

**Continuous Mortality Investigation
Mortality Sub-Committee**

Working Paper 10

The Mortality of Impaired Assured Lives, 1991-2002

November 2004

THE MORTALITY OF IMPAIRED ASSURED LIVES, 1991-2002

SUMMARY

The investigation into the mortality of impaired assured lives was started on 1 January 1982 and includes only policies written on or after that date. The reports on the mortality of impaired assured lives cover a rolling period of twelve years. The Mortality Sub-Committee believes that this period maximises the number of deaths available for investigation while still being short enough to preclude secular changes in mortality from having too big an influence on the results. On this occasion data for the years 1991-2002 is covered. The previous report (*C.M.I.R.* 20, 91) covered data for the period 1987-1998.

The sections that follow cover the data build up, the results in general, and comments on a number of impairments with sufficient data to allow more detailed study. The tables relating to the text are placed together at the end of the report on pp 4 to 9.

1. THE DATA

Tables IMP 1a and IMP 1b show, for males and females respectively, the exposed to risk and the deaths in the same impairment groups as were shown in the last report.

The investigation covers policies, separately coded, from each of the major categories of life assurance business investigated by the CMI. These are single life permanent (whole life and endowment), both linked and non linked, and temporary, plus joint life first death. However, again in order to maximise the data, all classes are combined for the purposes of this report. The number of offices participating in the investigation has reduced since the last report. Further, the volume of new business reported under this investigation by these offices has also been reducing. This may be due to existing products sold by these offices being replaced by new ones which are not included in the returns to the CMI for this investigation, or that their new products do not include benefits that require underwriting and hence rating. This may also be due to reducing market shares of the contributing offices. Another possible reason may be that changes in offices' underwriting stances could have led to a greater proportion of lives being accepted on standard terms.

2. THE RESULTS – GENERAL COMMENTS

The results are presented in Tables IMP 2a and IMP 2b. These show, for broad impairment groups, the exposed to risk, the actual deaths and the percentage ratios of the actual deaths to those which would have been expected using the AM92 select table for males, and the AF92 select table for females. An index showing the additional mortality per 1000 exposed to risk is also given.

The median point for the impaired lives data probably lies somewhere around the middle of 1996. At this point the level of mortality of unrated lives against AM92/AF92 select for all durations was approximately 89% for males and 95% for females.

In previous reports, for some groups an analysis by duration was possible, though for many impairment groups there was only enough data to give results for all durations combined. However, as data volumes have continued to fall, there is no longer sufficient data to validate any analysis by duration. Therefore, all analysis and commentary in this report is based on all duration data only.

It should always be kept in mind that the results in most impairment groups are based on a limited number of deaths, and that there are wide variations between the sub-groups in each category.

3. THE RESULTS BY IMPAIRMENT

The following paragraphs cover only those groups of impairment where there are sufficient data to provide significant results. In the following commentary, additional risk is measured by comparing the 100A/E for the impairment group with the 100A/E for unrated lives.

3.1 *Hypertension*

For all age groups it is clear that hypertension is a significant extra risk both for males and females. As in the last report on impaired lives (*C.M.I.R. 20*) the lower the age at entry, the higher the additional risk for both sexes. For males, the additional risk within age groups increases with the severity of the hypertension. For females, the data are too few to allow a full analysis by severity of the hypertension.

3.2 *Ischaemic heart disease without surgery*

The additional risk is very heavy among males entering at ages below 50. There is not enough data for females entering at ages below 50 to reach any conclusions. At ages over 50, the additional risk for males falls and that for females rises, converging at a point for both sexes about twice the mortality recorded for standard lives.

3.3 *Ischaemic heart disease with surgery*

There are a significant number of deaths among the males and the additional mortality recorded is severe. Similarly to the previous report, a higher additional mortality is recorded among the females, but the number of deaths on which this conclusion is based is again small.

3.4 *Nervous disorders*

The distinct difference, for both males and females, between those whose disorder is defined as mild or moderate and those whose disorder is severe continues to be observed. For males, those with a mild or moderate diagnosis experience a level of mortality very similar to that experienced by standard lives, while for females the level is higher than for standard lives. Those with a severe diagnosis suffer a significant additional risk. For females, the additional risk is higher than for males, particularly in the case where the disorder is severe.

3.5 *Disseminated sclerosis*

There is a severe additional risk apparent, with the additional risk being higher for females. The additional risk for males is higher than observed in the previous report, though remains below the females.

3.6 *Peptic ulcer*

For males, there is some extra risk for cases both with and without surgery; this differs from the previous report where there was virtually no extra risk for cases without surgery. The risk is higher for those with surgery and as noted in the previous report logic would suggest that these are the more serious cases.

3.7 *Epilepsy*

For both sexes, the recorded additional risk is significant, but for females the number of deaths on which this conclusion is drawn is small. Since most policyholders whose epileptic symptoms are well controlled are accepted on standard terms, the implication must be that only the rated cases are being submitted in the statistics supplied by offices.

