	98	75	93	80	56
61–	13	99	57	0	200
All ages	299	94	95	86	76
Duration 1					
–30	28	80	82	73	56
31–45	142	90	72	71	100
46–60	103	63	90	63	119
61–	17	98	86	52	100
All ages	290	78	80	68	93
Durations 2–4					
–25	6	46			
26–30	27	65			
31–35	75	96			
36–40	107	73			
41–45	107	62			
46–50	103	55			
51–55	113	68			
56–60	67	68			
61–65	32	88			
66–	4	56			
–30	33	60	78	80	93
31–45	289	73	65	71	85
46–60	283	62	77	86	58
61–	36	83	78	40	300
All ages	641	68	72	78	80
Durations 5 and over					
–30	9	60			
31–35	33	59			
36–40	96	66			
41–45	112	60			
46–50	134	62			
51–55	111	49			
56–60	111	66			
61–65	35	49			
66–	6	77			
–30	9	60	98	76	100
31–45	241	62	68	94	117
46–60	356	58	55	55	92
61–	41	52	58	93	50
All ages	647	59	62	75	95

Table 1.3.2a. *Decreasing temporary assurances, males,* 1983–86, *medical and non-medical combined: actual deaths and ratios of actual deaths to those expected using the A* 1967–70(5) *table*

Age group (nearest ages)	Actual deaths 1983–86	100A/E 1983–86	100A/E 1979–82	100A/E 1975–78	100A/E 1971–74
Duration 0					
–30	16	80	85	96	72
31–45	71	85	72	88	113
46–60	106	83	82	85	72
61–	25	96	86	71	62
All ages	218	85	79	88	87
Duration 1					
–30	17	74	84	89	77
31–45	83	73	82	84	82
46–60	160	80	80	89	84
61–	28	62	62	78	69
All ages	288	75	80	87	81
Durations 2–4					
–25	4	45	54	84	46
26–30	30	72	75	68	80
31–35	49	67	83	60	90
36–40	90	65	79	69	79
41–45	131	74	77	83	78
46–50	157	68	94	79	89
51–55	192	71	76	77	81
56–60	212	81	69	77	91
61–65	111	77	84	65	72
66–	32	65	84	62	
–30	34	68	71	71	79
31–45	270	69	79	72	
46–60	561	73	80	78	86
61–	143	74	84	65	72
All ages	1,008	72	80	74	82
Durations 5 and over					
–30	21	68	78	50	67
31–35	109	72	77	70	85
36–40	355	69	67	86	85
41–45	555	64	77	80	114
46–50	878	67	75	80	89
51–55	1,026	65	79	78	86
56–60	1,119	70	83	75	87
61–65	824	70	78	71	81
66–	230	61	74	56	
–30	21	68	78	50	97
31–45	1,019	66	74	80	
46–60	3,023	67	79	78	90
61–	1,054	68	77	67	81
All ages	5,117	67	78	76	91

• A proportion of the data received for this investigation is returned with a combined medical code. The figures in Table 1.3.2a are, therefore, greater than the sum of the corresponding figures from Tables 1.3.2b and 1.3.2c.

Table 1.3.2b. *Decreasing temporary assurances, males,* 1983–86, *medical data: actual deaths and ratios of actual deaths to those expected using the A* 1967–70(5) *table*

Age group (nearest ages)	Actual deaths 1983–86	100A/E 1983–86	100A/E 1979–82	100A/E 1975–78	100A/E 1971–74
Duration 0					
–30	0	0	77	18	110
31–45	3	54	140	124	162
46–60	18	95	87	90	59
61–	10	73	93	67	71
All ages	31	80	97	88	87
Duration 1					
–30	2	202	90	100	90
31–45	4	47	77	98	50
46–60	21	64	73	92	76
61–	14	60	73	82	45
All ages	41	62	74	93	69
Durations 2–4					
–30	1	33	78	79	N/A
31–35	7	103	108	64	129
36–40	9	64	82	45	88
41–45	17	91	82	74	89
46–50	16	60	88	77	87
51–55	29	65	72	78	74
56–60	55	68	62	78	80
61–65	46	66	81	69	72
66–	27	75	89	62	
–30	1	33	78	79	92
31–45	33	84	89	62	
46–60	100	66	69	78	79
61–	73	69	83	67	72
All ages	207	69	76	73	82
Durations 5 and over					
–30	1	43	113	45	160
31–35	10	54	66	56	94
36–40	52	63	82	105	100
41–45	103	62	80	78	110
46–50	158	58	67	84	96
51–55	226	67	72	90	73
56–60	254	60	75	67	92
61–65	333	64	74	68	83
66–	151	60	78	53	
–30	1	43	113	45	107
31–45	165	61	79	82	
46–60	638	62	73	78	87
61–	484	62	75	64	83
All ages	1,288	62	74	74	90

Table 1.3.2c. *Decreasing temporary assurances, males,* 1983–86, *non-medical data: actual deaths and ratios of actual deaths to those expected using the A* 1967–70(5) *table*

Age group (nearest ages)	Actual deaths 1983–86	100A/E 1983–86	100A/E 1979–82	100A/E 1975–78	100A/E 1971–74
Duration 0					
–30	16	84	86	104	66
31–45	68	88	63	82	104
46–60	87	81	80	81	85
61–	15	128	63	95	0
All ages	186	86	74	88	87
Duration 1					
–30	15	68	83	87	75
31–45	77	74	83	81	88
46–60	138	84	84	87	90
61–	14	68	20	52	200
All ages	244	78	82	84	85
Durations 2–4					
–30	33	70	71	70	N/A
31–35	42	63	80	59	83
36–40	80	65	78	74	77
41–45	110	71	76	85	76
46–50	135	67	96	79	90
51–55	161	72	77	77	85
56–60	151	86	80	72	127
61–65	61	86	92	40	75
66–	4	35	37	65	
–30	33	70	71	70	77
31–45	232	67	78	74	
46–60	447	75	86	78	91
61–	65	79	85	44	75
All ages	777	72	79	74	82
Durations 5 and over					
–30	20	71	73	51	42
31–35	99	75	80	73	82
36–40	297	71	63	82	80
41–45	445	65	76	80	116
46–50	701	70	77	79	99
51–55	783	65	81	75	90
56–60	834	74	87	81	84
61–65	463	75	85	73	77
66–	66	63	59	66	
–30	20	71	73	51	95
31–45	841	68	72	79	
46–60	2,318	70	82	78	92
61–	529	73	81	72	77
All ages	3,708	70	79	77	92

Table 1.3.3. *Level and decreasing temporary assurances combined, males, 1983–86, medical and non-medical combined: actual deaths and ratios of actual deaths to those expected using the A 1967–70(5) table*

Age group (nearest ages)	Actual deaths 1983–86	100A/E 1983–86	100A/E 1979–82
Duration 0			
–30	75	127	103
31–45	222	92	82
46–60	237	78	84
61–	62	94	69
All ages	596	89	85
Duration 1			
–30	46	76	84
31–45	254	86	78
46–60	304	72	79
61–	63	65	63
All ages	667	76	77
Durations 2–4			
–25	10	43	
26–30	61	70	
31–35	132	80	
36–40	216	69	
41–45	259	66	
46–50	285	61	
51–55	347	69	
56–60	329	77	
61–65	177	75	
66–	59	66	
–30	71	64	76
31–45	607	70	75
46–60	961	69	78
61–	236	72	78
All ages	1,875	69	77
Durations 5 and over			
–30	33	68	
31–35	157	71	
36–40	478	68	
41–45	710	63	
46–50	1,057	66	
51–55	1,198	63	
56–60	1,276	67	
61–65	930	68	
66–	272	63	
–30	33	68	85
31–45	1,345	66	73
46–60	3,531	65	76
61–	1,202	67	75
All ages	6,111	66	76

were merged when constructing the base data for the new tables prepared by the Committee, on the basis of the 1979–82 experience, and published in *C.M.I.R.* **10**. Table 1.3.3 shows the combined data (medical and non-medical combined) for the quadrennia 1979–82 and 1983–86.

The female experience

The investigations into the mortality experienced by female holders of temporary assurance policies were started in 1982. 1983–86 is, therefore, the first full quadrennium for which statistics are available. Tables 1.3.4, 1.3.5 and 1.3.6 show the experience over the quadrennium for, respectively, level temporary assurances, decreasing temporary assurances and level and decreasing temporary assurances combined. The figures shown relate to all medical groups combined. The comparison bases used are the FA 1975–78 table and the A 1967–70(5) table minus 4 years.

In the level temporary experience 83% of the exposed to risk relates to durations in force of less than 5 years. Three factors probably contribute to this phenomenon. Firstly, this is a relatively new investigation and a small number of the contributing offices submitted data only in respect of business written on or after 1st January 1982. Secondly, as with the whole life and endowment

Table 1.3.4. *Level temporary assurances, females,* 1983–86, *medical and non-medical combined: actual deaths and ratios of actual deaths to those expected using the FA* 1975–78 *table and the A* 1967–70(5) *table minus four years*

Age group (nearest ages)	Actual deaths 1983–86	100A/E by FA 1975–78	100A/E by A 1967–70(5) minus 4 years
Duration 0			
All ages	52	66	47
Duration 1			
All ages	60	76	51
Durations 2–4			
–30	16	67	34
31–45	59	49	54
46–60	31	46	45
61–	16	107	113
All ages	122	54	51
Durations 5 and over			
–45	53	72	70
46–60	41	76	66
61–	10	118	84
All ages	104	76	69

Table 1.3.5. *Decreasing temporary assurances, females,* 1983–86, *medical and non-medical combined: actual deaths and ratios of actual deaths to those expected using the FA* 1975–78 *table and the A* 1967–70(5) *table minus four years*

Age group (nearest ages)	Actual deaths 1983–86	100A/E by FA 1975–78	100A/E by A 1967–70(5) minus 4 years
Duration 0			
All ages	33	63	47
Duration 1			
All ages	42	73	50
Durations 2–4			
–30	6	38	20
31–45	55	66	72
46–60	46	62	61
61–	4	37	25
All ages	111	59	56
Durations 5 and over			
–45	79	57	56
46–60	79	74	63
61–	16	66	47
All ages	174	65	58

investigations larger numbers of women are entering the insurance market and this will tend to lower the average duration in force. Thirdly, as in the male level temporary experience, the essentially short term nature of the contracts will make for a different distribution by duration to that of products of a longer term nature.

In the decreasing temporary experience some 63% of the exposure is at durations less than 5 years. The first and second factors mentioned above would contribute towards this kind of distribution while the third would act in the opposite direction.

Comparisons with earlier quadrennia are not possible and the small number of deaths makes it difficult to draw firm conclusions. However, two tentative remarks can be made. Firstly, the results from the two temporary experiences, when compared on the FA 1975–78 table, appear to indicate mortality levels substantially lighter than those suffered in the female whole life and endowment experience. Secondly, there appears to be little significant difference between the levels of mortality in the level temporary experience and the decreasing temporary experience. As in the case of the male experiences, the two investigations are

Table 1.3.6. *Level and decreasing temporary assurances combined, females, 1983–86, medical and non-medical combined: actual deaths and ratios of actual deaths to those expected using the FA 1975–78 table and the A 1967–70(5) table minus four years*

Age group (nearest ages)	Actual deaths 1983–86	100A/E by FA 1975–78	100A/E by A 1967–70(5) minus 4 years
Duration 0			
All ages	85	65	47
Duration 1			
All ages	102	75	51
Durations 2–4			
–30	22	56	28
31–45	114	56	61
46–60	77	54	53
61–	20	65	66
All ages	233	56	53
Durations 5 and over			
–45	132	62	61
46–60	120	75	64
61–	26	79	56
All ages	278	69	62

to be merged giving a larger body of data which should contribute to greater stability in the results. Table 1.3.6 shows the combined results for 1983–86.

1.4 LINKED CONTRACTS

The 1983–86 quadrennium shows a substantial increase in the exposed to risk in the linked life investigation over that recorded in the quadrennium 1979–82. That for males has increased by nearly 50% while that for females has nearly tripled. Interestingly the crude death rate per 1,000 has increased for both males and females over the two quadrennia. This could be caused by a number of factors, for example a change in the nature of the business included, an increase in the average age of the exposed to risk, a genuine deterioration in the mortality experienced by the group or even, in part at least, random fluctuation.

It is difficult to determine the exact composition of the data forming the linked life investigation. At the inception of the investigation a typical policy would have been a fully medically underwritten contract on a whole life or endowment basis where the sum assured, rather than being a fixed sum of money (with or without profits), was linked to the value of the investments making up the fund.

A continuing problem over the years has been the appearance in the experience of contracts with a very restricted sum at risk, under which there is virtually no medical selection. A major effort was made at the time of the last report (on the 1979–82 experience) to eliminate these policies from the investigation and much was achieved. Offices have been asked to be vigilant when making their returns to ensure that such cases are not included and progress has definitely been made. However, it is clear that there are still a significant number of these policies in the data, particularly at older ages.

Another cause of heterogeneity arises from the ingenuity of the market in bringing forward new types of policy. Almost exclusively these products are unit linked and do not fit easily into the existing classification of business operated by the Bureau. Provided such policies are fully medically underwritten they are normally included in the linked investigation. 'Universal Life' policies are but one example of the new kind of business entering the experience.

The mortality experience over the quadrennium 1983–86 is shown in Tables 1.4.1 and 1.4.2, relating to males and females respectively. Comparative figures are shown also for the quadrennium 1979–82. For males the comparison basis used is the A 1967–70 table. For females two bases are used, the FA 1975–78 table and the A 1967–70 table minus four years. Although the investigation started in 1976, comparisons for 1976–78 are not shown here as that data is known to contain a high proportion of restricted cover contracts.

The male experience at durations 2 and over indicates that the level of mortality suffered by this group was lighter in the quadrennium 1983–86 than it was in 1979– 82. The improvement in mortality has occurred in all age groups except 31 to 35 and 66 to 75. The level of mortality in 1983–86 was lower than that in the whole life and endowment experience for the same group over the same period. Again the lighter mortality was manifest in nearly all age groups. There is no indication in the experience for durations 2 and over of the heavier mortality one might expect to find due to the existence of restricted cover cases at high ages : it is possible that any excess mortality attached to this group might decline as the duration increases. However, at durations 0 and 1 it seems clear that the restricted cover cases known to be present give rise to additional mortality above that which would otherwise be expected, particularly at ages over 60.

The level of mortality suffered in the female experience at durations 2 and over has also fallen between 1979–82 and 1983–86. The fall is not uniform over the age range, being greater at ages up to 60. The level of mortality experienced in the unit linked investigation during the quadrennium overall was the same as that experienced in the corresponding whole life and endowment assurance group, and the pattern through the age groups was not dissimilar. There is nothing in these results which provides any real evidence of additional mortality at higher ages at durations 2 and over occasioned by the presence of restricted cover cases in the data. As with males, any excess mortality attaching to this group may decline as duration increases. Little can be drawn from the results

Table 1.4.1. *Linked contracts of life assurance, males,* 1983–86, *medical and non-medical combined: actual deaths and ratios of actual deaths to those expected using the A* 1967–70 *table*

Age group (nearest ages)	Actual deaths 1983–86	100A/E 1983–86	100A/E 1979–82
Duration 0			
–30	53	127	88
31–45	79	84	86
46–60	187	71	99
61–75	216	126	75
76–	60	227	925
All ages	595	100	106
Duration 1			
–30	28	86	112
31–45	85	95	134
46–60	229	82	78
61–75	230	107	93
76–	101	216	125
All ages	673	102	98
Durations 2 and over			
–20	8	134	174
21–25	22	80	153
26–30	37	74	127
31–35	89	106	90
36–40	110	64	82
41–45	167	62	74
46–50	308	66	74
51–55	465	58	71
56–60	709	57	67
61–65	727	58	67
66–70	387	61	43
71–75	280	60	49
76–80	284	78	
81–85	143	76	89
86–90	54	57	
91–	19	86	
All ages	3,809	62	71

Table 1.4.2. *Linked contracts of life assurance, females,* 1983–86, *medical and non-medical combined: actual deaths and ratios of actual deaths to those expected using the* FA 1975–78 *table and the A* 1967–70 *table minus four years*

Age group (nearest ages)	Actual deaths 1983–86	100A/E by FA 1975–78 1983–86	1979–82	100A/E by A 1967–70 minus 4 years 1983–86	1979–82
Duration 0					
–30	6	77	138	34	62
31–45	18	71	18	64	16
46–60	43	60	40	46	30
61–75	70	88	93	78	82
76–	181	302	281	458	411
All ages	318	130	89	118	76
Duration 1					
–30	3	57	120	55	47
31–45	21	100	98	82	79
46–60	57	90	83	64	59
61–75	56	74	26	56	20
76–	220	261	193	295	206
All ages	357	143	80	118	60
Durations 2 and over					
–30	14	119		54	
31–35	10	63		57	
36–40	25	79		88	
41–45	29	62		68	
46–50	65	86		83	
51–55	89	66		56	
56–60	145	72		56	
61–65	116	55		40	
66–70	130	77		55	
71–75	129	67		48	
76–80	208	96		72	
81–85	237	116		94	
86–90	165	109		101	
91–	58	55		63	
–30	14	119	212	54	105
31–45	64	68	93	72	99
46–60	299	73	92	60	77
61–75	375	66	68	47	50
76–	668	99	88	84	74
All ages	1,420	81	88	64	72

at durations 0 and 1. There is clearly excess mortality at ages over 75, over and above that which would be expected in a fully medically examined experience. It should be noted that the number of deaths at these durations in 1979–82 was small, 40 and 27 respectively, so that the results, particularly when subdivided by age group, could be subject to wide random variation.

1.5 JOINT LIFE FIRST DEATH ASSURANCES

This investigation is a relatively new one having been started as from 1st January 1982. The quadrennium 1983–86 is, therefore, the first for which analyses of the mortality experience are available. The investigation includes policies written on one male and one female life only and both lives must have been accepted at normal rates. The object of this restriction is to provide a check on the data submitted in that the total number of policies in force for each sex should be equal. With only minor exceptions, this is the case.

Tables 1.5.1 and 1.5.2 show the experience for males and females respectively. For males the comparison basis used is the A 1967–70 table. For females two bases are used, the FA 1975–78 table and the A 1967–70 table minus four years.

For males, when all age groups combined are considered, the mortality experienced is lighter than that suffered by holders of whole life and endowment assurance policies, substantially so at durations 0 and 2 and over, where the lighter mortality occurs throughout the age range. In the case of females, the difference between the mortality experienced in the two investigations is even more striking, that in the joint life first death investigation again being substantially the lower. A caveat should, perhaps, be entered at this stage. While it is not unreasonable to compare the two experiences, it should be noted that the data studied in the joint life first death investigation has been contributed by a relatively small number of offices whose experience may not be representative of the much larger number contributing to the whole life and endowment assurance investigation.

1.6 GUARANTEED ACCEPTANCE ASSURANCES

This investigation was started as from 1st January 1983 following the appearance on the market a year or so earlier of policies accepted without medical evidence. It was restricted to policies issued in connection with mortgages (which, in fact, covered the majority of the business). Following the perceived adverse selection against offices by holders of these policies they were withdrawn from the market to be replaced by policies issued following the completion of a proposal form containing a very limited number of questions (in some cases only one) relating to health (see Section 1.7). This group of assured lives has, therefore, become virtually a closed class, their experience of historical interest only acting as a cautionary tale for actuaries of the future.

Tables 1.6.1. and 1.6.2. give the experience of males and females respectively.

Table 1.5.1. *Joint life first death assurances, males,* 1983–86, *medical and non-medical combined: actual deaths and ratios of actual deaths to those expected using the A* 1967–70 *table*

Age group (nearest ages)	Actual deaths 1983–86	100A/E by A 1967–70
Duration 0		
–30	10	39
31–35	12	74
36–40	12	53
41–45	6	27
46–50	13	48
51–55	37	68
56–60	32	108
61–	15	119
All ages	137	65
Duration 1		
–30	17	77
31–35	15	91
36–40	24	111
41–45	18	87
46–50	18	78
51–55	35	73
56–60	22	67
61–	12	77
All ages	161	80
Durations 2 and over		
–30	40	67
31–35	53	64
36–40	80	70
41–45	71	61
46–50	75	59
51–55	81	54
56–60	81	58
61–65	59	68
66–70	24	68
71–	11	45
All ages	575	61

Table 1.5.2. *Joint life first death assurances, females,* 1983–86, *medical and non-medical combined: actual deaths and ratios of actual deaths to those expected using the FA* 1975–78 *table and the A* 1967–70 *table minus four years*

Age group (nearest ages)	Actual deaths 1983–86	100A/E by FA 1975–1978	100A/E by A 1967–70 minus 4 years
Duration 0			
-30	10	55	24
31–45	9	25	22
46–60	27	67	47
61–	1	29	24
All ages	47	48	34
Duration 1			
-30	6	43	17
31–45	17	54	43
46–60	31	88	63
61–	3	82	61
All ages	57	68	44
Durations 2 and over			
-30	20	38	19
31–35	38	59	52
36–40	35	43	48
41–45	50	75	83
46–50	34	57	55
51–55	28	48	41
56–60	23	54	42
61–65	17	74	54
66–	14	90	65
All ages	259	56	47

For males the comparison basis used is the A 1967–70 table. For females two bases are used, the FA 1975–78 table and the A 1967–70 table minus four years. In the case of the A 1967–70 table for males and the FA 1975–78 table for females the comparisons at durations 0 and 1 are given using both the select and the ultimate rates.

The male experience is of a reasonable size with a total exposure of over a quarter of million lives and nearly four hundred deaths. The mortality experienced has, indeed, been heavy when compared with the experience of holders of whole life and endowment policies accepted on the conventional medical or non-medical basis. Compared to such a group the excess mortality appears to

Table 1.6.1. *Guaranteed acceptance assurances, males,* 1983–86: *actual deaths and ratios of actual deaths to those expected using the A* 1967–70 *table. At durations* 0 *and* 1 *comparisons using both the select and ultimate rates are shown*

Age group (nearest ages)	Actual deaths 1983–86	100A/E by A 1967–70 select	100A/E by A 1967–70 ultimate
Duration 0			
-30	16	119	82
31–40	28	192	134
41–50	25	123	80
51–60	13	216	120
61–	2	1,429	606
All ages	84	154	102
Duration 1			
-30	16	89	76
31–40	37	155	132
41–50	47	130	102
51–60	19	134	94
61–	3	492	291
All ages	122	132	105
Durations 2 and over			
-30	18	80	
31–35	18	107	
36–40	15	60	
41–45	32	100	
46–50	44	100	
51–55	37	105	
56–60	16	145	
61–	5	195	
All ages	185	98	

decline as the duration increases. However, the comparisons using the ultimate rates throughout suggest that, while there is substantial excess mortality over and above that which would be expected in a mature group of medically selected assured lives, the excess is affected to only a limited extent, if at all, by duration. Given the number of deaths the evidence of any additional adverse selective effect peculiar to the early years is inconclusive.

The female experience is very small with a limited number of deaths. Even so, it can be said that, at durations 0 and 1, the number of deaths is substantially

Table 1.6.2. *Guaranteed acceptance assurances, females,* 1983–86*: actual deaths and ratios of actual deaths to those expected using the FA* 1975–78 *table and the A* 1967–70 *table minus four years. At durations* 0 *and* 1 *comparisons using the FA* 1975–78 *table are shown on both a select and an ultimate basis*

Age group (nearest ages)	Actual deaths 1983–86	100A/E by FA 1975–78 select	100A/E by FA 1975–78 ultimate	100A/E by A 1967–70 minus 4 years
Duration 0				
All ages	15	168	101	119
Duration 1				
All ages	25	167	111	113
Durations 2 and over				
All ages	29	80		71

in excess of the number which would be expected in a group of policyholders subjected to conventional medical selection. However, the experience at duration 2 and over in the two groups of policyholders is not dissimilar.

1.7 MINIMUM EVIDENCE ASSURANCES

This investigation started as from 1st January 1985 and is the successor of the guaranteed acceptance investigation described in Section 1.6. It covers whole life and endowment policies issued following the completion of a proposal form containing a limited number of questions (sometimes only one) on health. There are two sections to the investigation, one relating to policies written on one life only and the other relating to policies written on a joint life first death basis. The latter group is restricted to policies written on one male and one female life where both lives have been accepted at normal rates.

The experience for males is shown in Tables 1.7.1a and 1.7.1b relating, respectively, to policies on single lives and policies on joint lives. Tables 1.7.2a and 1.7.2b give the experience for female lives. For males the comparison basis used is the A 1967–70 table. For females two bases are used, the FA 1975–78 table and the A 1967–70 table minus four years. The female single life experience is extremely limited and no real conclusions can be drawn from it.

The two sections of the male experience are of similar size with an exposed to risk of 279,147 in the single life group and 300,414 in the joint life group. The corresponding deaths are 260 and 165 respectively. As would be expected, the major part of the exposure is at durations 0 and 1. Exposure at durations 2 and over is effectively at duration 2 only.

Table 1.7.1a. *Minimum evidence assurances written on one life only, males, 1983–86: actual deaths and ratios of actual deaths to those expected using the A 1967–70 table.*

Age group (nearest ages)	Actual deaths 1983–86	100A/E by A 1967–70
Duration 0		
-25	13	81
26–30	24	149
31–35	20	160
36–40	21	116
41–45	20	94
46–50	19	83
51–	1	43
All ages	118	108
Duration 1		
-25	5	69
26–30	10	86
31–35	10	103
36–40	4	29
41–45	20	124
46–50	13	70
51–	5	83
All ages	67	80
Durations 2 and over		
-30	12	123
31–40	12	54
41–50	37	92
51–60	14	75
61–	0	0
All ages	75	82

In the male experience it is interesting to observe that the mortality levels pertaining to the joint life experience are lower than those in the single life experience. This reflects the pattern shown in the two groups where the lives were fully medically underwritten. The mortality experienced in the joint life section is at a similar level to that in the corresponding medically underwritten investigation, as is that in the single life section at duration 1. The mortality experienced in the single life section at duration 0 and at durations 2 and over lies between the level in the fully underwritten experience and that in the guaranteed acceptance experience. This latter pattern is the one which would be expected when comparing the three experiences.

