New Zealand Mortality Investigation
Insured Lives 2008–2010

Abridged Report

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A Berkshire Hathaway Company

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1 Executive Summary

1.1 Scope of Report

- This reports covers years 2008 – 2010 for term life insurance only. Ten companies contributed data to the mortality pools. The previous mortality investigation was conducted by Eriksen & Associates Limited for the observation period 2005 – 2007. Changes in both the scope of product and data contributors make extensive comparisons to the previous report of limited use.
- The data basis for this study was strong enough to yield significant results in certain blocks, with approximately 5.4 million records and 12,000 deaths available for observation in total. The types of cover were classified as follows:

Table 1.1.1: Data volume observed in scrubbed pools by benefit type and q_x levels in per mil, unadjusted for demographic mix

	Data Volume		
	Exposed to Risk	Number of Claims	q_x in per mil
Non-Accelerated Term	2,861,892	4,240	1.48
Guaranteed Acceptance Term	269,735	6,786	25.16
Other Term	64,028	133	2.08
Accelerated Term	456,633	363	0.79

1.2 Key Findings

- Non-accelerated term mortality levels are well under 2005–07 New Zealand population levels, observing 54% Actual versus Expected claims (A/E) for males and 57% for females.
- Accelerated term insurance showed mortality levels significantly below non-accelerated term, perhaps due to the nature of the accelerated product whereby the death benefit is partly or wholly accelerated by another event and paid prior to death. The ratio of A/E's between the two products is 0.71.
- As expected, guaranteed acceptance business exhibits significantly higher mortality levels, with age-standardized mortality at over 230% that of underwritten mortality levels. However, when comparing and interpreting claims experience of different segments, it should be taken into consideration that the underlying risks and portfolios are structurally different – this applies to individual companies as well as to the pools as a whole.
- The mortality ratio from smokers to nonsmokers lies just below 200% for most age ranges for both genders.
- Wide variation in mortality levels exists among companies within the same benefit type.
- Sum-weighted A/Es are slightly lower than exposure-weighted A/Es for underwritten products but higher for guaranteed acceptance.
- The average amount of death cover per policy in non-accelerated term exposures was $237,000 for males and $209,000 for females. The average cover is higher for accelerated term and much lower for guaranteed acceptance.
- Absolute mortality rates for non-accelerated term were 1.9 per mil for males and 1.1 for females, reflecting different demographics. Graduated mortality rates at individual ages for non-accelerated term as well as guaranteed acceptance can be found in Appendix 7.1.
- A select period of 3 years was assumed in this investigation, though mortality levels continue to increase for at least the following 5 policy years.
- As expected, nonstandard lives exhibited higher mortality levels than standard lives. After applying death loadings to expected mortality rates, ratio of nonstandard to standard mortality levels fell to under 1.00, meaning that the industry is rating sufficiently for the additional risk.

1.3 Limitations

The investigation was under certain data specification constraints; in addition, limited data volume was observed in certain cells. Please reference the Methodology section as well as tabulations in Appendix for further details on these considerations.

We have reviewed the quality of data for reasonability and have a fair number of contributors for non-accelerated term business in particular; nonetheless, mortality results reported in this investigation may not apply to an individual insurer's portfolio of risks.

2 Glossary of Terms

For certain clarifications and details, please refer to Section 5 on methodology.

Accelerated Benefit – Benefit where its payment will reduce the sum insured of another benefit.

Actual / Expected (A/E) – Actual mortality claims observed in insurance data pools divided by expected mortality as observed in the New Zealand population. A/E is weighted either on an exposures (lives) basis or on an insured sums basis, as indicated in the captions of the graphs. All sum-weighted A/E's are calculated based on sum insured as found in the amount of death cover data field.

Age – Age last of the insured life at the date of census for exposures or year prior to date of death for claims.

Data Year – The year the data was classified in, which for most data contributors was on a reported calendar year basis.

Duration – The years removed from the policy effective date, as defined by curtate duration.

Expected – Unless otherwise indicated, population level mortality as defined by the New Zealand 2005–07 (NZ05-07) period life tables for Māori and non-Māori populations combined.

Mortality Rate – Actual q_x as observed in the insured lives data pool.

Observation period – January 1, 2008 – December 31, 2010, and on a reported (Date of Notification, or Date of Admission for terminal illness claims) basis except where the data contributor only had incurred dates (Date of Claim) available, in which case incurred dates were used. Please see Section 5 on methodology for further details on our consideration of incurred but not reported (IBNR) claims. There were also data contributors who provided data built around the valuation date, meaning that they submitted data instead from October 1, 2007 – September 30, 2010. For simplicity, however, we refer to the observation period throughout this report as 2008 – 2010.

Select – Unless otherwise specified, we have defined the "select" period in which underwriting effects play the largest role in influencing mortality results to be the initial three policy years. This means that curtate durations of 0, 1, and 2 are included in our select period. Longer durations (3+) are considered to be the "ultimate" period, even though some underwriting effects may still remain.

Standard – Underwritten products (accelerated and non-accelerated in this report) are assigned scores by the underwriter at the closing of a policy, and a death loading (% increase to "normal" mortality expected for the block of business) is applied. Those policies with a death loading above 0% are considered nonstandard. Those underwritten policies with 0% are deemed standard lives.

3 Introduction

We are pleased to present the results of the mortality investigation of insured lives in New Zealand between 2008 and 2010. This investigation has been prepared for the New Zealand Society of Actuaries by General Reinsurance AG (Gen Re). Previous investigations have been performed by Jonathan Eriksen & Associates for experience years 2005 – 2007 and by Peter Davies for experience years 2000 – 2004.

This report has a focus on term life insurance products, both underwritten and guaranteed acceptance, and its scope is accordingly slightly different to that of prior investigations. The data pools in this report reflect the contribution of 10 New Zealand life insurance companies. The report provides key findings in the products, compares mortality to population levels, and also provides multiple graduated tables in the Appendix.

Please feel free to contact Gen Re at any time with comments and questions regarding this report. Our contacts for this investigation are:

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We also thank our colleague, Ms. Julia Warth, for her contribution as internal peer reviewer, as well as Mr. Boris Geißler, who served as the technical analyst.

Sydney and Cologne, October 2012

4 Overview of Data

4.1 List of Contributors

We would like to thank the following individual life insurers for their data contributions:

- AMP
- Asteron
- AXA
- BNZ Life
- Fidelity Life
- OnePath Insurance Services
- OnePath Life
- Sovereign Assurance
- Tower Life
- Westpac Life

All leading writers of life insurance have been included in this study, representing over 80% market share in New Zealand of individual term written premium.

4.2 Data Submission Process

All 10 of the contributing insurers adhered to the data specifications laid out by the New Zealand Society of Actuaries. We received claims files for all claims falling within the 2008 – 2010 observation period. We separately received four exposure files from each company – one for each census date, from the beginning of the period (December 31, 2007), and each year thereafter through December 31, 2010.

The specified format is similar to that followed in previous investigations, but with a few minor structural adjustments as well as changed benefit definitions and exclusions. Data contributors classified and submitted data according to the following benefit types:

Table 4.2.1: Description of benefit classifications

Benefit Type	Description
10	**Non-Accelerated Term:** Term insurance benefits that had substantial underwriting. Benefits that have any accelerated morbidity benefit attached at the census date should not have been included here. This classification includes yearly renewable term as well as level premium term. These benefit have historically been sold with formal advice; however, benefit sold directly online or over-the-phone with substantial underwriting (either manual or through an automated engine) would also be included.
11	**Guaranteed Acceptance Term:** Term insurance benefits sold on a guaranteed acceptance basis (i.e. no underwriting). These benefits are typically direct marketed to clients with no formal advice, but other guaranteed acceptance products sold through advisors, affinity partners or banks would be included.
12	**Other Term:** All other term insurance benefits that aren't guaranteed acceptance, but had limited underwriting and were generally sold with no or very limited advice. Examples include: (1) a direct-mail term product with a 1-page questionnaire; (2) a term policy sold over-the-counter at a bank branch with 5 simple questions and no needs analysis.
13	**Accelerated Term:** Term insurance benefits that had substantial underwriting. And have one or more accelerated morbidity benefit attached at the census date (e.g. critical illness, TPD). If it was not practical to accurately determine whether there are accelerated morbidity benefits attached, then data contributors reverted to the non-accelerated term benefit type (10). Terminal illness is not regarded as an accelerated benefit.

Products falling outside these definitions and thus excluded from the study include, among others:

- Participating and non-participating traditional benefits, e.g. whole of life and endowment
- Unbundled life benefits
- Single premium benefits
- Group schemes with employer subsidies and guaranteed acceptance
- Accidental death cover
- Joint and contingent life benefits
- Benefits with no or nominal amounts of death cover, e.g. health insurance with a nominal death benefit

The vast majority of data consisted of 20–64-year-old males and females for underwritten term products, and higher age ranges for guaranteed acceptance products with lower sums.

In total for the investigation period of 2008 – 2010, we observed the following exposure basis:

Table 4.2.2: Data volume observed in scrubbed pools by benefit type and raw qx levels in per mil, unadjusted for age mix

	Data Volume		
	Exposed to Risk	Number of Claims	q_x in per mil
Non-Accelerated Term (10)	2,861,892	4,240	1.48
Guaranteed Acceptance Term (11)	269,735	6,786	25.16
Other Term (12)	64,028	133	2.08
Accelerated Term (13)	456,633	363	0.79

The number of claims in Table 4.2.2 is for the 3 data years combined; the exposures are the counts of exposed-to-risk for all four census dates – at the end of 2007, 2008, 2009, and 2010 – with exposures at the end of 2007 and 2010 multiplied by ½.

The emphasis of the data is on underwritten term life business, with most falling under non-accelerated term. A smaller volume of data was available for guaranteed acceptance term business but yielding statistically significant results; the smallest block of data fell under "other term", which entails limited underwriting.

Detailed analysis was performed in this investigation by the following characteristics:

- Benefit Type
- Policy Year
- Data Year
- Sex
- Company
- Smoking Status
- Attained Age
- Death Cover
- Duration

The following is a comprehensive list of fields provided in the data submissions for each exposure:

- Benefit Type, as defined above
- Table Code, which was unique to each company
- Sex
- Underwriting Basis
- Date of Birth
- Date Risk Commenced, which determined the policy year
- Amount of Death Cover, which was used for all sum-based analysis
- HIV Testing Status, which was optional and not well populated; we do not report on its results
- Smoking Status
- Death Indicator, which was optional and did not provide credible results

- Death Loading, which was used to define standard and nonstandard risks, and which we also used to compare underwriting loads at outset to observed mortality ratios
- CPI Increase, which we used in structuring the data and counting exposures and sums, but which we do not report on in this publication

For all claims we also received reported dates, incurred dates where available, cause of death, claim amount and type of claim to indicate terminal illness as well as whether the claim was paid in full.

Further details on the data specifications and process for data submission can be found in Appendix 7.4.

The quality of the results depends on the submissions received, i.e. the accuracy and completeness of exposures and claims (deaths) data. Submissions for each company were reviewed individually and in relation to the pools for reasonability. In a few instances, adjustments were made in the data scrubbing process, which will be disclosed in the individual company benchmarking reports.

Actuarial judgment was required on the part of the data contributors in classifying risks between non-accelerated and accelerated term; we have accepted the classifications as provided, though different data contributors may have used different approaches in differentiating between these two benefit types. For accelerated term policies low mortality levels can be noted; this could be due to under-reporting of deaths after the accelerated benefit is in place rather than reflecting low mortality levels. Again, however, results are shown on the data in the pools with no adjustments.

Late claims have perhaps a minimal impact on data quality as the time lag of reporting on mortality benefits is minimal; no IBNR adjustments have been included in this investigation, as described in the Methodology section.

4.3 Exposure Basis

The number of data contributors by benefit type is as follows:

Table 4.3.1: Number of insurers contributing data to each benefit type

Product	Number of Data Contributors
Non-Accelerated Term (10)	10
Guaranteed Acceptance Term (11)	7
Other Term (12)	3
Accelerated Term (13)	4

We scaled down the exposures of any data contributor exceeding 35% contribution, for both guaranteed acceptance (11) and accelerated term (13). This re-weighting of exposures was performed for both of these benefit types to protect the anonymity of all data contributors.

Non-accelerated term policies (10) had robust data volume and 10 data contributors that were well distributed, so no scaling factors were applied in this instance. For other term (12), we did not re-weight exposures. However, we exclude this benefit type from the core of our analysis and do not provide graduated tables for this product due to both low data volume and the small number of data contributors.

