Current Issues in Life Assurance (15th CILA)

Analysis of Indian Assured Lives Mortality (IALM) Table 2012-14

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Agenda

- About IALM 2012-14
- Data
- Study Contours
- Graduation
- Comparison with IALM 06-08
- Key Observations

What is IALM 2012-14

- Reference table which has underlying mortality of Male Medically underwritten lives with duration 2 and over.
- Includes the following:
  - All types of policy status including paid-up and reduced paid up cases
  - Policies sourced from urban as well as rural
  - All claims including repudiated claims
  - Product types - Traditional, Term & Linked (health, annuities and riders excluded)
  - Medically underwritten standard lives

Effective date of adoption of table – 01st April 2019

Data

	Duration 2 & over		All Durations	
Study period	**2012-14**	**2006-08**	**2012-14**	**2006-08**
Exposed to risk (in life years)	462,725,781	247,697,398	602,651,281	350,952,803
Deaths	1,231,974	667,380	1,454,519	786,572

- Exposure and claims have nearly doubled since the last study
- Data submitted by all life insurers
- Multiple iterations undertaken to ascertain the completeness of data.

Portfolio snapshot

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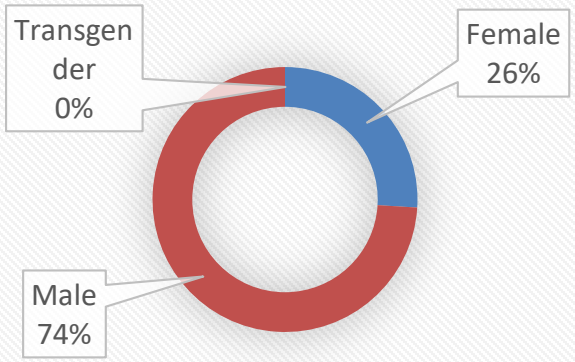
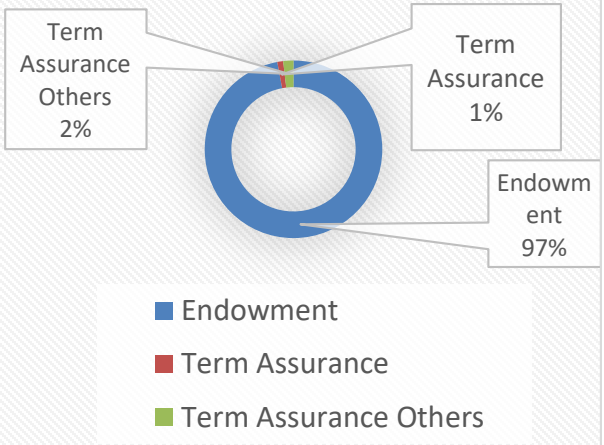
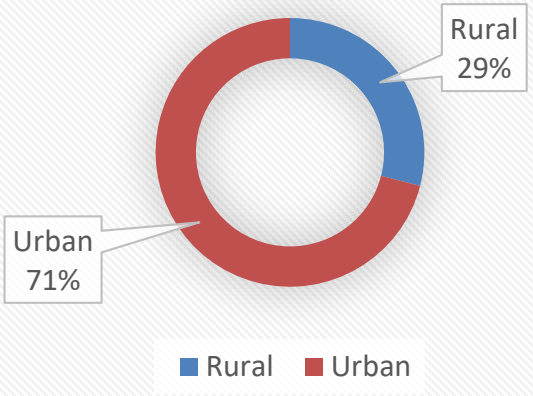
Gender



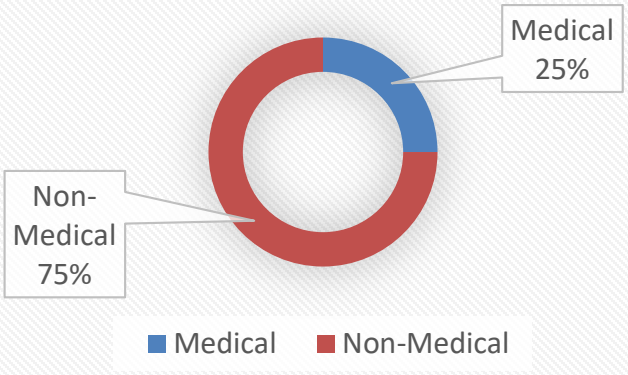
Products



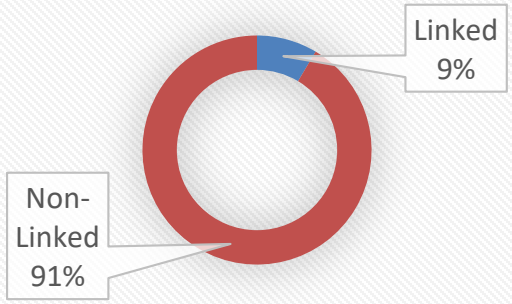
Rural-Urban



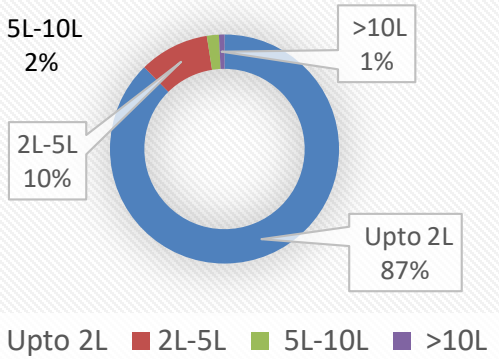
Medical Type



Product type



Sum Assured



Study Contours

Period of Investigation (POI)	POI restricted to two years basis the analysis of the claims reporting lag. It takes at least 2 years from date of death to report ~97% of death claims
Age Definition/Rate Interval	• Age definition – Age last birthday • Rate interval – Life year • (both are consistent with the previous 2006-08 study)
Repudiated Claims	• Repudiated claims are included as part of the investigation for following reasons - Complexities in terms of modeling & consistency with previous investigations
Reduced / Paid-up cases	• These cases have been included for following reasons – unable to establish the policy statuses at the time of reporting death claims
Select Period	• Duration 2 and onwards as ultimate rates which is consistent with previous investigation • The selection effect observed beyond 2 years is negligible.

Graduation

- Approach -
  - only those age ranges were chosen for graduation where the number of deaths is at least 5. The age ranges were fixed separately for set of combination of risk factors.
  - Also, stability in the pattern of crude death rates over the ages were considered.
- Choice of models – following graduations methods were tested
  - GM (r, s) Models
  - Whittaker – Henderson Model
  - Cubic Spline
  - Heligman Pollard Model
- The following criteria has been applied for choosing a particular model for graduation:
  - Suitability of the shape of the curve
  - Reasonableness of fit as seen from test values for various diagnostic tests

Modified Heligman Pollard model was selected based on the specified criteria and was consistent with 2006-08 study

Heligman Pollard Model

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The mortality law suggested by Heligman and Pollard is:

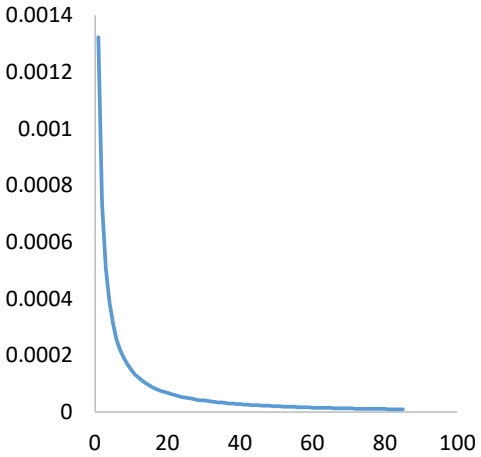
$$\frac{q_x}{p_x} = A^{(x+B)^C} + De^{-E(lnx - lnF)^2} + GH^x$$

Where q_x is the probability of dying within 1 year for a person aged x exactly and

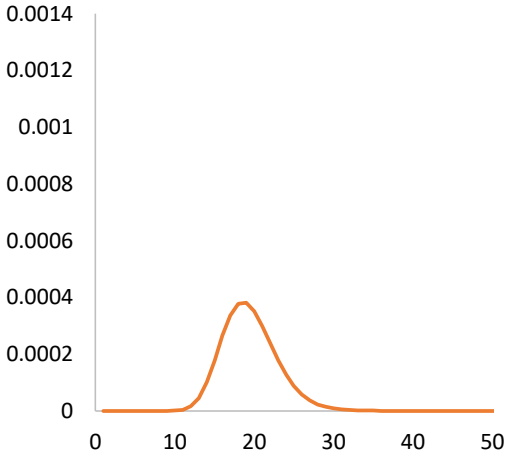
$p_x = 1 - q_x$

Each component represents a distinct component of mortality:

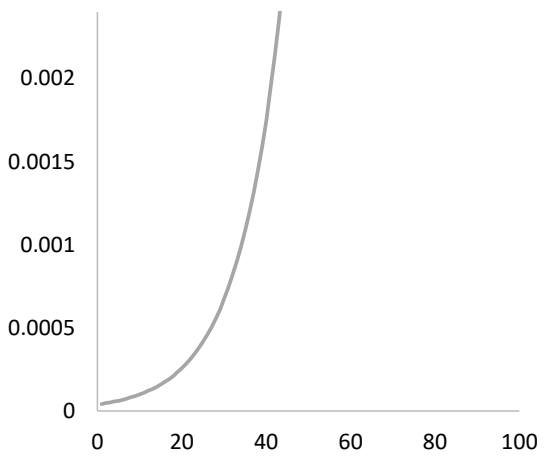
Component 1: Infant Mortality



Component 2: Accident Hump



Component 3: Senescent Mortality



Hetrogeneity

During the process of graduation, it was observed that there is heterogeneity in the underlying data which could be due to the following reasons:

- Different underwriting practices
- Inherent differences in the mortality of the underlying insured populations.
- Misreporting of ages on a large scale in certain groups of assured lives
- Preference for certain dates of births – limited impact
- Multiple policies

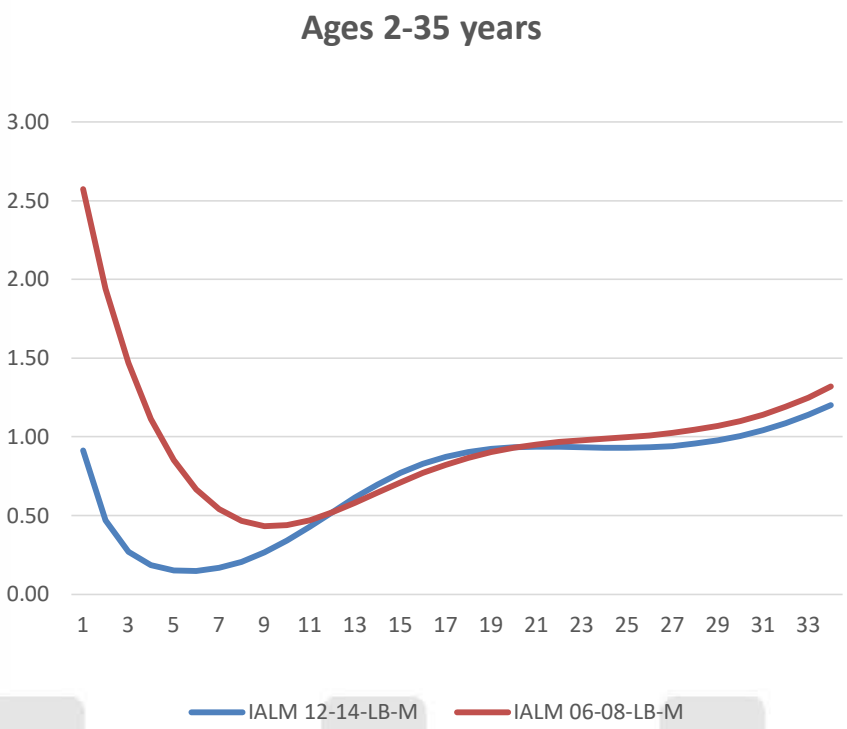
- **All test statistics were subjected to the Redington - Michaelson test and were adjusted before testing for smoothness and goodness of fit.**
- **The value of k^2 didn't impact the graduated rates.**
- **The approach has been described in the Research Paper by R. H. Daw in JIA 113 (1986) 103 – 149.**

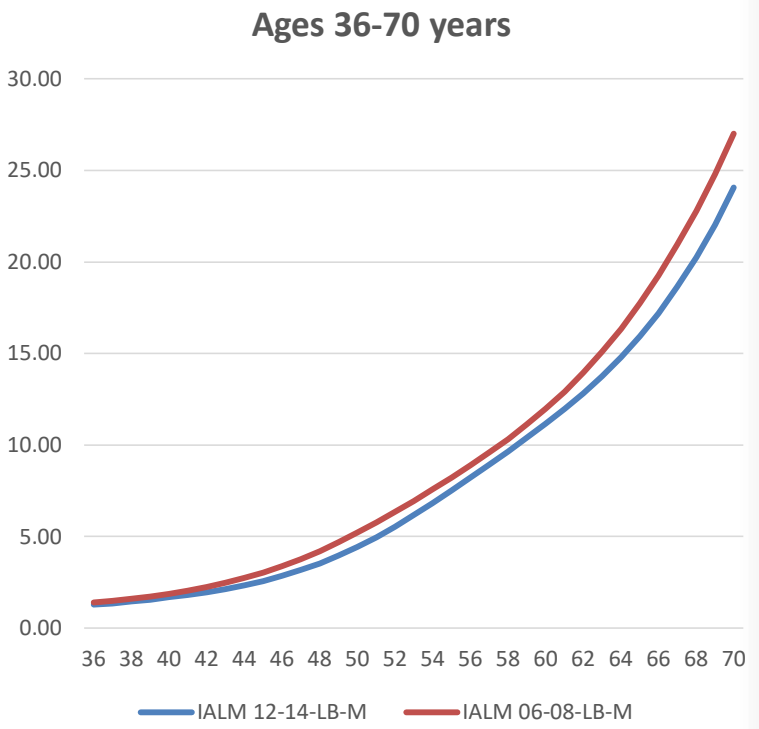
Limiting Age

The upper age limit of 115 is chosen after consideration of the following, somewhat arbitrarily to reflect –