Table 1.7.1b. *Minimum evidence assurances written on one male life and one female life, males, 1983–86: actual deaths and ratios of actual deaths to those expected using the A 1967–70 table.*

Age group (nearest ages)	Actual deaths 1983–86	100A/E by A 1967–70
Duration 0		
–25	11	59
26–30	16	77
31–35	17	84
36–40	17	57
41–45	16	51
46–50	13	45
51–	0	0
All ages	90	60
Duration 1		
–25	6	77
26–30	8	67
31–35	9	81
36–40	10	65
41–45	15	93
46–50	10	66
51–	1	35
All ages	59	73
Durations 2 and over		
–30	6	137
31–40	4	53
41–50	6	59
51–	0	0
All ages	16	66

When considering the results noted above it must be remembered that the policies included in the minimum evidence experience have only been on the market for a short time and that the investigation has only been running for two years; the exposed to risk is of short duration and is relatively limited in size. Any conclusions drawn at this stage must therefore be regarded as tentative.

Table 1.7.2a. *Minimum evidence assurances written on one life only, females, 1983–86: actual deaths and ratios of actual deaths compared to those expected using the FA 1975–78 table and the A 1967–70 table minus four years.*

Age group (nearest ages)	Actual deaths 1983–86	100A/E by FA 1975–78	100A/E by A 1967–70 minus 4 years
Duration 0			
All ages	8	45	31
Duration 1			
All ages	7	96	62
Durations 2 and over			
All ages	2	85	73

Table 1.7.2b. *Minimum evidence assurances written on one male life and one female life, females, 1983–86: actual deaths and ratios of actual deaths compared to those expected using the FA 1975–78 table and the A 1967–70 table minus 4 years.*

Age group (nearest ages)	Actual deaths 1983–86	100A/E by FA 1975–78	100A/E by A 1967–70 minus 4 years
Duration 0			
-30	14	53	22
31–40	17	55	50
41–50	13	60	51
51–	0	0	0
All ages	44	56	36
Duration 1			
-30	4	34	13
31–40	15	101	80
41–50	10	92	73
51–	2	426	303
All ages	31	82	48
Durations 2 and over			
All ages	6	44	35

2. POLICIES OF ASSURANCE ISSUED IN THE REPUBLIC OF IRELAND

2.1 WHOLE LIFE AND ENDOWMENT ASSURANCES

The investigation into the mortality experience of male lives assured under whole life and endowment assurance policies issued in the Republic of Ireland

Table 2.1.1a. *Whole life and endowment assurances, policies issued in the Republic of Ireland, males,* 1983–86, *medical and non-medical combined: actual deaths and ratios of actual deaths to those expected using the A* 1967–70 *table*

Age group (nearest ages)	Actual deaths 1983–86	100A/E 1983–86	100A/E 1979–82	100A/E 1975–78	100A/E 1971–74
Duration 0					
All ages	76	128	139	105	103
Duration 1					
All ages	64	100	109	119	107
Durations 2 and over					
–25	8	67	132	154	
26–30	36	111	108	100	
31–35	46	72	102	97	
36–40	97	74	90	88	
41–45	169	71	94	99	
46–50	310	77	99	92	
51–55	472	75	103	120	
56–60	780	93	105	101	
61–65	869	93	95	97	
66–70	326	107	108	96	
71–75	193	83	108	98	
76–80	211	104	136	118	
81–85	138	104	99	113	
86–90	51	74	100	101	
91–	22	96	116	73	
–45	356	75	97	99	102
46–60	1,562	83	103	105	117
61–75	1,388	95	100	97	105
76–	422	99	118	112	113
All ages	3,728	88	103	102	110

is well established and comparisons are available with earlier quadrennia stretching back to 1971–74. A similar investigation for female assured lives was started as from 1st January 1982, so that 1983–86 is the first quadrennium for which statistics are available for them.

The results are shown in Tables 2.1.1a, 2.1.1b, and 2.1.1c for males and in Table 2.1.2 for females. For males the comparison basis used is the A 1967–70 table. For females two bases are used, the FA 1975–78 table and the A 1967–70 table minus four years.

The male experience is a large one with 3,868 deaths and an exposed to risk of 842,891. However, this exposure is some 15 per cent less than that in the previous quadrennium 1979–82. As the contributing offices have remained the same over the period the fall suggests a reduction in new business between the

Table 2.1.1b. *Whole life and endowment assurances, policies issued in the Republic of Ireland, males,* 1983–86, *medically examined: actual deaths and ratios of actual deaths to those expected using the A* 1967–70 *table*

Age group (nearest ages)	Actual deaths 1983–86	100A/E 1983–86	100A/E 1979–82	100A/E 1975–78	100A/E 1971–74
Duration 0					
All ages	10	110	121	92	89
Duration 1					
All ages	8	70	123	82	89
Durations 2 and over					
–30	6	271	113	117	
31–35	5	61	59	104	
36–40	21	81	90	95	
41–45	37	63	90	106	
46–50	79	65	97	88	
51–55	169	75	106	121	
56–60	309	85	116	103	
61–65	421	90	95	102	
66–70	253	110	107	91	
71–75	158	82	106	97	
76–80	179	102	137	123	
81–85	112	97	99	113	
86–90	42	70	88	93	
91–	21	103	110	79	
–45	69	73	87	104	100
46–60	557	78	109	106	112
61–75	832	93	100	98	105
76–	354	95	116	114	112
All ages	1,812	88	105	104	108

two quadrennia. Much new business in the Republic of Ireland is being written on a unit linked basis rather than as conventional (with or without profit) whole life and endowment assurances; these statistics confirm this. It certainly appears that such new business as is being written on a whole life and endowment basis is being accepted on a non-medical basis, the exposure at durations 0 and 1 in the medical section being very small.

The female experience is much smaller with only 203 deaths and an exposed to risk of 122,847. At all durations the major part of the exposure is in the non-medical section.

For males the results show considerable improvement in the mortality experienced in 1983–86 compared to that four years earlier. The largest improvements

Table 2.1.1c. *Whole life and endowment assurances, policies issued in the Republic of Ireland, males,* 1983–86, *non-medical data: actual deaths and ratios of actual deaths to those expected using the A* 1967–70 *table*

Age group (nearest ages)	Actual deaths 1983-86	100A/E 1983-86	100A/E 1979-82	100A/E 1975-78	100A/E 1971-74
Duration 0					
All ages	66	131	142	110	100
Duration 1					
All ages	56	106	105	139	116
Durations 2 and over					
-25	7	60	113	161	
26-30	31	102	117	94	
31-35	41	74	112	95	
36-40	76	72	90	86	
41-45	132	74	96	95	
46-50	231	82	100	95	
51-55	303	74	101	118	
56-60	471	99	95	99	
61-65	448	97	94	87	
66-70	73	96	117	135	
71-75	35	90	123	108	
76-80	32	121	133	84	
81-85	26	149	104	116	
86-	10	85	190	127	
-45	287	75	100	97	102
46-60	1,005	86	99	105	122
61-75	556	96	99	93	105
76-	68	122	131	101	121
All ages	1,916	88	100	100	114

Table 2.1.2. *Whole life and endowment assurances, policies issued in the Republic of Ireland, females,* 1983–86, *medical and non-medical combined: actual deaths and ratios of actual deaths to those expected using the FA* 1975–78 *table and the A* 1967–70 *table minus four years*

Age group (nearest ages)	Actual deaths 1983–86	100A/E by FA1975-78	100A/E by A1967-70 minus 4 years
Duration 0			
All ages	3	31	22
Duration 1			
All ages	12	122	78
Durations 2 and over			
-30	10	117	56
31-35	9	98	87
36-40	17	132	148
41-45	23	136	149
46-50	28	138	133
51-55	17	70	60
56-60	20	70	55
61-65	24	84	61
66-70	9	73	52
71-75	12	147	104
76-	19	66	58
-45	59	124	107
46-60	65	89	76
61-75	45	92	66
76-	19	66	58
All ages	188	95	78

lie mainly in the age groups 31 to 55. The improvements noted followed two quadrennia of relatively stable experience. Overall the level of mortality experienced in the Republic of Ireland investigation is about 20 per cent heavier than that experienced in the corresponding United Kingdom investigation. However, when studied age group by age group it would appear that there is little to choose between the two experiences at ages 31 to 55 but that the Irish experience is substantially heavier above those ages. This suggests that the shape of the underlying mortality curve applicable to Irish business may now be different from that applicable to business written in the United Kingdom. However, too much should not be read into the results of this latest quadrennium alone. It will be observed that any trends which might be observed have been far from consistent over the four quadrennia studied.

As is the case for males, the level of mortality recorded in the female experi-

ence is substantially in excess of that noted in the corresponding investigation for policies issued in the United Kingdom. However, the situation compared with the male experience is reversed. At ages up to 50 the Irish experience exhibits substantially heavier mortality than the corresponding United Kingdom group, whereas at ages over 50 (except the 71–75 age group) the two experiences are very similar. Again, therefore, the indications are that the shape of the underlying mortality curve applicable to the Irish policyholders is different from that applicable to holders of policies issued in the United Kingdom. However, the experience is a small one and wide variations may therefore be

Table 2.2.1. *Linked contracts of life assurance, policies issued in the Republic of Ireland, males,* 1983–86, *medical and non-medical combined: actual deaths and ratios of actual deaths to those expected using the A* 1967–70 *table.*

Age group (nearest ages)	Actual deaths 1983–86	100A/E by A 1967–70
Duration 0		
-30	26	123
31-40	12	81
41-50	23	95
51-60	18	75
61-	0	0
All ages	79	93
Duration 1		
-30	24	91
31-40	15	72
41-50	36	113
51-60	26	79
61-	4	159
All ages	105	92
Durations 2 and over		
-25	33	117
26-30	37	91
31-35	54	98
36-40	86	96
41-45	86	65
46-50	188	103
51-55	211	92
56-60	220	94
61-65	148	88
66-	38	76
All ages	1,101	91

expected, particularly when considering individual age groups. Further evidence would therefore be required before any firm conclusions are drawn.

2.2 LINKED CONTRACTS

The investigation into the mortality experience of lives assured under linked life assurance contracts issued in the Republic of Ireland was started as from 1st January 1982. The quadrennium 1983–86 is therefore the first for which results are available.

In the event only two offices have submitted data over the quadrennium for this investigation. Following the practice of the Bureau where, in order to preserve confidentiality, results are distributed to contributing offices only if three or more have supplied data, no analyses have hitherto been circulated. However, the offices concerned have indicated their willingness for the results to be made available for the benefit of the profession, which has opened the way for this first report to be made. The Executive Committee is grateful for the generosity of the offices concerned in this matter; it is to be hoped that, now the investigation is established, and with a third office joining as from 1st January 1987, other offices may reconsider their current inability to make returns so that a really worthwhile pool of data is built up for the benefit of all.

The experience recorded is set out in Tables 2.2.1 and 2.2.2 relating to males and females respectively. For males the comparison basis used is the A 1967–70 table. For females two bases are used, the FA 1975–78 table and the A 1967–70 table minus four years.

Table 2.2.2. *Linked contracts of life assurance, policies issued in the Republic of Ireland, females,* 1983–86, *medical and non-medical combined: actual deaths and ratios of actual deaths to those expected using the FA* 1975–78 *table and the A* 1967–70 *table minus four years*

Age group (nearest ages)	Actual deaths 1983–86	100A/E by FA 1975-78	100A/E by A 1967-70 minus 4 years
Duration 0			
All ages	13	61	39
Duration 1			
All ages	32	121	72
Durations 2 and over			
-30	13	84	36
31-45	27	58	60
46-60	78	99	85
61-	25	93	67
All ages	143	85	68

The level of mortality recorded for males at durations 2 and over is substantially in excess of that recorded for males taking out similar contracts in the United Kingdom. This excess is distributed fairly evenly over the age range. When the linked experience is compared with that of holders of whole life and endowment policies issued in the Republic of Ireland there appears to be little difference in the mortality levels overall. However, at ages up to 60 the linked experience shows higher mortality, while at ages 61 and over the whole life and endowment experience shows the heavier mortality. The linked data is very restricted in amount at ages over 65: this is possibly an indication that the linked experience is immature and that policies have therefore a lower average duration than those in the whole life and endowment experience, particularly at these older ages. The effect of initial selection may therefore still be present.

The results for females are based on fairly limited data, deaths at durations 2 and over being only 143 in total. The indications are that the overall level of mortality experienced is similar to that recorded in the corresponding United Kingdom experience.

3. PENSION AND ANNUITY POLICIES ISSUED IN THE UNITED KINGDOM

3.1 PENSIONERS UNDER LIFE OFFICE PENSION SCHEMES

Tables 3.1.1a and 3.1.1b, on the basis of 'lives' and 'amounts' respectively, give the experience during 1983–86 of pensioners retiring at or after normal retiring age and show comparative figures for the two previous quadrennia. It should be remembered when considering these results that, although the experience is observed on both a 'lives' and an 'amounts' basis, the PA(90) tables and the projected rates published with them were based on 'amounts' only. It should also be remembered that PA(90) contains allowance for projected improvement in mortality up to the year 1990.

For females a steady improvement in mortality has been observed over a number of quadrennia. For males the reductions observed in 1979–82 followed

Table 3.1.1a. *Pensioners who retired at or after the normal age, 1983–86, 'lives': actual deaths and ratios of actual deaths to those expected using the PA (90) table*

Age group (nearest ages)	Actual deaths 1983-86	100A/E 1983-86	100A/E 1979-82	100A/E 1975-78
Males				
-60	68	106	127	111
61-65	996	91	107	
66-70	11,715	94	106	118
71-75	21,728	101	115	126
76-80	23,284	107	118	124
81-85	17,383	111	117	119
86-90	6,907	110	113	118
91-	2,186	102	105	105
All ages	84,267	104	114	121
Females				
-60	69	115	157	162
61-65	1,025	114	113	115
66-70	1,414	100	107	113
71-75	2,081	96	105	113
76-80	2,778	100	107	111
81-85	2,731	103	116	119
86-90	1,508	102	114	116
91-	660	103	103	106
All ages	12,266	101	110	114

Table 3.1.1b. *Pensioners who retired at or after the normal age*, 1983–86, *'amounts': actual deaths and ratios of actual deaths to those expected using the PA* (90) *table*

Age group (nearest ages)	Actual deaths 1983–86 (£pa)	100A/E 1983-86	100A/E 1979-82	100A/E 1975-78
Males				
-60	143,914	113	60	97
61-65	1,325,578	78	81	
66-70	6,401,665	75	86	100
71-75	8,012,018	82	98	108
76-80	6,532,012	92	100	111
81-85	4,199,860	100	107	114
86-90	1,535,777	103	111	111
91-	521,417	106	103	101
All ages	28,672,241	86	96	107
Females				
-60	32,537	83	130	167
61-65	421,879	102	100	94
66-70	400,466	82	90	105
71-75	454,336	85	94	101
76-80	465,234	88	97	109
81-85	373,167	85	104	115
86-90	223,377	99	111	127
91-	99,407	99	89	103
All ages	2,470,423	89	98	106

three quadrennia of relatively stable experience. At the time this reduction was considered to be a puzzling although, as far as could be ascertained, a genuine feature of the experience. The experience of 1983–86 would appear to confirm that a new trend has now become established.

It is perhaps worth recording here one caveat on the female results. Analysis of the 1986 experience on the basis of 'lives' showed results much as expected with a figure for 100A/E of 100, which was in line with results in previous years. The analysis on the basis of 'amounts', however, produced a figure for 100 A/E of only 76, compared with 98, 95 and 93 in 1983, 1984 and 1985 respectively. Investigation within the Bureau indicated that this very low figure was spread over a number of contributing offices and therefore appears to be a genuine, if anomalous, feature. The experience for 1987 has returned to the kind of level that would otherwise have been expected. A difference of this magnitude will

obviously have an effect on the quadrennial results, which should, in this particular instance therefore, be treated with caution.

For males the lighter experience of 1983–86 has been exhibited in all age groups on a 'lives' basis and for all but the youngest and oldest age groups on an 'amounts' basis. For females the lighter experience was experienced in all age groups except 61–65 and 91 and over for both 'lives' and 'amounts'. The major improvements have been, in general, over the whole of the age range from 66–90, which corresponds reasonably well with what occurred in the previous inter-quadrennial period.

It should be noted that, on an 'amounts' basis, the 100A/E ratio for 1983–86 was, for all ages combined, well below 100 for both sexes. The lighter than expected mortality occurred in the age groups 61–80 in the male experience and in all age groups except 61–65 in the female experience. It was stated in *C.M.I.R.* **8** that, although PA(90) contained an allowance for future improvement, it is not suitable for calculating premium rates and setting up reserves for an average portfolio of business without appropriate adjustment. The experience over 1983–86 does nothing to mitigate concern on this matter. The Committee has recently published new standard tables, based on the 1979–82 experience. The warning contained in the preface of PA(90) applies equally to all standard tables and bears repeating: '*The Committee cannot stress too strongly that it is the responsibility of any life office or actuary using these tables to ensure that they are appropriate for the particular purpose to which they are put*'.

Table 3.1.2 shows, for each year 1975 to 1986, a comparison, on an 'amounts' basis, of the actual experience with that expected if the projections underlying PA(90) had been fulfilled. For males the overall experience is continuing to improve at a rate greater than that allowed for in the projections and study of the pattern over the age groups reinforces the view expressed in *C.M.I.R.* **8** that the shape of the underlying mortality curve may now be inappropriate. In the female experience the unusual outturn in 1986 is clearly seen. Leaving that out of account, the indications are still that the female experience too is improving at a greater rate than that allowed for in the projections although more slowly than the males. At individual age groups the trends are more difficult to discern: the experience is more volatile, as would be expected since there is a smaller amount of data in each cell and since in an 'amounts' investigation the deaths (being measured in £'s) do not follow a simple binomial distribution.

As from 1st January 1976 the Bureau has collected data by duration since retirement and the first analysis by duration was included with the reports on the 1975–78 experience in *C.M.I.R.* **5**. No analysis of the combined experience for the quadrennium 1979–82 has been published: the select period was increased from 5 to 10 years as from 1st January 1981 which made it virtually impossible to combine the experience over the quadrennium. Also, the durational experience in 1981, the year of the the changeover, was, for technical reasons, not completed. For the record the experience for the individual years 1979–82, on a lives basis, is set out in Table 3.1.3.

Table 3.1.2. *Pensioners who retired at or after the normal age: actual deaths 1975-86 on the basis of 'amounts' (£pa) expressed as a percentage of those expected on the basis of the Peg 1967–70 'amounts' mortality experience (which underlies the PA(90) table) projected forward to the appropriate calendar year*

Age group (nearest ages)	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Males												
-60	76	86	96	107	67	52	91	32	42	116	158	99
61-65					83	86	71	87	66	78	75	81
66-70	97	97	95	94	81	83	86	79	75	78	73	66
71-75	101	108	105	99	95	97	91	93	81	81	83	75
76-80	103	109	101	109	102	94	93	97	97	85	85	91
81-85	107	116	106	108	96	102	106	105	101	105	97	92
86-90	107	109	100	109	100	115	106	105	112	99	100	97
91-	90	96	95	105	102	111	92	96	94	102	126	92
All ages	100	105	101	101	92	93	91	91	86	85	84	80
Females												
-60	179	305	85	80	131	101	31	198	79	74	69	99
61-65	103	97	80	81	94	116	53	84	109	113	106	73
66-70	95	95	102	101	113	74	62	80	118	80	69	65
71-75	96	99	90	88	88	93	95	80	80	81	86	82
76-80	115	101	102	96	88	85	140	95	86	96	92	70
81-85	104	96	119	113	94	114	176	90	79	80	94	77
86-90	89	149	105	124	107	103	181	123	110	93	102	86
91-	78	83	88	86	84	82	191	89	82	148	106	60
All ages	102	103	98	97	96	94	93	90	94	92	90	74

An analysis by duration for the quadrennium 1983–86, with a full period of 10 years, is set out in Table 3.1.4. Some offices were able to give an analysis by duration only for pensions commencing after 1st January, 1976; these offices were permitted to record pensions starting before 1976 as duration 10 and over, regardless of the length of time the pensions had actually been in payment. In the years up to 1986, therefore, the data recorded at duration 10 and over contains a proportion of cases at shorter durations. For males on a 'lives' basis the indications are that mortality is lighter than expected in the early years after retirement becoming heavier than expected after 5 years or so: on an 'amounts' basis all the figures are lower than expected with an increasing trend as duration increases. For females on a 'lives' basis the pattern is of higher than expected mortality at duration 0, falling to lower than expected at or around duration 5, and rising again as duration increases. The pattern on an 'amounts' basis is much less easy to discern, but the figures are virtually all lower than expected.

Table 3.1.5 gives the experience of pensioners who retired before the normal

Table 3.1.3. *Pensioners who retired at or after the normal age, analysis by duration for the quadrennium* 1979–82*: ratios of actual deaths to those expected using the PA*(90) *table*

Year	Duration 0	1	2	3	4	5+	All
Males, lives							
1979	104	98	104	133	117	116	115
1980	109	104	105	110	146	114	114
1981			Not available				111
1982	99	92	95	107	107	118	114
Females, lives							
1979	130	86	116	114	114	111	110
1980	132	115	106	113	146	105	108
1981			Not available				108
1982	132	112	120	111	101	111	111

age, using PA(90) as the basis of comparison. The table also compares the experience of early retirement pensioners with that of normal and late retirement pensioners. As has been noted in previous quadrennia the early retirement pensioners have experienced the heavier mortality. The established pattern where the additional mortality tends to be greater at the younger end of the age range, the addition falling off as age increases, has again been observed in the 1983–86 quadrennium.

Table 3.1.6 shows the experience of 'all pensioners combined' irrespective of the time of retirement. This represents an aggregation of all those originally 'selected' as members in certain employments and now on pension. Comparisons for 1975–78 and 1979–82 are also shown. The figures show a steady improvement, over the quadrennia shown, in the mortality experienced by both sexes. Mortality has improved throughout the age range.

Table 3.1.7. shows the size of the data on both a 'lives' and 'amounts' basis and the average pensions per annum. Among the lives drawing pension the established pattern where the amount of pension decreases as age increases has been observed in all sections of the experience, the only exception being male early retirements in the youngest age group. To some degree, it would be expected that the pensions payable to the more recently retired would be greater than those payable to pensioners who had retired some time ago; as schemes mature younger retirees will have had the opportunity of a longer period of

Table 3.1.4. *Pensioners who retired at or after the normal age, analysis by duration for the quadrennium* 1983–86*: ratio of actual deaths to those expected using the PA*(90) *table*

	Duration											
Year	0	1	2	3	4	5	6	7	8	9	10+	All
Males, lives												
1983	89	91	100	102	99	111	96	136	110	115	107	107
1984	96	90	85	96	94	101	100	100	132	111	106	106
1985	97	85	97	90	99	91	102	105	98	125	109	105
1986	93	83	88	91	91	98	101	96	98	97	106	101
1983-86	94	87	93	96	96	101	100	108	108	111	107	104
Females, lives												
1983	146	114	88	113	92	112	90	140	108	103	102	104
1984	127	107	131	101	101	94	100	114	112	94	97	100
1985	114	123	102	113	98	92	92	101	105	121	99	101
1986	110	79	77	91	83	88	89	101	93	97	103	100
1983-86	124	106	100	105	94	96	93	113	104	104	101	101
Males, amounts												
1983	80	63	81	82	72	90	84	110	97	91	98	88
1984	65	92	71	80	81	79	85	90	110	89	96	88
1985	80	73	68	76	90	78	91	90	80	94	94	86
1986	76	63	64	77	67	84	80	75	89	81	94	81
1983-86	76	72	71	79	78	82	85	89	92	87	95	86
Females, amounts												
1983	132	111	87	105	66	79	69	162	87	96	97	98
1984	73	84	107	95	97	102	81	85	94	84	100	95
1985	62	124	84	147	69	82	62	88	101	100	94	93
1986	72	52	42	53	60	70	60	66	126	80	90	76
1983-86	81	90	78	100	73	82	66	92	106	89	92	89

Table 3.1.5. *Pensioners who retired before the normal age: experience* 1983–86 *compared with the PA*(90) *table and with pensioners who retired at or after the normal age*

Age group (nearest ages)	Lives			Amounts		
	Actual deaths 1983–86	100A/E	Ratio of 100A/E (early retirement) to 100A/E (normal or late retirement)	Actual deaths 1983–86 (£pa)	100A/E	Ratio of 100A/E (early retirement) to 100A/E (normal or late retirement)
Males						
-55	301	265	1.61	224,589	209	1.69
55-60	1,465	149	1.51	1,116,853	116	1.04
61-65	5,129	125	1.37	4,044,542	102	1.31
66-70	7,171	118	1.26	3,902,332	90	1.20
71-75	7,098	114	1.13	2,948,837	97	1.18
76-80	5,388	115	1.07	1,710,232	104	1.13
81-85	1,958	112	1.01	531,752	110	1.10
86-90	423	106	.96	86,652	99	.96
91-	108	109	1.07	25,465	155	1.46
All ages	29,041	119	1.14	14,591,254	100	1.16
Females						
-55	89	254	.83	38,579	229	1.36
56-60	328	179	1.74	131,679	155	2.01
61-65	554	146	1.28	201,207	137	1.34
66-70	405	121	1.21	102,444	104	1.27
71-75	378	105	1.09	76,338	102	1.20
76-80	327	104	1.04	40,818	93	1.06
81-85	232	95	.92	25,155	89	1.05
86-90	147	109	1.07	10,540	105	1.06
91-	36	88	.85	2,093	91	.92
All ages	2,496	123	1.22	628,853	124	1.39

Table 3.1.6. *Pensioners normal, late and early retirement combined, 1983–86: actual deaths and ratios of actual deaths to those expected using the PA (90) table*

		Lives			Amounts			
Age group (nearest ages)	Actual deaths 1983-86	100A/E 1983-86	100A/E 1979-82	100A/E 1975-78	Actual deaths 1983-86 (£pa)	100 A/E 1983-86	100 A/E 1979-82	100 A/E 1975-78
Males								
-55	313	259	378		233,378	204	364	
56-60	1,521	146	184	160	1,251,978	116	135	128
61-65	6,125	118	136		5,370,120	95	103	
66-70	18,886	102	112	124	10,303,997	80	91	105
71-75	28,826	104	118	128	10,960,855	85	101	111
76-80	28,672	109	119	125	8,242,244	94	101	112
81-85	19,341	111	117	119	4,731,612	101	107	114
86-90	7,330	110	113	118	1,622,429	103	110	112
91-	2,294	102	105	105	546,882	108	103	99
All ages	113,308	108	118	126	43,263,459	90	100	111
Females								
-55	100	263	357	220	43,211	220	390	203
56-60	386	162	206		159,584	132	162	
61-65	1,579	123	120	125	623,086	111	106	106
66-70	1,819	104	111	116	502,930	86	94	110
71-75	2,459	97	106	115	530,674	87	95	103
76-80	3,105	100	109	113	506,052	88	98	108
81-85	2,963	102	115	119	398,322	86	104	114
86-90	1,655	102	113	118	233,917	99	110	126
91-	696	102	103	111	101,500	99	87	105
All ages	14,762	104	113	118	3,099,276	95	103	111