Table 4.3.2 below shows a summary of data volume, both in number of exposures and number of claims included in our analysis.

Table 4.3.2: Summary of exposure basis by select phase, ultimate phase and all durations. Exposed to Risk (half of exposures in 2007 and 2010 and all exposures in 2008 and 2009 plus half of all deaths) as well as claims counts are shown for each gender and benefit type.

	Male Exposed to Risk	Female Exposed to Risk	Male Claims	Female Claims
Select				
Non-Accelerated Term (10)	524,391	487,600	575	257
Guaranteed Acceptance Term (11)	39,708	50,983	550	483
Other Term (12)	8,530	12,486	10	7
Accelerated Term (13)	108,231	92,318	69	31
Ultimate				
Non-Accelerated Term (10)	969,528	880,374	2,195	1,213
Guaranteed Acceptance Term (11)	73,808	105,237	2,958	2,795
Other Term (12)	17,033	25,980	69	47
Accelerated Term (13)	139,198	116,885	164	98
All Durations *				
Non-Accelerated Term (10)	1,493,919	1,367,973	2,770	1,470
Guaranteed Acceptance Term (11)	113,515	156,220	3,508	3,287
Other Term (12)	25,563	38,465	79	54
Accelerated Term (13)	247,429	209,203	233	129

* Claim and exposure totals may not reconcile to Table 4.2.2 due to rounding

More detailed statistics and tabulations can be found in Section 7.3 of the Appendix.

5 Methodology

In-force and claims files were provided as of 31 December 2007, 2008, 2009 and 2010 (some companies provided data as of 30 September 2007, 2008, 2009 and 2010).

The age and duration of the in-force policies were calculated as age last and curtate duration as per 31 December of the data year. The age of the deaths was calculated as Age Last as of 1st January of the Year of Claim corrected by ½ year (which is Age Last as per 1st July of the Year of Claim). The duration of deaths was calculated as curtate duration as per date of claim. For those companies with valuation date at 30 September the above calculations of age and duration were adjusted accordingly.

To calculate q_x:

The q-rate is the number of deaths divided by the *exposed to risk,* which is defined for a single year here as the average of the in-force data at the beginning and at the end of the year plus ½ of the deaths during the year:

$d_x^{08/09/10}$ actual deaths of age x in 2008 / 2009 / 2010

$N_x^{07/08/09/10}$ in-force data at the end of 2007 / 2008 / 2009 / 2010

$$m_x = \frac{2 \cdot \left(d_x^{08} + d_x^{09} + d_x^{10}\right)}{N_x^{07} + 2 \cdot N_x^{08} + 2 \cdot N_x^{09} + N_x^{10}}$$

$$q_x = \frac{m_x}{1 + m_x / 2} = \frac{2 \cdot \left(d_x^{08} + d_x^{09} + d_x^{10}\right)}{N_x^{07} + 2 \cdot N_x^{08} + 2 \cdot N_x^{09} + N_x^{10} + d_x^{08} + d_x^{09} + d_x^{10}}$$

To calculate A/E:

A/E is calculated by dividing the actual deaths by the expected deaths, which are the exposed to risk times the expected q-rate:

$$A/E_x = \frac{2 \cdot \left(d_x^{08} + d_x^{09} + d_x^{10}\right)}{\left(N_x^{07} + 2 \cdot N_x^{08} + 2 \cdot N_x^{09} + N_x^{10} + d_x^{08} + d_x^{09} + d_x^{10}\right) \cdot q_x}$$

q_x (expected) mortality is based on New Zealand population table for age x.

As mentioned in the Data Submission Process section, we performed reasonability checks and in some instances removed or reclassified exposures or claims. We have deleted approximately 70 claims we found to be faulty or outside the scope of our investigation. One example of this would be if a policy was first reported as a terminal illness claims and then reported in the data as a death claim, both with full payment – we have counted this as one claim. However, this scrubbing in total is a one-sided adjustment; as we do not know which claims were missing, we may have slightly underestimated mortality, but if completely a one-sided adjustment this would affect the A/E by less than 1%.

Please see the Data Submission Process section for further details on the data specifications and structure of data found in the pools. The Appendix provides details on how the graduated tables were developed at individual ages.

As mentioned in section 4.3 on Exposure Basis, we scaled down the exposures of any data contributor exceeding 35% contribution, for both guaranteed acceptance (11) and accelerated term (13). This re-weighting of exposures was performed for both of these benefit types to protect the anonymity of all data contributors.

A note on IBNR: most data contributors classified their data according to date of notification (or date of admission for terminal illness claims), meaning that if the data is sorted by reported year, then incurreds not yet reported by the end of 2010 are missing, but that this gap is compensated by the reporteds we received for incurreds prior to 2008. We have assumed that the pattern of reporting did not change significantly, and that industry-wide the volume of business did not shift significantly enough for the lag in payments to distort our results.

6 Results

6.1 Overview

We compared the mortality levels observed in the pools (actual) for the years 2008 to 2010 to mortality levels observed in New Zealand's population 2005 – 2007 (expected). All summary mortality rates fall below population levels for the analyzed products except for guaranteed acceptance. We show the actual-to-expected (A/E) mortality levels for each product separately for select and ultimate periods below in Table 6.1.1 (males) and Table 6.1.2 (females). To the left of each table is the exposure-weighted A/E result and to the right is the sum-weighted result.

Table 6.1.1: Exposure-weighted and sum-weighted A/E by select and ultimate phase for each product, males

Males	Exposure-Weighted Actual / Expected			Sum-Weighted Actual / Expected		
Product	All Durations	Select	Ultimate	All Durations	Select	Ultimate
Non-Accelerated Term	54%	45%	57%	46%	42%	48%
Guaranteed Acceptance Term	131%	140%	129%	144%	160%	140%
Other Term	85%	61%	89%	75%	46%	89%
Accelerated Term	37%	30%	41%	33%	27%	37%

As expected, term products with significant underwriting, experience mortality significantly below those with no (guaranteed acceptance) or limited (other term products) underwriting.

Newly underwritten products experience a selection effect in the first several years. Table 6.1.1 above shows an 11–12 percentage point increase in the A/E from the select to the ultimate period for males with significant underwriting (exposure-weighted). We observe the reverse on guaranteed acceptance policies, where the select period has the highest mortality level on the table.

Other term benefits, which comprise a mélange of products, have relatively low data volume, but the age-adjusted mortality levels fall somewhere between those term products with significant underwriting and those with guaranteed acceptance. This is to be expected as other term benefits were defined to have limited underwriting.

Sum-weighted A/Es are slightly lower than exposure-weighted A/Es for underwritten products but not for guaranteed acceptance, perhaps suggesting some anti-selection at the higher sums. However, the relations observed in exposure-weighted A/Es between select and ultimate as well as between products hold when weighting by insured sums as well.

Similar relationships exist for the females:

Table 6.1.2: Exposure-weighted and sum-weighted A/E by select and ultimate phase for each product, females

Females	Exposure-Weighted Actual / Expected			Sum-Weighted Actual / Expected		
Product	All Durations	Select	Ultimate	All Durations	Select	Ultimate
Non-Accelerated Term	57%	39%	63%	48%	32%	55%
Guaranteed Acceptance Term	124%	137%	122%	135%	154%	131%
Other Term	68%	49%	72%	77%	63%	83%
Accelerated Term	44%	29%	52%	35%	22%	45%

One distinction in the results for females, however, is that the difference between select and ultimate is larger than for males in the underwritten products. This holds in both the exposure-weighted and sum-weighted results.

We show similar results as in the above two tables but for standard lives only. This means excluding nonstandard lives (those exposures who at time of underwriting received a death loading). Accordingly we show underwritten term products only:

Table 6.1.3: Exposure-weighted and sum-weighted A/E by select and ultimate phase for each product, males. Standard lives only.

Males	Exposure-Weighted Actual / Expected			Sum-Weighted Actual / Expected		
Product	All Durations	Select	Ultimate	All Durations	Select	Ultimate
Non-Accelerated Term	52%	43%	54%	44%	40%	46%
Accelerated Term	35%	30%	38%	32%	27%	35%

The A/Es fall in standard lives only by no more than 2–3 percentage points for both exposure-weighted and sum-weighted, both in select and ultimate years. The reason for the small difference between standard lives and all lives is that less than 8% of exposures received death loadings above 0%. The same stable results are observed in females:

Table 6.1.4: Exposure-weighted and sum-weighted A/E by select and ultimate phase for each product, females. Standard lives only.

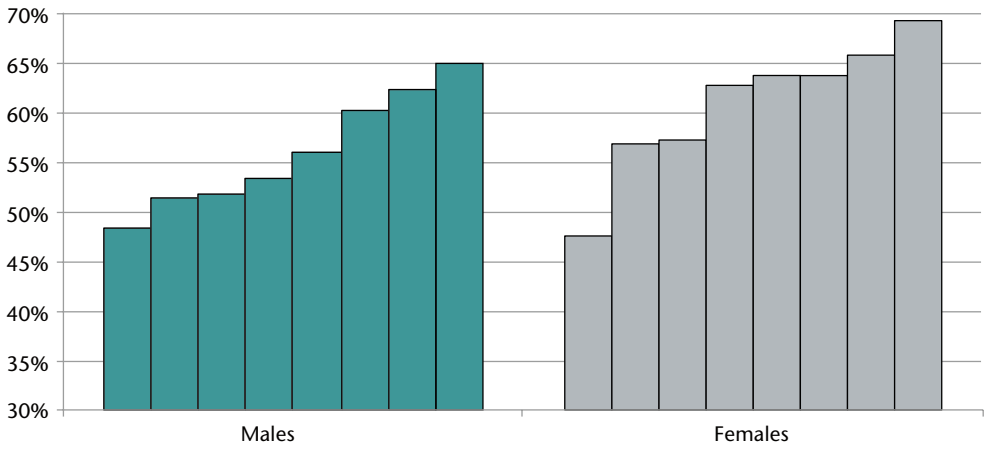
Females	Exposure-Weighted Actual / Expected			Sum-Weighted Actual / Expected		
Product	All Durations	Select	Ultimate	All Durations	Select	Ultimate
Non-Accelerated Term	54%	36%	59%	46%	29%	54%
Accelerated Term	42%	26%	51%	33%	18%	44%

The A/Es for female standard lives vary by no more than 4 percentage points from Table 6.1.3, which includes all lives.

Appendix 7.3 shows tabulations of the data for results shown above, as well as for figures throughout this report. Please reference this Appendix for data volume and statistical significance of key results.

Having excluded two companies at random for sake of anonymity, we show in the graph below how the exposure-weighted A/E mortality for ultimate non-accelerated term business varies by insurer:

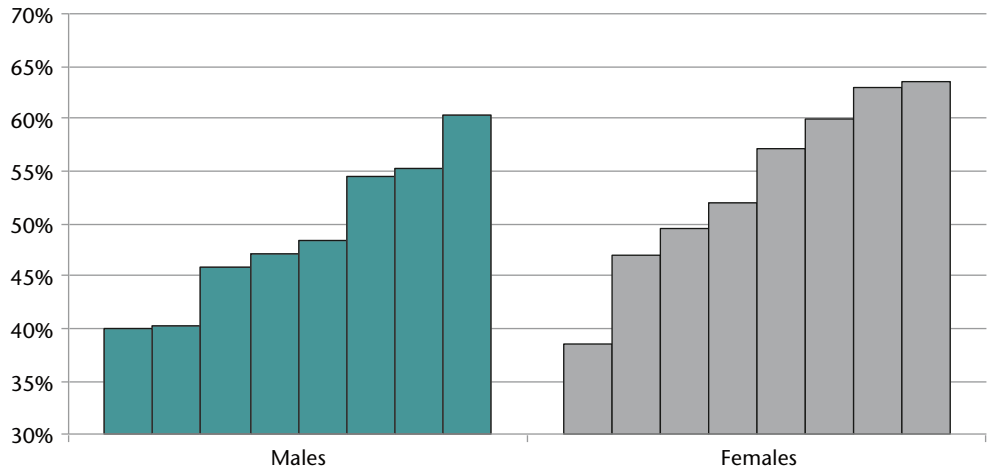
Figure 6.1.1: Variation by selected companies in exposure-weighted A/Es for males and females. Ultimate non-accelerated term policies only.



The insurers are sorted according to the exposure-weighted A/E result for each gender. One can see that the mortality level varies significantly at the summary level – likely drivers include not just different mixes of age and duration for each company, but also slightly different risks as well as selection effects.

