

### **Society's 2014 Aggregated Insured Life Mortality Study**

The Demography Committee of the Society have recently completed the 2014 Insured Life Mortality study. Full results will be placed on the Society's website

(<https://web.actuaries.ie/press/demography-studies>) together with the results of the previous aggregated studies carried out in 2009. A summary of the results and methodology are provided below together with some commentary in respect of the Insured Life Study.

#### **Methodology**

The 2014 study covers deaths in calendar years 2008-2012 for Decreasing Term Assurance (DTA) and Level Term Assurance (LTA) products (with Critical Illness policies generally excluded) for 5 participating insurance companies. The data was split by age, sex, smoking status and duration for the two main product types. The actual mortality ("A") and expected mortality ("E") data provided were grouped by 5-year age bands and by duration (i.e. select period 0-4 years and ultimate duration of 5+ years). "A"s and "E"s were obtained on a lives and on a sum assured exposure basis.

The standard mortality tables used in calculating the "E"s were the "2000 series" for temporary insurances, with no past improvements built-in, as prepared by the Continuous Mortality Investigation (CMI). The CMI, support the Institute and Faculty of Actuaries, has a long history of providing authoritative and independent mortality and sickness rate tables for UK life insurers and pension funds. Tables used were TMN, TFN, TMS & TFS for males non-smoker, female non-smoker, male smoker and female smoker respectively. A similar study was conducted by the Society in 2009 covering deaths in the calendar years 2006-2007. A/E information from the 2009 study is summarised alongside the 2012 study to enable analysis of trends in A/E over the combined period 2006-2012.

The Society specified the data submission format for participating companies to be as straightforward as possible, in order to maximise the number of participating companies and thus enhance credibility of the study results. Compromises in terms of richness of data collected were necessary as a result of this initiative (e.g. aggregating of data by age band, no exposure measures, no cause of death information, etc). Companies may have different treatments of factors such as age definition, policy duration, run-off of sum assumed for DTA, different underwriting/rating factors, distribution channels etc. Therefore it is necessary to interpret the results allowing for the fact that the underlying data may include an element of heterogeneity. It is widely accepted that mortality does vary from year to year. The impact of inherent statistical fluctuations will likely outweigh any potential distortions arising from this heterogeneity.

Companies were requested to supply "A"s and "E"s by lives and sum assured, split out by the groupings described above. Five companies provided data for the 2014 study compared with seven companies which provided data for the 2009 study. The data was aggregated by the Society and only this aggregated data was supplied to Actuaries on the Demography Committee for analysis to ensure confidentiality of individual company data.



## Study size

The total number of deaths recorded in the mortality study was 7,052 and was split out as follows:

	DTA					LTA					Total
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	
Male Smoker	110	111	90	103	110	117	120	91	142	118	1112
Male Non-Smoker	203	261	235	225	163	391	407	454	483	509	3331
Female Smoker	55	58	62	70	61	67	89	75	77	73	687
Female Non-Smoker	115	105	125	138	137	199	229	264	291	319	1922
	483	535	512	536	471	774	845	884	993	1019	7052

64% of deaths recorded were in respect of LTA products and 36% in respect of DTA products. Male non-smokers made up 47% of deaths, female non-smokers 27%, male smokers 16% and the remaining 10% were deaths from female smokers. The proportion of deaths by gender and smoking status largely reflect the respective volumes of policies sold.

## Results

Actual/Expected deaths:

All durations	DTA						LTA					
	2008	2009	2010	2011	2012	08-12	2008	2009	2010	2011	2012	08-12
<b>Lives:</b>												
Male Smoker	83%	79%	62%	68%	71%	72%	84%	81%	58%	86%	67%	75%
Male Non-Smoker	86%	102%	86%	77%	53%	80%	98%	93%	94%	92%	89%	93%
Female Smoker	78%	76%	76%	80%	67%	75%	91%	109%	83%	79%	68%	85%
Female Non-Smoker	88%	73%	79%	80%	74%	79%	103%	105%	106%	105%	103%	104%
<b>Sum assured:</b>												
Male Smoker	90%	74%	53%	55%	60%	66%	67%	60%	47%	70%	57%	60%
Male Non-Smoker	86%	108%	88%	77%	57%	82%	81%	85%	67%	70%	68%	73%
Female Smoker	88%	92%	86%	79%	70%	82%	66%	96%	70%	69%	59%	71%
Female Non-Smoker	82%	71%	72%	76%	64%	72%	82%	62%	60%	87%	68%	72%

Apart from female non-smokers by lives for LTA, for all other groups (gender/smoker status/product type) the A/E over 2008-2012 by lives & sum assured results were less than 100% of the “2000 series” tables. The actual deaths reflect approximately a decade of mortality improvements compared to the “2000 series” tables. More up-to-date mortality tables based on assured lives may give A/Es closer to 100%, stripping out issues such as past improvements or allowing for changes in smoking habits over the last decade.

It is very noticeable that the A/Es are generally lighter for 2012 compared to 2008-2011. It is believed the main driver for this would be the missing incurred but not reported (IBNR) claims in more recent data. There was a similar IBNR issue in the 2009 study which indicated that the 2007 claims might be missing a number of IBNR claims. This may be a key driver for the lower A/Es in 2009 study compared to the 2014 study, since the final year represented a bigger part of the total exposure and as the claims’ reporting & processing timescales are likely to have reduced over time.