- IALM 06-08 table had a limiting age of 115 years.
- (1925-1935), the first Indian table, used 102 as the limiting age at which qx reaches value of 1.
- LIC (94-96) stops with age 99 but the qx value then is 0.3844. By implication the theoretical limiting age is higher and possibly around 110 years.
- Approximate comparison with internationally adopted limiting age for assured lives mortality tables
- Presence of policy records up to age 108 in the data collected.
- Trends of improvements in observed mortality rates of assured lives in India

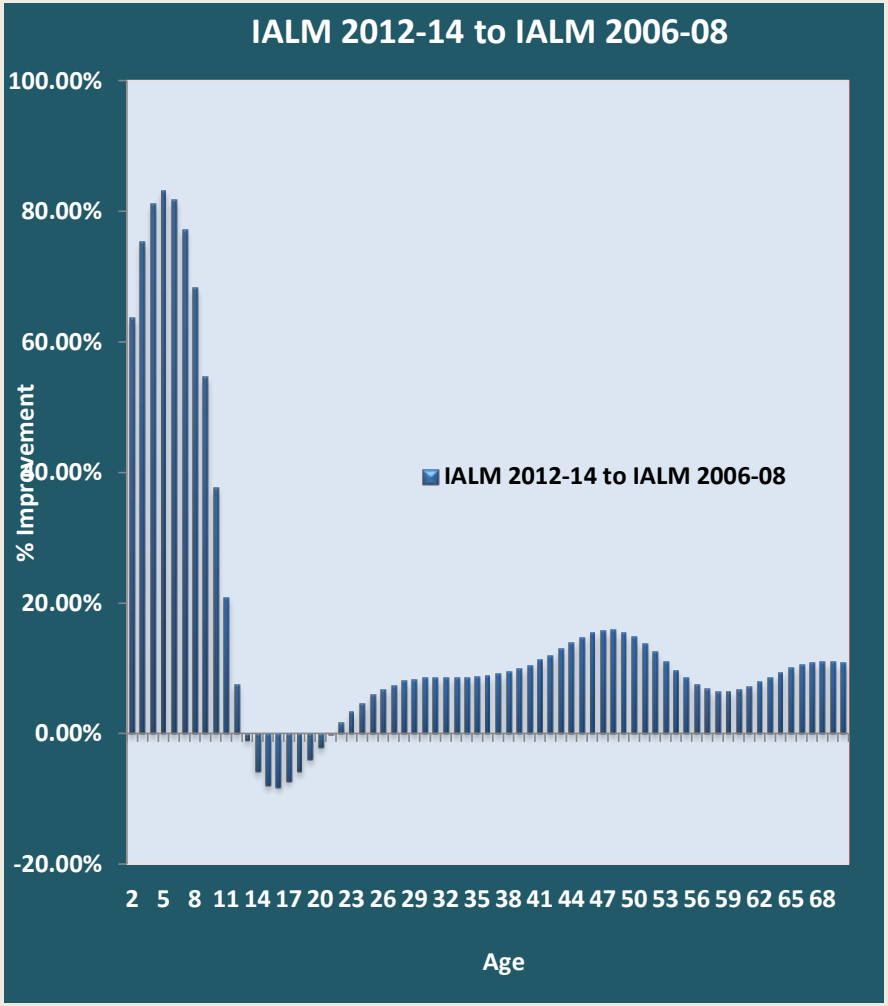
Standard Mortality Tables

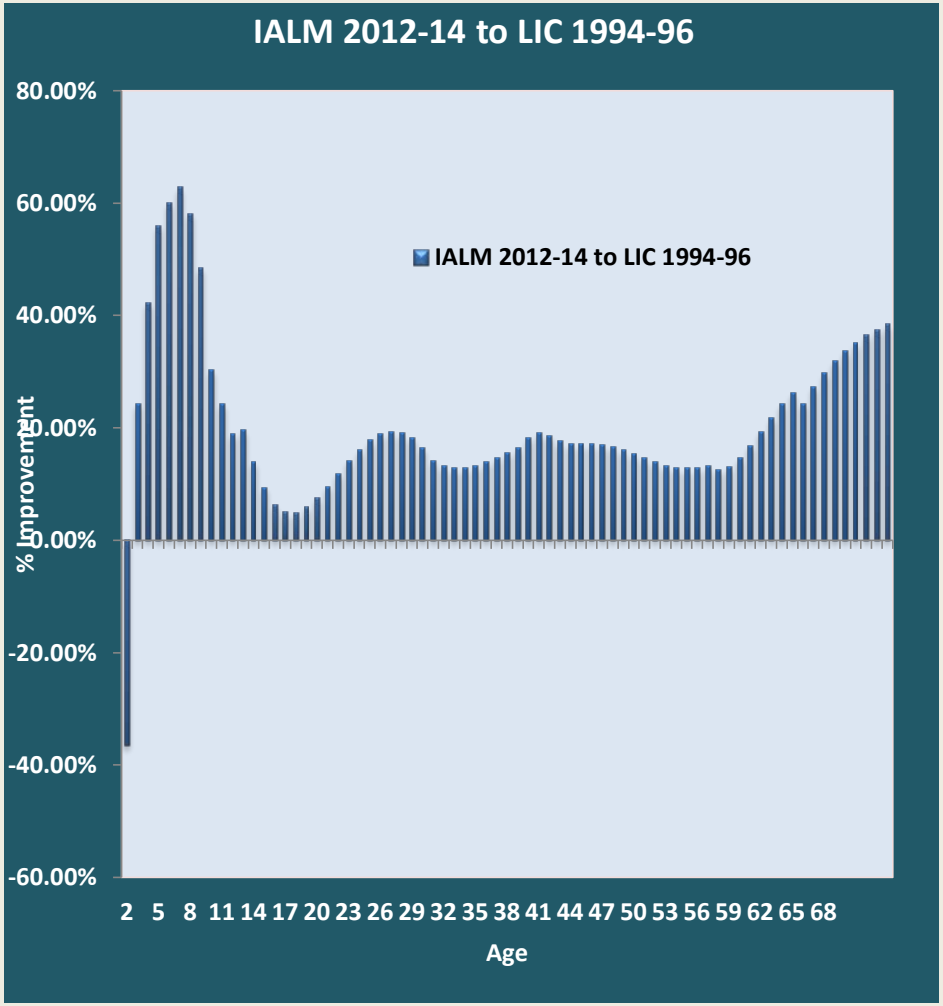




IALM 2012-14 mortality rates are lighter than the IALM 2006-08 across all ages up to age75 except at age range 12-21 due to shift of accident hump to younger ages.