We found that the results varied even more widely when looking at A/Es weighted by insured sums:

Figure 6.1.2: Variation by selected companies in sum-weighted A/Es for males and females. Ultimate non-accelerated term policies only. Note that the anonymized companies have been sorted according to sum-weighted A/Es, which is not necessarily the same order of companies observed in Figure 6.1.1.



One can see given this variation that mortality results reported in this investigation may not apply to an individual insurer's portfolio of risks.

Guaranteed acceptance benefits were more volatile in A/E results by company, but this is partially explained by the different products and related risks that are bundled into this benefit classification. Exposure-weighted A/Es for the guaranteed acceptance classification varied by more than 100% among companies. Conversely, we observed less variation in accelerated term A/Es than in the variation reported above for non-accelerated term. This lower variation may also reflect few data contributors.

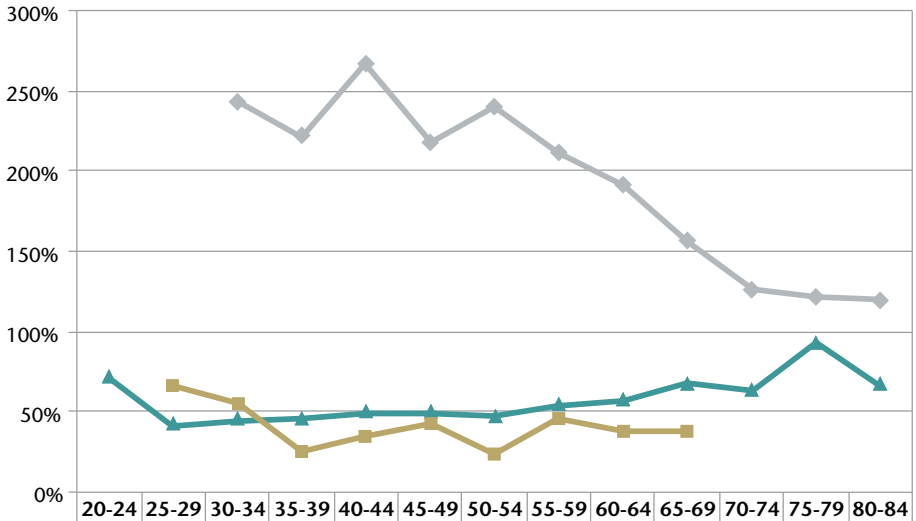
6.2 Analysis by Age Band

The overview of results presented in Section 6.1 reflects mortality levels across all ages. Probability of death increases exponentially at the older ages; for this reason, exposures across all products are skewed towards younger attained ages in comparison to the attained age distribution of the claims. As a result of the exponential increase in death rates along with age, our observed mortality levels at the all-age level are dominated by older ages. It is therefore important to take a look at A/Es by age band, as the insured mortality level may vary more widely from the population at certain age bands than others.

For underwritten products (non-accelerated and accelerated term as well as other term), the majority of the exposures as well as deaths lie in the 40–69-year-old range. For guaranteed acceptance, however, attained ages lie mostly between 60 and 79. We exclude from the below analysis age ranges with low data volume.

We show below the male A/Es by age band for accelerated term, non-accelerated term, and guaranteed acceptance business:

Figure 6.2.1: Male exposure-weighted A/Es and corresponding numbers of deaths by 5-year age band. All lives are included in the analysis (for all durations as well as standard/nonstandard lives), and the results are shown for 3 benefit types: accelerated term, non-accelerated term, and guaranteed acceptance. Cells with 5 claims or less are not shown.



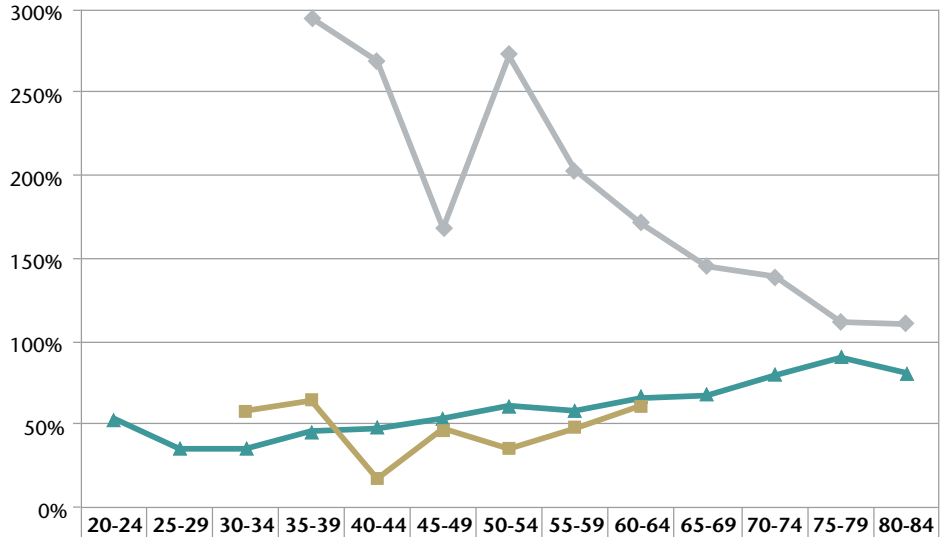
	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84
non-Accel A/E	72%	41%	44%	45%	49%	49%	48%	54%	57%	68%	63%	93%	66%
GA A/E			243%	222%	267%	218%	241%	218%	192%	158%	127%	122%	120%
Accel A/E		66%	56%	25%	34%	42%	24%	46%	39%	38%			
non-Accel Claims	26	30	58	124	214	314	403	529	533	338	135	54	8
GA Claims			6	7	10	13	37	106	266	445	608	857	775
Accel Claims		8	13	14	30	52	30	52	26	6			

The relationship in A/Es of guaranteed acceptance > non-accelerated term > accelerated term holds for each age band, except in ages 25–34, where low data volume may explain the accelerated term findings.

We note that the significant anti-selection effects of guaranteed acceptance lessen with attained age. Non-accelerated term A/E appears to increase steadily with age; we note that this trend disappears when controlling for the higher durations that are observed with higher ages (i.e. in the highest ages the policyholders are further removed from the underwriting point in time). It appears that the age shape of the population does not fit equally well at all age bands due at least in part to these selection effects.

We observe similar relationships and trends with the female data:

Figure 6.2.2: Female exposure-weighted A/Es and corresponding numbers of deaths by 5-year age band. All lives are included in the analysis (for all durations as well as standard/nonstandard lives), and the results are shown for 3 benefit types: accelerated term, non-accelerated term, and guaranteed acceptance. Cells with 5 claims or less are not shown.



	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
non-Accel A/E	53%	36%	35%	47%	48%	53%	61%	57%	64%	66%	74%	83%	82%
GA A/E				294%	269%	168%	272%	203%	171%	146%	139%	111%	110%
Accel A/E			59%	65%	17%	47%	36%	47%	61%				
non-Accel Claims	7	10	28	81	138	224	292	270	225	109	55	22	7
GA Claims				6	9	9	41	104	239	403	621	675	705
Accel Claims			9	21	9	32	20	19	12				

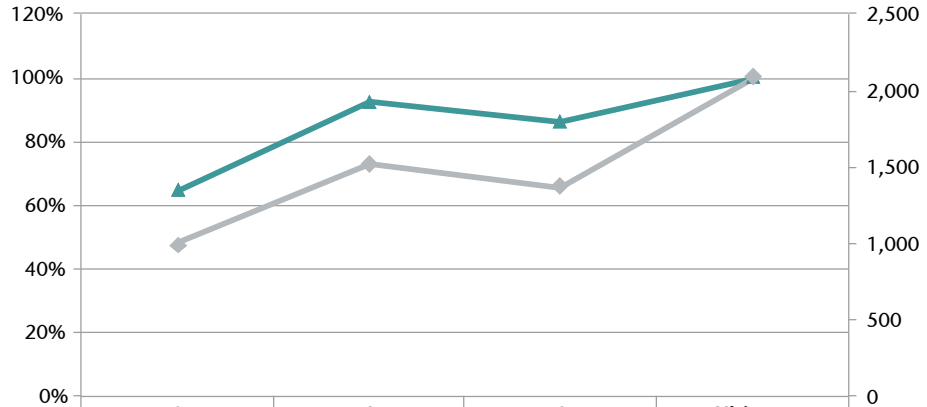
Exposures decline less quickly at the highest ages (in ages 85+) in guaranteed acceptance business for females than males, as the females simply have longer life expectancies; we observed continued reversion towards population mortality levels at these highest ages.

6.3 Analysis of Selection Effects

The prior two mortality investigations have assumed a select phase of 3 years. In the bulk of the analysis in this report, we have adopted this assumption. That is to say, **select results that follow are a weighted average of curate durations 0, 1, and 2, and ultimate results comprise the durations beyond this.** This also defined the select and ultimate phases the results of which were shown in the Overview section 6.1.

The selection effect on underwritten term life insurance is clearly visible over the three-year period, where the A/E level is well below the ultimate level (with curtate duration of 3 years and above). We compare in Figure 6.3.1 the select A/Es as percent of the ultimate level for non-accelerated term policies:

Figure 6.3.1: Select exposure-weighted A/E as % of Ultimate A/E; for standard non-accelerated term policies, all ages



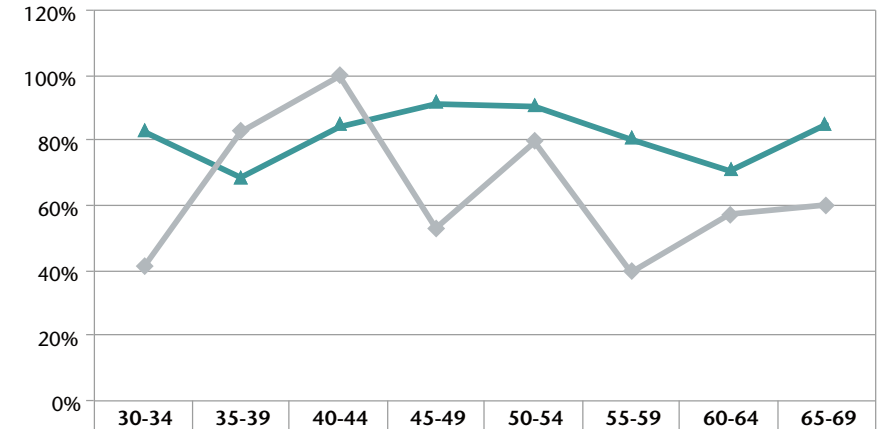
	0	1	2	Ultimate
Sel/Ult - M	0.64	0.91	0.86	1.00
Sel/Ult - F	0.48	0.71	0.65	1.00
# Claims - M	155	191	154	1,953
# Claims - F	64	82	65	1,064

We observed a similar pattern in accelerated term policies.

As we note in Section 6.1, the reverse trend is observed in guaranteed acceptance business, where the select period has a higher A/E than the ultimate period – likely reflecting anti-selection effects, though we do note a different mix of contributors in the select versus ultimate phase which may distort guaranteed acceptance findings by duration.

A look at the same ratio as above for each age band shows that the select mortality levels lie well below the ultimate period across almost all relevant age ranges:

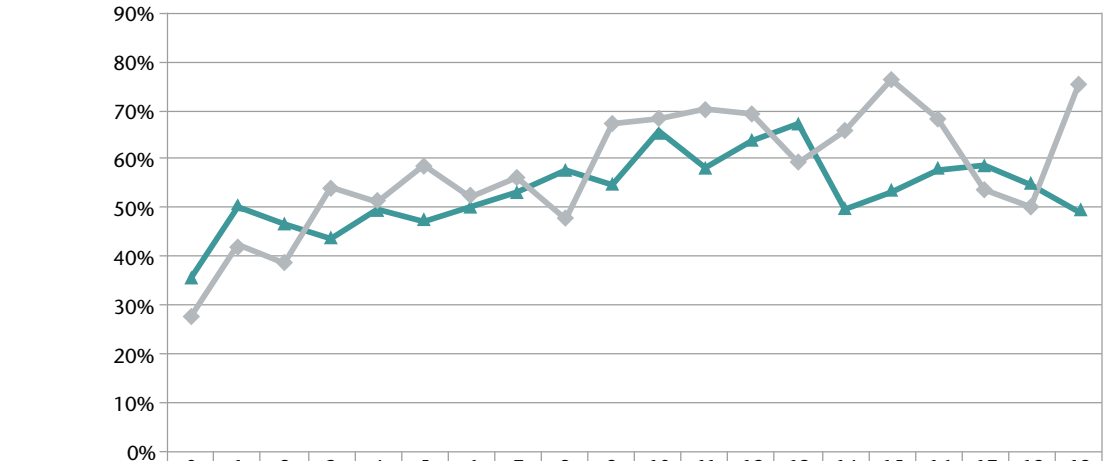
Figure 6.3.2: Select exposure-weighted A/E as % of Ultimate A/E; for standard non-accelerated term policies, across key age bands



	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69
Sel/Ult - M	0.82	0.68	0.85	0.91	0.91	0.80	0.72	0.85
Sel/Ult - F	0.41	0.83	1	0.53	0.80	0.40	0.58	0.60
Ult Claims - M	25	72	135	214	274	392	411	253
Ult Claims - F	16	47	83	164	212	218	170	85

We do, however, see a possible interpretation of selection effects continuing well beyond the initial three years, perhaps for another five years:

Figure 6.3.3: Movement in exposure-weighted A/Es by curtate duration up to duration 19, non-accelerated term policies, standard lives



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
A/E - M	35%	50%	47%	44%	50%	47%	50%	53%	58%	55%	66%	58%	64%	67%	50%	53%	58%	59%	55%	49%
A/E - F	28%	42%	39%	54%	51%	58%	52%	56%	47%	67%	68%	70%	69%	59%	66%	76%	68%	54%	50%	75%
# Claims - M	155	191	154	135	152	148	162	174	189	173	186	144	133	112	64	50	42	34	23	13
# Claims - F	64	82	65	85	80	94	87	96	81	109	96	83	68	47	40	34	23	14	9	8

Similar development in the select years was observed in accelerated term policies.