Table 3.1.7. *Pensioners 1983–86: exposed to risk, deaths and average pensions*

Age group (nearest ages)	Exposed to risk: Lives	Exposed to risk: Amounts (£pa)	Exposed to risk: Average pension (£pa)	Deaths: Lives	Deaths: Amounts (£pa)	Deaths: Average pension (£pa)
Males, normal or late retirement.						
-60	5,518	9,866,844	1,788	68	143,914	2,116
61-65	48,734	79,673,510	1,635	996	1,325,578	1,331
66-70	392,781	274,000,070	698	11,715	6,401,665	546
71-75	449,686	208,810,666	464	21,728	8,012,018	369
76-80	300,923	99,720,715	331	23,284	6,532,012	281
81-85	146,197	39,461,300	270	17,383	4,199,860	242
86-90	40,394	9,590,481	237	6,907	1,535,777	222
91-	9,307	2,133,141	229	2,186	521,417	239
All ages	1,393,540	723,256,727	519	84,267	28,672,241	340
Females, normal or late retirement.						
-60	10,222	6,959,347	681	69	32,537	472
61-65	96,218	45,119,581	469	1,025	421,879	412
66-70	89,788	31,553,617	351	1,414	400,486	283
71-75	81,360	20,304,072	250	2,081	454,336	218
76-80	62,431	12,016,350	192	2,778	465,234	167
81-85	36,304	5,962,614	164	2,731	373,167	137
86-90	12,560	1,925,240	153	1,508	223,377	148
91-	3,301	500,382	152	660	99,407	151
All ages	392,184	124,341,203	317	12,266	2,470,423	201

Table 3.1.7. *(Continued)*

Age group (nearest ages)	Exposed to risk: Lives	Exposed to risk: Amounts (£pa)	Exposed to risk: Average pension (£pa)	Deaths: Lives	Deaths: Amounts (£pa)	Deaths: Average pension (£pa)
Males, early retirement.						
-55	16,608	15,855,817	955	301	224,589	746
56-60	72,959	71,078,950	974	1,465	1,116,853	762
61-65	201,219	194,165,911	965	5,129	4,044,542	789
66-70	195,644	141,854,371	725	7,171	3,902,332	544
71-75	131,883	65,209,296	494	7,098	2,948,837	415
76-80	65,916	23,485,762	356	5,388	1,710,232	317
81-85	16,751	4,646,640	277	1,958	531,752	272
86-90	2,605	573,423	220	423	86,652	205
91-	429	71,282	166	108	25,465	236
All ages	704,014	516,941,452	734	29,041	14,591,254	502
Females, early retirement.						
-55	11,280	5,898,907	523	89	38,579	433
56-60	32,739	15,077,991	461	328	131,677	401
61-65	41,975	16,363,114	390	554	201,207	363
66-70	21,653	6,467,126	299	405	102,444	253
71-75	13,749	2,902,960	211	378	76,338	202
76-80	7,124	1,005,341	141	327	40,818	125
81-85	3,339	387,963	116	232	25,155	108
86-90	1,137	84,888	75	147	10,540	72
91-	220	12,537	57	36	2,093	58
All ages	133,216	48,200,827	362	2496	628,853	252

Table 3.1.8. *Pensioners: percentage of total exposed to risk returned as early retirements and ratios of* 100 *A/E early retirements to* 100 A/E *normal retirements using as a comparison basis the PA* (90) *table*

Age group (nearest age)	1983–86		1979–82		1975–78	
	Percentage of early retirements in total data	Ratio 100 A/E early retirement to 100 A/E normal retirement	Percentage of early retirements in total data	Ratio 100 A/E early retirement to 100 A/E normal retirement	Percentage of early retirements in total data	Ratio 100 A/E early retirement to 100 A/E normal retirement
Males, lives						
-55	94	1.61	94	2.75	72	1.66
56-60		1.51		1.49		
61–65	81	1.37	74	1.37		
66-70	33	1.26	26	1.20	23	1.21
71-75	23	1.13	20	1.12	14	1.13
76-80	18	1.07	12	1.01	8	1.10
81-85	10	1.01	7	1.05	5	.98
86-90	6	.96	5	.97	4	.88
91-	4	1.07	4	1.03	5	.92
All	34	1.14	27	1.18	24	1.25
Females, lives						
-55	81	.83	78	1.79	72	1.53
56-60		1.74		1.40		
61-65	30	1.28	23	1.27	20	1.46
66-70	21	1.21	16	1.26	13	1.21
71-75	14	1.09	11	1.06	10	1.18
76-80	10	1.04	9	1.23	9	1.17
81-85	8	.92	8	.88	7	.91
86-90	8	1.07	7	.93	7	1.26
91-	6	.85	6	.94	7	1.71
All	25	1.22	21	1.26	18	1.31

membership and will therefore have accrued greater benefits. However, the steady downward trend in amount as age, and therefore duration since retirement, increases is probably also influenced by the probability that pension increases, where they are made, are likely to reflect no more than price inflation (and often less). The younger pensioners will have had the benefit of wage inflation until a more recent date. With minor exceptions the average pension among those dying has been less than that drawn by the survivors.

There is an unexpected peculiarity in the data, which has appeared in at least the three latest quadrennia. In 1983–86, the average pensions payable to males who retired early are, between ages 66 and 85, greater than those payable to males who retired at or after normal pension age. This could well be connected to the increasing tendency for people to retire before their scheme normal pension age for reasons other than ill-health. In the early eighties in particular, employers, in response to economic conditions, used early retirement, often with generous pension concessions, as a means of reducing their labour force.

Table 3.1.8 sheds some interesting light on this. It is to be expected that an increasing tendency to early retirement for reasons other than ill-health would result in the exposed to risk in the early retirement section of the investigation increasing as a proportion of the total exposure, normal and early combined. The proportions in Table 3.1.8 show that this is indeed so, and indicates an acceleration of early retirement between the last two quadrennia.

It would also be expected that the ratios of the 100 A/E in the early retirement section would come closer to the 100 A/E in the normal retirement section, both comparisons being on the same basis. Table 3.1.8 shows these comparisons using PA(90) as the basis. Whilst overall the figures do indeed appear to show a gentle reduction in the ratio over time, study of the individual age groups suggests that there is a distortion produced by the changing overall proportion of early retirements, and that, in fact, mortality of early retirees is not improving as compared to those retiring at their normal scheme age in any clear, discernible way. The table raises as many questions as it answers. The question also arises as to whether, whatever the differences in mortality experienced between the two groups, the current distinction between early and normal retirement is becoming somewhat artificial.

3.2 RELICTS OF PENSIONERS

Tables 3.2.1a and 3.2.1b show the mortality experience of pensioners' relicts over the quadrennium 1983–86. The comparison basis used is the PA(90) table. As was observed in 1979–82 the experience of widows was considerably heavier than that of women drawing pensions in their own right, although in the current quadrennium the excess is not quite so marked.

The experience of widowers is published for the first time. Although the number of deaths is small the indications are that they too suffer excess mortality as compared to men drawing pensions in their own right. However, for males

Table 3.2.1a. *Widows, 1983–86: actual deaths and ratios of actual deaths to those expected using the PA(90) table*

Age group (nearest ages)	Lives Actual deaths 1983-86	Lives 100A/E 1983-86	Lives 100A/E 1979-82	Amounts Actual deaths 1983-86 (£pa)	Amounts 100A/E 1983-86	Amounts 100A/E 1979-82
-55	55	196	187	49,384	162	108
56-60	89	162		52,493	119	
61-65	172	125	193	120,479	129	144
66-70	326	140	152	173,029	128	160
71-75	347	103	140	175,550	105	118
76-80	333	100	108	112,880	82	104
81-85	299	107	113	83,608	92	114
86-90	135	88	115	38,497	92	92
91-	47	85		12,770	85	
All ages	1803	112	137	818,690	108	124

Table 3.2.1b. *Widowers, 1983–86: actual deaths and ratios of actual deaths to those expected using the PA(90) table*

Age group (nearest ages)	Lives Actual deaths 1983–86	Lives 100A/E	Amounts Actual deaths 1983–86 (£pa)	Amounts 100A/E
-65	5	88	3,325	155
66-75	9	104	1,677	68
76-85	13	194	7,481	148
86-	6	293	2,230	152
All ages	33	143	14,713	132

the excess appears to be greatest at the higher end of the age range, while the reverse is the case for widows.

3.3. RETIREMENT ANNUITY POLICIES: CONTRACTS PROVIDING PENSIONS UNDER THE TERMS OF SECTION 620 OF THE I.C.T.A. 1988, FORMERLY SECTION 226 OF THE I.C.T.A. 1970

The exposed to risk has grown rapidly in this investigation. For males in deferment the exposure has grown by nearly 60% between the quadrennium 1979–82 and the quadrennium 1983–86, while the exposure in the in payment

section has increased by nearly 82%. For females the exposure has doubled in both sections of the investigation.

Table 3.3.1 shows the experience of 1983–86 for both males and females in deferment compared with the experience of 1979–82. For males the experience

Table 3.3.1a. *Retirement annuity policies in deferment,* 1983–86, *males: actual deaths and ratios of actual deaths to those expected using the ultimate rates from the A* 1967–70 *table*

Age group (nearest ages)	Actual deaths 1983-86	100A/E 1983-86	100A/E 1979-82	100A/E 1975-78
- 25	52	77	65	77
26 - 30	118	75	92	92
31 - 35	293	87	87	88
36 - 40	677	79	82	92
41 - 45	1,090	72	77	85
46 - 50	1,883	70	75	83
51 - 55	2,922	65	78	83
56 - 60	4,406	70	74	83
61 - 65	4,067	63	72	79
66 - 70	1,351	54	58	59
71 - 75	369	47	59	51
76 -	7	30	113	0
All ages	17,235	66	73	79

Table 3.3.1b. *Retirement annuity policies in deferment,* 1983–86, *females: actual deaths and ratios of actual deaths to those expected using the ultimate rates from the FA* 1975–78 *table*

Age group (nearest ages)	Actual deaths 1983-86	100A/E 1983-86	100A/E 1979-82
- 30	9	73	102
31 - 35	22	80	68
36 - 40	64	81	112
41 - 45	107	70	85
46 - 50	232	85	83
51 - 55	280	67	81
56 - 60	410	77	79
61 - 65	279	73	69
66 - 70	98	62	60
71 - 75	46	92	93
All ages	1,547	74	78

of 1975–78 is also shown. The comparison basis for males is the A 1967–70 (ultimate) table. For females the basis is the FA 1975–78 (ultimate) table.

For males there has been a steady overall downward trend in the rates experienced over the three quadrennia shown. The mortality of this experience is considerably lighter than that of the assured lives experience. At age group 31–35 and to a lesser extent at age group 36–40 the improvement in mortality appears to be slowing down or even to have ceased altogether. This effect was also observed in the whole life and endowment section.

The female experience is much smaller and the comparisons are only available for two quadrennia. However, the indications are that the overall mortality rates experienced have been falling, although there is no clear pattern by age group. As is the case with the males, the rates of mortality of retirement annuitants are considerably lower than those of whole life and endowment policyholders.

Table 3.3.2 shows the experience of retirement annuity policyholders once

Table 3.3.2. *Retirement annuities in course of payment,* 1983–86*: actual deaths and ratios of actual deaths to those expected using the ultimate section of the a* (90) *tables*

Age group (nearest ages)	Actual deaths 1983-86	100A/E 1983-86	100A/E 1979-82	100A/E 1975-78
Males				
- 55	103	1,011	1,315	210
56 - 60	216	352	325	
61 - 65	1,414	124	123	116
66 - 70	3,637	93	95	101
71 - 75	4,531	94	98	100
76 - 80	3,601	96	108	101
81 - 85	1,602	102	104	104
86 - 90	393	91	107	100
91 -	66	73		
All ages	15,563	99	102	102
Females				
- 55	14	452	330	141
56 - 60	35	253	203	
61 - 65	164	94	123	97
66 - 70	321	111	102	90
71 - 75	330	88	92	90
76 - 80	303	89	100	103
81 - 85	203	114	101	63
86 - 90	73	123	68	110
91 -	8	84		
All ages	1,451	100	101	93

their annuities come into payment. The comparisons are with the ultimate section of the *a*(90) table.

Overall it appears that mortality has improved little over the three quadrennia observed. Closer inspection, however, shows that mortality up to age 65 (males)

Table 3.3.3. *Retirement annuity policies, in deferment and in payment combined,* 1983–86*: actual deaths and ratios of actual deaths to those expected using the ultimate section of the a*(90) *tables*

Age group (nearest ages)	Actual deaths 1983-86	100A/E 1983-86	100A/E 1979-82
Males			
- 25	52	73	61
26 - 30	118	73	91
31 - 35	293	92	93
36 - 40	677	88	91
41 - 45	1,100	83	88
46 - 50	1,898	80	87
51 - 55	3,000	75	89
56 - 60	4,622	78	81
61 - 65	5,481	76	82
66 - 70	4,988	81	82
71 - 75	4,900	89	94
76 - 80	3,606	96	108
81 - 85	1,604	100	104
86 - 90	393	91	112
91 -	66	72	59
All ages	32,798	83	88
Females			
- 30	9	75	105
31 - 35	22	99	85
36 - 40	64	94	132
41 - 45	108	73	88
46 - 50	236	87	85
51 - 55	289	73	88
56 - 60	445	92	92
61 - 65	443	85	87
66 - 70	419	95	87
71 - 75	376	89	92
76 - 80	303	89	101
81 - 85	203	114	101
86 - 90	73	122	66
91 -	8	78	
All ages	2,998	89	91

and 60 (females) is much heavier than would be expected on the standard table, but that mortality has, in fact, improved at the higher ages (the pattern being less clear for females). Ages 65 for men and 60 for women are the state pension ages and it may be that those (mainly self-employed) retirement annuitants who retire earlier are in poorer health. The closeness of the overall ratios to 100, and the less than 100% ratios for the higher ages suggest that the *a*(90) table now contains little, if any, margin for future improvement in respect of this group.

Table 3.3.3 shows the experience, using as a comparison basis the ultimate section of the *a*(90) table, of the two sections combined. As will be observed the mortality experience is well below the level of the *a*(90) table for both sexes. The ratios for the age groups 51–65, when compared with the corresponding ratios in table 3.3.2, support the view that it tends to be the poorer lives who transfer from the in deferment section to the in payment section at ages under those of the state pension scheme.

The male experience is a large one, with nearly four times the number of deaths included in the immediate annuity experience. It exhibits the characteristics of neither the immediate annuitant experience, nor the life office pensioner experience. However, the freedom to issue such contracts was withdrawn as from the end of June 1988; they were replaced by personal pensions which may attract a different type of life. The Executive Committee, therefore, after consultation with the contributing offices, decided that it was not appropriate to produce a graduated table specific to this group of lives. The investigation will, however, continue although the lives included will form a closed class of business.

A new investigation into the mortality experience of holders of personal pension policies (issued under Clause IV of Part IV of the I.C.T.A 1988) has been started as from 1st January 1989.

3.4 IMMEDIATE ANNUITY CONTRACTS

Although this is one of the longest running investigations maintained by the Bureau, it is, in terms of the exposed to risk, now one of the smallest. The exposed to risk is declining rapidly; it fell by some 20% for both males and females between 1979–82 and 1983–86. In the period under review annuities with a guaranteed period are excluded from the experience. This restriction has been removed as from experience year 1988, which should boost the exposed to risk considerably.

Tables 3.4.1 and 3.4.2 show, for males and females respectively, the number of deaths in 1983–86 together with ratios of actual deaths to those expected using the *a*(90) table on the basis of both 'lives' and 'amounts'. Corresponding ratios for previous quadrennia are also given.

For males durations 5 and over there has been a decline in the overall level of mortality experienced over the three quadrennia on both a 'lives' and an

Table 3.4.1. *Immediate annuitants, 1983–86, males: actual deaths and ratios of actual deaths to those expected using the a(90) tables (select for duration 0, ultimate for other durations), calculated on the basis of both 'lives' and 'amounts'*

		Lives			Amounts		
Age group (nearest ages)	Actual deaths 1983-86	100A/E 1983-86	100A/E 1979-82	100A/E 1975-78	100A/E 1983-86	100A/E 1979-82	100A/E 1975-78
Duration 0							
- 70	13	115	125	160	98	98	161
71 - 80	58	117	115	100	108	128	97
81 -	47	110	117	110	87	110	112
All ages	118	114	117	120	96	115	115
Durations 1 - 4							
- 60	0	0	211	136	0	168	42
61 - 65	23	157	128	90	114	152	66
66 - 70	56	97	89	100	117	88	93
71 - 75	70	77	76	97	73	103	94
76 - 80	130	86	88	111	95	97	122
81 - 85	114	88	78	109	80	80	121
86 - 90	72	102	86	112	80	73	110
91 - 95	27	92	66	83	88	64	64
96 -	11	121	94	64	124	104	36
All ages	503	90	84	103	87	87	105
Durations 5 and over							
- 60	5	192	238	174	97	113	207
61 - 65	15	137	125	150	143	68	155
66 - 70	76	101	115	108	112	108	131
71 - 75	336	93	102	105	79	105	110
76 - 80	797	99	100	107	110	100	116
81 - 85	962	105	111	117	84	122	121
86 - 90	743	106	116	113	98	108	117
91 - 95	394	107	107	117	117	98	124
96 -	117	94	101	91	63	110	105
All ages	3,445	102	108	111	101	108	118

'amounts' basis. On a 'lives' basis the downward trend is reasonably clear over all age groups apart from the youngest and oldest. No discernible pattern is apparent over individual age groups on an 'amounts' basis.

At the earlier durations the trends are less clear although the overall tendency is still downwards. The figures for durations 1 to 4 on a 'lives' basis look a little

Table 3.4.2. *Immediate annuitants, 1983–86, females: actual deaths and ratios of actual deaths to those expected using the a(90) tables (select for duration 0, ultimate for other durations), calculated on the basis of both 'lives' and 'amounts'*

		Lives			Amounts		
Age group (nearest ages)	Actual deaths 1983-86	100A/E 1983-86	100A/E 1979-82	100A/E 1975-78	100A/E 1983-86	100A/E 1979-82	100A/E 1975-78
Duration 0							
- 70	5	126	195	196	574	139	180
71 - 80	55	109	151	140	101	145	110
81 -	114	122	121	132	121	108	143
All ages	174	120	134	140	121	118	135
Durations 1 - 4							
- 60	2	118	270	181	51	176	165
61 - 65	3	33	116	93	20	125	100
66 - 70	16	81	95	95	87	88	76
71 - 75	59	83	88	84	88	92	84
76 - 80	133	85	101	96	80	108	104
81 - 85	204	105	96	112	122	96	125
86 - 90	169	104	108	118	115	114	125
91 - 95	110	114	127	131	123	137	126
96 -	34	101	121	115	67	98	132
All ages	730	98	104	106	105	108	114
Durations 5 and over							
- 60	8	213	238	174	71	44	229
61 - 65	30	218	125	150	190	115	204
66 - 70	81	110	115	108	96	113	95
71 - 75	340	114	102	105	92	106	103
76 - 80	937	101	100	107	95	92	107
81 - 85	1,866	110	111	117	110	115	120
86 - 90	2,239	115	116	113	117	109	128
91 - 95	1,524	118	107	117	116	119	134
96 -	637	113	101	91	122	110	127
All ages	7,662	112	108	111	111	110	121

out of line but, in statistical terms, are not unreasonably so. When looking at individual age groups, consistent trends are virtually impossible to pick out.

The female experience at durations 5 and over shows virtually no improvement over the three quadrennia shown, whether looked at overall or by age group. At the earlier durations there appears to be a clear overall downward

trend, except at duration 0 on an 'amounts' basis. No discernible trend is visible by age group.

It is interesting to observe that, while the male experience appears to be improving mainly at the longer durations, such improvement as there is in the female experience appears to be confined to durations less than 5. The phenomenon noted in *C.M.I.R.* **8** that annuitant mortality appears to be relatively heavy at the younger ages when compared to the $a(90)$ table is again apparent, which calls into question the degree of self-selection being exercised by the annuitant.

Table 3.4.3 shows, for each year 1975 to 1986, a comparison of actual deaths with those expected on the projected rates underlying the $a(90)$ table. As was noted in *C.M.I.R.* **8** the figures fluctuate from year to year, making it difficult

Table 3.4.3. *Immediate annuitants, (annuities purchased after* 1956 *only): actual deaths* 1975–86 *at durations* 1 *and over on the basis of 'lives', expressed as a percentage of those expected on the aeg* 1967–70 *mortality experience (which underlies the* $a(90)$ *table) projected forward to the appropriate calendar year*

Age group (nearest ages)	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Males												
- 60	162	80	215	125	167	186	258	242	154	79	0	179
61 - 65	108	94	145	87	112	138	145	88	187	149	121	118
66 - 70	98	88	105	101	89	103	89	117	91	80	114	106
71 - 75	97	80	113	98	90	96	101	87	82	88	90	86
76 - 80	95	84	111	114	95	103	89	89	84	102	96	98
81 - 85	105	115	92	125	107	101	99	102	102	95	107	95
86 - 90	109	96	115	109	111	121	102	98	99	91	115	104
91 - 95	102	101	121	98	115	92	97	87	101	99	104	104
96 -	108	88	60	82	97	103	113	101	82	106	59	129
All ages	101	94	108	109	102	104	98	88	94	91	102	99
Females												
- 60	146	290	223	159	199	113	167	204	130	204	227	185
61 - 65	158	181	129	101	153	170	116	87	106	109	205	126
66 - 70	97	104	116	98	105	99	109	75	110	97	91	100
71 - 75	94	95	103	101	108	94	87	107	109	99	116	91
76 - 80	91	107	109	111	103	99	101	95	104	97	95	87
81 - 85	121	116	120	101	114	102	109	104	112	105	100	113
86 - 90	116	118	115	115	120	110	114	99	126	98	116	109
91 - 95	116	115	121	117	117	105	114	111	126	106	121	108
96 -	123	121	103	107	123	116	96	118	119	109	106	109
All ages	110	113	114	109	114	104	107	103	117	102	109	106

to discern trends. However, the fact that the overall ratio for males has been less than 100 in five out of the last six years suggests that the $a(90)$ projections may now be showing an inadequate degree of improvement. In contrast, the level of mortality in the female experience has remained persistently higher than projected.

Table 3.4.4 shows the average amounts of annuity in both the exposed to risk and the deaths. In general among both the exposed to risk and the deaths, average amounts tend to increase as age increases. Overall, for males the amounts are higher among the deaths than among the exposed to risk, while for females the reverse is true. In neither case is there any clear pattern over the individual age groups.

The figures in tables 3.4.1, 3.4.2 and 3.4.4 raise the question as to whether there is any positive advantage to be gained from collecting annuity data on

Table 3.4.4. *Immediate annuitants, 1983–86, all durations combined: exposed to risk, deaths and average amounts of annuity*

	Exposed to Risk			Deaths		
Age group (nearest ages)	Lives	Amounts (£pa)	Average amount (£pa)	Lives	Amounts (£pa)	Average amount (£pa)
Males						
- 60	768	571,678	744	5	1,321	264
61 - 65	1,699	1,267,307	746	42	30,677	730
66 - 70	5,022	3,505,628	698	141	107,303	761
71 - 75	11,139	9,771,058	877	420	319,176	760
76 - 80	15,437	14,933,037	967	971	1,027,268	1,058
81 - 85	11,275	12,326,004	1,093	1,098	959,655	874
86 - 90	5,567	6,686,249	1,201	830	910,480	1,097
91 - 95	2,035	2,709,144	1,331	429	627,984	1,464
96 -	463	673,589	1,455	130	142,862	1,099
All ages	53,405	52,443,694	982	4,066	4,126,726	1,015
Females						
- 60	1,509	1,034,725	686	10	2,260	226
61 - 65	2,878	1,866,153	648	36	41,820	1,162
66 - 70	6,720	4,219,485	628	99	52,923	535
71 - 75	16,361	13,283,684	812	414	271,150	655
76 - 80	28,544	22,356,781	783	1,110	774,967	698
81 - 85	30,258	22,613,832	747	2,114	1,584,086	749
86 - 90	21,070	16,188,818	768	2,440	1,873,474	768
91 - 95	8,946	6,776,180	757	1,668	1,288,571	773
96 -	2,437	1,934,642	794	675	518,685	768
All ages	118,723	90,274,300	760	8,566	6,407,936	748

both a 'lives' and 'amounts' basis. Over three quadrennia there appears to be little consistently observed difference between the two sets of results.

It is a commonly held belief that annuitant mortality is, age for age, lighter than that for assured lives. The reasoning behind this belief holds that annuitants are a self-selecting group since only those considering themselves to have a life expectancy at least as good as, and probably better than, the average would wish to take out such a contract. Early results from the calculations forming the basis of the paper 'The mortality of pensioners and annuitants in 1979–84 according to cause of death' suggested that the belief might be misplaced. Table 3.4.5 shows the ratios of actual deaths to those expected for both assured lives and annuitants in using the A 1967–70 table as a comparison

Table 3.4.5. *Immediate annuitants,* 1983–86*; ratios of actual deaths to those expected using the A* 1967-70 *table for males and the FA* 1975–78 *table for females, together with corresponding ratios for holders of whole life and endowment assurances*

Age group (nearest ages)	Duration 0 100 A/E		Duration 1 100 A/E		Durations 2 and over 100A/E	
	Annuitants	Assured lives	Annuitants	Assured lives	Annuitants	Assured lives
Males, lives						
61-65	162*	90	107*	90	143	77
66-70	222*	109	129*	90	90	71
71-75	134	144	148	118	76	74
76-80	281	177	189	112	80	81
81-85	201	100*	185	140*	84	86
86-90	338	123*	202	120*	85	85
91-95	304*	-	77*	-	86	79
96-100	588*	-	469*	-	85	57
101-	-	-	-	-	43	31
All ages	231	109	174	98	83	77
Females, lives						
61-65	270*	89*	66*	102*	142	85
66-70	74*	119	101*	98*	101	72
71-75	105	99	121	114	107	75
76-80	155	152	140	100	96	77
81-85	149	144*	136	122*	103	98
86-90	131	-	126	354*	99	112
91-95	227	-	174	-	91	92
96-100	109*	-	106*	-	79	51
101-	-	-	-	-	82	27
All ages	149	106	135	106	96	82

* Figures based on fewer than 10 deaths

for males and the FA 1975–78 table for females. It will be observed that for both sexes and at all durations, taking the overall figures for all ages over 60, the annuitant mortality has indeed been the heavier (there is virtually no data at ages below 60 in the annuitant experience) except for males at durations 2 and over at ages over 70 where the two experiences suffered remarkably similar levels of mortality.