3.8 *Diabetes mellitus*

Among males there is a clear distinction between the mortality experience of early onset and late onset cases, with that of early onset being much the heavier. There is a similar pattern for females, although this is less pronounced and the number of deaths is smaller.

3.9 *Respiratory disorders*

There is some additional risk for males suffering bronchial asthma. Where this degenerates to chronic bronchitis the risk is much heavier. Unlike the previous report, the additional presence of emphysema does not seem to increase the additional mortality much, though the small number of deaths should be noted. Emphysema on its own, however, tends to show very heavy additional mortality.

3.10 *Tumours*

For females, the additional risk for malignant tumours appears to be extremely high. Where the tumours are non-malignant there is a less severe, yet still significant extra risk. This differs from the previous report which showed no apparent extra risk from non-malignant tumours. The number of male deaths is small, but the indications are of severe additional risk.

3.11 *Overweight*

Like the previous report there appears to be significant additional risk in both sub-groups for females, although this is more pronounced for females over 40% overweight. There is insufficient data to give a breakdown by entry age. For males, more than 30% overweight, the additional risk appears to be higher at ages 30 to 49 than for ages 50 and over.

4. CONCLUSIONS

The exposed to risk has continued to reduce, particularly at durations 0 and 1, due to fewer offices contributing data. Volumes of new business reported by the remaining offices under this investigation are also falling.

While the investigation is yielding what the Executive Committee believes to be useful results, their credibility would be greatly enhanced if more offices were to join the investigation.

It remains to thank those offices that have faithfully contributed data over the years. Others could show their appreciation by offering to join them in this enterprise. The CMI would be pleased to discuss this with anyone interested.

Table IMP 1a. Impaired lives 1991-2002, males: deaths and exposed to risk in impairment groups, by curtate duration.

Impairment	Duration 0		Duration 1		Durations 2 & over		All durations	
	Deaths	Exposed to risk	Deaths	Exposed to risk	Deaths	Exposed to risk	Deaths	Exposed to risk
Hypertension	4	1,834	12	2,009	411	29,326	427	33,169
IHD without surgery	30	2,106	33	2,396	681	24,836	744	29,338
IHD with surgery	8	727	9	808	115	4,945	132	6,479
Cerebrovascular disease	4	271	4	295	62	2,599	70	3,165
Nervous disorders	5	2,381	3	2,413	115	24,801	123	29,595
Disseminated sclerosis	3	228	0	273	34	2,867	37	3,367
Peptic ulcer	0	446	1	506	113	13,662	114	14,613
Ulcerative colitis	0	630	4	730	29	6,704	33	8,064
Crohn's disease	0	404	1	457	22	4,454	23	5,315
Epilepsy	0	397	3	434	43	7,535	46	8,366
Diabetes mellitus	15	3,719	23	4,301	388	36,642	426	44,662
Respiratory disorders	15	5,413	20	5,560	261	44,918	296	55,891
Urinary disorders	0	157	2	200	33	4,171	35	4,527
Malignant tumour	4	169	2	138	4	421	10	728
Overweight	12	8,407	20	8,251	306	65,718	338	82,375
All impairments in investigation	100	27,286	137	28,767	2,617	273,596	2,854	329,648

Table IMP 1b. Impaired lives 1991-2002, females: deaths and exposed to risk in impairment groups, by curtate duration.

Impairment	Duration 0		Duration 1		Durations 2 & over		All durations	
	Deaths	Exposed to risk	Deaths	Exposed to risk	Deaths	Exposed to risk	Deaths	Exposed to risk
Hypertension	7	928	4	1,042	257	15,538	268	17,508
IHD without surgery	9	571	3	652	145	6,119	157	7,341
IHD with surgery	1	104	0	120	16	638	17	862
Cerebrovascular disease	2	169	1	181	31	1,534	34	1,884
Nervous disorders	8	4,287	9	4,063	129	34,688	146	43,038
Disseminated sclerosis	0	377	1	439	38	3,789	39	4,604
Peptic ulcer	2	175	1	183	12	2,974	15	3,332
Ulcerative colitis	0	501	1	564	8	4,135	9	5,200
Crohn's disease	1	526	2	585	9	3,971	12	5,082
Epilepsy	1	470	2	504	15	6,288	18	7,261
Diabetes mellitus	9	1,981	18	2,301	135	17,412	162	21,693
Respiratory disorders	8	6,531	13	6,347	167	39,756	188	52,634
Urinary disorders	0	96	1	104	9	2,187	10	2,387
Malignant tumour	4	606	7	640	98	5,991	109	7,237
Overweight	17	17,873	22	17,457	329	126,305	368	161,634
All impairments in investigation	69	35,193	85	35,178	1,398	271,322	1,552	341,693

Table IMP 2a. Impaired lives, 1991-2002, males, all investigations and all durations combined: exposed to risk, actual deaths, percentage ratios of actual deaths to those expected using the AM92 select table (100A/E) and excess deaths per 1000 exposed to risk (A-E ‰).