We defined the select period throughout this report to be curtate durations 0 through 2, which reflects significantly lower mortality levels than the ultimate levels and is in keeping with prior investigations. As the continuing benefit of underwriting appears to wane after the first three years, particularly for females, we preferred to begin the ultimate period earlier to lend more credibility to the ultimate graduated tables. An alternate view of a 5-year select period would increase A/Es for females by 6 points and for males by 1 point.

6.4 Insured Sums and Related Mortality Levels

Note: All information on sums insured in this section and throughout the report is on a New Zealand dollar basis, is based on the Amount of Death Cover field, and reflects any CPI increases as provided by data contributors.

The sums for non-accelerated term are significantly higher than guaranteed acceptance. Accelerated term contains slightly higher average sums per policy. Table 6.4.1 below shows both the average amounts of cover per policy in the exposure basis by product as well as percentiles:

Table 6.4.1: Average (mean) amounts of death cover for each benefit type as well as percentiles. All lives and durations.

Amount of Death Cover by Percentiles					
	Mean	25th %ile	50th %ile	75th %ile	90th %ile
Non-Accelerated Term	$223,000	$100,000	$170,000	$300,000	$455,000
Guaranteed Acceptance Term	$ 10,000	$ 3,000	$ 5,000	$ 9,000	$ 20,000
Other Term	$121,000	$ 50,000	$100,000	$160,000	$260,000
Accelerated Term	$308,000	$125,000	$250,000	$400,000	$570,000

Due to the one-sided boundary on distribution of sums, the means are all higher than the median (50th percentile), as expected. The sums for guaranteed acceptance are much lower but have a slightly longer tail at higher sums – the 90th percentile as a ratio of the 50th percentile is over 4, whereas both underwritten term products have a corresponding ratio of below 3.

The lowest sums (under $5,000) observed in guaranteed acceptance business appear to be used to cover funeral expenses.

We do note a small disparity between males and females, where the average sums taken out are lower for females than males in the underwritten products. The difference narrows considerably at younger ages for both underwritten products:

Table 6.4.2: Average amount of death cover per policyholder, males and females, as well as for males and females under 40. Non-accelerated term policies only, all lives and durations.

Average Amount of Death Cover by Gender						
	Males	Females	M/F Ratio	Males Under 40	Females Under 40	M/F Ratio
Non-Accelerated Term	$237,000	$209,000	1.13	$251,000	$248,000	1.01
Guaranteed Acceptance Term	$ 10,000	$ 10,000	1.00			
Other Term	$114,000	$126,000	0.90	$176,000	$194,000	0.91
Accelerated Term	$336,000	$275,000	1.22	$324,000	$301,000	1.08

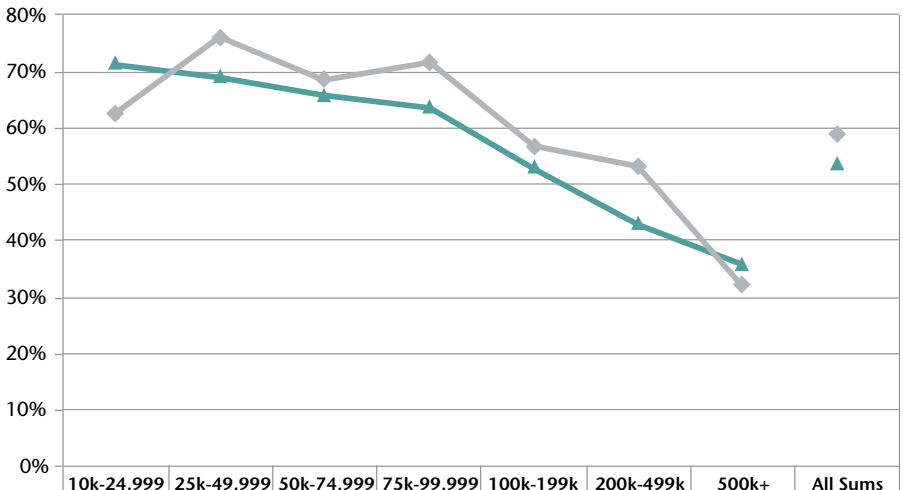
We note that the gender disparity in average sums has narrowed in ages under 40 for accelerated term and closed for non-accelerated term. Attained ages under 40 exhibited significantly higher sums across the board for females, but male sums in ages under 40 were also higher than all ages except in accelerated term.

The variation in product and level of insured sum, observed in Table 6.4.1 and behind the results in Table 6.4.2, exists for both guaranteed acceptance and other term in particular, making results for these two benefit types difficult to interpret. We do not show results for guaranteed acceptance under age 40 due to low data volume at the younger ages.

In addition to traditional pricing factors such as age and sex there are many other socio-economic and clinical criteria that influence mortality level. The amount of death cover (insured sum) is a well-known factor and is available for all policies. However, the relationship between sum insured and socio-economic status is not always the same – for underwritten, largely higher sum products, the amount of death cover is a sign of prosperity. For other products with lower premiums, this may not be the case. In addition, higher sums taken out may be an indication of stronger underwriting requirements and may simply comprise a different set of risks.

To see how the level of insured sum affects mortality, Figure 6.4.1 shows for non-accelerated term policies both the claims counts we observed and the resulting A/E by insured sum band:

Figure 6.4.1: Exposure-weighted A/Es by amount of death cover for non-accelerated term, males and females. Standard lives, ultimate years only.

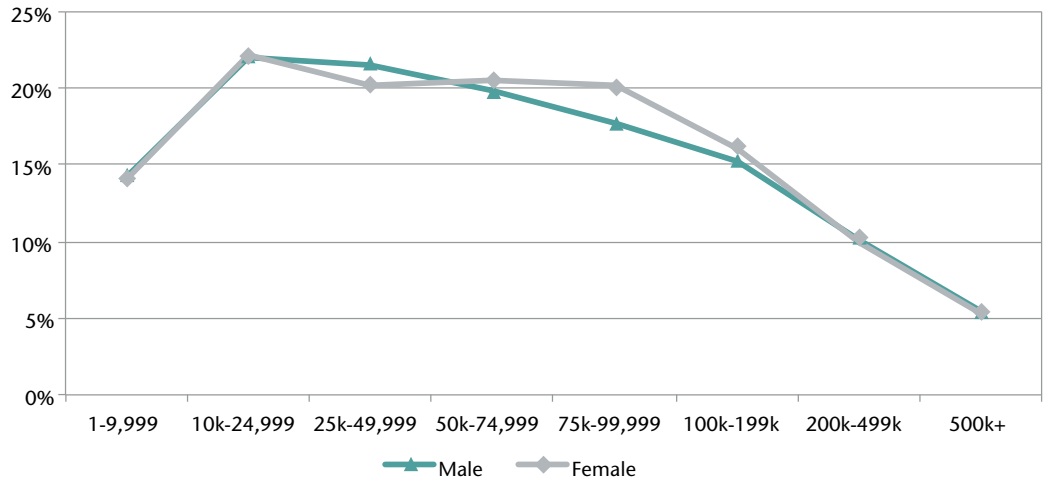


	10k-24,999	25k-49,999	50k-74,999	75k-99,999	100k-199k	200k-499k	500k+	All Sums
Std-M A/E	71%	69%	66%	63%	53%	43%	36%	54%
Std-F A/E	63%	76%	69%	72%	57%	53%	32%	59%
Std-M Claims	183	241	288	143	558	391	83	
Std-F Claims	89	140	163	86	315	228	20	

We see a similar pattern for males and females in non-accelerated term policies, where the mortality level declines steadily as the amount of death cover increases. Most policies are taken out with sums between 100,000–199,999. We noted a similar development in A/E for accelerated term policies, where A/E is lower in the higher sums.

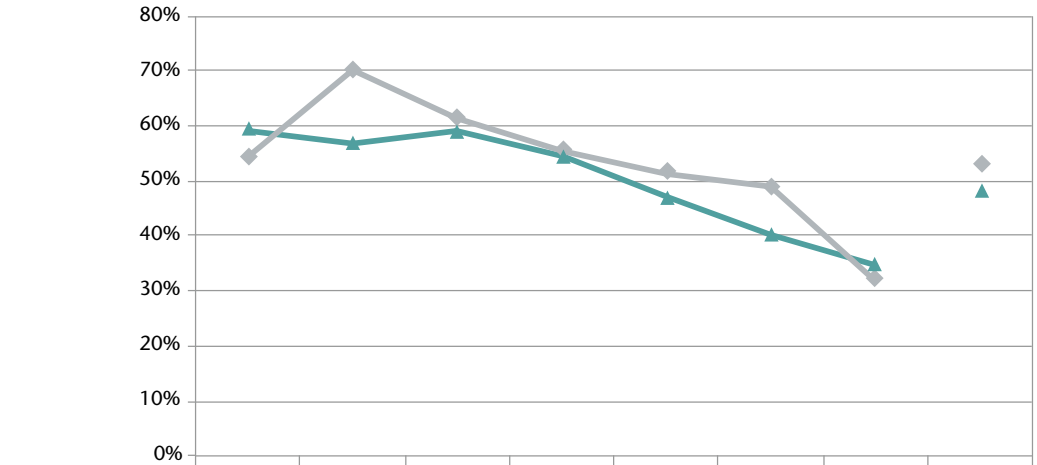
One may suspect that the reason for lower mortality levels at the higher sums lies in the smoking prevalence disparity. In this investigation we do observe declining smoker prevalence with higher sums. Figure 6.4.2 shows this declining reported smoker prevalence for both genders:

Figure 6.4.2: Smokers as percent of all exposures (all smoking statuses, including aggregate) by sum insured band, males and females. Ultimate years, non-accelerated term.



However, we note that the insured sums effect illustrated in Figure 6.4.1 remains even among non-smokers, and that the smoking disparity is not attributable for the lower A/Es in the higher levels of death cover. We show the same insured sum effect for non-smokers in Figure 6.4.3:

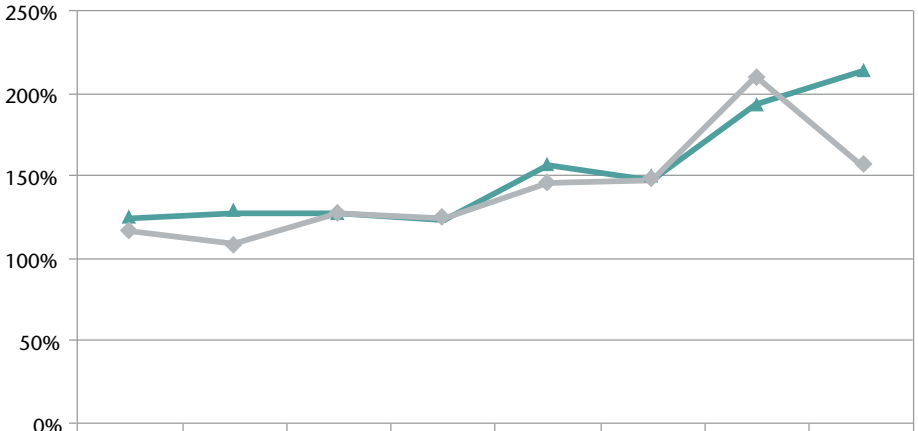
Figure 6.4.3: Exposure-weighted A/Es by amount of death cover for non-accelerated term, males and females. Standard lives, ultimate years only. Same as Figure 6.4.1 but for non-smokers only.