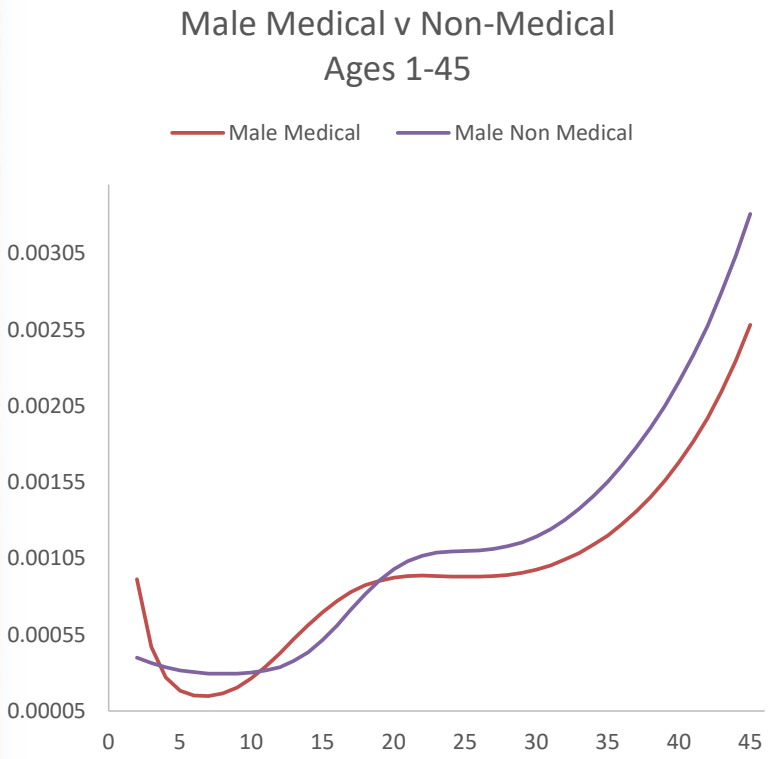
Change in 2012-14 over 2006-08 & 1994-96 Mortality Rates

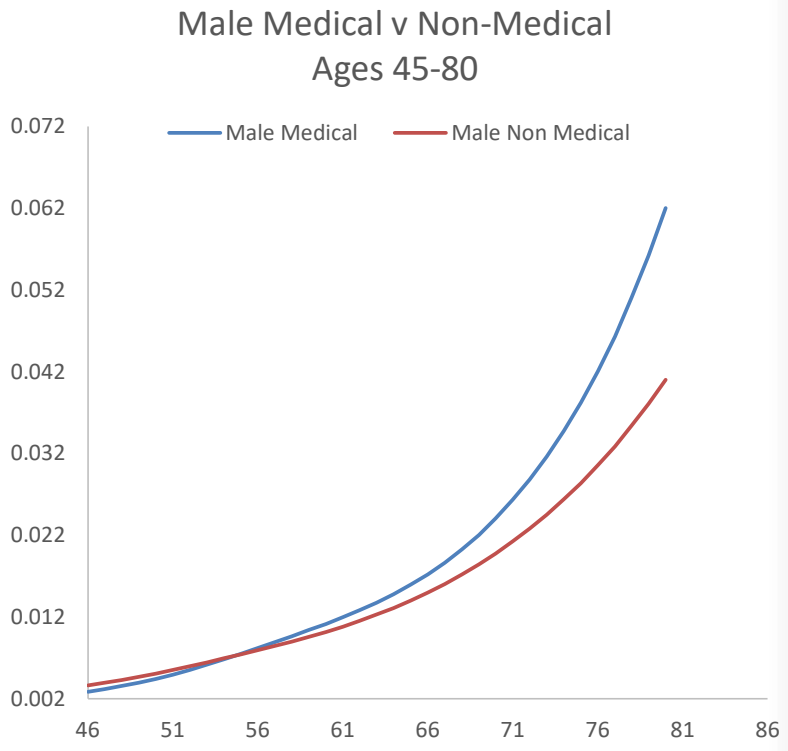




Change in mortality rates between the study periods can't be fully attributed to mortality improvements since the underlying data and experience may not be fully comparable

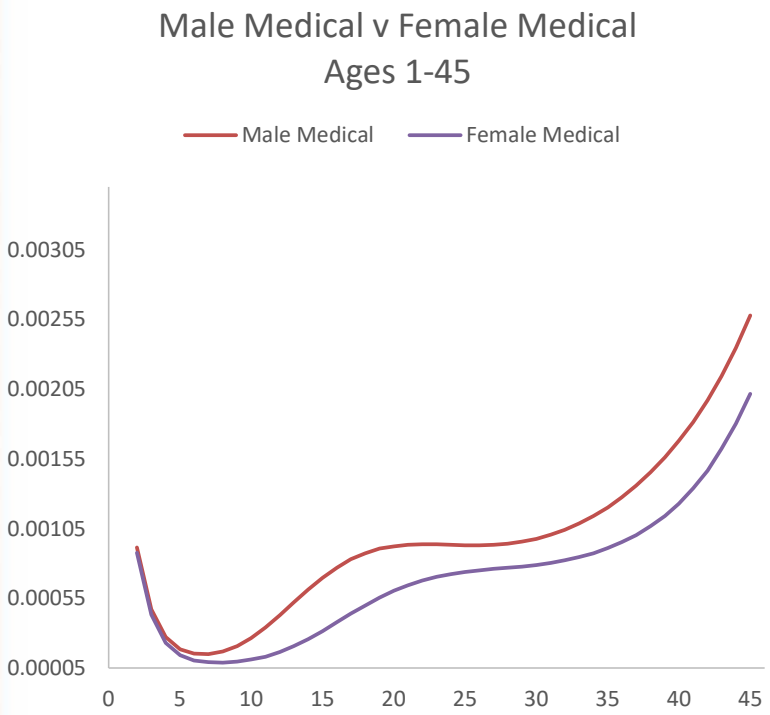
Medical / Non Medical Rates (dur 2+)

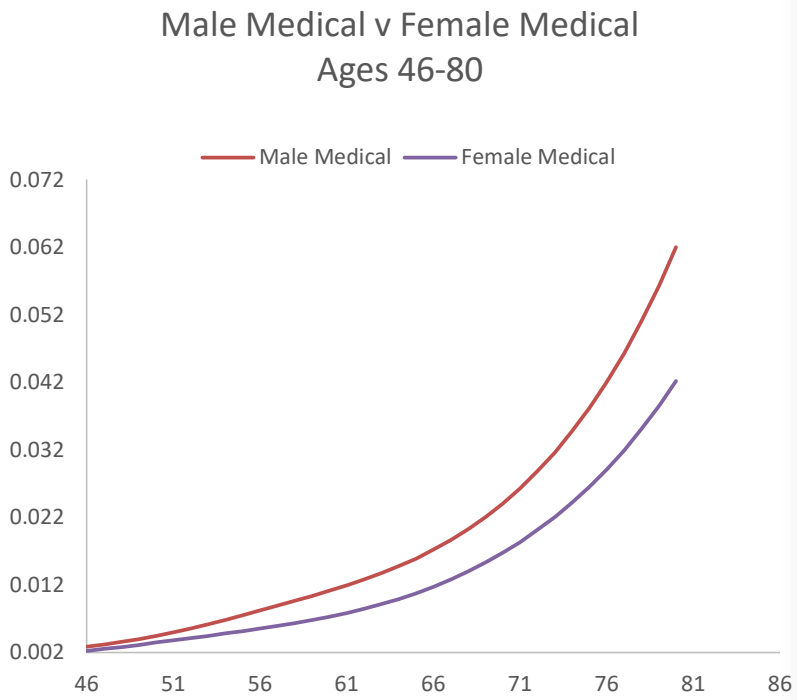




The ultimate Mortality rates for non-medically underwritten lives are lower than medically underwritten lives at ages above 55 years.