The immediate annuitant experience is a curious one. It does not seem to follow the patterns that would be expected from observation of other experiences. The experience does fluctuate quite widely from year to year; how much of this is due to the relatively small number of deaths involved and how much to other factors is difficult to determine. However, with some 2,000 deaths per year, spread over a relatively limited age range, the female experience at least could not really be called small, so what is the explanation? It is interesting to speculate as to why an immediate annuity is purchased in preference to some other form of income producing investment; the answers may give some clue as to why the mortality experience of this class of life behaves in such an unpredictable manner. The future inclusion in the investigation of annuities with a guaranteed term may affect the levels of mortality recorded.

4. SUMMARY

This section summarises the results from the investigations covered by this report.

Table 4.1 shows the results for the assured lives investigations. For males the comparisons are shown using the A 1967–70 table with a select period of two years except for temporary assurances where the A 1967–70(5) table is used. For females the comparisons are shown using both the FA 1975–78 table and the A 1967–70 table minus four years (A 1967–70(5) minus four years for temporary assurances). The table therefore allows quick comparison to be made between the overall levels of mortality experienced in the different investigations. When studying the table it should be borne in mind that there may be specific features affecting the overall result in particular cases. Reference should therefore be made to the detailed reports in Sections 1 and 2 before any conclusions are drawn.

Table 4.2 shows the overall results for the pensioner and annuitant investigations. The pensioner investigations are compared using PA(90), the annuitant investigations using $a(90)$. The caveat mentioned above on the conclusions to be drawn from overall indices again applies. In particular the age distributions in the two main pensioner investigations, those retiring at or after normal retiring age and those retiring before normal retiring age, are very different as are the distributions in the two annuitant investigations. The detailed reports appear in Section 3.

This report is part of a series of such reports made by the Executive Committee quadrennium by quadrennium. For those investigations being reported upon for the first time only the absolute level of mortality experienced over the quadrennium can be studied. For investigations which have been running for a longer period changes in the level of mortality observed in different quadrennia can be monitored. It is in this area that the real value of the ongoing work carried out in the Bureau lies, providing a solid base from which estimates of future mortality levels in the classes of life studied may be made.

Table 4.1. *Assured lives investigations, 1983–86: percentage of actual deaths to those expected using the tables specified, all ages combined, medical and non-medical combined (where applicable)*

	Whole life and endowment U.K.	Whole life and endowment R.I.	Level and decreasing temporary U.K.	Linked U.K.	Linked R.I.	Joint life first death U.K.	Guaranteed acceptance U.K.	Minimum evidence single life U.K.	Minimum evidence joint life U.K.
Males, using the A 1967-70 table*									
Duration 0	91	128	89	100	93	65	154	108	60
Duration 1	84	100	76	102	92	80	132	80	73
Durations 2 and over	74	88	67	62	91	61	98	82	66
Females, using the FA 1975-78 table									
Duration 0	79	31	65	130	61	48	168	45	56
Duration 1	96	122	75	143	121	68	167	96	82
Durations 2 and over	81	95	62	81	85	56	80	85	44
Females, using the A 1967-70 table minus four years*									
Duration 0	61	22	47	118	39	34	119	31	36
Duration 1	74	78	51	118	72	44	113	62	48
Durations 2 and over	81	78	58	64	68	47	71	73	35

* In the case of temporary assurances the A 1967-70(5) table is used

Table 4.2. *Pensioner and annuitant investigations, 1983–86: percentage of actual deaths to those expected using the tables specified, all ages combined, all durations combined*

	Pensioners retiring at or after NRA	Pensioners retiring before NRA	All pensioners	Pensioners' relicts	Retirement annuitants (in deferment and in payment combined)	Immediate annuitants
	PA(90)	PA(90)	PA(90)	PA(90)	*a*(90) ult	*a*(90)
Males						
Lives	104	119	108	143	83	101
Amounts	86	100	90	132	N/A	97
Females						
Lives	101	123	104	112	89	111
Amounts	89	124	95	108	N/A	111

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THE MORTALITY OF PENSIONERS AND ANNUITANTS IN 1979-84 ACCORDING TO CAUSE OF DEATH

1. HISTORICAL BACKGROUND

The investigation into the mortality of pensioners and of immediate annuitants according to cause of death was set up for a limited number of years after the discussion on 'The Non-mortality of Annuitants' by H.A.R. Barnett (*J.I.A.* **103**, 167) in February 1976. In fact the history of this investigation started some years earlier. It was in the late 1950s after a meeting of the C.M.I. Executive Committee that F.M. Redington, shortly before he became President of the Institute, commented off the record to A.E. Bromfield, later to become President of the Faculty, that he would love to know the causes from which annuitants do not die. No cause of death investigation of any kind had been undertaken by the Committee in respect of any class of lives at that time, and although some thought had been given to the possibility of analysing causes of death for certain classes of male assured lives, there was then no suggestion of making a similar study of annuitants or pensioners.

On 30th October, 1970 an article appeared in the London Evening Standard referring to a group in America who were studying the possible effects of eliminating all deaths caused by certain groups of diseases (as a result of possible medical advances); in particular this group intended to foster research into gerontology. The article spurred J.H. Gunlake to write to H.A.R. Barnett about the effects on pensioner mortality if certain major groups of illness were virtually removed as causes of death. Two life offices were approached (there may have been more, but the whole correspondence has not been retained) and, in the event, one office agreed to submit cause of death information in respect of annuitants starting in 1972, while the other was prepared, indeed keen, to send similar information in respect of pensioners from 1973. The reasons why a full investigation by the Bureau was not inaugurated at that time are set out in the paper by Barnett mentioned above, which analysed the statistics collected over a relatively short period from those two offices, but after the discussion on that paper it was decided to collect cause of death information for both pensioners and immediate annuitants for a limited but unstated period of time, starting with the year 1979. It was thought that these investigations might perhaps continue for eight years of experience, but after the initial momentum had worn off some of the contributing offices found the submission of the relevant data was becoming more irksome, the main difficulty being the obtaining of death certificates from pension fund trustees. Accordingly it was decided to close the experiences after the end of 1984, the sixth year. Cause of death information in

respect of immediate annuitants was collected and submitted by 15 offices, and in respect of pensioners by 8.

It is interesting to refer back to the written contribution made by Redington to the discussion on Barnett's paper, but in particular to figures which were never published but which Redington deduced from the paper and made available to the Bureau; these figures underlay his remarks. The somewhat tenuous data for annuitants had been made larger by the contributing office by the inclusion of 'non-C.M.I.' cases, mainly purchasers of annuities guaranteed for a fixed term (a class which a decade and a half later has been added to the types of annuity to be returned as C.M.I. data). Redington increased the size of the cells by combining the two sexes, the various duration groups, and all ages under 85, and came up with the results shown in Table 1. From these figures it appeared that, even from the scanty data, there was evidence of a significant lowering in the proportions dying from respiratory diseases, as a result of the self-selection exercised by those purchasing immediate annuities.

Table 1. *Immediate annuitants, experience of one office,* 1972–74, *both sexes and all durations combined, actual deaths* (A) *by cause, and expected deaths* (E) *by cause according to the proportions experienced by the population of England and Wales in the same* 3 *years*

Cause group	Ages under 85		Ages 85 and over	
	A	E	A	E
Malignant neoplasms (digestive)	66	64	45	44
Malignant neoplasms (respiratory)	35	38	8	10
Lymphatic neoplasms	11	9	7	4
Other neoplasms	80	57	47	36
Ischaemic heart disease	253	253	269	252
Other circulatory diseases	295	293	464	454
Respiratory diseases	114	144	188	218
Digestive diseases	16	24	27	25
All other causes	86	74	92	104

The paper also gave cause-specific mortality rates for the C.M.I. data, but the numbers of deaths were insufficient for any firm conclusions to be drawn; similar rates for the more numerous non-C.M.I. data could not be calculated as figures for the exposed to risk were not available.

The second appendix to the paper gave the relevant figures from the pensioner statistics, but was scarcely noticed in the discussion. This was surprising as what may be regarded as the initiating letter from Gunlake was specifically concerned with pensioner mortality, and it might have been better if the pensioner results had formed a section of the paper instead of being relegated to an appendix.

The results of the pensioners' investigation for 1979-84 are described in the

following Section 2, and the results of the immediate annuitants' investigation in Section 3. For males the pensioners' experience was the larger of the two, with 21,726 male deaths (the causes being known for 19,184 of the deaths) compared with 3,563 male annuitant deaths (causes known for 3,096). For females, however, the pensioners' experience was the smaller, with 2,537 female deaths (causes known for 2,250) compared with 6,650 female annuitant deaths (causes known for 5,873).

2. THE MORTALITY OF PENSIONERS IN 1979–84 ACCORDING TO CAUSE OF DEATH

The purpose of the investigation as far as pensioners are concerned may be stated as being to examine the combined effects after retirement of the different types of selection to which the body of lives is subject during each member's lifetime between the date of joining a pension scheme and the date he or she retires on pension at or after the normal retiring age for the scheme; and thus to be better able to estimate the probable position if a medical breakthrough reduces significantly the risk of death from a particular disease or group of diseases.

The selective influences are numerous. On admission to membership of a pension scheme the individual is presumably fit enough to carry on a particular occupation, so there can be stated to be some form of initial selection, though probably not as strong as that expected to be exercised by the purchaser of an annuity, or by the office accepting a proposer for life assurance. Admission to a pension scheme may occur at any time before retiring age, and frequently occurs at young ages, whereas the purchase of an annuity usually occurs at relatively advanced ages, and a proposal for assurance can take place at any time but becomes comparatively rare at the older ages. Leaving a pension scheme can be negatively selective (no longer physically fit for the occupation) or positively selective (moving to a better occupation), while redundancy could be partially selective in a negative way; but if in any of these circumstances a frozen pension is retained, then membership continues and the experience is not affected. Early retirement is often, though not necessarily, due to ill-health and can be expected to weed out some of the worst lives, and to some extent retirement at the normal retirement age may have a similar effect since the best lives may stay on and thus defer joining the pensioner experience until a later date and age.

Although the main investigation includes pensioners who retired early, this cause of death investigation has been confined to those who retired at or after the normal age.

It must be remembered that active membership of a pension scheme is not the same as membership of the pensioner experience, which does not start until the pension starts to be payable, and therefore whatever the combined effects of the various forms of selection mentioned earlier, the mortality experience does not start to be observed until a later date. Accordingly the experience is inevitably an ultimate one, and any comparison with assured lives or with annuitants needs to be made with the ultimate data. Even then the comparison may not be strictly valid as the likelihood is that the pensioners will be of much longer average duration since the initial selection.

The statistics consist of the data for pensioners who retired at or after the normal retiring age, already submitted to the main investigation by the 8

contributing offices who were prepared also to collect cause of death information in respect of these statistics. However, one of these 8 offices was, in the event, only able to provide cause of death information in respect of a relatively small proportion of the deaths, and it was decided to limit the report to the experience of the remaining 7 offices where the deaths for which the cause was unknown were no more than 12% of the total.

The exposed to risk (adjusted to allow in each group for the proportions of deaths where the cause was unknown) have been multiplied by the cause-specific rates of mortality in the national population data of England and Wales, for the same groups of causes as are employed by the Bureau in the analysis of causes of death amongst assured lives, in order to obtain the expected deaths according to the national rates; this gives a direct comparison between the pensioners' experience and that of the population, and also enables a comparison to be made with the experiences of annuitants and of assured lives under whole life and endowment assurances.

The results have been shown in seven broad cause groups, in Table 2.1 for males and Table 2.2 for females, with four age groups (a)60-74, (b)75-84, (c)85+ and (d) all ages 60 and over. Calculations were made for each quinary age group between 60 and 84 but little additional information would be obtained by showing the separate results. It must be borne in mind that any comparisons for the age group 85+ may be unreliable on account of different age distributions: it is known that the mean ages of the 85+ group in the C.M.I. pensioner population and the population of England and Wales are different. A split of deaths by cause at individual age groups over 85 in the national population is not available. Any returns in respect of ages under 60 nearest were excluded from the analysis, and there were no subdivisions by duration. The corresponding ratios 100A/E for immediate annuitants, which also appear later in the report, and for assured lives (at ultimate durations in each case) are shown, for comparative purposes, alongside those for the pensioners. In *C.M.I.R.* **9**, 103 standardization factors were shown, with the intention of giving an adjustment to the national rates to allow for the fact that a comparison with social classes I, II and III (Non-Manual) combined might be more valid than one with the whole population. These standardization factors are now reproduced in Tables 2.1(d) and 2.2(d), for all cause groups except the residual group 'other known causes'.

It will be seen that at ages 60-74 the ratios of actual to expected deaths for males were higher for the pensioners than for either the annuitants or the assured lives, apart from (a) accidental and violent deaths, (b) an insignificant difference in the residual group of neoplasms, and (c) a difference in 'other known causes' when compared with annuitants for whom the ratio was based on only a small number of deaths. At ages 75-84 the ratios for male pensioners were all higher, apart from two instances where the differences were insignificant. And when all ages over 60 are combined, again the only group where the male pensioners showed a lower ratio was that for accidental and violent deaths.

Table 2.1. *Pensioners, male; actual deaths (A) in* 1979–84 *in cause groups, and comparison with deaths expected (E) according to national male mortality over those years. Also comparison with corresponding* 100 *A/E for annuitants and assured lives at durations* 5 *and over*

Cause group	Pensioners A	Pensioners E	Pensioners 100 A/E	Annuitants, duration 5+ 100 A/E	Assured lives, duration 5+ 100 A/E
(a) Ages nearest 60–74					
Malignant neoplasms, digestive	797	864·18	92	66	72
Malignant neoplasms, respiratory	1,103	1,248·81	88	45	52
All other neoplasms	799	825·61	97	99	85
Circulatory diseases	4,617	5,264·21	88	82	66
Respiratory diseases	977	1,255·62	78	39	36
Accident, suicide, violence	85	149·28	57	126	66
All other known causes	522	667·48	78	122	61
All known causes	8,900	10,275·19	87	76	63
Cause unknown deaths excluded	1,268				
(b) Ages nearest 75-84					
Malignant neoplasms, digestive	566	686·68	82	75	72
Malignant neoplasms, respiratory	708	837·95	84	59	60
All other neoplasms	673	760·90	88	89	95
Circulatory diseases	4,470	5,226·99	86	81	77
Respiratory diseases	1,415	1,902·99	74	35	47
Accident, suicide, violence	96	139·35	69	57	71
All other known causes	714	856·91	83	83	82
All known causes	8,642	10,411·77	83	70	71
Cause unknown deaths excluded	1,063				

Table 2.1. *(Continued)*

Cause group	Pensioners A	Pensioners E	100 A/E	Annuitants, duration 5+ 100 A/E	Assured lives, duration 5+ 100 A/E	Standardization factor
(c) Ages nearest 85 and over						
Malignant neoplasms, digestive	63	95·79	66	71	66	
Malignant neoplasms, respiratory	78	75·29	104	51	55	
All other neoplasms	102	126·14	81	74	77	
Circulatory diseases	818	1,073·84	76	85	79	
Respiratory diseases	384	552·51	70	42	54	
Accident, suicide, violence	20	33·95	59	56	69	
All other known causes	177	225·73	78	70	72	
All known causes	1,642	2,183·25	75	70	70	
Cause unknown deaths excluded	211					
(d) Ages nearest 60 and over						
Malignant neoplasms, digestive	1,426	1,646·65	87	72	72	97
Malignant neoplasms, respiratory	1,889	2,162·05	87	54	54	91
All other neoplasms	1,574	1,712·65	92	86	87	95
Circulatory diseases	9,905	11,565·04	86	83	70	96
Respiratory diseases	2,776	3,711·12	75	39	42	78
Accident, suicide, violence	201	322·58	62	65	67	82
All other known causes	1,413	1,750·12	81	81	64	N/A
All known causes	19,184	22,870·21	84	71	66	92
Cause unknown deaths excluded	2,542					

Table 2.2. *Pensioners, female, actual deaths (A) in* 1979–84 *in cause groups, and comparison with deaths expected (E) according to national female mortality over those years. Also comparison with corresponding* $100A/E$ *for annuitants and assured lives at durations* 5 *and over*

Cause group	Pensioners A	Pensioners E	Pensioners 100 A/E	Annuitants, duration 5+ 100 A/E	Assured lives, duration 5+ 100 A/E
(a) Ages nearest 60–74					
Malignant neoplasms, digestive	79	104·51	76	63	82
Malignant neoplasms, respiratory	61	70·66	86	90	51
All other neoplasms	207	201·44	103	94	81
Circulatory diseases	424	538·32	79	77	54
Respiratory diseases	69	101·65	68	46	37
Accident, suicide, violence	13	25·92	50	95	87
All other known causes	81	111·47	73	96	50
All known causes	934	1,153·97	81	78	61
Cause unknown deaths excluded	108				
(b) Ages nearest 75-84					
Malignant neoplasms, digestive	63	78·68	80	82	75
Malignant neoplasms, respiratory	25	26·71	94	80	75
All other neoplasms	75	100·05	75	101	71
Circulatory diseases	518	657·48	79	76	77
Respiratory diseases	127	154·57	82	56	38
Accident, suicide, violence	17	21·62	79	85	84
All other known causes	116	128·38	90	81	70
All known causes	941	1,167·49	81	76	71
Cause unknown deaths excluded	125				

Table 2.2. *(Continued)*

Cause group	Pensioners A	Pensioners E	100 A/E	Annuitants, duration 5+ 100 A/E	Assured lives, duration 5+ 100 A/E	Standardization factor
(c) Ages nearest 85 and over						
Malignant neoplasms, digestive	12	21·60	56	89	68	
Malignant neoplasms, respiratory	0	3·85	-	74	93	
All other neoplasms	24	24·05	100	81	97	
Circulatory diseases	207	282·48	73	90	73	
Respiratory diseases	84	100·28	84	59	55	
Accident, suicide, violence	7	9·75	72	76	61	
All other known causes	41	60·50	68	78	94	
All known causes	375	502·51	75	81	72	
Cause unknown deaths excluded	54					
(d) Ages nearest 60 and over						
Malignant neoplasms, digestive	154	204·79	75	83	80	97
Malignant neoplasms, respiratory	86	101·22	85	80	53	88
All other neoplasms	306	325·54	94	92	80	99
Circulatory diseases	1,149	1,478·28	78	84	62	84
Respiratory diseases	280	356·50	79	57	42	72
Accident, suicide, violence	37	57·29	65	81	84	74
All other known causes	238	300·35	79	80	61	N/A
All known causes	2,250	2,823·97	80	79	64	88
Cause unknown deaths excluded	287					

When compared with the general population, the male pensioners showed lower mortality in all groups, indicating that the combined result of the various forms of selection does have some effect throughout the spectrum of different causes. It seems unlikely that this is wholly due to selection by social class; the pensioner statistics are known to include some 'works' schemes, but the proportions of lives from the lower income groups are not known. In fact the percentages are all lower than the social class standardization factors, though not always to a significant extent.

The one cause group (apart from accident, suicide and violence) where the ratio was significantly lower than that for all causes combined was respiratory diseases, i.e. the same group for which the annuitants and assured lives also displayed low mortality (but to a much greater extent.) It is worth noting that annuitants and assured lives, but not pensioners, also showed a low proportion of deaths from respiratory malignant neoplasms; it is possible that all respiratory diseases, including respiratory neoplasms, are class related in some way, but in the case of annuitants and assured lives to a much greater extent than would occur merely from selection by social class.

At ages 60-74 the ratios for females were higher for the pensioners than for either the annuitants or the assured lives, apart from (a) accidental and violent deaths (as for the males), (b) respiratory neoplasms where the ratio was insignificantly lower than for the annuitants, and (c) 'other known causes' where the ratio was also lower than for the annuitants, as in the case of the males. At ages 75-84 the accidental and violent deaths also showed a slightly lower ratio for the pensioners, while in the residual group of neoplasms it was the annuitants who exhibited the higher ratio. When all ages over 60 are combined, the pensioners had the lowest ratios for digestive neoplasms and for accident and violence, and also a lower ratio for circulatory diseases when compared with annuitants only; some of these features may be due to different age distributions. When compared with the general population the female pensioners all displayed ratios less than 100%, and less than the standardization factor with one exception; this exception, strangely enough, was the respiratory group of diseases, indicating that the apparent class relationship displayed by the results for males, and for female annuitants, appeared not to apply to the female pensioners; possibly the fact that the female pensioners dying from these causes numbered only 280 (compared with nearly ten times as many male pensioners) makes the female results unreliable; the 100 A/E ratio of 79 had a standard deviation of 5.3.

3. THE MORTALITY OF ANNUITANTS IN 1979–84 ACCORDING TO CAUSE OF DEATH

The purpose of this part of the investigation is to examine the effects of the self-selection believed to be exercised by individuals purchasing immediate annuities. It was felt that if the experience of annuitants were compared with that of assured lives, there might be some indication of those causes of death (if any) which were experienced to a significantly lower extent by the annuitants, with the implication that individuals already predisposed to death from such causes would avoid wasting capital on the purchase of annuities. However, if the statistics showed that lower mortality of the annuitant experience was spread over all the groups of causes, the implication would merely be that there was no special group of diseases from which the annuitants tended to eliminate themselves. On the one hand, successful personal elimination of many deaths from certain causes might indicate just where selection can be exercised against an office, and thus where life assurance underwriters might make more searching enquiries to guard against self-selection in the opposite direction, while on the other hand, if the superiority were fairly uniform over the complete gamut of causes there would be nothing to learn except that annuitants on the whole were exercising some form of general self-selection. A third possibility would be that there might be no superior longevity amongst the annuitants, and this would indicate that selection by the life offices of proposers for assurance was as good as self-selection by annuitants.

Immediate annuities are only infrequently purchased in young or middle age. Most are purchased after age 60, many after age 70, and as a consequence the average duration of annuitants' ultimate data is lower than the average duration of assured lives at the same age; in other words, the selection has taken place more recently, on average, in the case of annuitants, and this could be the sole reason for believing that they experience a lower level of mortality. The statistics currently being examined are not large enough to be fragmented into individual durations, but it seems likely that more reliable comparisons will be obtained in respect of the data at the narrower duration group 1-4 combined than at durations 5 and over; (duration 0 is being kept separate, since in all select experiences in the past there has been a marked difference in mortality between duration 0 and higher durations). Similarly, if the age groupings are too wide, the likelihood is that the annuitants in one age group will be of higher average age within the group than the corresponding assured lives in the same age group, whereas this feature may not be important if more narrow age groupings are adopted.

The statistics consist of the immediate annuitants' data already submitted to the main investigation by the 15 contributing offices who were prepared also to collect cause of death information in respect of these statistics. In some instances an office's statistics for a particular year have been omitted if, in that year, there

was an exceptionally high proportion of deaths for which certificates were not available. The results are shown for three duration groups (0, 1-4, 5+), and in the case of duration 5 and over the subdivisions by age are the same as for the pensioners' investigation (60-74, 75-84, 85+). For the lower durations all ages 60+ have been combined. The small quantity of returns in respect of ages under 60 nearest have been excluded from the analysis. The exposed to risk (adjusted to allow in each group for the proportions of deaths where the cause was unknown) have been multiplied by the cause-specific rates of mortality in the national population data of England and Wales, for the same groups of causes as are employed by the Bureau in the analysis of causes of death amongst assured lives, in order to obtain the expected deaths by cause according to the national rates; this gives a direct comparison between the annuitants' experience and that of the population.

In order to compare the different effects of selection on (a) annuitants and (b) assured lives, the similar results for lives assured under whole life and endowment assurances for the same years of observation are shown side by side with those for annuitants. The latest published cause of death figures for assured lives appeared in *C.M.I.R.* **9**, 103, and related to the years of experience 1979-82. These have been extended by adding in the corresponding results for 1983-84 in order to give a valid comparison between annuitants and assured lives. It could be argued that the appropriate comparative figures for assured lives ought to be restricted to the same 15 offices which submitted cause of death statistics for annuitants; this would have been a major task which would not have been worth undertaking, as the mere fact that an office submitted annuitant statistics could scarcely have any bearing on its assured lives experience, and it was thought to be just as appropriate to compare the whole cause of death data for assured lives aged 60+ nearest over the years in question.

The results are given in seven broad cause groups in Table 3.1 for males and in Table 3.2. for females. Section (a) of each gives the results for duration 0 and section (b) gives the results for durations 1 to 4 combined. The remaining sections of each table relate to durations 5 and over.

It will be seen that for nearly every group the ratio of actual to expected deaths is higher for annuitants than for assured lives. The first two exceptions are malignant neoplasms, respiratory, males, at durations 1 to 4, and also at durations 5 and over where, however, it will be found that the differences are not statistically significant even when the two duration groups are combined; and malignant neoplasms, digestive, both sexes at ages 60-74, durations 5 and over, where the differences are not statistically significant even when the sexes are combined. The experiences of annuitants and of assured lives are remarkably similar, and generally lighter than the mortality in the national experience. In some subdivisions the mortality from accident, suicide and violence was heavier for the annuitants than for the general population, but these figures are based on small numbers of annuitant deaths and are not significant.