	10k-24,999	25k-49,999	50k-74,999	75k-99,999	100k-199k	200k-499k	500k+	All Sums
Std-M A/E	59%	57%	59%	55%	47%	40%	35%	48%
Std-F A/E	55%	70%	61%	56%	51%	49%	32%	53%
Std-M Claims	122	164	219	106	441	336	77	
Std-F Claims	62	107	122	56	250	192	19	

Figure 6.4.4 contains A/Es observed by level of death cover for guaranteed acceptance.

Figure 6.4.4: Ultimate exposure-weighted A/Es for guaranteed acceptance by insured sum, males and females. Bands of insured sums defined by amount of death cover.



	1-999	1,000-2,499	2,500-4,999	5,000-7,499	7,500-9,999	10,000-24,999	25,000-49,999	≥ 50,000
Ult-M A/E	124%	128%	127%	123%	157%	147%	192%	213%
Ult-F A/E	117%	109%	127%	124%	145%	147%	211%	157%
Ult-M Claims	197	976	921	479	162	189	21	12
Ult-F Claims	166	818	1.019	455	163	149	17	7

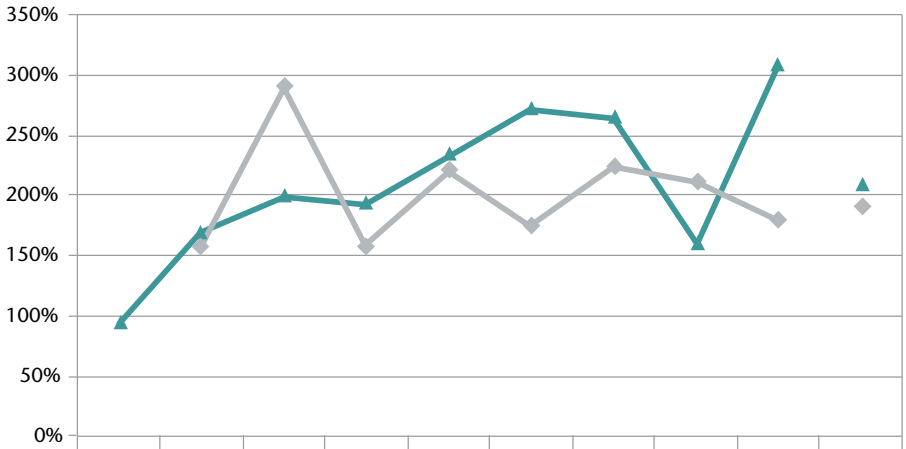
The opposite relationship appears, where the A/Es increase slightly in the higher sums but is more volatile at these higher sums and may reflect a different product mix than those with the lowest sums, or may reflect anti-selection effects.

6.5 Analysis of Smoker / Non-Smoker Mortality

From the data pools we find the following mortality ratios of smoker over nonsmoker mortality. These ratios mirror previous results, where smoker mortality is roughly twice that of nonsmoker mortality for underwritten term products, with aggregate mortality falling somewhere in between.

We show the results by age range for non-accelerated term business:

Figure 6.5.1: Ratio of smoker-to-nonsmoker exposure-weighted A/Es by age band. All durations, non-accelerated term, standard lives only. Cells with 5 claims or less are not shown.



	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	Ages 20-84
Male S/N	0.94	1.69	2.00	1.92	2.32	2.71	2.65	1.59	3.07	2.08
Female S/N		1.57	2.89	1.59	2.20	1.74	2.25	2.10	1.80	1.90
Smoker-M Claims	9	28	53	73	92	119	104	36	21	556
Smoker-F Claims		16	40	43	66	45	42	18	7	286

Age ranges outside 30–74 are not shown above due to low data volume. Male ratios appear to increase with age. Female ratios are more difficult to interpret from the above data but hover around 200%.

For males we observe a slightly higher mortality ratio than for females, at 2.08 versus 1.90.

The following table shows the exposures behind the smoker and nonsmoker data. As one can see below, those policies based on an aggregate rate were reported, but minimal exposures fell under this category.

Table 6.5.1: Distribution for each gender by smoking status and resulting exposure-weighted A/Es. Non-accelerated term, standard lives only, ages 20–84 only.

Summary by Smoking Status				
	Distribution of Exposed to Risk		Exposure-Weighted A/E	
	Male	Female	Male	Female
Aggregate	0.3%	0.2%		
Smoker	15.3%	15.2%	94%	91%
Nonsmoker	84.4%	84.6%	45%	48%
All	100.0%	100.0%	52%	54%

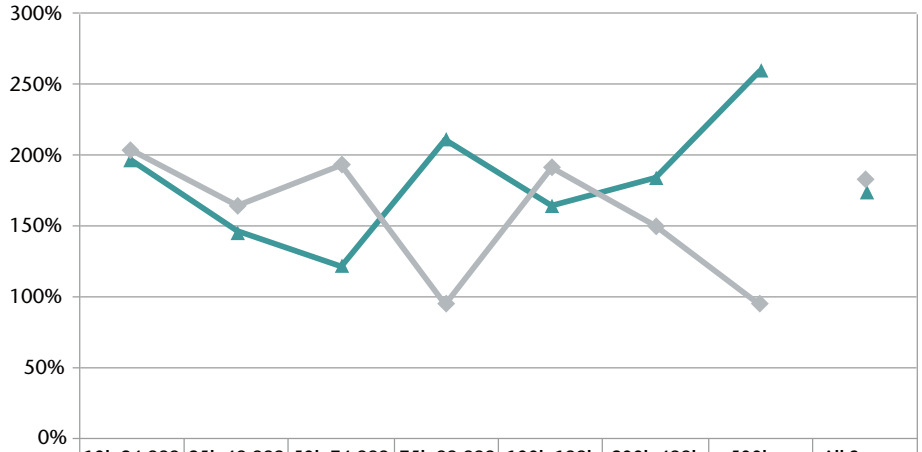
As aggregate rates are uncommon for underwritten term, we do not show the resulting A/E due to low data volume. As expected for all products together (which includes guaranteed acceptance), however, we observed aggregate mortality levels as lying between smoker and nonsmoker levels for both males and females.

For accelerated term and guaranteed acceptance, both the portion of smokers to nonsmokers as well as the mortality ratio between smokers and nonsmokers exhibited similar relationships.

6.6 Nonstandard Lives and Assessment of Death Loadings

In this section we compare A/E ratios of nonstandard (substandard) to standard lives – meaning how much higher the mortality is among the policyholders who received underwriting loadings at the time of issue. First we show the ratio for both males and females by amount of death cover:

Figure 6.6.1: Nonstandard/standard mortality ratios (ratio of exposure-weighted A/E's) by insured sum band for ultimate non-accelerated term policies. Ages 20–84 only included. Expected based on population q_x, unloaded for nonstandard lives' underwriting levels.

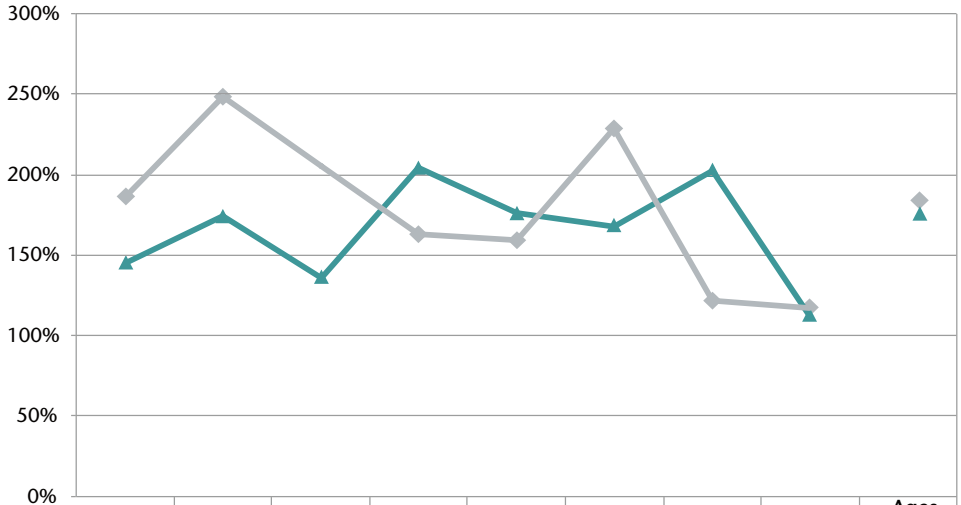


	10k-24.999	25k-49.999	50k-74.999	75k-99.999	100k-199k	200k-499k	500k+	All Sums
Nonstd/Std Ratio-M	1.98	1.46	1.21	2.11	1.65	1.84	2.60	1.76
Nonstd/Std Ratio-F	2.04	1.64	1.93	0.95	1.92	1.51	0.95	1.83
Std-M Claims	183	241	288	143	558	391	83	1,953
Std-F Claims	89	140	163	86	315	228	20	1,064

The mortality ratio of nonstandard/standard appears higher for females in the smaller insured sums, and then reverses itself in the higher sums, where male mortality ratios are higher.

We show the same analysis but by age band instead of insured sum:

Figure 6.6.2: Nonstandard / standard mortality ratios (ratio of exposure-weighted A/E) by selected age bands for ultimate non-accelerated term policies. Expected based on population q_x, unloaded for nonstandard lives' underwriting levels.



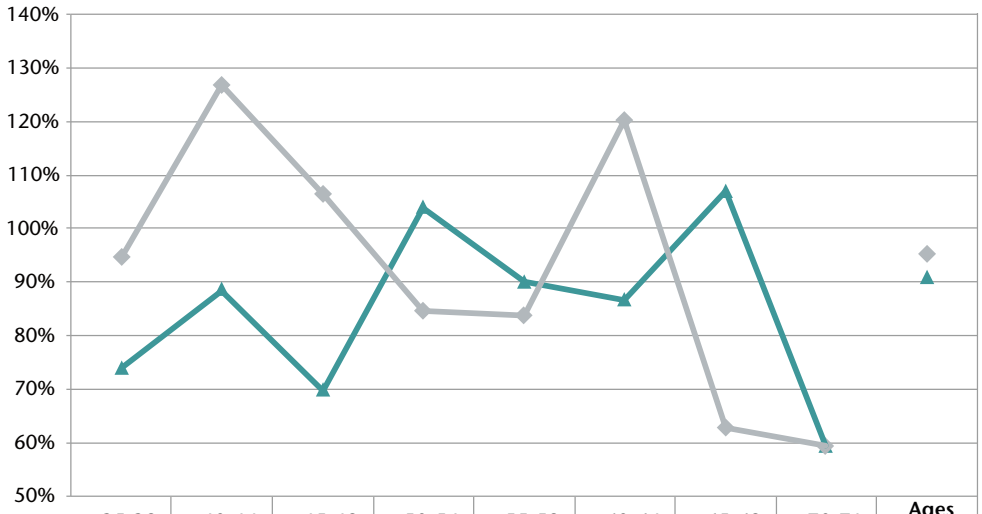
	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	Ages 20-84
Nonstd/Std Ratio-M	1.46	1.74	1.36	2.04	1.76	1.67	2.03	1.12	1.76
Nonstd/Std Ratio-F	1.87	2.48	2.05	1.63	1.60	2.29	1.22	1.17	1.84
Std-M Claims	72	135	214	274	392	411	253	113	1,952
Std-F Claims	47	83	164	212	218	170	85	45	1,064

No clear pattern of differences in mortality ratio emerges by age band. Overall, the mortality ratio of nonstandard / standard is quite similar for males as for females.

As a further step, we add the death loading directly onto the expected mortality levels, to see if the underwriting loadings applied at the time of issue were sufficient to cover the extra risk. In Figure 6.6.3 below the expected mortality for each nonstandard life is multiplied by the death loading assumed by the underwriter. This death loading is defined by (% above nonstandard + 1). Figure 6.6.3 compares to the unloaded expected values shown above in Figure 6.6.2.

The industry appears to be slightly "over-correcting" for nonstandard lives in general. The numbers in Figure 6.6.1 and 6.6.2 show ratios far above 1.0 for nonstandard – mostly between 1.3 and 2.5. Figure 6.6.3 below shows the "corrected" ratios, i.e. after controlling for the death loading:

Figure 6.6.3: Ratio of nonstandard / standard exposure-weighted A/Es for selected age bands. Underwriting loads are embedded in the E of the nonstandard A/E's, in contrast to Figure 6.6.2. Note the different vertical axis scale. Ultimate years, non-accelerated term only.