Male vs Female

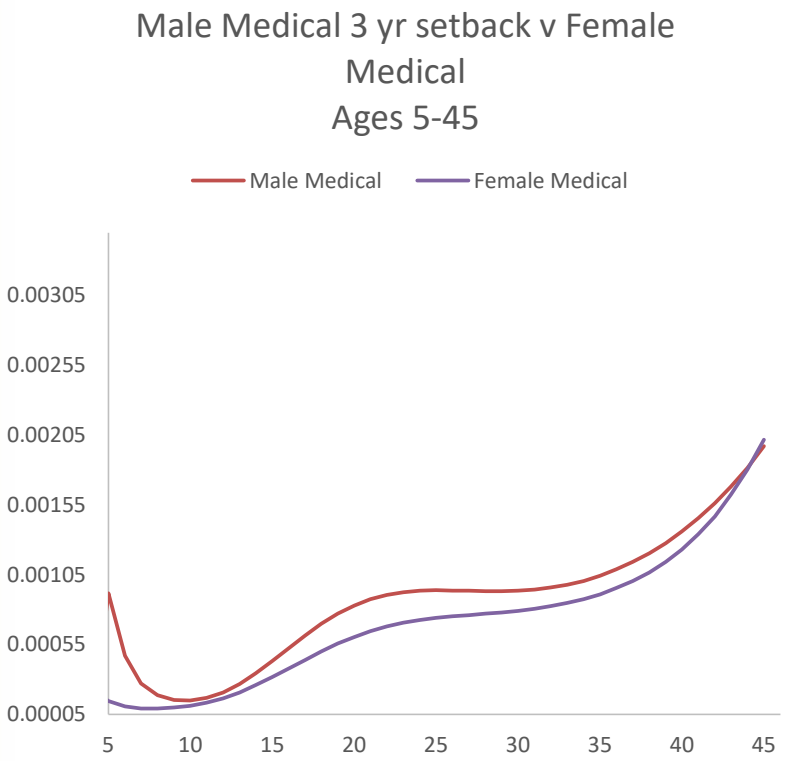


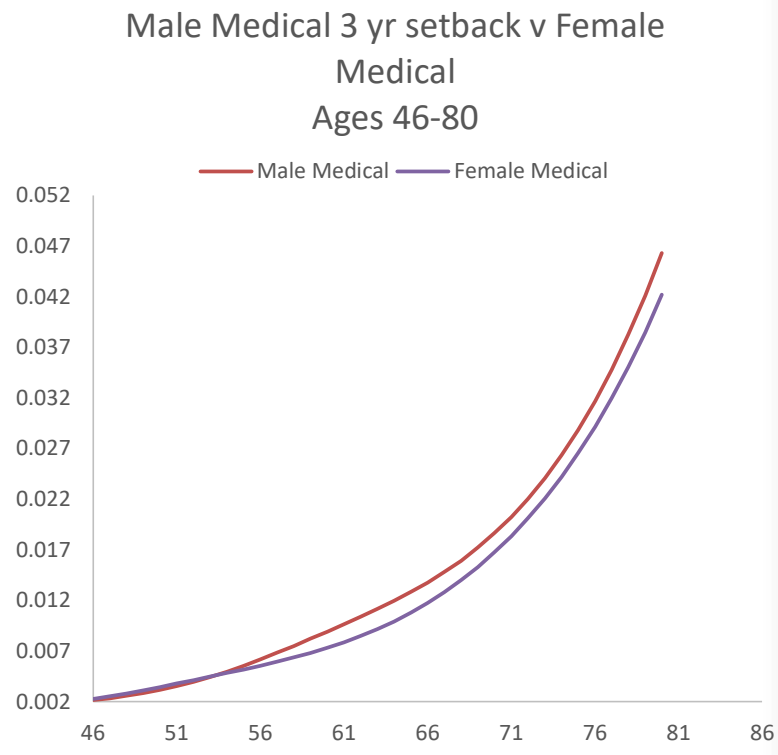


The peaks and troughs of the Male v Female mortality curve suggests a 3 year age setback to be appropriate.
Male rates are increasing at a faster rate than female rates post age 45 years.

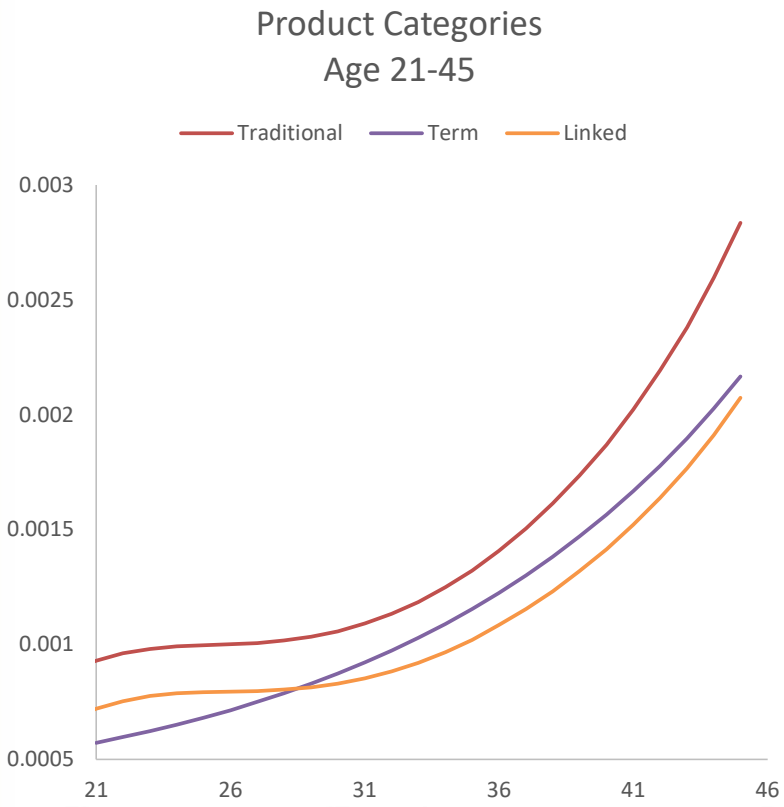
Similar pattern observed in Male Non-Medical v Female Non-Medical Rates