Table 3.1. *Immediate annuitants compared with assured lives, males; actual deaths (A) in* 1979–84 *in cause groups and comparison with deaths expected (E) according to national male mortality over those years*

Cause Group	Annuitants			Assured Lives		
	A	E	100A/E	A	E	100A/E
(a) Ages nearest 60 and over, duration 0						
Malignant neoplasms, digestive	4	8·57	47	49	102·68	48
Malignant neoplasms, respiratory	3	10·43	29	41	152·21	27
All other neoplasms	9	9·23	98	27	97·09	28
Circulatory diseases	37	67·49	55	198	598·50	33
Respiratory diseases	11	25·25	44	25	120·79	21
Accident, suicide, violence	3	1·96	153	13	22·82	57
All other known causes	4	11·04	36	17	76·75	22
All known causes	71	133·97	53	370	1,170·84	32
Cause unknown deaths excluded	6			21		
(b) Ages nearest 60 and over, durations 1 to 4						
Malignant neoplasms, digestive	36	37·63	96	315	437·58	72
Malignant neoplasms, respiratory	14	46·45	30	318	648·92	49
All other neoplasms	31	39·82	78	269	414·50	65
Circulatory diseases	188	294·88	64	1,112	2,555·04	44
Respiratory diseases	26	109·97	24	91	514·60	18
Accident, suicide, violence	9	8·67	104	52	98·94	53
All other known causes	30	47·13	64	132	329·02	40
All known causes	334	584·55	57	2,289	4,998·60	46
Cause unknown deaths excluded	43			69		
(c) Ages nearest 60 to 74, durations 5 and over						
Malignant neoplasms, digestive	28	42·13	66	3,813	5,265·41	72
Malignant neoplasms, respiratory	27	60·16	45	4,168	7,951·60	52
All other neoplasms	40	40·27	99	4,164	4,878·05	85
Circulatory diseases	217	263·14	82	20,010	30,217·88	66
Respiratory diseases	26	66·12	39	2,005	5,634·92	36
Accident, suicide, violence	9	7·16	126	835	1,264·79	66
All other known causes	41	33·60	122	2,279	3,766·76	61
All known causes	388	512·58	76	37,274	58,979·41	63
Cause unknown deaths excluded	52			1,737		

Table 3.1. *(Continued)*

Cause Group	Annuitants			Assured Lives		
	A	E	100A/E	A	E	100A/E
(d) Ages nearest 75 to 84, durations 5 and over						
Malignant neoplasms, digestive	86	114·61	75	824	1,146·24	72
Malignant neoplasms, respiratory	80	135·52	59	835	1,391·48	60
All other neoplasms	115	128·71	89	1,200	1,269·68	95
Circulatory diseases	732	903·63	81	6,778	8,798·34	77
Respiratory diseases	120	346·92	35	1,527	3,225·37	47
Accident, suicide, violence	14	24·63	57	167	234·84	71
All other known causes	125	150·59	83	1,181	1,440·25	82
All known causes	1,272	1,804·61	70	12,512	17,506·20	71
Cause unknown deaths excluded	206			600		
(e) Ages nearest 85 and over, durations 5 and over						
Malignant neoplasms, digestive	43	60·63	71	188	286·53	66
Malignant neoplasms, respiratory	23	44·67	51	117	211·16	55
All other neoplasms	59	79·34	74	285	372·22	77
Circulatory diseases	623	729·16	85	2,755	3,471·22	79
Respiratory diseases	163	388·16	42	1,002	1,849·40	54
Accident, suicide, violence	13	23·42	56	76	110·83	69
All other known causes	107	151·96	70	516	712·16	72
All known causes	1,031	1,477·34	70	4,939	7,013·52	70
Cause unknown deaths excluded	160			238		
(f) Ages nearest 60 and over, durations 5 and over						
Malignant neoplasms, digestive	157	217·37	72	4,825	6,698·18	72
Malignant neoplasms, respiratory	130	240·35	54	5,120	9,554·24	54
All other neoplasms	214	248·32	86	5,649	6,519·95	87
Circulatory diseases	1,572	1,895·93	83	29,543	42,487·44	70
Respiratory diseases	309	801·20	39	4,534	10,709·69	42
Accident, suicide, violence	36	55·21	65	1,078	1,610·46	67
All other known causes	273	336·15	81	3,976	5,919·17	64
All known causes	2,691	3,794·53	71	54,725	83,499·13	66
Cause unknown deaths excluded	418			2,575		

Table 3.2. *Immediate annuitants compared with assured lives, females; actual deaths* (A) *in* 1979–84 *in cause groups and comparison with deaths expected* (E) *according to national female mortality over those years.*

	Annuitants			Assured Lives		
Cause group	A	E	100A/E	A	E	100A/E
(a) Ages nearest 60 and over, duration 0						
Malignant neoplasms, digestive	7	7·38	95	14	24·57	57
Malignant neoplasms, respiratory	0	2·37	0	9	17·41	52
All other neoplasms	6	9·47	63	13	50·75	26
Circulatory diseases	48	72·88	66	48	123·92	39
Respiratory diseases	9	21·95	41	5	24·48	20
Accident, suicide, violence	3	2·51	120	5	6·55	76
All other known causes	9	14·57	62	6	26·94	22
All known causes	82	131·13	63	100	274·62	36
Cause unknown deaths excluded	15			4		
(b) Ages nearest 60 and over, durations 1 to 4						
Malignant neoplasms, digestive	36	42·98	84	69	84·48	82
Malignant neoplasms, respiratory	15	13·79	109	61	59·44	103
All other neoplasms	34	54·69	62	98	172·85	57
Circulatory diseases	298	421·46	71	189	429·76	44
Respiratory diseases	67	127·20	53	26	84·67	31
Accident, suicide, violence	9	14·88	60	16	22·33	72
All other known causes	59	81·79	72	35	93·86	37
All known causes	518	756·79	68	494	947·39	52
Cause unknown deaths excluded	68			6		
(c) Ages nearest 60 to 74, durations 5 and over						
Malignant neoplasms, digestive	22	35·08	63	131	160·08	82
Malignant neoplasms, respiratory	18	19·93	90	62	122·29	51
All other neoplasms	55	58·25	94	284	351·92	81
Circulatory diseases	157	203·95	77	391	727·77	54
Respiratory diseases	18	38·75	46	51	138·55	37
Accident, suicide, violence	8	8·41	95	38	43·43	87
All other known causes	37	38·67	96	82	163·95	50
All known causes	315	403·04	78	1,039	1,707·99	61
Cause unknown deaths excluded	48			66		

Table 3.2. *(Continued)*

	Annuitants			Assured Lives		
Cause group	A	E	100A/E	A	E	100A/E
(d) Ages nearest 75 to 84, durations 5 and over						
Malignant neoplasms, digestive	132	161·68	82	23	30·70	75
Malignant neoplasms, respiratory	39	48·99	80	8	10·65	75
All other neoplasms	197	195·49	101	28	39·29	71
Circulatory diseases	1,085	1,430·95	76	197	254·22	77
Respiratory diseases	201	359·75	56	22	58·50	38
Accident, suicide, violence	40	46·99	85	7	8·36	84
All other known causes	222	273·20	81	35	49·75	70
All known causes	1,916	2,517·05	76	320	451·47	71
Cause unknown deaths excluded	271			27		
(e) Ages nearest 85 and over, durations 5 and over						
Malignant neoplasms, digestive	131	148·02	89	9	13·22	68
Malignant neoplasms, respiratory	18	24·48	74	2	2·16	93
All other neoplasms	131	162·21	81	14	14·48	97
Circulatory diseases	1,892	2,107·02	90	140	192·07	73
Respiratory diseases	467	796·82	59	40	72·98	55
Accident, suicide, violence	55	72·55	76	4	6·56	61
All other known causes	348	444·51	78	38	40·54	94
All known causes	3,042	3,755·61	81	247	342·01	72
Cause unknown deaths excluded	375			45		
(f) Ages nearest 60 and over, durations 5 and over						
Malignant neoplasms, digestive	285	344·78	83	163	204·00	80
Malignant neoplasms, respiratory	75	93·40	80	72	135·10	53
All other neoplasms	383	415·95	92	326	405·69	80
Circulatory diseases	3,134	3,741·92	84	728	1,174·06	62
Respiratory diseases	686	1,195·32	57	113	270·03	42
Accident, suicide, violence	103	127·95	81	49	58·35	84
All other known causes	607	756·38	80	155	254·24	61
All known causes	5,273	6,675·70	79	1,606	2,501·47	64
Cause unknown deaths excluded	694			138		

Apart from a few other places in the tables, where the differences are clearly not significant, the only remaining group for which the annuitants appear to have lighter mortality are respiratory diseases at duration 5 and over, ages 75-84, males, where the difference is significant. This group appears in Table 3.1(d) where 100A/E for respiratory diseases is 35 for annuitants (standard deviation 5.4) and 47 for assured lives (standard deviation 1.8); the standard deviation of the difference of 12 is the square root of the sum of the squares of

the two standard deviations, or 5.7. Similarly, if the results for the lower durations are combined with the ultimate data, the all duration results for males at ages 75-84 are: annuitants A = 133, 100 A/E = 33 with standard deviation 5.0: assured lives A = 1,549, 100 A/E = 47 with standard deviation 1.7. The difference of 14 in the ratios has a standard deviation of 5.3. (These figures are not directly available from the tables, as the annuitant statistics for the lower durations are not substantial enough to be worth printing in quinary or even denary age groups.)

The significant difference between annuitant and assured lives mortality from respiratory diseases demonstrated above is almost entirely due to bronchitis (Ninth Revision I.C.D. code 490-496) where the ratio difference is 25 with a standard deviation of 8.09. The differences for the other diseases in the respiratory group (pneumonia, and miscellaneous respiratory diseases), although in the same direction, are not large enough to be significant on their own. Bronchitis, then, possibly with a similar contribution from other respiratory diseases, is the one group of causes where self-selection more than 5 years previously seems to have been more effective than selection by the life offices; and if the difference is due to the average duration in the 5 and over data being lower for the annuitants than for the assured lives it is surprising that a similar result has not been shown for other chronic conditions. It is interesting that the respiratory group of diseases is the same cause group for which the tenuous data used in Barnett's paper indicated a possible lowering of proportions dying, after self-selection. As has been noted earlier this cause group produces significantly lower mortality than that for all cause groups combined.

What has appeared in high relief from this investigation is that annuitants in 1979-84 did not experience lower mortality than assured lives. Was the belief that they ever did merely a myth? The graduated *aeg* 1967-70 rates of mortality for male annuitants at durations 1 and over were certainly lower than the A 1967-70 rates of mortality for male assured lives at durations 2 and over, but the difference may have been due to the difference in the select period; however at duration 0 the select A 1967-70 rates of mortality were appreciably lower than *aeg* 1967-70 select. The annuitant and assurances experiences for 1979-82, used as the base data for the new standard tables published in *C.M.I.R.* **10**, confirm that, for that quadrennium, annuitant mortality was not lower than that for assured lives. The same feature is noted in the reports on the annuitant and assurances investigations for 1983-86 which are included in this volume. Has self-selection become less effective? Does the experience include annuities purchased on retirement or on widowhood where there has been no selection whatever? Or has life underwriting improved? We can only speculate as to the reason. There may well be some changes in the experience from 1989 onwards, after the inclusion in the statistics of annuities guaranteed for a fixed term, and for life thereafter.

4. ACKNOWLEDGEMENTS

This report would not be complete without an acknowledgement to the 8 offices who took the trouble to submit the data for pensioners, and to the 15 offices who submitted similar data for annuitants. These offices are listed below, under their shortened names (as at the time of the investigation).

Offices submitting pensioner statistics:

Equitable
Guardian Royal Exchange
Legal and General
National Provident
Pearl
Scottish Provident
Standard
Yorkshire General

Offices submitting annuitant statistics:

Canada Life
Eagle Star
Equitable
Equity and Law
Guardian Royal Exchange
London Life
National Provident
Pearl
Prudential
Refuge
Scottish Mutual
Scottish Provident
Standard
United Kingdom Provident
Yorkshire General

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THE MORTALITY OF IMPAIRED LIVES 1983–86

1. INTRODUCTION

In 1982 the Bureau started collecting statistics in respect of lives suffering certain impairments at the time of proposing for life assurance. This followed a long period, running into decades, when the Executive Committee had regularly considered whether the collection of such statistics was feasible, and the matter was still in abeyance when an approach was made by the Life Underwriters Club for the Bureau to start an investigation into the mortality of impaired lives. The Committee was willing, but when it replied that such a project would require the contribution of data by the offices the matter subsided into further abeyance for another long period, until in the late 1970's E.B.O. Sherlock, the then Chairman of the Committee, invited the contributing offices to send representatives to an exploratory meeting to consider in depth the possibility of collecting the necessary statistics. At the end of that meeting 25 offices indicated their willingness to contribute data, and R.D. Clarke (who had retired as Secretary to the Committee, but who kindly agreed to give his advice based on his experience within his own office) drew up a list of impairments for which he considered there might be sufficient data to be worth investigating. The offices were consulted again, some minor alterations were made to the list, and the investigation started on 1st January 1982, limited to lives who proposed for assurance on or after that date, and to classes of assurance covered by the main investigations.

Only 12 offices contributed data for the year of experience 1982, and as the new quadrennium for the main investigations started in 1983 the Committee decided to regard 1982 as a 'trial run'. The size of the data was indicated in the preliminary report 'Impaired Assured Lives Investigation' (*C.M.I.R.* **8**, 47), and as it was known that more offices would be contributing data from 1st January 1983, it was agreed that no further reports should include the limited 1982 experience. In the event, 20 offices have been contributing statistics throughout the period 1983-86, and the present report covers the experience over those four years. Those offices who contributed are listed in Appendix C.

2. THE DATA

Tables 1(a) and 1(b) show for males and females respectively the exposed to risk and deaths in the same broad impairment groups as were shown in the table in the 1982 report, duration by duration. As the investigation is confined to policies issued on or after 1st January 1982, there ought to have been no cases of duration greater than 4, but in fact a small number of cases at duration 5 have been included by some of the offices.

Table 1(a). *Impaired lives,* 1983–86, *males, deaths* (D) *and exposed to risk* (ER) *in impairment groups, by curtate duration*

Impairment	Duration 0		Duration 1		Durations 2 and over		All Durations	
	D	ER	D	ER	D	ER	D	ER
Hypertension	26	4,257	31	3,793	53	4,433	110	12,483
Ischaemic heart disease without surgery	65	2,785	54	2,279	72	2,460	191	7,524
Ischaemic heart disease with surgery	4	209	5	144	2	146	11	499
Cerebrovascular disease	6	243	2	182	2	182	10	607
Nervous disorders	4	2,733	6	2,298	12	2,687	22	7,718
Disseminated sclerosis	2	208	2	163	2	186	6	557
Peptic ulcer	5	2,278	10	2,049	7	2,452	22	6,779
Ulcerative colitis	2	401	1	346	2	390	5	1,137
Crohn's disease	-	213	1	153	1	163	2	529
Epilepsy	5	888	2	707	2	768	9	2,363
Diabetes mellitus	19	2,447	8	1,792	11	1,691	38	5,930
Respiratory disorders	15	3,894	8	3,030	20	3,291	43	10,215
Urinary disorders	1	572	-	505	1	602	2	1,679
Tumour	-	21	-	12	-	13	-	46
Overweight	2	6,519	8	5,462	15	6,018	25	17,999
All impairments in investigation	156	27,668	138	22,915	202	25,482	496	76,065

Table 1(b). *Impaired lives,* 1983–86, *females, deaths* (D) *and exposed to risk* (ER) *in impairment groups, by curtate duration*

Impairment	Duration 0		Duration 1		Durations 2 and over		All Durations	
	D	ER	D	ER	D	ER	D	ER
Hypertension	8	1,772	10	1,601	18	1,915	36	5,288
Ischaemic heart disease without surgery	8	613	10	499	12	532	30	1,644
Ischaemic heart disease with surgery	-	26	-	21	1	23	1	70
Cerebrovascular disease	2	132	5	108	1	119	8	359
Nervous disorders	11	3,160	8	2,716	5	3,088	24	8,964
Disseminated sclerosis	-	210	1	174	4	194	5	578
Peptic ulcer	-	334	-	275	2	321	2	930
Ulcerative colitis	-	202	-	168	-	189	-	559
Crohn's disease	-	161	-	117	-	115	-	393
Epilepsy	-	592	1	442	1	452	2	1,486
Diabetes mellitus	4	981	-	714	5	638	9	2,333
Respiratory disorders	5	1,982	2	1,571	4	1,693	11	5,246
Urinary disorders	1	249	-	217	-	259	1	725
Tumour	5	452	5	397	4	456	14	1,305
Overweight	6	6,056	2	4,727	5	4,750	13	15,533
All impairments in investigation	50	16,922	44	13,747	62	14,744	156	45,413

Table 2 shows the in force at duration 0 on 1st January in successive years, subdivided by the main impairment groups under investigation. This demonstrates that the numbers of new cases per annum have been tending to decrease. This could be due to changes in standards of underwriting, but such an explanation seems unlikely as the same feature is present in the data for nearly every one of the 20 offices; or it could be due to the initial momentum of the investigation having decreased, with underwriters no longer including as many cases as they might, possibly overlooking the fact that where an impairment is present but no extra premium is being charged the case should still be included. However, there

Table 2. *Impaired lives data, males and females, in force at duration* 0 *on* 31*st December in successive years*

Impairment	In force 31.12.1983		In force 31.12.1984		In force 31.12.1985		In force 31.12.1986	
	M	F	M	F	M	F	M	F
Hypertension	1,315	534	1,156	481	766	342	711	324
Ischaemic heart disease without surgery	728	161	754	155	614	150	633	146
Ischaemic heart disease with surgery	43	7	50	7	56	7	74	6
Cerebrovascular disease	61	45	60	31	60	27	69	34
Nervous disorders	987	1,029	607	718	407	498	448	639
Disseminated sclerosis	53	57	53	50	52	53	46	54
Peptic ulcer	810	115	541	66	329	63	326	75
Ulcerative colitis	116	49	107	50	83	50	96	45
Crohn's disease	47	42	54	42	55	38	68	47
Epilepsy	260	168	206	151	188	106	201	170
Diabetes mellitus	493	242	673	270	653	253	717	250
Respiratory disorders	1,333	575	887	472	682	372	838	543
Urinary disorders	213	77	132	47	96	50	63	47
Tumour	13	106	4	124	2	107	0	103
Overweight	2,031	1,586	1,651	1,541	1,124	1,192	1,104	1,510
All impairments in investigation	8,503	4,793	6,935	4,205	5,167	3,308	5,394	3,993
Normal Lives, medical data, same 20 offices.*	11,928	5,836	9,991	6,312	5,126	3,457	5,787	3,763
Normal Lives, non-medical, same 20 offices.*	176,319	94,484	160,946	95,496	129,218	83,416	131,342	89,323

* Figures relate to whole life and endowment policies only.

is a similar feature in the main investigation for whole life and endowment assurances, as shown at the bottom of Table 2; the total new data is declining, and the medical proportion has fallen from around 6% in 1984 and 1985 to around 4% in 1986 and 1987. This reflects the growth of mortgage business which is subject to minimum evidence and thus excluded from the main investigation. Even allowing for the fact that the Impaired Lives data represents a wider range of policy types, this switch to minimum evidence business would nonetheless appear to be the main reason for the decline in the new data.

3. THE RESULTS – GENERAL COMMENTS

The results are considered under the main impairment groups, sub-divided where the statistics so justify, and are presented in Appendices A and B for males and females respectively. These show the exposed to risk, the actual deaths, a mortality ratio giving the relationship between actual and expected deaths on the standard tables A 1967-70 for males and FA 1975-78 for females, and the excess deaths per 1,000 exposed to risk. Current mortality for assured lives is considerably lighter than that indicated by the standard tables, and the results should therefore be viewed in the light of overall average rates of mortality for 1983-86 of approximately 75% of A 1967-70 for males and 80% of FA 1975-78 for females.

With 143 different impairment codes it was not to be expected that the experience of 20 offices over four years would supply sufficient data for a significant comment to be made on each minor subdivision, and the purpose of this report is to give concisely what information is possible in reasonable groups and sub-groups. The Committee does not suggest, however, that any of the 143 codes should be discarded at this stage, since the volume of statistics will become larger in future quadrennia as the investigation approaches maturity, as information at higher durations becomes available, and possibly as more contributing offices join the investigation.

Hitherto the Bureau has had no information from which a report on the mortality of impaired lives could be prepared, but the profession in the U.K. has been able to benefit from results generously published by one office (the pilot office) through the pens of Dr. T.W. Preston and Messrs. R.D. Clarke and M. Leighton. The latest in the series was the paper by Leighton on "The Mortality of Impaired Lives 1974-83" (*J.I.A.* **114**, 19), to which some reference will be made in the following paragraphs. It must, however, be remembered that the mid-point of Leighton's period of observation was six years earlier than the mid-point of the period on which the present report is based, although the periods shared a common year (1983); also that the average duration since entry in Leighton's statistics was considerably higher than that of the Bureau's data with a maximum duration of 5 years, and that Leighton's mortality standard of comparison for males was A 1967-70 rated down one year whereas the Bureau has used A 1967-70 without any rating down (but both have used FA 1975-78 for females). Readers must also be reminded that all these standards are now out-of-date for normal assured lives in the U.K.

The pilot office has continued the investigation of its own experience, whilst also contributing to the C.M.I. investigation, and has been able to extract its own results for many of the same impairments for the same period and using the same bases for comparison. Where possible the pilot office's results are shown alongside the C.M.I. results in Appendices A and B and referred to in the text.

Much of the pilot office data at durations 0 to 4 is included in the C.M.I. data,

resulting in a considerable overlap. However, the pilot office data also includes policies of much higher durations up to a maximum of almost 40 years, while the C.M.I. data includes policies from 19 other offices.

The mortality ratios shown in Appendices A and B are for all durations combined, but an examination of the data by duration in force shows considerable variation. Tables 3(a) and 3(b) show the data for males and females respectively for those impairment groups for which there are significant numbers of deaths.

The implication of the results in Tables 3(a) and 3(b) is that the pattern of additional mortality is not adequately represented at each duration by a constant ratio of standard mortality. As would be expected this is demonstrated most obviously in Table 3(a) for ischaemic heart disease; perhaps more surprisingly this is also shown for diabetes mellitus, although the number of deaths is much smaller.

Table 3(a). *Mortality ratios (males)*

	Mortality ratios by duration in force				
Impairment	0	1	2 and over	All	Actual deaths
Hypertension	155	137	99	119	110
Ischaemic heart disease without surgery	433	295	182	262	191
Nervous disorders	79	100	98	94	22
Peptic ulcer	94	148	49	83	22
Diabetes mellitus	331	133	104	170	38
Respiratory disorders	206	96	126	137	43
Overweight	25	87	88	74	25

Table 3(b) *Mortality ratios (females)*

	Mortality ratios by duration in force				
Impairment	0	1	2 and over	All	Actual deaths
Hypertension	119	125	95	107	36
Ischaemic heart disease without surgery	270	329	202	251	30
Nervous disorders	326	222	63	161	24

4. THE RESULTS BY IMPAIRMENT

The following paragraphs comment only on those impairments for which the statistics are large enough for significant interpretation.

Hypertension

For the youngest group, under age 40 at entry, no conclusions can be drawn either for males or for females, but for the two higher age groups it is clear that hypertension is a significant additional risk for both sexes, although for females the mortality ratio is nearer normal for ages 60 and over. From the male data, any evidence that the mortality ratios increase according to the severity of the hypertension is confusing. The experience of the pilot office is rather lighter than that of the C.M.I for both males and females; also with the larger number of deaths, the ratios do increase with the severity of the hypertension. It is well known that there is difficulty in interpreting data relating to hypertensive lives with the greater use of hypotensive drugs; the blood pressure reading taken at an insurance medical examination may not be a true reflection of the underlying hypertension, and there will be no homogeneity of medical treatment thereafter.

Ischaemic heart disease (without surgery)

While the exposed to risk appears limited, the number of deaths is adequate for an analysis to be made. The pattern that is normally expected with this impairment is that the mortality ratios decrease with duration since onset, and while there is some evidence of this for male lives under age 50 at entry, the pattern is not repeated for entry ages over 50; the experience for 4 - 6 years after onset is particularly heavy. For the pilot office for entry ages over 50, where the data is slightly smaller, but of longer duration, the mortality ratios are fairly constant. In the female data for entry ages over 50 the mortality ratio is lower for the longer duration category. For this impairment where heavy immediate mortality is anticipated, an examination of the alternative of excess death rates is often more helpful; for all the male data, including that of the pilot office, the excess rate lies between 10 and 16 per thousand with the exception of the very heavy mortality already mentioned for the category of males over 50 at entry, 4 - 6 years since onset; in the case of females, where there are fewer deaths, there is greater variation in the excess rate, the highest figure being for females aged 50 and over with duration within 4 years of onset.

Further examination of the C.M.I. male data by duration in force rather than by age at entry reveals the decreasing mortality ratios, as shown in Table 3(a); the excess death rate also reduces with duration as indicated by the following table:

Duration in force	Exposed to Risk	Actual Deaths	100A/E	A–E o/oo
0	2,785	65	433	17.9
1	2,279	54	295	15.7
2 and over	2,460	72	182	13.2
All	7,524	191	262	15.7

Ischaemic heart disease (with surgery)
The data is much less for this category than for ischaemic heart disease without surgery, and it is difficult to draw conclusions, beyond saying that the additional risk is undoubtedly severe.

Nervous disorders
The division of data into mild/moderate and severe psychoneuroses illustrates significant differences between these categories in the experience for both males and females, and the pattern is repeated in the experience of the pilot office. Mild or moderate psychoneurosis appears to be a minimal additional risk, certainly in the pilot office experience with its substantial data. The severe category probably includes too wide a range of diagnoses to enable any conclusions helpful to the underwriter to be drawn, beyond stating that the risk appears to be considerable, particularly for females.

Peptic ulcer
Previous experience of the pilot office for peptic ulcer without surgery is repeated, both in the C.M.I. data and that of the pilot office. After allowing for improvements in standard life mortality, any additional risk appears to be minimal. The situation may be more complicated if there are associated impairments. The experience for peptic ulcer with surgery is contradictory for the C.M.I. and pilot office data, but the number of deaths is too small to draw any valid conclusions.

Diabetes mellitus
The results for males indicate that the mortality ratio may decrease according to entry age, and that within the category of entry ages over 50 there is some increase in the mortality ratio as the duration since diagnosis increases; but this may reflect the difference between diabetes with an early and a late age at onset, the former being considered much more severe. In all categories, female as well as male, the risk is clearly substantial. Further analysis of this impairment in future investigations when larger volumes of data are available should prove interesting.

Respiratory disorders
For bronchial asthma the C.M.I. and pilot office male data produce the same result, which after adjustment for current mortality represents some moderate additional risk. Chronic bronchitis without emphysema, placing more reliance upon the pilot office data, would appear to be rather more severe. Chronic bronchitis with emphysema produces the highest mortality ratio in the investigation, apart from some categories of ischaemic heart disease. The experience of the pilot office, with larger data, is less severe, but still considerable. For the female data the experience is not large enough to draw any additional conclusions.