Impairment			Exposed to risk	Actual deaths	100 A/E	A-E ‰
Hypertension						
Entry ages	SAP	DAP				
Under 40	all	all	7,784	23	160	1.1
40-59	155 & over	under 95	5,875	64	171	4.5
40-59	155 & over	95-105	7,989	62	124	1.5
40-59	under 155	95 & over	3,938	29	123	1.4
40-59	155 & over	over 105	3,064	36	166	4.7
40-59	all	all	20,865	191	144	2.8
60 & over	160 & over	under 100	2,478	111	114	5.5
60 & over	160 & over	100-110				
60 & over	under 160	100 & over	1,783	77	118	6.5
60 & over	160 & over	over 110	260	25	246	57.1
60 & over	all	all	4,521	213	123	8.9
Ischaemic heart disease (without surgery)						
Entry ages	Onset					
Under 50	within 4 years		4,541	45	313	6.7
Under 50	4 years & over		3,675	40	295	7.2
50 & over	within 2 years		5,170	131	152	8.7
50 & over	2-4 years		4,344	131	185	13.8
50 & over	4-6 years		3,760	112	187	13.8
50 & over	6 years & over		7,850	285	175	15.6
Ischaemic heart disease (with surgery)			6,479	132	207	10.5
Cerebrovascular disorders			3,165	70	201	11.1
Nervous disorders						
Mild or moderate			20,398	78	88	-
Severe (including schizophrenia & attempted suicide)			9,197	45	119	0.8
Disseminated sclerosis			3,367	37	318	7.5
Peptic ulcer						
Without surgery			11,370	73	102	0.1
With surgery			3,243	41	147	4.0
Ulcerative colitis			8,064	33	139	1.1
Crohn's disease			5,315	23	195	2.1
Epilepsy			8,366	46	164	2.1

Table IMP 2a. (Continued).

Impairment		Exposed to risk	Actual deaths	100 A/E	A-E ‰
Diabetes mellitus					
Entry ages	Years since diagnosis				
Under 50	all	33,618	135	260	2.5
50 & over	under 10	7,149	160	150	7.5
50 & over	10 or more	3,895	131	266	21.0
Respiratory disorders					
Bronchial asthma		52,789	203	120	0.6
Chronic bronchitis without emphysema		2,047	47	204	11.7
Chronic bronchitis with emphysema		695	33	226	26.5
Emphysema without bronchitis		360	13	361	26.1
Urinary disorders		4,527	35	143	2.3
Tumours					
Breast, malignant		728	10	237	7.9
Overweight					
Entry ages	Overweight %				
Under 30	20-30	19,992	10	77	-
Under 30	over 30	8,559	2	32	-
30-49	20-30	25,384	72	151	1.0
30-49	over 30	16,378	61	179	1.6
50 & over	20-30	8,189	140	122	3.1
50 & over	over 30	3,875	53	108	1.0
Non-rated lives - 1996				89	

Table IMP 2b. Impaired lives, 1991-2002, females, all investigations and all durations combined: exposed to risk, actual deaths, percentage ratios of actual deaths to those expected using the AF92 select table (100A/E) and excess deaths per 1000 exposed to risk (A-E ‰).

Impairment			Exposed to risk	Actual deaths	100 A/E	A-E ‰
Hypertension						
Entry ages	SAP	DAP				
Under 40	all	all	2,888	9	242	1.8
40-59	all	all	9,641	63	150	2.2
60 & over	all	all	4,980	196	130	9.0
all	all	all	17,508	268	136	4.1
Ischaemic heart disease (without surgery)						
Entry ages	Onset					
Under 50	all durations		1,387	2	66	-
50 & over	within 4 years		2,782	65	184	10.7
50 & over	4 years & over		3,173	90	178	12.5
Ischaemic heart disease (with surgery)			862	17	268	12.4
Cerebrovascular disorders			1,884	34	243	10.6
Nervous disorders						
Mild or moderate			30,332	87	120	0.5
Severe (including schizophrenia & attempted suicide)			12,707	59	196	2.3
Disseminated sclerosis			4,604	39	400	6.4
Peptic ulcer						
With or without surgery			3,332	15	93	-
Ulcerative colitis			5,200	9	117	0.2
Crohn's disease			5,082	12	204	1.2
Epilepsy			7,261	18	157	0.9
Diabetes mellitus						
Entry ages	Years since diagnosis					
Under 50	all		17,147	48	314	1.9
50 & over	under 10		2,650	68	245	15.2
50 & over	10 or more		1,896	46	264	15.1
Respiratory disorders			52,634	188	188	1.7

Table IMP 2b. (Continued).

Impairment	Exposed to risk	Actual deaths	100 A/E	A-E ‰	
Urinary disorders	2,387	10	211	2.2	
Tumours					
All malignant excluding cervical	5,495	103	332	13.1	
Breast, non malignant, and uterine fibroids	1,742	6	141	1.0	
Overweight					
Entry ages	Overweight %				
all	20-40	124,196	277	112	0.2
all	over 40	37,438	91	129	0.5
all	all	161,634	368	116	0.3
Non-rated lives - 1996			95		