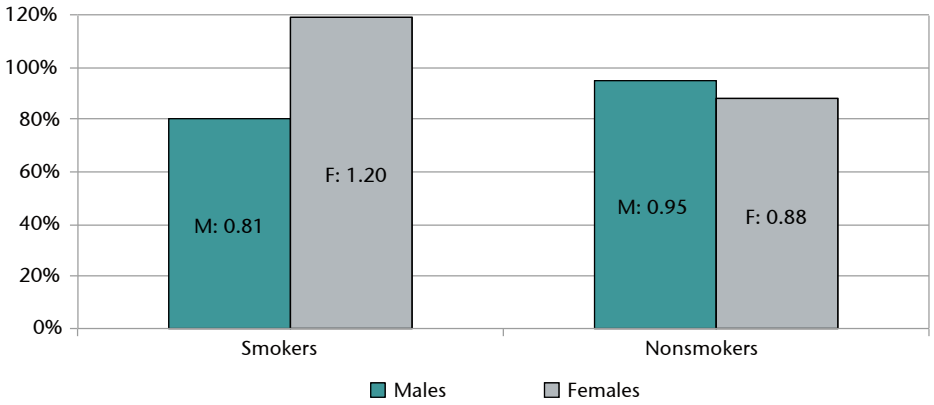


	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	Ages 20-84
Nonstd/Std Ratio-M	0.74	0.88	0.70	1.04	0.90	0.87	1.07	0.59	0.91
Nonstd/Std Ratio-F	0.95	1.27	1.06	0.85	0.84	1.20	0.63	0.59	0.95
Std-M Claims	72	135	214	274	392	411	253	113	1,952
Std-F Claims	47	83	164	212	218	170	85	45	1,064

One sees mortality ratios slightly under 1.0 in total for both males and females.

We also observed differences in the mortality ratio for smokers:

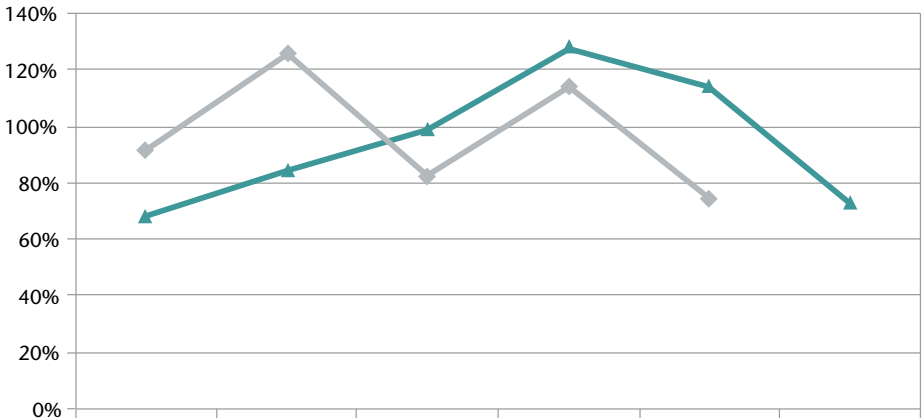
Figure 6.6.4: Ratio of nonstandard / standard exposure-weighted A/Es by smoking status. Nonstandard A/E is normalized or "loaded" as in Figure 6.6.3. Ultimate years, non-accelerated term only.



The above 1.20 mortality ratio for female smokers indicates that perhaps the industry is under-correcting for the effect of smoking on females.

Further analysis was performed on how these "corrected" mortality ratios with loaded E's develops by level of death loading. In a perfectly priced and underwritten world, the corrected mortality ratio between nonstandard and standard lives would be 1.00 at each death loading level. However, the ratio varies when looking at key underwriting loading levels shown in Figure 6.6.5:

Figure 6.6.5: Ratio of nonstandard / standard exposure-weighted A/Es for selected death (underwriting) loading levels. Underwriting loads are embedded in the E of the nonstandard A/Es, in comparison to Figure 6.6.2. Loadings of 50%, 75%, 100%, 150%, 200%, and 250% are shown. +100%, for example, means that the E in the A/E was raised by 100% for the nonstandard lives. Ultimate years, non-accelerated term only.



	+50%	+75%	+100%	+150%	+200%	+250%
Nonstd/Std Ratio-M	0.68	0.85	0.98	1.27	1.13	0.72
Nonstd/Std Ratio-F	0.91	1.25	0.83	1.14	0.75	
Std-M Claims	1,952	1,952	1,952	1,952	1,952	1,952
Std-F Claims	1,064	1,064	1,064	1,064	1,064	1,064
Loaded-M Claims	50	188	50	28	46	35
Loaded-F Claims	41	28	25	17	8	

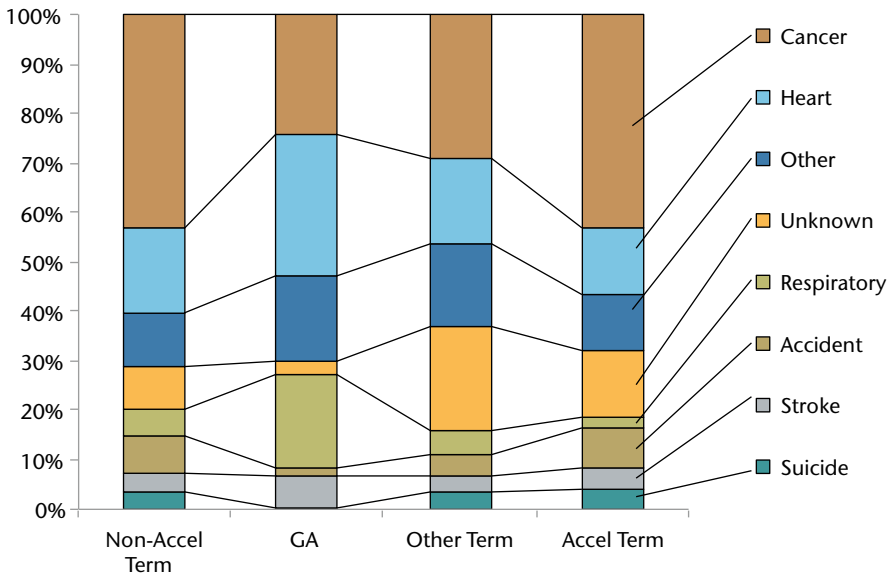
Males look to be overcorrected at the lower death loading levels. There is no clear tendency in the female ratios – the mortality ratios hover around 1.00. The higher underwriting loadings have lower data volume. Caution should be taken in interpreting these mortality ratios as the nonstandard lives may comprise a different distribution of durations or ages than the standard lives.

6.7 Cause of Death

6.7.1 Distribution by Cause of Death

Cause of death distribution among claims is shown separately for each benefit type in Figure 6.7.1.1:

Figure 6.7.1.1: Distribution of claims by cause of death for each benefit type, all claims in pools. Causes of death sorted in order of claims count.

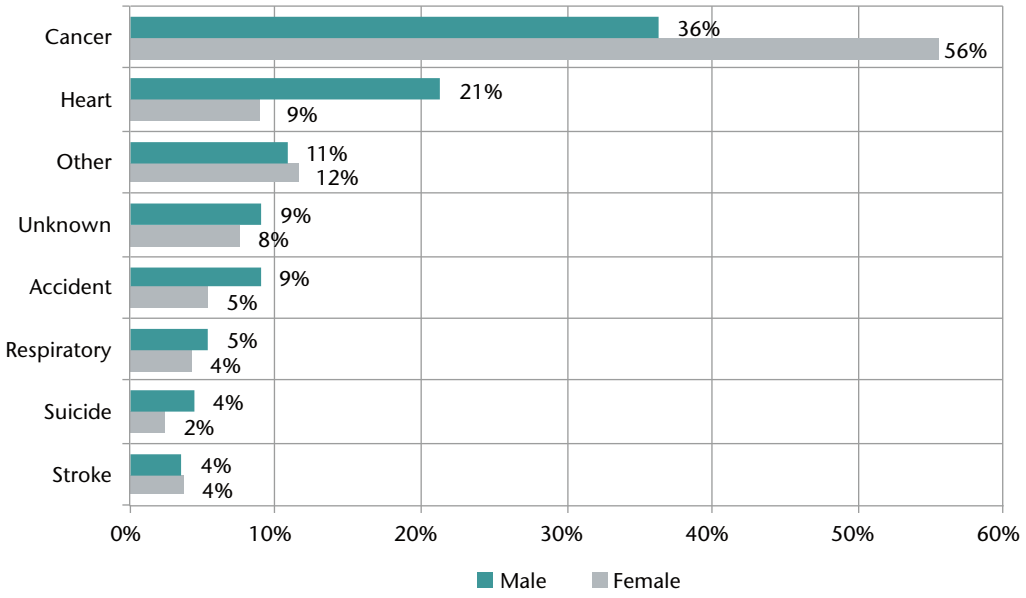


Heart disease is a lead killer in guaranteed acceptance versus cancer for the other term products. Despite the fact that reported smoker prevalence in guaranteed acceptance policies is no higher than in the underwritten products, respiratory-related claims are much higher amongst guaranteed acceptance policies. The above Figure 6.7.1.1 is across all age bands, but even when refining to overlapping ages – ages 50–69 – the same differences between underwritten and guaranteed acceptance appear.

In all products, we observe a fairly high number of claims with cause of death coded as other or unknown. Unknown indicates an unknown cause of death, and "other" indicates causes of death that do not fit into the above grouping, such as Alzheimer's disease, dementia, diabetes, congenital disorders, and so forth. Please see the Data Specifications attached in Appendix 7.4 for further details on the cause of death classifications.

We then performed a more comprehensive analysis by cause of death for non-accelerated term policies only. Here we show the distribution of cause of death by gender:

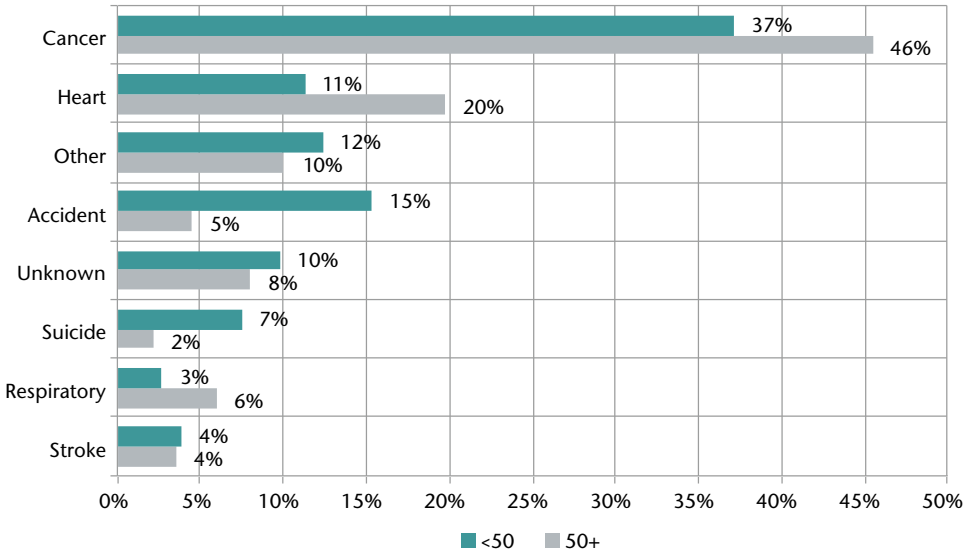
Figure 6.7.1.2: Distribution of claims by cause of death for each gender, non-accelerated term policies only. Causes of death sorted in order of claims count.



We note the portion of cancer claims increases with underwritten products. 36% of non-accelerated term claims for males were cancer-related, and 56% for females.