It has been seen that, at the time of underwriting, emphysema appears to be a more serious impairment than chronic bronchitis. But when causes of death are examined, cases where both chronic bronchitis and emphysema are reported are classified as chronic bronchitis, in accordance with the linkage rules in the *Manual of the International Statistical Classification of Diseases, Injuries, and Cause of Death, Ninth Revision* (*W.H.O.* 1977). Included in this volume is a report on the causes of death related to the statistics underlying this report; consideration has been given, for this purpose, to separating deaths due to chronic bronchitis with emphysema from those due to chronic bronchitis alone.

Tumours

The female mortality from malignant breast tumours is significantly high.

Overweight

The C.M.I. data is quite small and no real conclusions can be drawn. That of the pilot office is large enough to produce significant results, but any additional mortality is small.

5. CONCLUSION

The Committee is approaching the 20 offices already contributing to the impaired lives investigation, to ask them to make suggestions if they feel that any other impairments ought to be added to the list, e.g. other tumours. The only impairment which is at present on the list and which it is felt could be omitted is malignant tumours of the breast in the case of male lives (the other tumours for which statistics are at present collected being inapplicable to male lives anyway); but even this group would probably remain if the offices decided they wished now to include other tumours.

It was realised when the investigation was inaugurated, that it would be several quadrennia before the Committee could obtain full results from a mature set of statistics, and possibly even longer before the durations approach those of the data which formed the basis of the reports by Preston, Clarke and Leighton. Nevertheless it is felt that the present report indicates that the statistics are sufficient to produce useful results, and that the investigation will prove useful to the offices. The profession has progressed from obtaining impaired lives statistics from just one office, to obtaining similar statistics from 20 offices. It is hoped that other offices who contribute data to the main assured lives investigation will now be encouraged to add their impaired lives data to this investigation which is now beginning to produce useful results. The Bureau will be very pleased to discuss this with any interested office.

It remains for the Committee to express its gratitude to those offices who have contributed data, thus helping this project to get off to a promising start, with the hope that the offices themselves will derive real benefit as the investigation becomes more mature.

APPENDIX A

Impaired lives, 1983–86, males; percentage ratios of actual deaths to those expected using the A 1967–70 table (100 A/E) *and excess deaths per* 1,000 *exposed to risk (A-E o/oo); experiences of CMI Impaired Assured Lives Investigation (CMI) and of the Pilot Office all durations combined.*

Impairment			CMI Exposed to risk	CMI Actual deaths	CMI 100A/E	CMI A-E o/oo	Pilot Office Exposed to risk	Pilot Office Actual deaths	Pilot Office 100A/E	Pilot Office A-E o/oo
Hypertension										
Entry ages	S.A.P	D.A.P								
under 40	all	all	2,510	0	–	–				
40–59	155 & over	under 95	1,767	14	140	2.3	4,818	45	70	–
40–59	155 & over	95–105	4,617	21	90	–	11,300	106	91	–
40–59	under 155	95 & over								
40–59	155 & over	over 105	1,381	11	145	2.5	2,838	40	141	4.1
40–59	all	all	7,765	46	112	0.6	18,956	191	92	–
60 & over	160 & over	under 100	1,094	31	122	5.1	1,743	74	92	–
60 & over	160 & over	100–110	935	23	117	3.5	908	34	95	–
	under 160	100 & over								
60 & over	160 & over	over 110	179	10	264	34.7	160	8	128	11.1
60 & over	all	all	2,208	64	131	6.8	2,811	116	95	–
Ischaemic heart disease (without surgery)										
Entry ages	Onset									
under 50	within 4 years		964	13	555	11.1	1,091	20	613	15.4
under 50	4 years & over		912	12	479	10.4	797	15	593	15.6
50 & over	within 2 years		1,104	26	213	12.5	808	20	170	10.2
50 & over	2–4 years		1,180	30	233	14.5	836	23	186	12.7
50 & over	4–6 years		1,083	45	353	29.8	884	23	165	10.3
50 & over	6 years & over		2,282	65	215	15.2	1,797	59	191	15.7
Ischaemic heart disease (with surgery)			499	11	320	15.2	483	17	403	26.4
Cerebrovascular disorders			607	10	189	7.8	505	9	171	7.4

APPENDIX A *(Continued)*

Impairment			CMI Exposed to risk	CMI Actual deaths	CMI 100A/E	CMI A–E o/oo	Pilot office Exposed to risk	Pilot office Actual deaths	Pilot office 100A/E	Pilot office A–E o/oo
Nervous disorders										
Mild or moderate			5,360	13	78	–	50,363	217	78	–
Severe (including schizophrenia & attempted suicide)			2,358	9	134	1.0	8,873	46	108	0.4
Disseminated sclerosis			557	6	368	7.9	185	1	244	3.2
Peptic ulcer										
Without surgery			4,973	14	75	–	6,246	15	64	–
With surgery			1,806	8	102	0.1	1,741	4	39	–
Ulcerative colitis			1,137	5	170	1.8	1,319	3	86	–
Crohn's disease			529	2	235	2.2	758	4	280	3.4
Epilepsy			2,363	9	195	1.8	4,087	9	121	0.4
Diabetes mellitus										
Entry ages	Years since diagnosis (at entry)									
under 50	all		4,201	10	186	1.1				
50 & over	under 10		1,019	16	148	5.1	7,153	103	230	8.1
50 & over	10 or more		710	12	196	8.3				
Respiratory disorders										
Bronchial asthma			9,089	18	91	–	9,248	23	93	–
Chronic bronchitis without emphysema			678	7	106	0.6	1,198	22	143	5.5
Chronic bronchitis with emphysema			353	16	368	33.0	985	36	207	18.9
Emphysema without bronchitis			95	2	246	12.6				
Urinary disorders			1,679	2	37	–	16,945	84	71	–
Tumours										
Breast, malignant			46	0	–	–				
Overweight										
Entry ages	Overweight %									
under 30	20–30		4,062	1	39	–	27,972	46	74	–
under 30	over 30		2,464	0	–	–	9,979	23	112	0.3
30–49	20–30		4,951	7	104	0.1	24,760	188	105	0.4
30–49	over 30		4,697	6	87	–	15,897	88	109	0.5
50 & over	20–30		992	5	60	–	1,333	28	63	–
50 & over	over 30		833	6	77	–	796	18	88	–

APPENDIX B

Impaired lives, 1983–86, females; percentage ratios of actual deaths to those expected using the FA 1975–78 table (100 A/E) *and excess deaths per* 1,000 *exposed to risk* (A–E o/oo)*; experiences of CMI Impaired Assured Lives Investigation (CMI) and of the Pilot Office, all durations combined.*

			CMI				Pilot Office			
Impairment			Exposed to risk	Actual deaths	100A/E	A–E o/oo	Exposed to risk	Actual deaths	100A/E	A–E o/oo
Hypertension										
Entry ages	S.A.P.	D.A.P.								
under 40	all	all	713	1	181	0.6				
40–59	all	all	2,892	13	166	1.8	2,065	6	58	–
60 & over	all	all	1,683	22	87	–	1,840	40	82	–
All	all	all	5,288	36	107	0.4	3,905	46	78	–
Ischaemic heart disease (without surgery)										
Entry ages	Onset									
under 50	all durations		257	1	236	2.3				
50 & over	within 4 years		595	15	341	17.8	934	18	178	8.4
50 & over	4 years & over		792	14	196	8.7				
Ischaemic heart disease (with surgery)			70	1	243	8.4				
Cerebrovascular disorders			359	8	479	17.6	199	4	435	15.5
Nervous disorders										
Mild or moderate			6,330	10	90	–	22,581	47	84	–
Severe (including schizophrenia and attempted suicide)			2,634	14	370	3.9	5,465	17	164	1.2
Disseminated sclerosis			578	5	450	6.7				
Peptic ulcer										
With or without surgery			930	2	72	–				
Ulcerative colitis			559	0	–	–				

APPENDIX B (*Continued*)

Impairment		CM1 Exposed to risk	CM1 Actual deaths	CM1 100A/E	CM1 A–E o/oo	Pilot office Exposed to risk	Pilot office Actual deaths	Pilot office 100A/E	Pilot office A–E o/oo
Crohn's disease		393	0	–	–				
Epilepsy		1,486	2	142	0.4				
Diabetes mellitus		2,333	9	183	1.7	902	6	205	3.4
Respiratory disorders		5,246	11	139	0.6	6,125	15	141	0.7
Urinary disorders		725	1	137	0.4	1,758	3	74	–
Tumours									
Breast, malignant		765	13	410	12.9	278	5	266	11.2
Breast, non-malignant and uterine fibroids		540	1	114	0.2	674	1	21	–
Overweight									
Entry ages	Overweight%								
All	20–40	10,210	4	40	–				
All	over 40	5,323	9	134	0.4				
All	all	15,533	13	78	–	21,783	25	91	–

APPENDIX C

The following offices contributed data to the Impaired Lives Investigation (short names only)

Britannic
Commercial Union
Eagle Star
Equitable
Equity and Law
G.A. Life
National Provident
Norwich Union
Pearl
Prudential
Refuge
Royal Life
Scottish Amicable
Scottish Equitable
Scottish Life
Scottish Mutual
Scottish Provident
Scottish Widows
Sun Alliance
United Kingdom Provident

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THE MORTALITY OF IMPAIRED LIVES 1983–86 ACCORDING TO CAUSE OF DEATH

From the year 1983, cause of death statistics have been collected from those offices who contribute to the impaired lives investigation in respect of policies included in that investigation. The original intention was that cause-specific rates of mortality from the population statistics would be applied to the exposed to risk, to produce figures for expected deaths which could be compared with the actual deaths, cause by cause in each impairment group, and the ratios of actual to expected deaths could then be compared with the corresponding ratios in the main (unimpaired) assured lives investigation. It was realised that during the early years of the investigation the data would be small, and that for most impairment groups nothing more than an all-ages comparison would be valid.

In the event, some offices have been unable to submit any cause of death data for the deaths among impaired lives, and some have submitted the information in respect of only a few cases, with the result that out of 652 deaths (496 male and 156 female) the Bureau has been supplied with cause of death information in only 275 cases, including 7 where the cause was unknown and 4 where the impairment code was not stated, leaving 264 (199 male and 65 female) with full particulars both of the impairment and of the cause of death. This proportion, about 40% for each sex, is too low for reliable exposed to risk and cause-specific expected deaths to be calculated, and an actual and expected comparison will need to wait until a later quadrennium when, in any case, the data will be larger, and when it is hoped a higher proportion of cases will be submitted complete with cause of death particulars. The Committee thanks those offices which have followed the instructions and completed the particulars, and especially the one office which does not normally submit any cause of death returns, but which did so for the impaired lives.

With only a small number of cases it is, nevertheless, possible to make a detailed examination as to whether or not the stated causes are related to the recorded impairment, an analysis which would be somewhat daunting (though not impossible) if the number of deaths ran into thousands, each of which would have to be considered individually. In this instance each of the 264 cases has been examined, and categorised according to whether (a) the underlying cause and the impairment were identical, or would have been linked under the linkage rules of the *Manual of the International Statistical Classification of Diseases, Injuries and Causes of Death, Ninth Revision (W.H.O. 1977)*; (b) the impairment was associated with the underlying cause or was stated on the certificate as a contributory cause, but was not itself the underlying cause of death; or (c) there was no certain connexion between the impairment and the causes on the certificate, even though the impairment might still have accelerated the death.

Table 1. *Impaired lives, 1983–86, males and females; relationship between impairment recorded by underwriters and cause of death on death certificate*

Impairment		No. of cases where impairment linked to or was the same as underlying cause		No. of cases where impairment was associated or contributory cause		Cases where there was no certain connexion		Total
Hypertension	M	28	(80%)	0		7	(20%)	35
	F	5	(42%)	0		7	(58%)	12
Ischaemic heart without surgery	M	72	(87%)	5	(6%)	6	(7%)	83
	F	10	(59%)	1	(6%)	6	(35%)	17
Ischaemic heart with surgery	M	6		0		1		7
	F	0		0		0		0
Cerebrovascular disease	M	3		0		3		6
	F	2		0		0		2
Nervous disorders	M	0		0		9		9
	F	0		0		10	(100%)	10
Disseminated sclerosis	M	1		3		0		4
	F	1		1		1		3
Peptic ulcer	M	0		0		3		3
	F	0		0		1		1
Ulcerative colitis	M	1		0		2		3
	F	0		0		0		0
Crohn's disease	M	0		1		0		1
	F	0		0		0		0
Epilepsy	M	2		0		1		3
	F	0		0		0		0
Diabetes mellitus	M	1	(7%)	3	(21%)	10	(71%)	14
	F	1		2		2		5
Respiratory disorders	M	8	(42%)	5	(26%)	6	(32%)	19
	F	2		1		3		6
Urinary disorders	M	0		0		0		0
	F	0		0		0		0
Tumour	M	0		0		0		0
	F	0		2		2		4
Overweight	M	0		1	(8%)	11	(92%)	12
	F	0		0		5		5
All impairments	M	122	(61%)	18	(9%)	59	(30%)	199
	F	21	(32%)	7	(11%)	37	(57%)	65

The results of this categorisation are shown in Table 1, and are discussed below under the headings of the different impairment groups.

Hypertension.

With a comparatively large number of deaths it seemed desirable to divide the cases in this category according to severity, although not into all of the 21 codes.

The deaths have therefore been analyzed separately according to Systolic and Diastolic Arterial Pressure, using the following criteria for moderate hypertension; higher or lower S.A.P. or D.A.P readings have been classified as severe or slight respectively:

Age at entry	S.A.P.	D.A.P.
40 - 59	155 - 170	95 - 105
60 and over	160 - 175	100 - 110

There were no deaths in the data below age 40 at entry.

On this basis the figures in Table 1 for hypertension may be rewritten as follows:

Sex	Intensity of impairment	Identical with or linked to cause of death	No certain connexion with cause of death	Total
by S.A.P.				
M	Severe	16	5	21
	Moderate	12	2	14
F	Severe	3	4	7
	Moderate	1	2	3
	Slight	1	1	2
by D.A.P.				
M	Severe	7	3	10
	Moderate	11	1	12
	Slight	10	3	13
F	Severe	1	3	4
	Moderate	3	4	7
	Slight	1	0	1

It will be seen that a much higher proportion of males than of females died from a cause linked to the impairment, but with only 12 female deaths it would be premature to draw any conclusion at this stage.

Taking the two sexes together, the proportion of cases identical with or linked to the cause of death is shown as follows:

	Severe	Moderate	Slight
by S.A.P.	68%	76%	-
by D.A.P.	57%	74%	79%

This exhibits a trend which is the opposite to what might have been expected. However, the numbers are not large, and the results may not be significant.

Ischaemic heart disease without surgery
This group showed an even higher proportion where the impairment was either linked to the cause of death or was a contributory cause; as in the case of hypertension, the proportion was higher for the males than for the females.

Ischaemic heart disease with surgery
These cases were all male, and 6 of the 7 deaths were linked to the impairment.

Cerebrovascular disease
The male deaths divided equally between those where death was linked to the impairment and those where there was no connexion. The two female deaths were both linked to the impairment.

Nervous disorder
None of the deaths was positively connected with the impairment, but the 9 male deaths included one suicide, one overdose and one 'cuts to both wrists', while the 10 female deaths included 2 suicides, one fall from a height into a river, and one intra-cerebral tumour in a case where the impairment was mild psychoneurosis. These 7 cases, and possibly some of the others in the group, could have been connected with the impairment, but were not certainly so; it must be remembered that contributory causes may not always be mentioned on the death certificate.

Disseminated sclerosis
In all but one of the cases the impairment was either linked to or connected with the cause of death.

Peptic ulcer, ulcerative colitis, and Crohn's disease
There were 8 deaths, in 6 of which the impairment appeared to be unconnected with the cause.

Epilepsy
In 2 of the 3 cases the impairment was also the underlying cause of death.

Diabetes mellitus
In 12 of the 19 cases there was no stated connexion between the impairment and the cause of death, in 5 the impairment was a contributory cause, and in only 2 was it the underlying cause.

Respiratory disorders
This group consists of 18 different codes, and although it would clearly be

unproductive to break down the information about the 25 deaths into the individual codes, it was thought to be worth-while to separate them into the four impairments irrespective of age at entry and severity; the four impairments are bronchial asthma, chronic bronchitis without emphysema, chronic bronchitis with emphysema, emphysema without bronchitis. The subdivided results are:-

Impairment	Sex	Identical with underlying cause	Impairment as contributory cause	Other respiratory underlying cause	Unconnected	Total
Bronchial asthma	M	2	2	1	2	7
	F	1	1	0	0	2
Chronic bronchitis without emphysema	M	1	2	1	1	5
	F	0	0	0	1	1
Chronic bronchitis with emphysema	M	4	1	1	0	6
	F	0	0	1	0	1
Emphysema without bronchitis	M	1	0	0	0	1
	F	1	0	0	1	2
Totals	M	8	5	3	3	19
	F	2	1	1	2	6

The heading 'other respiratory underlying cause' has been introduced as in these cases the underlying cause was respiratory cancer, which could have been connected with (although not caused by) the recorded impairment.

Urinary disorders
There were no deaths where the recorded impairment was a urinary disorder.

Tumours
In the four cases of tumour (all female) there was no connexion with the underlying cause in two of the deaths; in the other two there might have been a connexion as the underlying cause was a tumour of a different site.

Overweight
In the 17 cases of overweight there was no stated connexion with the underlying cause in 16 of them; the one case where overweight was given as a contributory cause was in the group 20-30% overweight, i.e. the lightest of the overweight codes. It might have been expected that the results would show a bias towards cardiovascular and cerebrovascular causes of death, but in fact these causes were reported in only 6 of the 17 overweight cases; this is in approximately the same proportion as was observed in the deaths in the normal assured lives

investigation for 1979-82 at durations 0-4, and the result shows no apparent bias towards these causes of death. It was noticed that there were 5 cases where death was due to suicide or accident, a higher proportion than was observed in the 1979-82 experience of normal lives at the same durations, but not high enough to be significant, in such a small experience, of exceptional accident-proneness. The possibility of connexions with the recorded impairment will be further investigated when a larger experience becomes available for the quadrennium 1987-90.

This report does not set out to come to any conclusions. It may be regarded as being of an interim nature, in the hope that an analysis of actual and expected deaths by cause may be made in respect of the next quadrennium. To this end the Bureau is reminding all offices submitting impaired lives data that full cause of death details are required. In future the Bureau will scrutinise the statistics each year, as they do for the main investigation causes of death, to ensure that each office's batch is complete, and to remind any office which has omitted to send its returns. In the meanwhile it is hoped that the report, which is the only feedback to the offices possible with the limited quantity of data, will be of some interest to underwriters.

The Committee wishes to record its thanks to Dr. Mary Reynolds, who kindly agreed to give her opinion in any case where there was doubt as to whether or not the impairment was connected with the underlying cause of death.

CMIR, 11 (1991) 113–142

SICKNESS EXPERIENCE 1979–82 FOR INDIVIDUAL PHI POLICIES

INTRODUCTION

The last report on the sickness experience for individual PHI policies was published in *C.M.I.R.* 7 and related to the years 1975 to 1978 inclusive. Graduations of the Standard male sickness and claim inception rates were presented together with a commentary on the experience, the graduations and specific aspects of the data.

That report considered in some detail a number of difficulties which arise in interpreting the results from an investigation of the Manchester Unity type. There is little doubt that it is easier to interpret the results from an investigation of inception rates and recovery rates. The Sub-Committee has developed such a system and will publish the results as soon as possible.

Meanwhile, there is an obvious need for more up to date statistics to be made available to show the trend in morbidity since 1978. For this reason, the experience in the years 1979 to 1982 inclusive has been compared in this report with the experience in the years 1975 to 1978. No attempt has been made to graduate the experience on this occasion.

The overall experience in 1979–82 was slightly better than in 1975–78. There are, however, strong indications from practitioners that the experience has deteriorated since 1982. The rates of sickness set out in this report are likely to be appreciably lower than those now being experienced.

1. GENERAL EXAMINATION OF THE AGGREGATE DATA

1.1 The volumes of Aggregate data contributed for the years 1979-82, analysed by general characteristics, are summarised in Tables 1.1 and 1.2.

1.2 Table 1.1 shows that during the four year period 1979 to 1982 there were appreciable increases in the proportion of policies on female lives, the proportion of policies insuring increasing benefits, the proportion of policies for which there was no medical examination and the proportion of policies subject to increasing premiums.

1.3 Table 1.2 shows the number of claims included in the Aggregate data. The number of claims in each year increased only moderately despite the fact that the number of policies in force increased by over 50% during the four years.

Table 1.1. *Number of policies in force at beginning and end of the period of investigation, analysed by varying attributes*

Attribute		Number of policies at 1.1.79	Percentage of Total	Number of policies at 31.12.82	Percentage of Total
Sex	Male	219,169	94·6	331,885	92·9
	Female	12,433	5·4	25,224	7·1
Country	U.K.	220,954	95·4	341,906	95·8
	Republic of Ireland	10,423	4·5	14,794	4·1
	Isle of Man	62	-	108	
	Channel Islands	163	·1	301	·1
Occupation rated	Not rated	193,134	83·4	301,305	84·4
	Rated	38,468	16·6	55,804	15·6
Type of benefit	Level	192,566	83·1	251,747	70·5
	Increasing	34,041	14·7	101,844	28·5
	Decreasing	4,995	2·2	3,518	1·0
Medical evidence	Medical	72,969	31·5	105,180	29·5
	Non-medical	72,630	31·4	140,162	39·2
	Non-selection	58	-	92	
	Unknown	85,945	37·1	111,675	31·3
Type of premium	Level annual	219,497	94·8	317,679	89·0
	Recurrent single	-	-	-	
	Increasing annual	12,091	5·2	39,425	11·0
	Other	14	-	5	
Underwriting exclusions	No extra risk	194,483	84·0	319,882	89·6
	Hypertension etc·	481	·2	464	·1
	Neurosis	2,280	1·0	2,990	·9
	Unknown*	25,272	10·9	20,079	5·6
	All other exclusions	9,086	3·9	13,694	3·8
Total		231,602	100·0	357,109	100·0

Table 1.2. *Number of claims during each year, analysed by various attributes*

Attribute		1979	1980	1981	1982
Sex	Male	7,264	7,721	7,316	7,482
	Female	570	638	599	640
Country	U.K.	7,591	8,080	7,550	7,788
	Republic of Ireland	239	276	359	330
	Isle of Man	1	1	1	1
	Channel Islands	3	2	5	3
Occupation rated	Not rated	6,780	7,237	6,709	6,820
	Rated	1,054	1,122	1,206	1,302
Type of benefit	Level	6,517	6,772	6,292	6,340
	Increasing	539	898	1,080	1,327
	Decreasing	778	689	543	455
Medical evidence	Medical	1,794	2,003	2,127	2,192
	Non-medical	2,203	2,477	2,391	2,890
	Non-selection	–	163	215	12
	Unknown	3,837	3,716	3,182	3,028
Type of premium	Level annual	7,589	7,635	7,015	7,045
	Recurrent single	–	225	271	285
	Increasing annual	245	499	629	792
	Other	–	–	–	
Underwriting exclusions	No extra risk	6,695	7,158	6,689	6,885
	Hypertension etc.	42	31	21	21
	Neurosis	113	116	89	91
	Unknown*	387	366	383	368
	All other exclusions	597	688	733	757
Mode of commencement	Continuation	1,969	2,218	2,685	2,583
	New claim	5,698	5,996	5,130	5,424
	Interrupted claim	14	13	5	4
	Revived claim	55	59	39	38
	Benefit rate changed	98	73	56	73
Full/Reduced	Full	7,597	8,149	7,736	7,936
	Reduced	237	210	179	186
Mode of cessation	Current claim	2,025	2,525	2,189	2,077
	Policy expired	92	117	126	122
	Death	112	146	84	111
	Recovery	5,496	5,494	5,459	5,736
	Lump sum	3	2	2	6
	Ex-gratia commutation	7	2	2	2
	Benefit altered	97	73	53	68
	Other	2	–	–	
Total		7,834	8,359	7,915	8,122

• Exclusion may or may not be present

2. THE STANDARD MALE EXPERIENCE

2.1 The main investigation reported in *C.M.I.R.* 7 was on data relating to policies issued on 'standard' terms. For practical purposes 'standard' policies were defined as being U.K. policies without an occupational rating, without a known exclusion clause for a medical impairment and not providing a lump sum or other unusual forms of benefit. The precise requirements for inclusion in the Standard experience were:

Field	Description	Code	Description
4	Geographical location	1	U.K.
8	Occupation rating	0	No rating
15	Type of benefit	1	Level
		2	Increasing
		3	Decreasing
18	Underwriting impairment	0	No exclusion
		7	Unknown

2.2 The Standard sickness experience for males in 1979–82 is set out in Tables 1-6 of the Appendix. This has been measured against the graduated rates for males which were published in *C.M.I.R.* 7, 99 (based on the 1975–78 experience) , but it should be noted that no attempt was made to graduate the 1975–78

Table 2.1. *Comparison of (a) Aggregate and (b) Standard experience Weeks of sickness % actual/expected (by C.M.I.R.7 Graduated) Males. All sickness periods combined.*

Ages	30–34	35–39	40–44	45–49	50–54	55–59	60–64
Deferred period							
1 week (a)	74·1	93·0	85·7	99·5	96·3	103·9	103·0
(b)	68·5	80·0	82·7	103·3	102·7	108·2	109·6
(a)/(b)	1·08	1·16	1·04	·96	·94	·96	·94
4 weeks (a)	187·7	171·8	133·4	155·9	93·0	106·4	85·5
(b)	93·2	115·6	81·3	88·9	87·3	91·4	85·0
(a)/(b)	2·01	1·49	1·64	1·75	1·06	1·16	1·01
13 weeks (a)	183·3	135·6	122·5	104·6	85·7	94·1	81·0
(b)	146·9	130·2	103·5	93·1	85·6	93·6	81·9
(a)/(b)	1·25	1·04	1·18	1·12	1·00	1·01	·99
26 weeks (a)	170·9	145·7	123·7	106·8	84·0	123·3	136·4
(b)	145·7	132·7	120·8	104·3	77·7	120·1	134·7
(a)/(b)	1·17	1·10	1·02	1·02	1·08	1·03	1·01
52 weeks (a)	139·1	73·5	92·5	101·2	77·2	122·5	92·2
(b)	144·3	47·7	97·8	103·7	77·2	123·9	96·6
(a)/(b)	·96	1·54	·95	·98	1·00	·99	·95

experience in respect of policies with a deferred period of 52 weeks, due to paucity of data. The experience of such policies in the period 1979–82 has therefore been compared with the graduated rates for policies with a deferred period of 26 weeks.