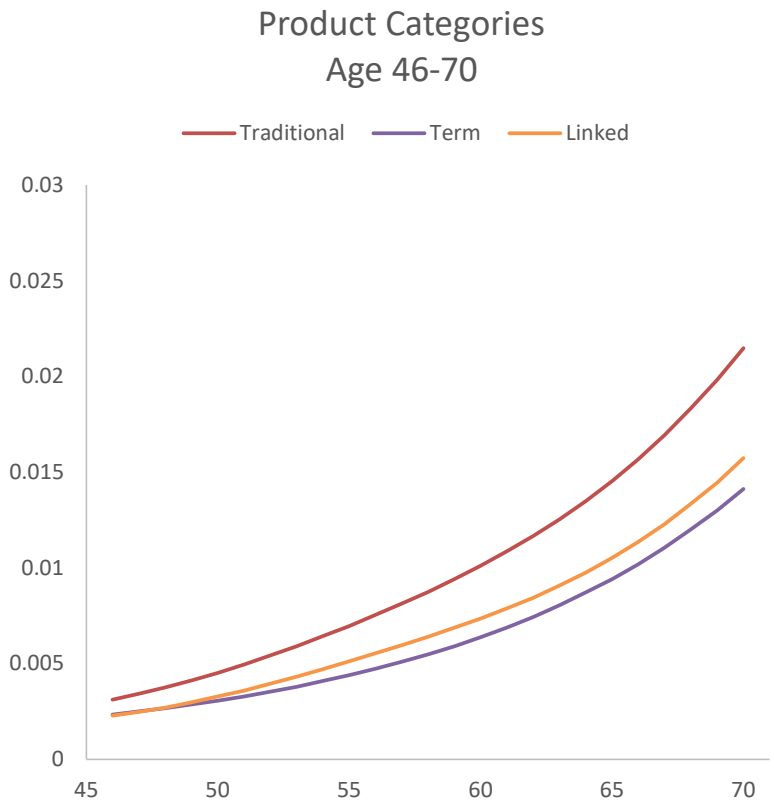
Male 3 year setback vs Female





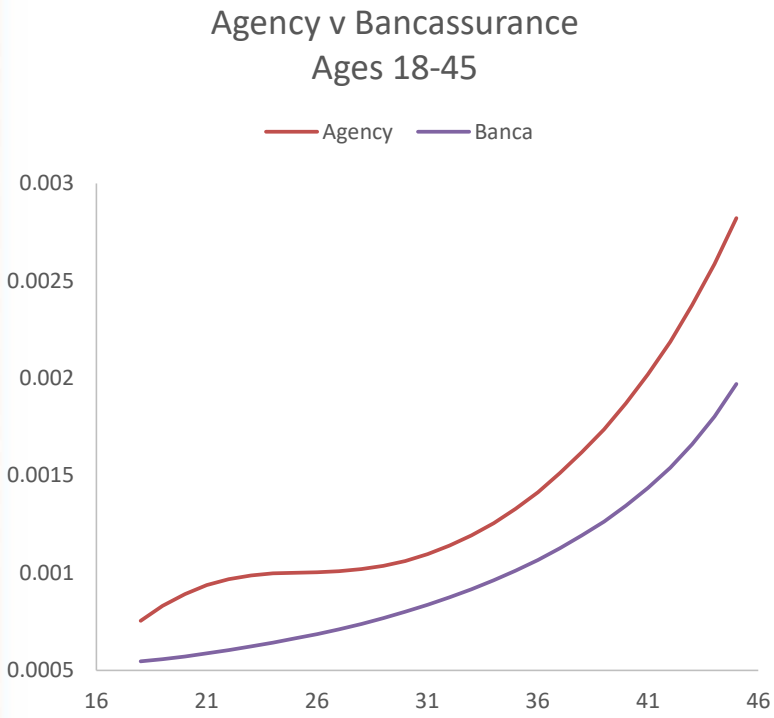
Traditional Vs Term Vs ULIP

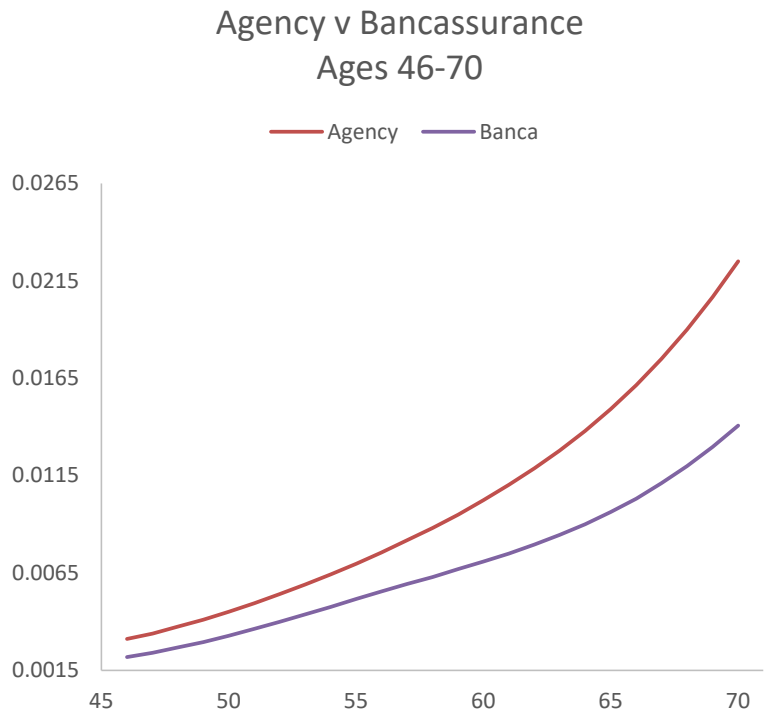




Traditional Products usually exhibit heavier mortality experience than Linked and Term products. Experience of Term products after 45 years of age is better than Linked products.