The mix in cause of death shifts in older ages, with fewer accidents and suicide but more respiratory, cancer, and heart-related claims dominating ages 50 and over:

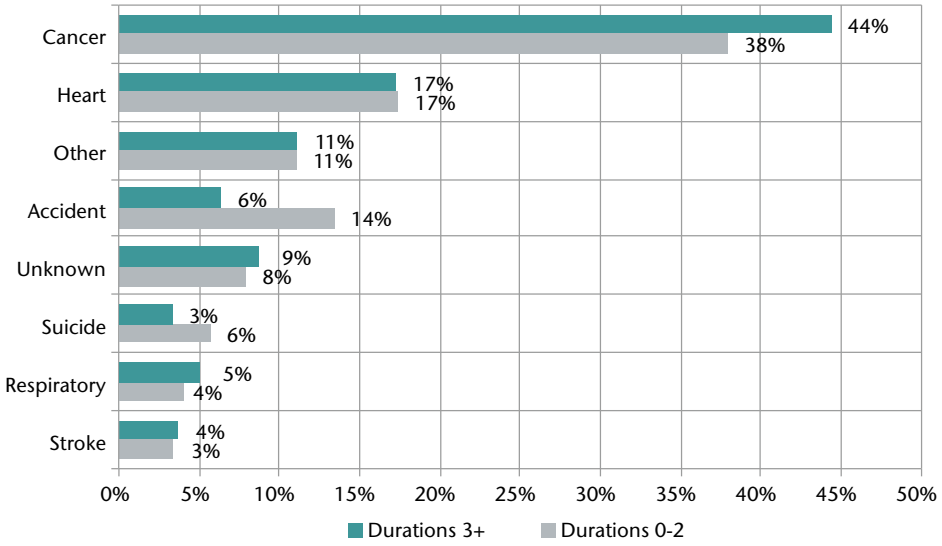
Figure 6.7.1.3: Distribution of claims by cause of death for attained ages under 50 versus 50 and over, non-accelerated term policies only. Causes of death sorted in order of claims count.



We note that the same movements between younger and older ages occurred in the other products, except that in guaranteed acceptance, cancer mortality increased on an absolute basis in older ages but was crowded out by heart and respiratory.

We also analyzed cause of death distribution in the select years versus ultimate years:

Figure 6.7.1.4: Distribution of claims by cause of death in select versus ultimate years, non-accelerated term policies only. Causes of death sorted in order of claims count.



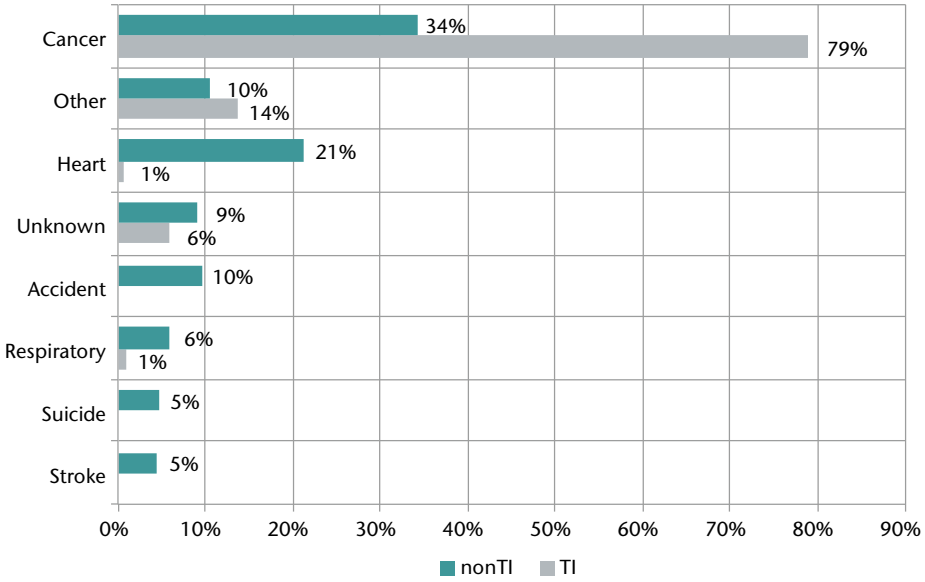
In looking at the select versus ultimate years, we note slightly higher contribution of cancer-related mortality in the ultimate years, and higher accidents and suicide as percent of total claims in the select years. The suicide contribution to claims is surprisingly high; despite underwritten products' exclusions on self-inflicted injury, suicide claims nonetheless comprise 6% of non-accelerated term claims in the select years. When analyzing guaranteed acceptance business, the suicide contribution to claims is 0 in the select years, presumably due to stricter exclusion clauses in the product.

6.7.2 A Look at Terminal Illness Claims

Terminal illness claims comprised 9% of all claims. Terminal illness claims were more prevalent in the underwritten products (20% for both accelerated and non-accelerated term), and only 2% for guaranteed acceptance products.

For non-accelerated term we show the cause of death distribution for terminal illness compared to non-terminal illness claims:

Figure 6.7.2.1: Distribution of claims by cause of death for terminal illness (TI) versus non-TI, non-accelerated term policies only. Causes of death sorted in order of claims count.



Among all terminal illness claims, the main reason for claim was cancer – at 79% of all claims as opposed to only 34% for non-terminal illness claims among non-accelerated term policies.

6.8 Underwriting Basis

The data submission included a parameter on underwriting basis. Underwriting basis was defined as either underwritten, a group continuation policy, guaranteed insurability, a conversion policy, guaranteed acceptance, or unknown. This field provided no further insights on the guaranteed acceptance business, as it is all non-underwritten. There were a few conversion policies but not yielding credible results.

For underwritten term business, predictably the vast majority were classified as underwritten. Conversion policies exhibited slightly higher mortality, and group continuations had low data volume but appear to have much higher mortality. There were a significant number of claims and exposures classified as unknown underwriting basis. A few claims fell under guaranteed insurability or acceptance, likely misclassifications:

Table 6.8.1: Average exposure-weighted A/Es for non-accelerated term business and corresponding death counts

Underwriting Basis	Male Claims	Female Claims	Male Exp-Wtd A/E	Female Exp-Wtd A/E
Underwritten	2,220	1,204	52%	54%
Conversion	128	53	66%	72%
Group Continuation	24	11	109%	229%
Unknown	386	194	60%	75%
Guaranteed Insurability	4	2		
Guaranteed Acceptance	8	6		

The results were too volatile to report for accelerated term policies.

6.9 Results by Data Year and Commentary on Mortality Trends

6.9.1 Results by Data Year 2008 – 2010

Table 6.9.1: Average exposure-weighted A/Es for the current observation period by data year, by benefit type

	Males			Females		
Product	2008	2009	2010	2008	2009	2010
Non-Accelerated Term	55%	57%	51%	51%	64%	56%
Guaranteed Acceptance Term	142%	130%	123%	120%	124%	127%
Accelerated Term	45%	34%	32%	49%	48%	35%

One can see in the above table that results varied by data year, even for the products with significant claims experience (see tabulations in Appendix 7.3). We observe lower mortality in 2010 for both underwritten term products; this is due to the time lag and reporting of claims. Please reference the Methodology section further details on IBNR. This shows why we have analyzed results throughout the rest of the report with all three data years together.

6.9.2 Comparison to Previous Report

Using the mapping of old to new benefit types as provided in the data specifications, we compared our overall results to the prior investigation. The mapping is not 1 to 1 for underwritten term business as this investigation differentiates for accelerated benefits whereas the last investigation differentiated on level term versus yearly renewable term, hence our providing a range when citing A/Es from the prior investigation.

The following table shows high-level exposure-weighted A/E results for each gender and benefit type:

Table 6.9.2.1: Average exposure-weighted A/Es for the current observation period compared with the previous investigation

	Males		Females	
Product	**2005-2007***	**2008-2010**	**2005-2007***	**2008-2010**
Accelerated and Non-Accelerated Term*	48-53%	52%	57-59%	56%
Guaranteed Acceptance Term	136%	131%	124%	124%
Other Term	78%	85%	82%	68%

* See cautionary note directly below on the ranges provided for the accelerated and non-accelerated term products

2005 – 2007 values are taken from Appendix 6 of the Eriksen & Associates report.[1] "Level Term" and "YRT" have together been mapped to our accelerated and non-accelerated term products, so the ranges we show above for these two products are differentiated by payment structure, which is a different parameter than this investigation's differentiation for accelerated benefits. We note that the vast majority of exposures in the prior report were for YRT business, so the appropriate comparator is likely more towards YRT values (53% exposure-weighted A/E for males, 57% for females).

The following table shows high-level sum-weighted A/E results for each gender and benefit type:

Table 6.9.2.2: Average sum-weighted A/Es for the current observation period compared with the previous investigation

	Males		Females	
Product	**2005-2007***	**2008-2010**	**2005-2007***	**2008-2010**
Accelerated and Non-Accelerated Term*	31-44%	44%	38-45%	47%
Guaranteed Acceptance Term	134%	144%	127%	135%
Other Term	58%	75%	51%	77%

* See cautionary note above on the ranges provided for the accelerated and non-accelerated term products. Sum-weighted values for YRT in prior investigation were 44% for males, 45% for females.

Relationships among products as well as relationship between genders look to be stable from the prior investigation to the current one. We observe over double the mortality level for guaranteed acceptance for both exposure- and sum-weighted results and for both genders. We also observe lower A/Es when weighted by insured sum than by exposures.

It is difficult to compare small movements in absolute A/Es between the two investigations, but the sum-weighted A/Es appear to have increased slightly, whereas the exposure-weighted A/Es appear to have fallen slightly. We notice this in particular for the guaranteed acceptance business but the trend seems there for underwritten business as well. One rationale may be that underwriting limits have changed, or that the market is experiencing stronger anti-selection in higher sums. We would not draw further significant conclusions from these comparisons, however.

Movement from prior to current investigation was similar between genders except for Other Term business. We notice that the exposure-weighted A/Es increased in Other Term for males but decreased for females; this bucket has low data volume, however, and comprises a mixture of risks.

6.9.3 Comment on Mortality Trends

It is a challenge to interpret historical mortality trends. The three-year observation period within this report is much too short and volatile to glean a trend. Mortality levels do look to have improved slightly from the prior investigations on an exposure-weighted basis, which build on the findings from the previous mortality investigation; it is nearly as difficult, however, to read too much into changes in mortality levels between this report and the prior investigations due to both shifts in data contributors and changes in scope of benefits studied.

1 Eriksen, J. Report Into The Mortality of New Zealand Insured Lives 2005 – 2007. The New Zealand Society of Actuaries, November 2009.

Long-term mortality trends derived from historical population data from the Human Mortality Database (HMD) for New Zealand (total population, including Māori and non-Māori) indicate mortality improvements as reported in the previous mortality investigation report:

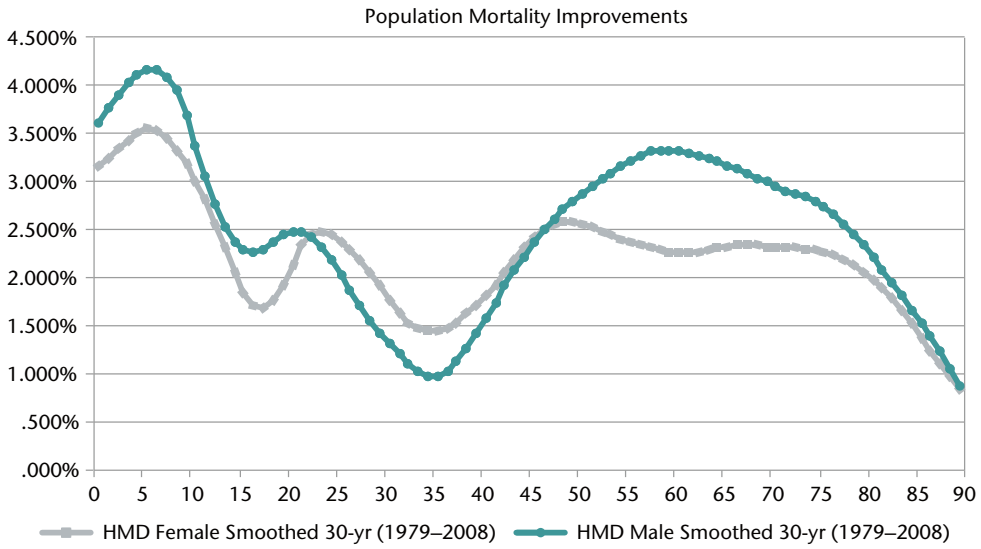
Table 6.9.3.1: Mortality trends observed in the Human Mortality Database, weighted by age according to demographics observed in non-accelerated and accelerated term from the insured data pools

Population Mortality Trends for Ages 20–64		
	Male	Female
10-Year Trend (1999–2008)	2.1%	1.7%
30-Year Trend (1979–2008)	2.2%	2.1%

Recent trends for females seem to have fallen slightly, where the most recent decade of available data shows improvements 0.4% lower than the longer-term 30-year trend.