2.3 Comparisons of the exposed to risk show that the Standard male experience constitutes approximately 82% of the Aggregate experience for policies with a deferred period of 1 week, 51% for 4 weeks deferred, 78% for 13 weeks deferred, 89% for 26 weeks deferred and 91% for 52 weeks deferred.

As explained in *C.M.I.R.* 7, 7 there are more conditions which are dealt with by an exclusion when the deferred period is short than when it is long. Similarly, many occupations qualify for standard rates with a deferred period of 52 weeks but attract an occupational loading if the deferred period is 4 weeks. This accounts for the generally increasing percentage volume of Standard data in the longer deferred periods. The apparently anomalous figure for 1 week deferred probably arises because most of the business is in respect of particular professional occupations.

Table 2.2. *Standard experience (males). Comparison of experience in different deferred period tables, for each sickness period.*
Weeks of sickness % actual/expected (by C.M.I.R.7 Graduated)

Deferred period	Sickness period	Ages 25–34	35–44	45–54	55–64	All ages
1 week	1/3	82	80	79	79	80
	4/9	74	71	76	80	76
	13/13	48	78	81	78	77
	26/26	48	59	86	95	85
	52/52	47	101	112	110	108
	104/all	61	133	156	134	137
4 weeks	4/9	69	69	73	66	70
	13/13	59	69	79	57	67
	26/26	105	103	65	69	75
	52/52	167	161	68	88	91
	104/all	125	159	120	107	115
13 weeks	13/13	113	75	73	92	82
	26/26	117	85	74	95	87
	52/52	200	139	88	79	95
	104/all	199	160	99	90	100
26 weeks	26/26	103	84	77	98	89
	52/52	169	126	91	120	113
	104/all	201	152	89	135	123
52 weeks	52/52	95	66	86	127	103
	104/all	357	92	87	108	102

Table 2.3. *Standard experience (males). Central claim inception rates as a percentage of the actual claim inception rates in* 1975–78

Deferred period	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64
1 week	79	93	83	85	83	73	87	72
4 weeks	85	62	67	76	80	71	77	59
13 weeks	121	112	76	76	68	91	96	88
26 weeks	114	100	71	73	79	68	100	91
52 weeks	–	100	100	250	88	100	197	120

Table 2.1 compares the Aggregate and Standard experiences standardised in each case by reference to the graduated rates given in *C.M.I.R.* 7, 99. As may be expected from the percentages quoted earlier, it is the 4 week deferred period experience which has been most affected by the purification of the basic data, particularly at the younger ages. The 13 weeks deferred period experience has also been affected, albeit to a lesser extent.

2.4 Table 2.2 summarises the ratio of actual weeks of sickness to those expected according to the 1975–78 graduated rates. This indicates that the rate of claim is generally lower for shorter sickness periods, but higher for longer sickness periods, than in the previous investigation.

2.5 Table 2.3 compares claim inception rates in 1979–82 with the actual experience in 1975–78. This shows that inception rates have in general increased for policies with a deferred period of 52 weeks but have decreased for other deferred periods.

Two possible explanations for the change in the experience compared with the previous investigation are given below. One possibility is that fewer people were falling sick in the later period but that the recovery rates were lower. The other is that the apparent increase in long-term claims may be due to the increasing maturity of the experience. An investigation using the disability annuity approach should give a clearer indication of the reasons for the change in experience.

3. THE STANDARD FEMALE EXPERIENCE

3.1 The Standard sickness experience for females in 1979–82 is set out in Tables 7–12 of the Appendix. This has been measured against the graduated rates for males which were published in *C.M.I.R.* **7**, 99.

The volume of data relating to policies effected on the lives of females is insufficient to conduct a series of comparisons in a similar manner to those performed for male policyholders in Part 4. It is, however, possible to compare the Standard female experience with that in 1975–78 and also with the Standard male experience in 1979–82.

3.2. Table 3.1 compares the actual weeks of sickness experienced in 1979–82 with those expected on the basis of the 1975–78 female experience.

This indicates that the experience has improved in the age groups 25–34 and

Table 3.1. *Standard experience (females).Comparison of experience in different deferred period tables, for each sickness period.*
Weeks of sickness % actual/expected (1975–78) female experience

Sickness period	Deferred period	Ages 25–34	35–44	45–54	55–59	All ages
1/3	1 week	70	89	81	117	82
4/9	1 week	62	74	66	115	74
	4 weeks	70	131	77	183	98
13/13	1 week	66	38	55	110	62
	4 weeks	45	238	64	161	94
	13 weeks	53	147	62	70	80
26/26	1 week	34	24	46	54	39
	4 weeks	67	316	59	129	117
	13 weeks	81	266	93	136	123
	26 weeks	21	66	59	147	66
52/52	1 week					42
	4 weeks					122
	13 weeks					121
	26 weeks					84
	52 weeks					100
104/all	1 week					134
	4 weeks					133
	13 weeks					140
	26 weeks					325
	52 weeks					276

Table 3.2. *Comparison of the Standard experience of females with that of males. Analysis of weeks of sickness and inceptions*

Deferred period	Age group	Sickness A/E %	Expected weeks of sickness	Inceptions A/E %	Expected inceptions
1 week	Under 40	241	743	130	381
	40–49	167	599	191	114
	50–59	152	1,727	135	107
4 weeks	Under 40	306	683	214	54
	40–49	228	747	241	39
	50–59	106	1,235	150	30
13 weeks	Under 40	160	674	177	19
	40–49	229	845	283	14
	50–59	317	1,673	202	17
26 weeks	Under 40	158	352	208	5
	40–49	413	816	336	6
	50–59	234	1,883	195	12
52 weeks	Under 40	0	77	0	0
	40–49	397	223	135	1
	50–59	162	566	167	4

45–54 and deteriorated in the oldest age group. In age group 35–44 the experience is poorer in deferred periods 4 and 13 weeks and better in the other deferred periods.

3.3. Table 3.2 compares the actual weeks of sickness and the numbers of inceptions in the Standard female experience in 1979–82 with those expected on the basis of the Standard male experience in 1979-82. The results have been tabulated for three broad age groups and for each deferred period.

Except for one very small group, the actual sickness experience is substantially heavier for females than for males. As reported in *C.M.I.R.* 7, 11 there is some tendency for the proportionate extra sickness to be lower in the highest age group, with the exception of policies with a deferred period of 13 weeks.

The inception rates for females are in general substantially higher than those for males and the ratios of female to male rates are generally greatest in the 40–49 age group.

3.4. In Table 3.3 the data for all deferred periods has been amalgamated. The table sets out the ratio of actual to expected weeks of sickness, where the expected weeks of sickness has been obtained by summing the separate figures originally derived from the data for separate deferred periods. It can be seen that in general the Standard female experience is heavier than the Standard male

Table 3.3 *Comparison of the Standard experience of females with that of males. Weeks of sickness (all deferred periods combined) %actual/expected.*

Sickness	Age group							
period	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59
1/3	112	114	187	218	201	200	156	144
4/9	103	150	322	292	357	223	131	167
13/13	273	200	246	300	325	200	175	166
26/26	186	143	195	329	293	266	159	184
52/52	0	265	74	158	204	277	237	155
104/all	0	299	167	337	254	320	357	156

experience. The excess female sickness applies to all sickness periods and is greatest between the ages of 35 and 44.

3.5. Table 3.4 also compares the composite rates of sickness of females with those of males with all deferred periods combined both constructed as described in C.M.I.R. 7, 11. It can again be seen that the Standard female experience is heavier than the Standard male experience. The excess female sickness applies in all the sickness periods and is greatest between the ages of 35 and 54.

3.6. The investigations made in this report have produced similar results to the investigations made in *C.M.I.R.* 7, 11. Both show that the female experience is almost everywhere considerably higher than that for males.

Table 3.4. *Comparison of the Standard experience of females with that of males. Rates of sickness (all deferred periods combined) %actual/expected.*

Sickness	Age group							
period	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59
1/all	143	172	188	274	265	282	277	159
4/all	153	196	188	280	270	286	282	160
13/all	194	217	160	278	258	292	292	159
26/all	117	224	143	273	247	302	301	159
52/all	0	282	123	255	235	308	325	155

4. SUPPORTING INVESTIGATIONS

4.1. In *C.M.I.R.* 7, 30 various supporting investigations were undertaken for the 1975–78 experience. Similar investigations have been made in respect of the 1979–82 experience. A limited examination was made into the experience in respect of medical and non-medical cases and by size of policy. The results were inconclusive and, as indicated in *C.M.I.R.* 7, we have not included them in these supporting investigations.

4.2. The supporting investigations fall into two categories. First we have subdivisions of the Standard data by:

(a) duration in force and
(b) type of benefit.

where the comparison is between one or more subsets of the data on the one hand and the whole experience on the other.

Secondly we compare sets of policies which have been excluded from the Standard experience with that Standard experience. This category looks at the experience:

(1) in the Republic of Ireland,
(2) for occupationally rated cases and
(3) for policies which incorporate medical exclusions.

The actual/expected ratios for these two categories are thus not comparable with each other as in the first instance we are comparing a part with the whole, whilst in the other we are comparing completely different sets of data.

4.3. Actual weeks of sickness or numbers of inceptions have in each case been related to the expected weeks of sickness or number of inceptions using the Standard experience for 1979–82 for the appropriate deferred period and the result expressed as a percentage. The expected weeks of sickness and the expected inceptions have been tabulated to indicate not only the relative importance of the percentages but also to facilitate further calculations.

The in force policies and claims were allocated to only four age groups (under 40, 40–49, 50–59 and 60–64) as narrower age groupings would in some cases have reduced the volume of data in many cells to unacceptable levels. Even so, on occasions the actual and expected values are very small. Expected values have been recorded to the nearest integer, but the accurate figures have been used to calculate the ratios of actual to expected. Broader or all-age groupings have not been included as it was felt that these could hide real variations from age to age between the categories under review.

4.4. Policies in force less than 3 years.

Policies which have been in force for less than one year cannot contribute to the 52/52 claim rates and so are excluded from the exposed to risk for 52/52 sickness. Similarly, policies which have been in force for less than two years are excluded from the exposed to risk for 104/all sickness. This process might have been extended to make accurate provision for claims in the 3rd, 4th, 5th etc years. It is extremely doubtful whether the resulting data would have been amenable to analysis and so the process was not extended beyond the second year of claim.

As a result the claim rates derived for the 104/all sickness period are understated. When examining the experience in respect of policies within three

Table 4.1. 1979–82 *experience male lives.*
Comparison of select and ultimate experience with the total Standard experience Analysis of weeks of sickness (excluding 104/all) and inception rates

Deferred period	Age group	Weeks of sickness % Actual/Expected		Expected weeks of sickness		Inceptions % Actual/Expected		Expected Inceptions	
		Select	Ultimate	Select	Ultimate	Select	Ultimate	Select	Ultimate
1 week	Under 40	102	99	2,560	7,130	101	100	1,403	3,372
	40-49	99	100	1,088	8,983	117	98	320	2,299
	50-59	62	101	594	22,739	111	100	81	2,471
	60-64	12	100	34	11,786	39	100	3	781
	All ages	95	100	4,276	50,138	104	99	1,807	8,925
4 weeks	Under 40	95	102	1,724	4,127	100	100	166	291
	40-49	97	100	952	6,552	104	100	76	448
	50-59	90	100	523	10,885	83	101	31	524
	60-64	68	100	41	3,317	186	99	2	121
	All ages	94	101	3,240	24,881	100	100	275	1,384
13 weeks	Under 40	110	95	2,010	4,254	105	95	84	137
	40-49	153	90	1,213	6,578	143	90	42	182
	50-59	105	100	753	11,017	85	102	23	269
	60-64	110	100	61	4,387	76	101	1	82
	All ages	122	97	4,037	20,236	112	97	190	670
26 weeks	Under 40	69	110	728	2,264	97	99	19	47
	40-49	116	98	549	4,049	115	100	13	79
	50-59	110	100	579	11,518	113	98	11	190
	60-64	5	101	60	6,274	116	100	1	81
	All ages	93	101	1,916	26,105	107	99	44	397
52 weeks	Under 40	100	100	80	179	143	99	1	5
	40-49	10	111	120	973	0	108	3	20
	50-59	47	103	140	2,822	94	101	3	65
	60-64	0	101	8	990	0	100	0	18
	All ages	45	104	348	4,964	68	102	7	108

years of their inception, it is evident that claim rates for the 104/all period will be completely unreliable. Earlier sickness periods are not subject to the same degree of distortion. For this reason, the investigation described in this section excludes the 104/all sickness period.

A comparison has been made in Table 4.1 between the actual experience for policies which:

(a) have not been in force for 3 years – 'select' and
(b) have been in force for at least 3 years – 'ultimate'

Table 4.2. 1979–82 *experience male lives.*
Comparison of type of benefit with Standard experience.
Analysis of weeks of sickness and inception rates

Deferred period	Age group	Weeks of sickness % Actual/ Expected		Expected weeks of sickness		Inceptions % Actual/ Expected		Expected Inceptions	
		Increasing	Level	Increasing	Level	Increasing	Level	Increasing	Level
1 week	Under 40	83	104	1,494	8,357	100	100	777	3,882
	40–49	104	104	719	12,569	111	100	165	2,249
	50–59	86	99	350	29,661	107	107	28	1,862
	60–64	0	114	10	15,229	0	105	0	419
	All ages	89	104	2,573	65,816	102	102	970	8,412
4 weeks	Under 40	75	107	1,506	5,791	93	101	108	346
	40–49	121	96	1,293	9,088	108	97	71	449
	50–59	73	101	1,267	21,979	104	99	33	516
	60–64	27	99	233	9,785	107	100	3	117
	All ages	86	106	4,299	46,643	106	99	215	1,428
13 weeks	Under 40	108	96	3,005	5,948	97	100	79	142
	40–49	97	101	3,541	10,667	90	103	61	164
	50–59	96	101	3,608	24,711	118	97	42	250
	60–64	77	101	646	10,991	73	102	5	79
	All ages	99	100	10,800	52,317	99	100	187	635
26 weeks	Under 40	133	89	1,453	4,261	152	80	18	48
	40–49	115	96	2,609	9,402	131	89	22	70
	50–59	107	99	3,555	29,230	129	95	24	178
	60–64	96	100	1,187	22,581	167	96	4	77
	All ages	112	98	8,804	65,476	138	92	68	373
52 weeks	Under 40	47	124	263	579	38	114	2	4
	40–49	152	82	940	2,632	89	100	6	16
	50–59	100	100	1,842	8,910	111	97	12	56
	60–64	75	103	419	3,554	101	100	2	17
	All ages	107	98	3,464	15,675	96	99	22	93

and that expected according to the Standard male experience for 1979–82, excluding the 104/all period throughout.

The ultimate experience constitutes a large proportion of the total data and as is to be expected the experience as measured by weeks of sickness does not differ greatly from that exhibited by the Standard data. The select ratios frequently exceed 100%. There is no consistent trend and the pattern looks different from that shown in *C.M.I.R.* **7**, 32.

Inception rates are not affected in the same way as sickness rates by the duration in force and the figures compared have not been adjusted. The select experience appears to be worse than the Standard experience, although the difference is less than that shown in *C.M.I.R.* **7**. The reasons for this are not clear.

Table 4.3. 1979–82 *experience male lives.*
Comparison of Republic of Ireland and Standard experience. Analysis of weeks of sickness and inception rates

Deferred period	Age group	Weeks of sickness % Actual/Expected	Expected weeks of sickness	Inceptions % Actual/Expected	Expected Inceptions
1 week	Under 40	167	64	103	29
	40–49	85	175	50	31
	50–59	48	557	72	34
	60–64	91	309	154	9
	All ages	73	1,105	81	103
4 weeks	Under 40	135	625	162	39
	40–49	153	608	132	32
	50–59	236	807	139	19
	60–64	83	235	36	3
	All ages	170	2,275	143	93
13 weeks	Under 40	142	669	179	17
	40–49	134	735	177	12
	50–59	139	1,010	200	11
	60–64	23	417	34	3
	All ages	121	2,831	173	43
26 weeks	Under 40	160	151	163	2
	40–49	120	303	164	2
	50–59	203	776	92	5
	60–64	136	484	211	2
	All ages	166	1,714	139	11
52 weeks	Under 40	756	26		
	40–49	76	105		
	50–59	66	235		
	60–64	0	79		
	All ages	97	445		

4.5. Level or increasing benefit policies.

The results of this investigation are tabulated in Table 4.2. The majority of the business is still of a level benefit type so that its experience differs little from the Standard experience. The proportion of increasing benefit policies has grown rapidly so that this category is of relatively recent origin. The experience as measured by weeks of sickness fluctuates, but does not differ greatly from the Standard experience. The inception rates for increasing benefit policies also fluctuate, but there is some indication that overall they are slightly higher than those for the Standard experience.

4.6. Republic of Ireland.

The actual experience from policies effected on male lives in the Republic of

Table 4.4. 1979–82 *experience male lives.*
Comparison of of policies rated for occupation and Standard experience. Analysis of weeks of sickness and inception rates

Deferred period	Age group	Weeks of sickness % Actual/Expected	Expected weeks of sickness	Inceptions % Actual/Expected	Expected Inceptions
1 week	Under 40	258	246	100	106
	40–49	158	819	75	140
	50–59	118	1,894	84	118
	60–64	100	736	79	20
	All ages	133	3,895	85	384
4 weeks	Under 40	260	6,286	231	413
	40–49	197	5,774	167	303
	50–59	139	5,928	154	146
	60–64	170	1,463	170	18
	All ages	198	19,451	195	880
13 weeks	Under 40	166	1,783	231	49
	40–49	234	1,661	256	28
	50–59	117	1,908	181	21
	60–64	223	409	169	3
	All ages	174	5,761	226	101
26 weeks	Under 40	215	572	316	8
	40–49	144	490	195	4
	50–59	201	646	194	4
	60–64	179	255	228	1
	All ages	188	1,963	254	17
52 weeks	Under 40	0	64		
	40–49	0	83		
	50–59	165	168		
	60–64	0	41		
	All ages	78	356		

Ireland, excluding policies rated by reason of occupation or with an exclusion, is compared in Table 4.3 with the Standard experience, which relates to the U.K. only.

The figures are small, but there is a tendency for the experience to be worse than the Standard experience for policies with deferred periods of 4, 13 and 26 weeks, while being slightly better for policies with deferred periods of 1 and 52 weeks.

4.7. Occupation.

The experience, measured by weeks of sickness, of U.K. policies where it was known that a policy has been rated solely by reason of occupation is compared with the Standard experience in Table 4.4.

Table 4.5. 1979–82 *experience male lives.*
Comparison of policies with exclusions and Standard experience. Analysis of weeks of sickness and inception rates

Deferred period	Age group	Weeks of sickness % Actual/Expected	Expected weeks of sickness	Inceptions % Actual/Expected	Expected Inceptions
1 week	Under 40	184	1,063	141	514
	40–49	109	1,576	129	294
	50–59	90	4,304	121	277
	60–64	64	3,357	58	93
	All ages	94	10,300	127	1,178
4 weeks	Under 40	159	426	164	27
	40–49	156	611	119	32
	50–59	87	1,542	110	37
	60–64	59	792	136	10
	All ages	102	3,371	129	106
13 weeks	Under 40	31	218	93	5
	40–49	81	393	87	6
	50–59	69	982	102	10
	60–64	19	413	34	3
	All ages	57	2,006	88	24
26 weeks	Under 40	273	82	763	1
	40–49	114	220	335	2
	50–59	98	694	158	4
	60–64	99	571	51	2
	All ages	110	1,567	238	9
52 weeks	Under 40	0	20		
	40–49	134	74		
	50–59	45	250		
	60–64	0	95		
	All ages	48	439		

The experience for occupationally rated cases was much heavier than that of Standard cases across the whole age range. It should be noted that we have only identified the occupations for which an additional premium has been charged. The Standard experience thus includes many occupations which would have been rated if the deferred period were shorter.

The ratio of actual to expected claim inceptions is generally highest in the youngest age group, and, with the exception of deferred period 13 weeks, shows much less variation with age for the other age groups.

This feature was not noticeable in the analysis of the 1975–78 data. It is curious that the ratios for claim inceptions in deferred period 1 are lower than 100 whereas the ratios for weeks of sickness are greater than 100.

Table 4.6. 1979–82 *experience male lives.*
Comparison of policies with exclusions for neurosis, psychoneurosis and psychosis (including anxiety state) with Standard experience
Analysis of weeks of sickness and inception rates

Deferred period	Age group	Weeks of sickness % Actual/Expected	Expected weeks of sickness	Inceptions % Actual/Expected	Expected Inceptions
1 week	Under 40	190	131	113	61
	40–49	151	166	135	32
	50–59	44	437	128	29
	60–64	65	419	104	12
	All ages	84	1,153	120	134
4 weeks	Under 40	147	127	115	8
	40–49	88	122	108	6
	50–59	176	231	207	6
	60–64	301	122	68	1
	All ages	177	602	135	21
13 weeks	Under 40	65	82	0	2
	40–49	78	121	100	2
	50–59	28	187	0	2
	60–64	116	104	0	1
	All ages	65	494	36	7
26 weeks	Under 40	0	32	0	0
	40–49	40	68	362	1
	50–59	119	201	78	1
	60–64	39	132	0	0
	All ages	74	433	113	2
52 weeks	Under 40	0	4		
	40–49	0	33		
	50–59	142	109		
	60–64	210	25		
	All ages	121	171		

4.8. Policies with medical exclusions.

The experience of policies with medical exclusions which are otherwise 'Standard' is compared with the Standard experience in Table 4.5. Some Offices were unable to provide this information for policies in force prior to 1 January 1972 and the 'unknown' cases have been included in the Standard data. The results suggest that for short deferred periods the experience is heavier than the Standard experience below age 50 and lighter thereafter. The number of cases involved is, however, small and overall there appears to be no reason to assume anything other than the Standard experience for policies which incorporate health exclusions. As in *C.M.I.R.* 7, 39 policies with exclusions limited to neurosis, psychoneurosis and psychosis were considered separately and the results are shown in Table 4.6. The amount of data is very small and there is no clearly defined indication of any variation from the Standard experience.

4.9. Conclusion.

Policies which include an occupational loading exhibit a recognisably higher level of morbidity than the Standard experience. Policies effected in the Republic of Ireland were subject to higher morbidity than the 'Standard' in 1975–78, but this difference is less evident from the data for 1979–82. None of the other subdivisions of the data have resulted in any clear deviation from the Standard experience.