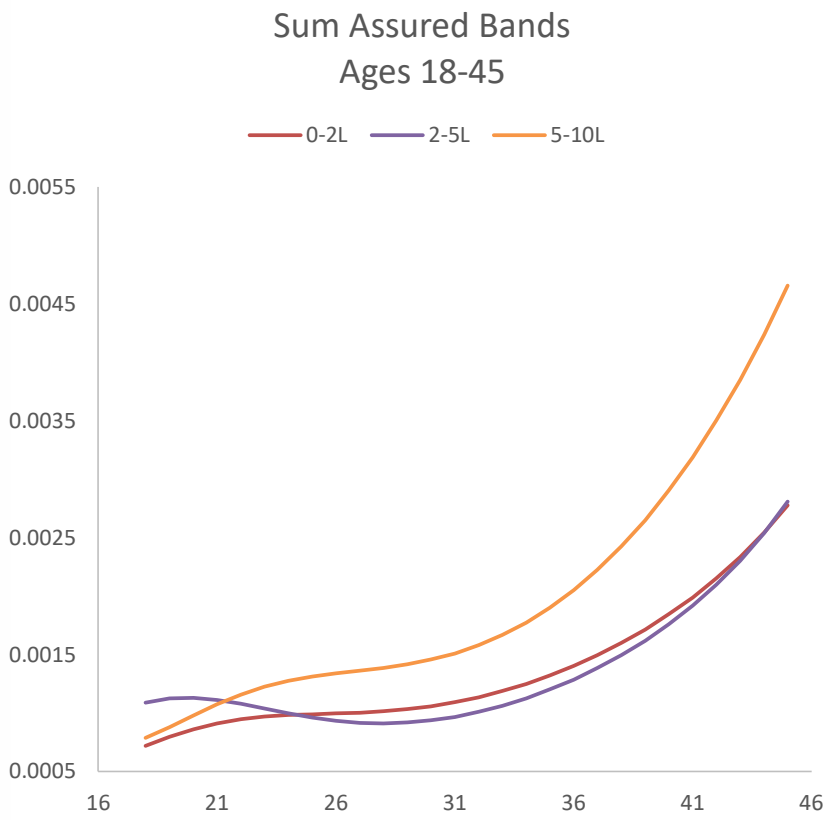
Agency Vs Bancassurance

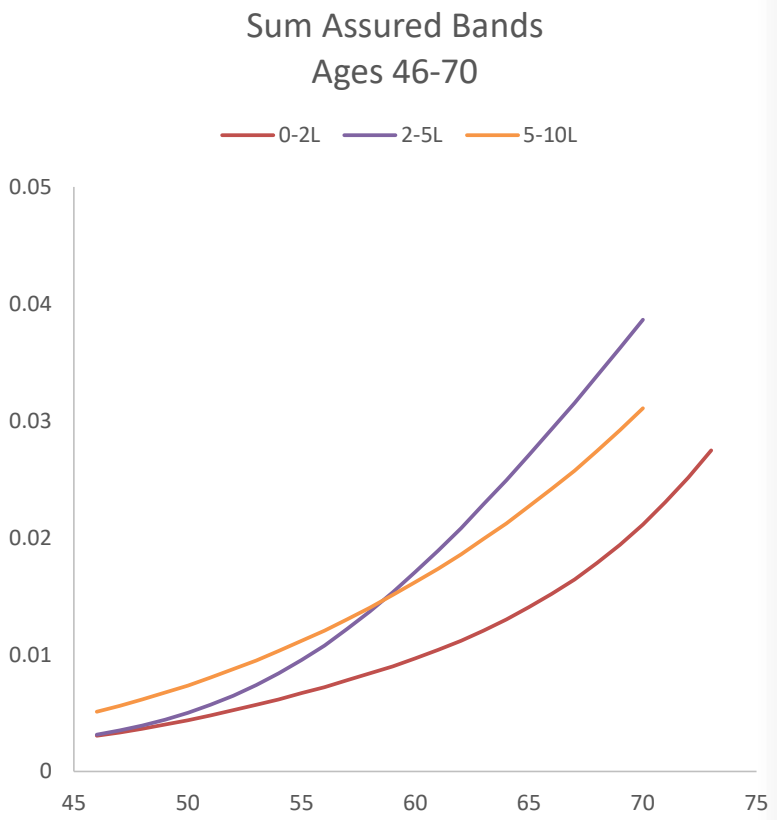




Mortality experience of the policies sourced through Agency Channel is heavier compared Bancassurance Channel. (effect of advice factor)
Accident hump is more profound for Agency business.

SA Bands

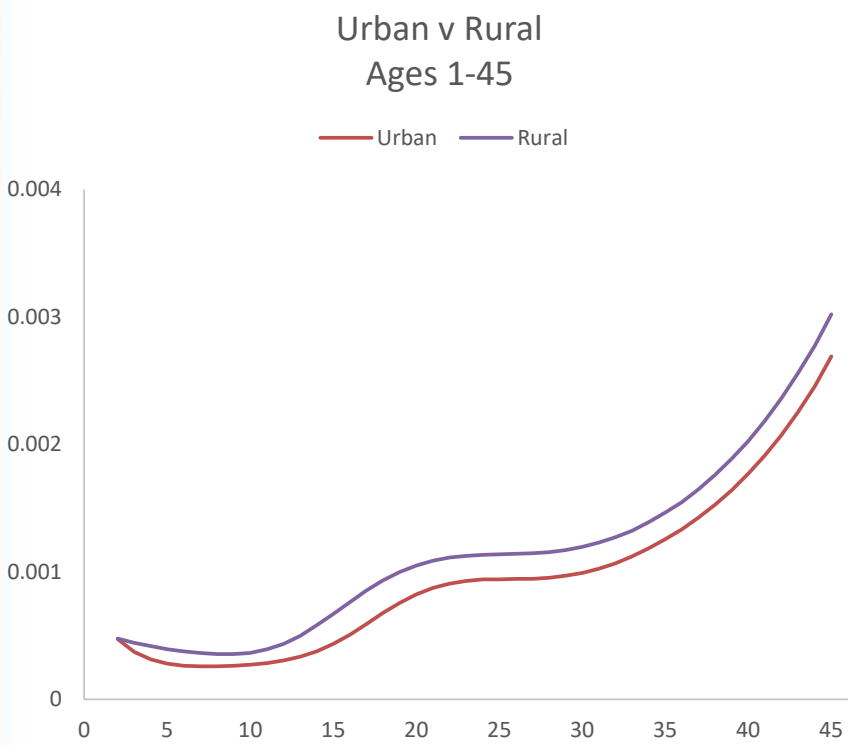


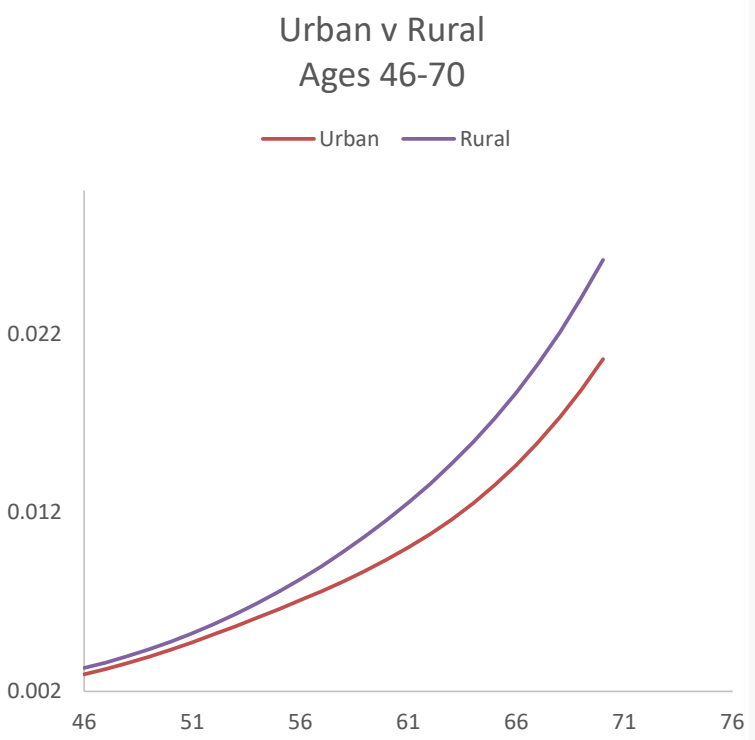


At lower ages (18-45 years), the experience of the higher sum assured band is markedly worse which is counter intuitive.

One of reasons for lower mortality for lower SA bands could be under-reporting of deaths.