We also show the mortality improvement curves by individual age as smoothed from HMD data. We show the most recent 30 years of data available for ages 0 to 89:

Figure 6.9.3.1: Mortality trends observed in the Human Mortality Database by individual age and for each gender, with a 30-year trend, smoothed one-dimensionally according to the Whittaker-Henderson method across years



Males in the population appear to have slightly higher historical improvements at the higher attained ages than females. Aside from infant mortality improvements, trends look to be highest in ages above 45.

It is difficult to compare and apply population trends to insured lives, but the mortality improvements reported in the prior 2005–2007 investigation look to be slightly higher for both genders than has been observed in the general population.

7 Tables and Appendices

7.1 Graduated Tables

This section (pp. 31-41) is intentionally left blank in the abridged version of the report.

7.2 Notes on the Significance of Individual Results

This section (pp. 42-43) is intentionally left blank in the abridged version of the report.

7.3 Tabulations of Results

This section (pp. 44-57) is intentionally left blank in the abridged version of the report.

7.4 Copy of Data Specifications for the Investigation

SECTION 3 - INPUT FILES

3.1 Input files for inforce benefits and claims are required to be produced as commadelimited files. Inforce files contain a census of inforce benefits at a particular date. The claims files contain details of the claims and claims reversals during a calendar year.

Further details about the required format for inforce and claims input files are outlined in Sections 4 and 5, respectively.

3.2 Each input file consists of one or more benefit records. It is also recommended that headings be added to each column to assist the investigation. Each benefitrecord contains details of a single benefit.

Benefit records for the claims input files consist of the same blocks of data as theinforce benefit records, followed by a block of claim data.

3.3 Details of the individual field formats are given in the appendices. Numeric fieldsare to consist of digits only (long integer format). Dates are to use the format DDMMYYYY. Alphanumeric fields (text format) may contain any printablecharacters other than commas. If a field is less than the length given in its format description, then it need not be padded with spaces or zeroes. If the value of an alphanumeric field is spaces, then it is coded as a null field.

3.4 Input files are to be provided on CD or USB drive. Input files can be compressed or zipped if required. The CD or USB drive should be accompanied by a submission form to allow proper identification and ensure the appropriate person can be contacted if there are any queries on the data submitted.

SECTION 4 - INFORCE FILE DETAILS

4.0 Naming convention (NEW!)

The filename of the inforce file is used to identify the company and census date. It is important that this filename be in the right format to assist the consultants.

Filename = ***XXX_I_YYYYMM.csv***
where: *XXX = Company Number*
I = "I" for inforce
YYYYMM = census year and month

4.1 Header Record

Previous investigations required a specific header record to identify the company nd census data. This has been removed as the information is contained in the filename (see 4.0 above).

However, it is recommended that companies include field headings that briefly describe the content of each column to ensure the consultants are using each field appropriately. This is particularly important in this investigation where some of the unused fields are now optional.

4.2 Inforce Benefit Record

Different companies have different definitions for benefits. For consistency Dacross companies the following benefit structure should be adopted.

A policy is made of benefits. Each policy must have at least one benefit. A benefit must be able to stand alone (i.e. it must be able to be the only benefit on a policy). Treatment of multiple benefits on a policy is as follows:

Cause of multiple benefit	Treatment
Different life assured	Benefits for different life assureds must be on separate benefit records.
CPI increases	CPI increases can be separate benefit records or they can be aggregated into one benefit.
Other (non-contractual) increases	Other increases must be on separate benefit records.
Different underwriting levels or different benefit types	Benefits must be on separate benefit records if it leads to a different benefit classification.

When preparing data for increases, care must be taken when populating the risk commencement date field. CPI increases submitted as separate benefit records must have the risk commencement date of the base benefit and there is a new (optional) field to identify whether the record is a CPI increase. Other (non-contractual) increases must have the risk commencement date of the increase itself. This will then allow an accurate assessment of the selection period (if any).

A total of 15 fields are specified and 3 of them are optional. Each field is explained below; a summary of the format is shown in Appendix B.

1. Policy Identifier — This a reference number that will identify the main policy.

2. Life Identifier — This is a reference number that will identify the life within a policy.

3. Benefit Identifier — This is a reference number that will identify the benefit for that life within the policy.

Note: The combination of Policy Identifier, Life Identifier and Benefit Identifier will be a unique reference number.

4. Benefit Type — The benefit type is a 2 digit integer between 10 and 13. Only term insurance benefit types with standard terms or with a percentage addition are included; the following product or benefit types are specifically excluded:

   - Participating and non-participating traditional benefits, e.g. whole of life, endowment;
   - Unbundled life benefits, e.g. death coverages attached to investment account, investment-linked or investment bond contracts;
   - Single premium benefits, e.g. mort gage repayment insurances withsingle premiums;
   - Credit Card Repayment Insurances;
   - Children's deferred insurances;
   - Group schemes where an employer subsidises coverage for employees and there is guaranteed acceptance up to a specified AAL;
   - Accidental Death benefits;
   - Industrial or Collector business;
   - Reinsurances received from other companies;
   - Joint and contingent life benefits; and
   - Benefits which have no or nominal amounts of death cover, e.g. health insurance swith a $2,500 death benefit.

   Benefits issued with exclusions, fixed dollar/per thousand dollar loading, age additions or other non-standard terms which do not involve a percentage extra mortality should be excluded. Care must be taken to ensure that benefits excluded due to non-standard terms are excluded both from the inforce and claims input files.

Type	Description
10	Non-Accelerated Term: Term insurance benefits that had substantial underwriting (see guidance note below). Benefits that have any accelerated morbidity benefits attached at the census date should not be included here (but see classification 13). This classification includes yearly renewable term as well as level premium term. These benefits have historically been sold with formal advice; however, benefits sold directly online or over-the-phone with substantial underwriting (either manual or through an automated engine) would also be included.
11	Guaranteed Acceptance Term: Term insurance benefits sold on a guaranteed acceptance basis (i.e. no underwriting). These benefits are typically direct marketed to clients with no formal advice, but other guaranteed acceptance products sold through advisors, affinity partners or banks would be included.
12	Other Term: All other term insurance benefits that aren't guaranteed acceptance, but had limited underwriting and were generally sold with no or very limited advice. Examples include: (1) a direct-mail term product with a 1 page questionnaire; (2) a term policy sold over-the-counter at a bank branch with 5 simple questions and no needs analysis.
13	Accelerated Term: Term insurance benefits that had substantial underwriting (see guidance note below) and have one or more accelerated morbidity benefits attached at the census date (e.g. critical illness, TPD). If it is not practical to accurately determine whether there are accelerated morbidity benefits attached, then use the non-accelerated term benefit type (10). Terminal illness is not regarded as an accelerated benefit.

Guidance Note: *The level of underwriting determines the level of mortality, so the classification is primarily based on the comprehensiveness of the underwriting involved. Assume the industry benchmark is a benefit sold by advisors with substantial underwriting – i.e. investigations into medical history, family history, hazardous pursuits / past-times / occupations. Benefits that are underwritten and were originally priced assuming mortality experience within 10% of the industry benchmark should be coded as either 10 or 13; otherwise they should be coded as 11 or 12. Some judgement is required to ensure the benefit classifications include similar levels of risk.*

5. Table Code: This is an internal company code identifying the policy table.

6. Sex: This is:
   - **M** for male, **F** for female, and
   - **U** for undifferentiated.

7. Underwriting Basis: This is:

   1 – "Underwritten" Lives were underwritten in some form.

   G – "Group Continuation"
   Benefits were effected under a group policy continuation option.

   I – "Guaranteed Insurability"
   Benefits (or increases) were effected under a guaranteed insurability option.

   C – "Conversion"
   Benefits were effected by a conversion of another policy.

   N – "Guaranteed Acceptance"
   Benefits under benefit classification 11 or benefits that were not underwritten.

   U – "Unknown"
   The underwriting basis is unknown.

8. Date of Birth: The date of birth of the insured, in the format DDMMYYYY.

9. Date Risk: The date the risk commenced, in the format Commenced DDMMYYYY.

10. Amount of Death: Cover This is the amount of cover in whole dollars, gross of any outward reinsurance. TheAmount of Death Cover should not includeany commas. The inclusion of any CPIincreases should reflect the company's treatment of CPI increases (i.e. either aggregated or separate benefit records).

11. HIV Testing Status: (OPTIONAL) This is:
    - **Y** if tested,
    - **N** if not tested, and
    - **U** if unknown or unrecorded

12. Smoking Status: This is:
- **S** if the life insured is recorded as a smoker for premium rating purposes,
- **N** if a non-smoker, and
- **A** if aggregate rates are used.

13. Death Cover: (OPTIONAL) This is: -Indicator
- Y if death cover is provided, and
- L if death cover is limited within an initial period. For example, return of premiums within the first 2 years for a Direct Marketing product.

14. Death Loading: This is any loading expressed as a percentage of standard mortality and covers bothmedical and non-medical risks. For standard, risks, the Loading field is zero.

15. CPI Increase: (OPTIONAL*) This is:
- **0** if the record is a CPI increase,
- 1 if the record is not a CPI increase (or has CPI i crea es aggre ate n s g d).

* This field is only optional for companies who aggregated their CPI increases into one benefit.

SECTION 5 - CLAIM FILE DETAILS

5.0 Naming convention (NEW!)

The filename of the claim file is used to identify the company and calendar year of claim. It is important that this filename be in the right format.

Filename = ***XXX_C_YYYY.csv***
where: *XXX = Company Number*
C = "C" for claim file
YYYY = calendar year of claim

5.1 Header Record

Previous investigations required a specific header record to identify the company and census data. This has been removed as the information is contained in the filename (see 5.0 above).

However, it is recommended that companies include field headings that brieflydescribe the content of each column to ensure the consultants are using each field appropriately. This is particularly important in this investigation where some ofthe unused fields are now optional.

5.2 Claim Benefit Record

The first 15 fields of the claim benefit record in the claims file are in exactly the same format as for inforce file. The categorisation of these first 15 fields must beconsistent with the categorisation within the inforce files.

For the claims input files, there are 7 additional fields required (fields 16 to 22 below). Each field is explained below; a summary of the format is shown in Appendix C.

16. Type of Notification: This is:
- **C** for a claim, and
- **R** for a claim reversal.

17. Date of Notification: This is the date the company was notified of thedeath claim. This field determines in which calendar year for a particular death claim falls.For terminal illness claims, this field is leftblank.For a claim reversal record, this should be the date the claim was reversed.

18. Date of Claim: The Date of Claim is:
- For death claims, the date of death,
- For terminal illness claims, the date of medical certification that the illness is terminal.

19. Date of Admission: This is the date the company admits liability to pay a terminal illness claim. This field determines in which calendar year a particular terminal illness claim falls.

20. Type of Claim: The types are as follows. ***Note:*** *pre-payments upon notification of death must be included with any residual amount paid when determining the type of claim.*

1. for a death claim paid in full.

2. for a claim where the amount paid is lessthan the full sum insured. For example, Direct Marketing products where a return of premiums is payable on death in the first 2 years.

3. for a terminal illness claim where an amount is paid (which might be the full sum assured or a discounted amount) as a result of a terminal illness and the policy terminated

4. for a terminal illness claim where some of the sum insured is paid out or loaned because of terminal illness and the benefit still remains in force.

21. Cause of Death: Cause of death should use the three letter code outlined in Appendix B. The cause should be the best estimate of the physical condition with the "external" cause taking precedence.

22. Claim Amount: The amount paid on claim for that benefit.enerally this would be the sum assured Gincluding any CPI increases.

There may be occasions where this is not the normal sum assured e.g. return of premiums. Interest payments on late claims and adjustments for outstanding/refunds of premiums should be excluded.

The claim amount needs to be consistent with the sum assured recorded at the benefit level. Pre-payments upon notification of death must be included in the total amount paid so that there is only one claim amount per inforce benefit record. Care must be taken if CPI increases are recorded separately that the claim amounts are consistent with the inforce sum assureds for that policy.

5.3 Claim Reversals

A claim which has been included in the data and is subsequently declined, should be treated as a recovery in the next return. As a general principle, any declined claims should be excluded from the claims data whether they attract a return of premiums or not.

When a death claim is reversed, the reversal record is to contain the same information as the original claim record, except for the Type of Notification (Claim Reversal) and the Date of Notification (which should contain the date the claim was reversed).

5.4 Calendar Year of Inclusion

Claims should be included in an annual submi ssion based on:

- Date of Notification for death claims, and
- Date of Admission for terminal illness claims.

This is to ensure that all claims are included, where notification occurs some time after the date of death. Companies may use the date of death to determine inwhich year a claim falls, if the date of notification is not available historically, as long as the analyst ensures that no claim is excluded or double-counted.

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