APPENDIX

Individual PHI policies 1979–82
All offices — Standard sickness experience

Table 1. *Males — Deferred period 1 week*

Age group	18–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	All ages
Sickness period 1/3											
Exposed to risk	0	1555	10419	17632	15823	12823	11901	12349	10887	5813	99202
Actual weeks of sickness	0	122	1162	2066	2100	1995	2118	2265	2572	1719	16119
Expected weeks of sickness	0	179	1319	2629	2679	2439	2538	3029	3204	2194	20210
Actual sickness rate	–	0·078	0·112	0·117	0·133	0·156	0·178	0·183	0·236	0·296	0·162
Actual/expected%	–	68·2	88·1	78·6	78·4	81·8	83·5	74·8	80·3	78·4	79·8
Sickness period 4/9											
Exposed to risk	0	1443	10246	17500	15730	12761	11862	12332	10882	5812	98568
Actual weeks of sickness	0	28	398	727	1121	961	1504	2032	2690	2163	11624
Expected weeks of sickness	0	46	424	1098	1388	1558	1943	2740	3380	2707	15284
Actual sickness rate	–	0·019	0·039	0·042	0·071	0·075	0·127	0·165	0·247	0·372	0·118
Actual/expected %	–	60·9	93·9	66·2	80·8	61·7	77·4	74·2	79·6	79·9	76·1
Sickness period 13/13											
Exposed to risk	0	1235	9902	17236	15548	12638	11787	12298	10873	5812	97329
Actual weeks of sickness	0	13	130	133	435	529	569	1190	1756	1355	6110
Expected weeks of sickness	0	11	135	415	570	663	855	1306	1916	2085	7956
Actual sickness rate	–	0·011	0·013	0·008	0·028	0·042	0·048	0·097	0·162	0·233	0·063
Actual/expected %	–	118·2	96·3	32·0	76·3	79·8	66·5	91·1	91·6	65·0	76·8
Sickness period 26/26											
Exposed to risk	0	957	9374	16837	15276	12454	11671	12246	10856	5812	95483
Actual weeks of sickness	0	26	103	132	321	396	524	1600	2826	2096	8024
Expected weeks of sickness	0	7	115	379	543	675	934	1532	2406	2802	9393
Actual sickness rate	–	0·027	0·011	0·008	0·021	0·032	0·045	0·131	0·260	0·361	0·084
Actual/expected %	–	371·4	89·6	34·8	59·1	58·7	56·1	104·4	117·5	74·8	85·4
Sickness period 52/52											
Exposed to risk	0	525	8285	16021	14730	12077	11434	12135	10822	5810	91839
Actual weeks of sickness	0	2	0	162	509	332	1141	2070	4331	4486	13033
Expected weeks of sicknes	0	5	98	246	339	495	901	1963	3709	4295	12051
Actual sickness rate	–	0·004	0·000	0·010	0·035	0·027	0·100	0·171	0·400	0·772	0·142
Actual/expected %	–	40·0	0·0	65·9	150·1	67·1	126·6	105·5	116·8	104·4	108·1
Sickness period 104/all											
Exposed to risk	0	95	6052	14338	13665	11340	10955	11903	10733	5801	84882
Actual weeks of sickness	0	0	0	220	226	1171	3302	6282	11842	16677	39720
Expected weeks of sickness	0	2	105	255	369	680	1694	4465	9420	11922	28912
Actual sickness rate	–	0·000	0·000	0·015	0·017	0·103	0·301	0·528	1·103	2·875	0·468
Actual/expected %	–	0·0	0·0	86·3	61·2	172·2	194·9	140·7	125·7	139·9	137·4

APPENDIX

Individual PHI Policies 1979–82
All offices — Standard sickness experience

Table 2. *Males — Deferred period 4 weeks*

Age Group	18–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	All ages
Sickness period 4/9											
Exposed to risk	76	2046	9077	19289	20645	17785	16808	14172	9126	3401	112425
Actual weeks of sickness	2	84	361	771	1223	1195	1725	1613	1743	730	9447
Expected weeks of sickness	3	75	408	1230	1684	1818	2154	2411	2291	1455	13529
Actual rate of sickness	0·026	0·041	0·040	0·040	0·059	0·067	0·103	0·114	0·191	0·215	0·084
Actual/expected %	66·7	112·0	88·5	62·7	72·6	65·7	80·1	66·9	76·1	50·2	69·8
Sickness period 13/13											
Exposed to risk	65	1828	8662	18771	20259	17559	16667	14106	9102	3401	110420
Actual weeks of sickness	0	24	98	331	588	610	1009	859	1140	402	5061
Expected weeks of sickness	1	22	155	570	827	914	1078	1279	1435	1261	7542
Actual rate of sickness	0·000	0·013	0·011	0·018	0·029	0·035	0·061	0·061	0·125	0·118	0·046
Actual/expected %	0·0	109·1	63·2	58·1	71·1	66·7	93·6	67·2	79·4	31·9	67·1
Sickness period 26/26											
Exposed to risk	48	1533	8062	18003	19691	17225	16457	14011	9068	3399	107497
Actual weeks of sickness	0	0	26	460	599	601	787	901	1572	661	5607
Expected weeks of sickness	0	22	120	344	501	665	1034	1548	1872	1380	7486
Actual rate of sickness	0·000	0·000	0·003	0·026	0·030	0·035	0·048	0·064	0·173	0·194	0·052
Actual/expected %	–	0·0	21·7	133·7	119·6	90·4	76·1	58·2	84·0	47·9	74·9
Sickness period 52/52											
Exposed to risk	26	1053	6941	16498	18597	16564	16039	13817	8990	3395	101920
Actual weeks of sickness	0	0	1	479	804	711	866	1113	2467	1564	8005
Expected weeks of sickness	0	9	68	219	369	574	1065	1858	2554	2044	8760
Actual rate of sickness	0·000	0·000	0·000	0·029	0·043	0·043	0·054	0·081	0·274	0·461	0·079
Actual/expected %	–	0·0	1·5	218·7	217·9	123·9	81·3	59·9	96·6	76·5	91·4
Sickness period 104/all											
Exposed to risk	4	468	4907	13625	16550	15264	15215	13409	8817	3372	91631
Actual weeks of sickness	0	0	0	358	1156	771	2174	5505	6619	6841	23424
Expected weeks of sickness	0	8	75	212	399	810	2052	4343	6668	5857	20424
Actual rate of sickness	0·000	0·000	0·000	0·026	0·070	0·051	0·143	0·411	0·751	2·029	0·256
Actual/expected %	–	0·0	0·0	168·9	289·7	95·2	105·9	126·8	99·3	116·8	114·7

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Individual PHI Policies 1979–82
All offices — Standard sickness experience

Table 3. *Males — Deferred period* 13 *weeks*

Age Group	18–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	All ages
Sickness period 13/13											
Exposed to risk	119	2686	15587	39932	47344	39284	33643	24606	14226	5307	222734
Actual weeks of sickness	6	51	307	629	903	960	1124	1317	1386	959	7642
Expected weeks of sickness	1	21	164	664	1138	1350	1624	1718	1543	1000	9223
Actual rate of sickness	0·050	0·019	0·020	0·016	0·019	0·024	0·033	0·054	0·097	0·181	0·034
Actual/expected %	600·0	242·9	187·2	94·7	79·3	71·1	69·2	76·7	89·8	95·9	82·9
Sickness period 26/26											
Exposed to risk	97	2294	14312	38048	45795	38308	33041	24339	14159	5303	215696
Actual weeks of sickness	0	18	308	611	998	903	1404	1661	2085	1279	9267
Expected weeks of sickness	2	30	190	593	965	1270	1819	2299	2231	1300	10699
Actual rate of sickness	0·000	0·008	0·022	0·016	0·022	0·024	0·042	0·068	0·147	0·241	0·043
Actual/expected %	0·0	60·0	162·1	103·0	103·4	71·1	77·2	72·2	93·5	98·4	86·6
Sickness period 52/52											
Exposed to risk	62	1656	11969	34429	42784	36411	31841	23792	14004	5291	202239
Actual weeks of sickness	0	0	211	853	1369	1352	2047	2257	3064	2210	13363
Expected weeks of sickness	0	14	110	423	782	1171	1939	2946	3674	2979	14038
Actual rate of sickness	0·000	0·000	0·018	0·025	0·032	0·037	0·064	0·095	0·219	0·418	0·066
Actual/expected %	–	0·0	191·8	201·7	175·1	115·5	105·6	76·6	83·4	74·2	95·2
Sickness period 104/all											
Exposed to risk	22	806	8042	27684	36948	32673	29426	22634	13655	5250	177140
Actual weeks of sickness	0	0	81	1006	1602	2433	3985	6783	9765	7189	32844
Expected weeks of sickness	0	14	118	429	858	1668	3809	7080	9969	8923	32868
Actual rate of sickness	0·000	0·000	0·010	0·036	0·043	0·074	0·135	0·300	0·715	1·369	0·185
Actual/expected %	–	0·0	68·6	234·5	186·7	145·9	104·6	95·8	98·0	80·6	99·9

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Individual PHI Policies 1979–82
All offices — Standard sickness experience

Table 4. *Males — Deferred period 26 weeks*

Age Group	18–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	All ages
Sickness period 26/26											
Exposed to risk	31	2091	15957	51309	62248	51663	45655	36154	23266	9573	297947
Actual weeks of sickness	0	33	208	419	602	834	922	1806	2777	1984	9585
Expected weeks of sickness	0	17	127	480	755	950	1432	2094	2642	2230	10727
Actual rate of sickness	0·000	0·016	0·013	0·008	0·010	0·016	0·020	0·050	0·119	0·207	0·032
Actual/expected %	–	194·1	163·8	87·3	79·7	87·8	64·4	86·2	105·1	89·0	89·4
Sickness period 52/52											
Exposed to risk	18	1527	13794	47720	59165	49643	44325	35492	23067	9558	284309
Actual weeks of sickness	0	0	273	516	941	1303	1539	2754	4760	4349	16435
Expected weeks of sickness	0	9	88	379	716	1062	1791	2921	4036	3550	14552
Actual rate of sickness	0·000	0·000	0·020	0·011	0·016	0·026	0·035	0·078	0·206	0·455	0·058
Actual/expected %	–	0·0	310·2	136·1	131·4	122·7	85·9	94·3	117·9	122·5	112·9
Sickness period 104/all											
Exposed to risk	6	749	9996	40700	52997	45548	41561	34058	22585	9506	257706
Actual weeks of sickness	0	0	148	969	1605	2363	5050	5461	15227	17435	48258
Expected weeks of sickness	0	9	108	448	902	1714	3979	7876	12270	11871	39177
Actual rate of sickness	0·000	0·000	0·015	0·024	0·030	0·052	0·122	0·160	0·674	1·834	0·187
Actual/expected %	–	0·0	137·0	216·3	177·9	137·9	126·9	69·3	124·1	146·9	123·2

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Individual PHI Policies 1979–82
All offices — Standard sickness experience

Table 5. *Males — Deferred period 52 weeks*

Age Group	18–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	All ages
Sickness period 52/52											
Exposed to risk	4	286	2839	11426	19416	19382	18551	14704	8536	2617	97761
Actual weeks of sickness	0	38	0	105	116	312	781	894	2068	998	5312
Expected weeks of sickness	0	1	18	92	237	416	753	1204	1471	948	5140
Actual rate of sickness	0·000	0·133	0·000	0·009	0·006	0·016	0·042	0·061	0·242	0·381	0·054
Actual/expected %	–	3800·0	0·0	114·1	48·9	75·0	103·7	74·3	140·6	105·3	103·3
Sickness period 104/all											
Exposed to risk	3	138	1869	9103	16906	17597	17349	14050	8323	2604	87942
Actual weeks of sickness	0	14	260	172	137	747	1732	2530	5262	2976	13830
Expected weeks of sickness	0	1	21	100	293	667	1671	3229	4447	3164	13593
Actual rate of sickness	0·000	0·101	0·139	0·019	0·008	0·042	0·100	0·180	0·632	1·143	0·157
Actual/expected %	–	1400·0	1238·1	172·0	46·8	112·0	103·7	78·4	118·3	94·1	101·7

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Individual PHI Policies 1979–82
All offices — Standard sickness experience

Table 6. *Males — All deferred periods combined*

Age Group	18–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	All ages
Sickness period 1/3											
Exposed to risk	0	1555	10419	17632	15823	12823	11901	12349	10887	5813	99202
Actual weeks of sickness	0	122	1162	2066	2100	1995	2118	2265	2572	1719	16119
Expected weeks of sickness	0	179	1319	2629	2679	2439	2538	3029	3204	2194	20210
Actual rate of sickness	–	0·078	0·112	0·117	0·133	0·156	0·178	0·183	0·236	0·296	0·162
Actual/expected %	–	68·2	88·1	78·6	78·4	81·8	83·5	74·8	80·3	78·4	79·8
Sickness period 4/9											
Exposed to risk	76	3489	19322	36788	36375	30546	28673	26505	20007	9214	210995
Actual weeks of sickness	2	112	760	1499	2344	2156	3229	3644	4431	2894	21071
Expected weeks of sickness	3	111	800	2317	3221	3733	4691	5868	6189	4257	31190
Actual rate of sickness	–	0·032	0·039	0·041	0·064	0·071	0·113	0·137	0·221	0·314	0·100
Actual/expected %	–	100·9	95·0	64·7	72·8	57·8	68·8	62·1	71·6	68·0	67·6
Sickness period 13/13											
Exposed to risk	183	5749	34151	75938	83152	69481	62099	51011	34202	14520	430486
Actual weeks of sickness	6	89	534	1093	1927	2101	2704	3367	4282	2715	18818
Expected weeks of sickness	2	51	474	1849	3067	3639	4478	5372	5955	5096	29983
Actual rate of sickness	–	0·015	0·016	0·014	0·023	0·030	0·044	0·066	0·125	0·187	0·044
Actual/expected %	–	174·5	112·7	59·1	62·8	57·7	60·4	62·7	71·9	53·3	62·8
Sickness period 26/26											
Exposed to risk	177	6875	47704	124198	143007	119646	106823	86748	57348	24086	716612
Actual weeks of sickness	0	77	645	1623	2519	2734	3637	5971	9261	6021	32488
Expected weeks of sickness	2	55	594	2839	5130	6482	8503	10723	12547	11281	58156
Actual rate of sickness	–	0·011	0·014	0·013	0·018	0·023	0·034	0·069	0·161	0·250	0·045
Actual/expected %	–	140·0	108·6	57·2	49·1	42·2	42·8	55·7	73·8	53·4	55·9
Sickness period 52/52											
Exposed to risk	110	5046	43824	126091	154691	134073	122188	99940	65416	26667	778046
Actual weeks of sickness	0	41	485	2112	3738	4008	6375	9087	16690	13609	56145
Expected weeks of sickness	1	56	521	1961	3589	5498	9533	15879	22054	19183	78275
Actual rate of sickness	–	0·008	0·011	0·017	0·024	0·030	0·052	0·091	0·255	0·510	0·072
Actual/expected %	–	73·2	93·1	107·7	104·2	72·9	66·9	57·2	75·7	70·9	71·7
Sickness period 104/all											
Exposed to risk	34	2255	30867	105450	137062	122419	114508	96050	64111	26531	699287
Actual weeks of sickness	0	14	490	2724	4726	7486	16247	26560	48712	51113	158072
Expected weeks of sickness	1	46	537	1886	3750	7339	17485	35316	55257	52930	174547
Actual rate of sickness	–	0·006	0·016	0·026	0·034	0·061	0·142	0·277	0·760	1·927	0·226
Actual/expected %	–	30·4	91·2	144·4	126·0	102·0	92·9	75·2	88·2	96·6	90·6

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Table 7. *Females — Deferred period 1 week*

Age Group	18–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	All ages
Sickness period 1/3										
Exposed to risk	1	354	1619	1011	764	619	459	516	454	5797
Actual weeks of sickness	0	31	205	221	221	194	163	148	154	1337
Expected weeks of sickness	0	41	203	148	129	118	97	128	133	997
Actual rate of sickness	0·000	0·088	0·127	0·219	0·289	0·313	0·355	0·287	0·339	0·231
Actual/expected %	–	75·6	101·0	149·3	171·3	164·4	168·0	115·6	115·8	134·1
Sickness period 4/9										
Exposed to risk	1	330	1592	1002	754	614	457	514	454	5718
Actual weeks of sickness	0	11	92	144	111	170	153	88	201	970
Expected weeks of sickness	0	10	63	62	67	75	73	116	140	606
Actual rate of sickness	0·000	0·033	0·058	0·144	0·147	0·277	0·335	0·171	0·443	0·170
Actual/expected %	–	110·0	146·0	232·3	165·7	226·7	209·6	75·9	143·6	160·1
Sickness period 13/13										
Exposed to risk	*1*	*284*	*1541*	*984*	*740*	*602*	*451*	*514*	*454*	*5571*
Actual weeks of sickness	0	14	60	55	27	56	53	43	123	431
Expected weeks of sickness	0	3	20	23	28	32	33	56	78	273
Actual rate of sickness	0·000	0·049	0·039	0·056	0·036	0·093	0·118	0·084	0·271	0·077
Actual/expected %	–	466·7	300·0	239·1	96·4	175·0	160·6	76·8	157·7	157·9
Sickness period 26/26										
Exposed to risk	1	224	1466	957	717	586	445	511	452	5359
Actual weeks of sickness	0	12	60	40	0	48	7	60	123	350
Expected weeks of sickness	0	1	17	20	26	32	36	65	98	295
Actual rate of sickness	0·000	0·054	0·041	0·042	0·000	0·082	0·016	0·117	0·272	0·065
Actual/expected %	–	1200·0	352·9	200·0	0·0	150·0	19·4	92·3	125·5	118·6
Sickness period 52/52										
Exposed to risk	*0*	*133*	*1302*	*903*	*676*	*553*	*433*	*507*	*450*	*4957*
Actual weeks of sickness	0	0	44	20	0	43	0	99	197	403
Expected weeks of sickness	0	1	15	14	16	23	34	85	150	338
Actual rate of sickness	–	0·000	0·034	0·022	0·000	0·078	0·000	0·195	0·438	0·081
Actual/expected %	–	0·0	293·3	142·9	0·0	187·0	0·0	116·5	131·3	119·2
Sickness period 104/all										
Exposed to risk	0	33	956	797	600	493	405	496	446	4226
Actual weeks of sickness	0	0	0	4	416	115	0	842	550	1927
Expected weeks of sickness	0	1	17	14	17	30	61	194	380	714
Actual rate of sickness	–	0·000	0·000	0·005	0·693	0·233	0·000	1·698	1·233	0·456
Actual/expected %	–	0·0	0·0	28·6	2447·1	383·3	0·0	434·0	144·7	269·9

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Table 8. *Females — Deferred period* 4 *weeks*

Age Group	18–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	All ages
Sickness period 4/9										
Exposed to risk	35	768	1785	1782	1673	1440	1166	830	451	9930
Actual weeks of sickness	9	28	107	219	336	341	243	147	130	1560
Expected weeks of sickness	1	29	77	114	137	145	149	141	112	905
Actual rate of sickness	0·257	0·036	0·060	0·123	0·201	0·237	0·208	0·177	0·288	0·157
Actual/expected %	900·0	96·6	139·0	192·1	245·3	235·2	163·1	104·3	116·1	172·4
Sickness period 13/13										
Exposed to risk	30	687	1704	1705	1620	1410	1150	823	450	9579
Actual weeks of sickness	11	10	52	91	207	165	140	72	74	822
Expected weeks of sickness	0	7	29	52	67	73	75	74	69	446
Actual rate of sickness	0·367	0·015	0·031	0·053	0·128	0·117	0·122	0·087	0·164	0·086
Actual/expected %	–	142·9	179·3	175·0	309·0	226·0	186·7	97·3	107·2	184·3
Sickness period 26/26										
Exposed to risk	22	579	1583	1597	1546	1365	1127	816	447	9082
Actual weeks of sickness	0	0	33	53	254	90	152	11	108	701
Expected weeks of sickness	0	7	23	30	39	53	70	88	90	400
Actual rate of sickness	0·000	0·000	0·021	0·033	0·164	0·066	0·135	0·013	0·242	0·077
Actual/expected %	–	0·0	143·5	176·7	651·3	169·8	217·1	12·5	120·0	175·3
Sickness period 52/52										
Exposed to risk	11	401	1358	1397	1409	1272	1080	796	442	8166
Actual weeks of sickness	0	0	61	52	175	88	140	55	145	716
Expected weeks of sickness	0	4	13	19	29	43	71	106	124	409
Actual rate of sickness	0·000	0·000	0·045	0·037	0·124	0·069	0·130	0·069	0·328	0·088
Actual/expected %	–	0·0	469·2	273·7	603·4	204·7	197·2	51·9	116·9	175·1
Sickness period 104/all										
Exposed to risk	1	182	941	1063	1162	1102	994	751	432	6628
Actual weeks of sickness	0	0	160	129	104	71	273	156	416	1309
Expected weeks of sickness	0	3	14	17	28	58	132	241	323	816
Actual rate of sickness	0·000	0·000	0·170	0·121	0·090	0·064	0·275	0·208	0·963	0·197
Actual/expected %	–	0·0	1142·9	758·8	371·4	122·4	206·8	64·7	128·8	160·4

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Table 9. *Females — Deferred period* 13 *weeks*

Age Group	18–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	All ages
Sickness period 13/13										
Exposed to risk	36	585	2224	3113	3154	2606	2019	1422	865	16024
Actual weeks of sickness	0	39	55	67	150	227	124	193	158	1013
Expected weeks of sickness	0	4	24	51	76	89	97	100	93	534
Actual rate of sickness	0·000	0·067	0·025	0·022	0·048	0·087	0·061	0·136	0·183	0·063
Actual/expected %	–	975·0	229·2	131·4	197·4	255·1	127·8	193·0	169·9	189·7
Sickness period 26/26										
Exposed to risk	26	491	2019	2911	2984	2501	1964	1400	860	15156
Actual weeks of sickness	0	16	8	113	191	160	245	262	339	1334
Expected weeks of sickness	0	7	28	45	64	83	108	132	135	602
Actual rate of sickness	0·000	0·033	0·004	0·039	0·064	0·064	0·125	0·187	0·394	0·088
Actual/expected %	–	228·6	28·6	251·1	298·4	192·8	226·9	198·5	251·1	221·6
Sickness period 52/52										
Exposed to risk	14	343	1657	2539	2668	2296	1859	1360	851	13587
Actual weeks of sickness	0	0	0	39	116	165	313	527	472	1632
Expected weeks of sickness	0	2	16	30	49	75	113	170	219	674
Actual rate of sickness	0·000	0·000	0·000	0·015	0·043	0·072	0·168	0·388	0·555	0·120
Actual/expected %	–	0·0	0·0	130·0	236·7	220·0	277·0	310·0	215·5	242·1
Sickness period 104/all										
Exposed to risk	2	156	1061	1903	2115	1906	1659	1281	827	10910
Actual weeks of sickness	0	0	0	0	284	238	467	1635	1714	4338
Expected weeks of sickness	0	2	16	30	49	98	215	406	592	1408
Actual rate of sickness	0·000	0·000	0·000	0·000	0·134	0·125	0·281	1·276	2·073	0·398
Actual/expected %	–	0·0	0·0	0·0	579·6	242·9	217·2	402·7	289·5	308·1

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Table 10. *Females — Deferred period 26 weeks*

Age Group	18–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	All ages
Sickness period 26/26										
Exposed to risk	17	325	1835	3269	3594	3546	3323	2459	1240	19608
Actual weeks of sickness	0	0	26	32	88	237	193	203	296	1075
Expected weeks of sickness	0	2	16	30	44	66	104	142	137	541
Actual rate of sickness	0·000	0·000	0·014	0·010	0·024	0·067	0·058	0·083	0·239	0·055
Actual/expected %	–	0·0	162·5	106·7	200·0	359·1	185·6	143·0	216·1	198·7
Sickness period 52/52										
Exposed to risk	11	224	1511	2905	3266	3301	3166	2407	1229	18020
Actual weeks of sickness	0	0	52	0	69	209	477	370	466	1643
Expected weeks of sickness	0	1	10	23	41	71	128	196	208	678
Actual rate of sickness	0·000	0·000	0·034	0·000	0·021	0·063	0·151	0·154	0·379	0·091
Actual/expected %	–	0·0	520·0	0·0	168·3	294·4	372·7	188·8	224·0	242·3
Sickness period 104/all										
Exposed to risk	5	102	968	2246	2644	2843	2857	2282	1195	15142
Actual weeks of sickness	0	0	30	156	104	559	1691	2241	828	5609
Expected weeks of sickness	0	1	11	24	46	108	273	523	629	1615
Actual rate of sickness	0·000	0·000	0·031	0·069	0·039	0·197	0·592	0·982	0·693	0·370
Actual/expected %	–	0·0	272·7	650·0	226·1	517·6	619·4	428·5	131·6	347·3

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Table 11. *Females — Deferred period 52 weeks*

Age Group	18–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	All ages
Sickness period 52/52										
Exposed to risk	1	48	422	756	1056	1173	1218	887	425	5986
Actual weeks of sickness	0	0	0	0	0	26	128	182	26	362
Expected weeks of sickness	0	0	3	6	13	25	50	73	72	242
Actual rate of sickness	0·000	0·000	0·000	0·000	0·000	0·022	0·105	0·205	0·061	0·060
Actual/expected %	–	–	0·0	0·0	0·0	104·0	256·0	249·3	36·1	149·6
Sickness period 104/all										
Exposed to risk	1	19	277	565	829	1007	1099	837	409	5043
Actual weeks of sickness	0	0	0	0	0	131	598	369	338	1436
Expected weeks of sickness	0	0	4	6	14	38	105	192	216	575
Actual rate of sickness	0·000	0·000	0·000	0·000	0·000	0·130	0·544	0·441	0·826	0·285
Actual/expected %	–	–	0·0	0·0	0·0	344·7	569·5	192·2	156·5	249·7

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Table 12. *Females — All deferred periods combined*

Age Group	18–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	All ages
Sickness period 1/3										
Exposed to risk	1	354	1619	1011	764	619	459	516	454	5797
Actual weeks of sickness	0	31	205	221	221	194	163	148	154	1337
Expected weeks of sickness	0	41	203	148	129	118	97	128	133	997
Actual rate of sickness	0·000	0·088	0·127	0·219	0·289	0·313	0·355	0·287	0·339	0·231
Actual/expected %	–	75·6	101·0	149·3	171·3	164·4	168·0	115·6	115·8	134·1
Sickness period 4/9										
Exposed to risk	36	1098	3377	2784	2427	2053	1623	1344	904	15646
Actual weeks of sickness	9	38	198	361	447	513	394	234	331	2525
Expected weeks of sickness	1	34	135	172	217	250	264	299	276	1648
Actual rate of sickness	0·250	0·035	0·059	0·130	0·184	0·250	0·243	0·174	0·366	0·161
Actual/expected %	900·0	111·8	146·7	209·9	206·0	205·2	149·2	78·3	119·9	153·2
Sickness period 13/13										
Exposed to risk	66	1555	5469	5804	5513	4618	3622	2759	1767	31173
Actual weeks of sickness	11	63	167	213	384	446	316	308	355	2263
Expected weeks of sickness	0	14	73	138	204	240	261	290	302	1522
Actual rate of sickness	0·167	0·041	0·031	0·037	0·070	0·097	0·087	0·112	0·201	0·073
Actual/expected %	–	450·0	228·8	154·3	188·2	185·8	121·1	106·2	117·5	148·7
Sickness period 26/26										
Exposed to risk	65	1619	6903	8734	8841	7998	6859	5188	3000	49207
Actual weeks of sickness	0	28	127	239	534	536	596	538	867	3465
Expected weeks of sickness	0	14	83	196	319	434	544	641	644	2875
Actual rate of sickness	0·000	0·017	0·018	0·027	0·060	0·067	0·087	0·104	0·289	0·070
Actual/expected %	–	200·0	153·0	121·9	167·4	123·5	109·6	83·9	134·6	120·5
Sickness period 52/52										
Exposed to risk	36	1147	6250	8498	9072	8595	7757	5956	3393	50704
Actual weeks of sickness	0	0	157	111	359	533	1058	1234	1306	4758
Expected weeks of sickness	0	13	72	131	213	352	603	944	1119	3447
Actual rate of sickness	0·000	0·000	0·025	0·013	0·040	0·062	0·136	0·207	0·385	0·094
Actual/expected %	–	0·0	218·1	84·7	168·5	151·4	175·5	130·7	116·7	138·0
Sickness period 104/all										
Exposed to risk	9	491	4203	6572	7349	7347	7012	5644	3306	41933
Actual weeks of sickness	0	0	191	290	910	1116	3028	5244	3851	14630
Expected weeks of sickness	0	12	75	116	203	442	1065	2077	2784	6774
Actual rate of sickness	0·000	0·000	0·045	0·044	0·124	0·152	0·432	0·929	1·165	0·349
Actual/expected %	–	0·0	254·7	250·0	448·3	252·5	284·3	252·5	138·3	216·0

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Table 13. *Males — Central claim inception rates per* 10,000 *exposed to risk*

Age Group	18–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	All ages
Deferred period 1 week	0	733	1008	1087	1071	1054	1065	994	1217	1347	1082
Deferred period 4 weeks	197	105	80	72	108	133	171	201	359	359	148
Deferred period 13 weeks	42	17	23	19	22	28	34	62	157	157	37
Deferred period 26 weeks	0	7	8	4	5	8	11	21	85	85	15
Deferred period 52 weeks	0	0	0	2	2	5	7	13	71	71	12

Table 14. *Females — Central claim inception rates per* 10,000 *exposed to risk*

Age Group	18–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	All ages
Deferred period 1 week	5000	1088	1149	1360	1721	2229	1743	1473	1498	1477
Deferred period 4 weeks	286	78	106	224	296	385	334	361	333	257
Deferred period 13 weeks	0	68	31	32	41	106	62	144	168	68
Deferred period 26 weeks	0	0	5	9	17	39	24	49	89	28
Deferred period 52 weeks	0	0	0	0	0	0	16	45	47	13

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