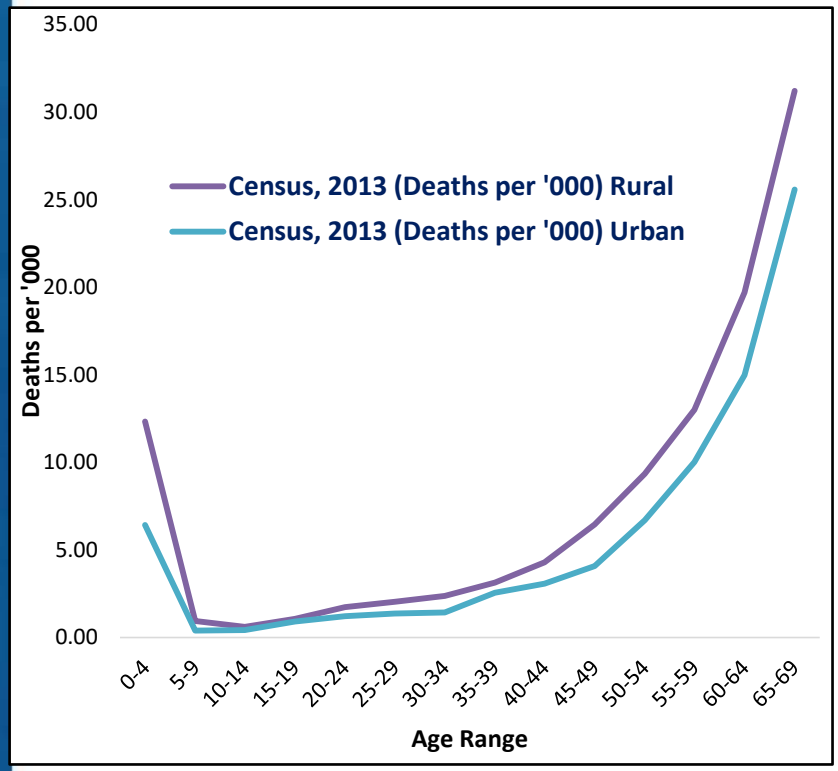
Urban / Rural

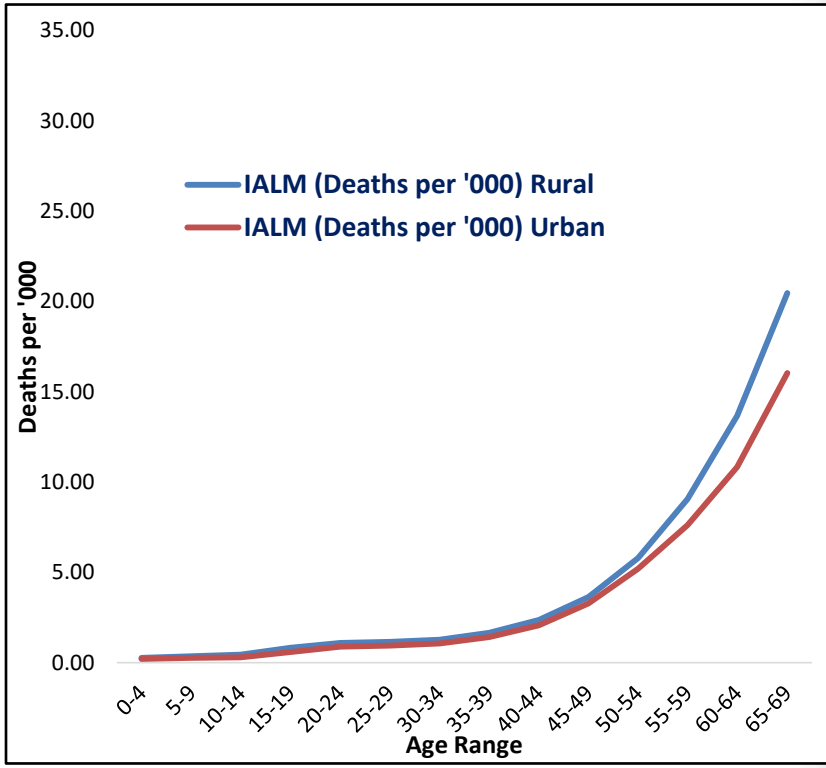




Mortality experience of Rural lives is heavier than the that of Urban lives as would be expected.

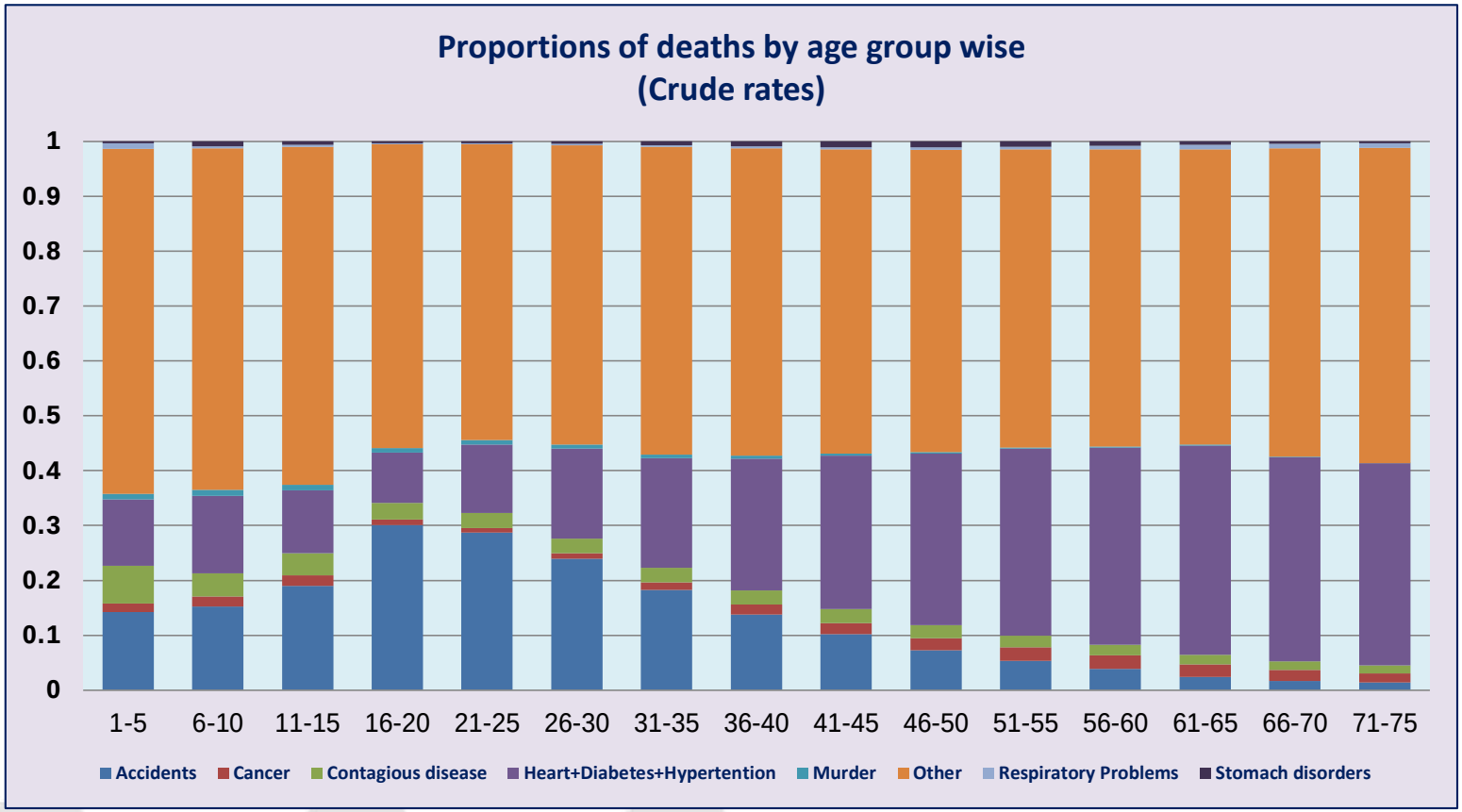
IALM 2012-14 Vs Census 2013





Mortality experience of Rural lives is heavier than the that of Urban lives as would be expected.

Cause of Death Analysis



- At all the ages, except younger ages, the major reason for deaths is heart-related problems.
- At younger ages, accidents account for a much higher proportion than other causes in the overall deaths

Current Activities

The AORC team is currently working on the following:

1. Annuitants mortality table
2. IALM 2015-17
3. Critical Illness Morbidity table for top 6 CI conditions

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Thank You

Members of the Actuarial Oversight Committee (AOC) for the 2012-14 study