In general mortality experience by lives is heavier than that by sum assured particularly for LTA. Sum assured amounts can be an indicator for different socio-economic groups. Typically more affluent lives, having larger sums assured amounts, are associated with lighter mortality experience.

One of the largest increases in lives A/E was on male non-smokers for DTA from 2008-2009. Male non-smokers deaths for DTA accounting for 43% of all deaths for DTA. This increase may be linked to economic factors during the height of the recession as highlighted in the media. The A/E in this group was highest for ages 35-40 for duration 1-4 years. There was a similar increase in the lives A/E

on female smokers for LTA from 2008-2009 but the number of deaths in this group was substantially lower and thus less credible than the male non-smokers A/E. Cause of death information was not available to the Society.

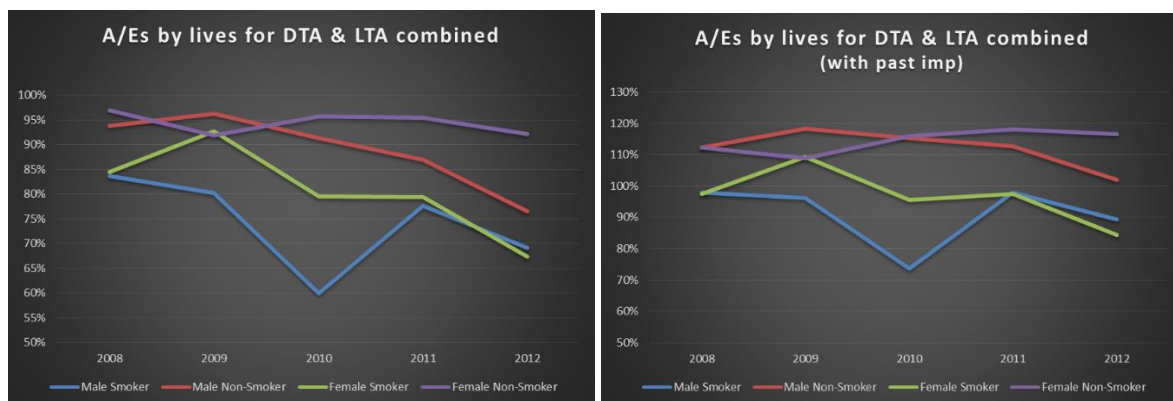
It is worth noting that when the data is subdivided by product, gender, smoking status and duration, this can leave number of lives in each cell in the low one hundreds and the corresponding A/E lacking credibility.

**Actual/Expected deaths (by duration):**

Duration	DTA				LTA			
	08-12		06-07		08-12		06-07	
	0-4	5+	0+ (All)	0+ (All)	0-4	5+	0+ (All)	0+ (All)
<b>Lives:</b>								
Male Smoker	78%	70%	72%	69%	90%	68%	75%	74%
Male Non-Smoker	98%	71%	80%	69%	131%	79%	93%	71%
Female Smoker	90%	69%	75%	59%	104%	77%	85%	78%
Female Non-Smoker	80%	78%	79%	63%	132%	93%	104%	67%
<b>Amounts:</b>								
Male Smoker	76%	57%	66%	62%	71%	52%	60%	56%
Male Non-Smoker	107%	62%	82%	60%	83%	68%	73%	71%
Female Smoker	102%	69%	82%	57%	89%	61%	71%	57%
Female Non-Smoker	77%	69%	72%	58%	62%	77%	72%	55%

The A/Es for earlier durations are higher for all groups. As the expected tables have separate values for duration 0-4 years and 5+, comparison of A/E by duration shows how the experience differs from the “2000 series” tables. This may indicate that relative selection has become more adverse compared to the “2000 series” tables over time.

In general one might expect a downward trend in A/E due to positive mortality improvements over time. From 2009 we can see this downward pattern. Allowing for past improvements in calculating the E would give a more level trend in A/E over time as the “E”s would be “matured” up to the same calendar year as when actual deaths occurred. Some further analysis (full results available on the website) was conducted by the Demography Committee to illustrate this by approximately maturing the “2000 series” tables up to relevant calendar years using past improvements from the latest CMI\_2014 improvement projection model. This gives a flatter A/E over time for the four groupings when combining A/Es over DTA and LTA products (see graphs below).



### **Concluding comments**

It is hoped that this study can be repeated in future years. It is also hoped the “A”s for 2006-2012 can be provided again which would lessen the impact of late reported claims so that clearer trends might be possible to view.

Before choosing a mortality assumption, companies should consider their own experience, allow for expected IBNR claims, consider which mortality tables best fit their experience and where appropriate factor in the cost of reinsurance. Hopefully these results will be of interest and comments are ‘food for thought’.

Please note that the above tables, graphs and comments are presented purely for public interest and have not been subject to the scrutiny necessary were they to be used for commercial decisions. Aggregation of the data means that mistakes, inconsistencies, etc by participating companies cannot be identified. The Society makes no warranty as to the accuracy of these figures and owns no duty of care to any party in respect of them. This note does not reflect the views of any employer of the members of the Society’s Demography Committee.

James Bradley FSAI

Demography Committee