Mortality Improvements in South Africa: What is going on?

Jason Cooper-Williams, Paul Lewis & Lize-Mari Albertyn

Gen Re
Agenda

1. Where in the world is Paul
2. Why is this of any relevance to you
3. Why do people die
4. What do we know about South Africa
5. Some scary numbers
6. Where to from here
Where in the world is Paul?
Where in the world will Paul be?
So why is this important to you?

• ASSA representative on the International Actuarial Associations Mortality Working Group

• (and other things)

• They discuss a lot of interesting, and complicated, stuff
Mortality assumptions in pensions reserving
IAA MWG: Mortality assumptions used in pensions and annuity reserving 2

• Compared tables used in valuation vs. population tables

• Evidence of a lack of consistency between countries

• Some countries don’t require any assumption of future mortality improvement!

• Important implications for actuaries and investors, defined benefit pension liabilities can form a significant item on the balance sheet of many companies
IAA MWG: Mortality assumptions used in pensions and annuity reserving

Comparison of male pension liability (age 65) taking UK as a base (assuming a long-term mortality improvement rate of 1% for the UK): equivalent liability of £1000 million for the UK
Healthy Longevity

Bridget Browne
IAA Mortality Working Group Meeting
Zagreb 29-30 September 2011
## Compression & Expansion of Morbidity

<table>
<thead>
<tr>
<th></th>
<th>Compression</th>
<th>Expansion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Absolute</strong></td>
<td>Dependent LE Years decrease</td>
<td>Dependent LE Years increase</td>
</tr>
<tr>
<td><strong>Relative</strong></td>
<td>Dependent LE as a % of Total LE decreases</td>
<td>Dependent LE as a % of Total LE increases</td>
</tr>
</tbody>
</table>

### Example:

<table>
<thead>
<tr>
<th></th>
<th>Total LE</th>
<th>Healthy LE</th>
<th>Dependent LE</th>
<th>Dependent LE as % of Total LE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>25</td>
<td>20</td>
<td>5</td>
<td>20%</td>
</tr>
<tr>
<td>Absolute expansion and relative expansion</td>
<td>28</td>
<td>21</td>
<td>7</td>
<td>25%</td>
</tr>
<tr>
<td>Absolute is constant with relative compression</td>
<td>28</td>
<td>23</td>
<td>5</td>
<td>18%</td>
</tr>
<tr>
<td>Absolute compression and relative compression</td>
<td>28</td>
<td>25</td>
<td>3</td>
<td>11%</td>
</tr>
</tbody>
</table>
Socio-demographics

- **Mortality trends** in recent decades in Eastern and Western Europe: contrasts, correlates and consequences, M Murphy
- Overview of known patterns and trends in longevity, M Glickman
- B1 Examining *disease based incidence and mortality rates* within the UK. H Love
- D1 From fast food to fast runners: changing mix, clouding conclusions. G Becker and G Lane
International

• A2 *Uncertainty in modelling mortality*. H v Broekhoven, IAA

• B2 Comparison of *cause of death trends* across US, UK, France and Spain. M Didou and J Hartley

• C2 *Modelling mortality and smoking prevalence* in developed countries, A Cairns and T Kleinhow
My questions

• Question 1: Why do South African actuaries not seem to care all that much about mortality improvements?

• Question 2: What is actually going on with mortality in South Africa?
• So what is happening in the rest of the world?

• www.worldmapper.org

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Land mass
Number of dentists working
Films watched
Birds at risk
Increased life expectancy
We are in a very different place to our developed world colleagues

• If you have proper mortality tables then it doesn’t really matter how people die, if all you are looking at is the next year

• For life insurance, mortality improvements are “fine” as they are a hidden margin

• For annuity and pension business, it is a very different story

• Going back to first principles, why do people die?
## Life Expectancy

<table>
<thead>
<tr>
<th>Key</th>
<th>UK</th>
<th>US</th>
<th>SA</th>
<th>Brazil</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life expectancy at birth (years)</td>
<td>80</td>
<td>79</td>
<td>54</td>
<td>73</td>
<td>65</td>
</tr>
<tr>
<td>Life expectancy at age 60 (years)</td>
<td>23</td>
<td>23</td>
<td>17</td>
<td>21</td>
<td>16</td>
</tr>
</tbody>
</table>
Why do people die

Death

Unnatural Causes (accidents, violence)

Natural Causes

Non-communicable (heart attack, cancer, stroke)

Communicable (HIV, flu, tuberculosis, dysentery)
## All Cause Mortality

<table>
<thead>
<tr>
<th>Country</th>
<th>Communicable</th>
<th>Non-communicable</th>
<th>Accidental</th>
<th>All Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Kingdom</td>
<td>36</td>
<td>401</td>
<td>25</td>
<td>462</td>
</tr>
<tr>
<td>United States</td>
<td>34</td>
<td>418</td>
<td>53</td>
<td>505</td>
</tr>
<tr>
<td>South Africa</td>
<td>983</td>
<td>635</td>
<td>72</td>
<td>1,691</td>
</tr>
<tr>
<td>Brazil</td>
<td>97</td>
<td>534</td>
<td>76</td>
<td>707</td>
</tr>
<tr>
<td>India</td>
<td>363</td>
<td>685</td>
<td>99</td>
<td>1,147</td>
</tr>
</tbody>
</table>

- Deaths per 100,000 population
- WHO statistics
## Non-communicable Mortality

<table>
<thead>
<tr>
<th>Country</th>
<th>Cancer</th>
<th>Cardiovascular</th>
<th>Respiratory</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Kingdom</td>
<td>137</td>
<td>142</td>
<td>34</td>
</tr>
<tr>
<td>United States</td>
<td>124</td>
<td>156</td>
<td>34</td>
</tr>
<tr>
<td>South Africa</td>
<td>155</td>
<td>262</td>
<td>62</td>
</tr>
<tr>
<td>Brazil</td>
<td>115</td>
<td>237</td>
<td>44</td>
</tr>
<tr>
<td>India</td>
<td>75</td>
<td>317</td>
<td>154</td>
</tr>
</tbody>
</table>
# Non-natural Cause Mortality

<table>
<thead>
<tr>
<th>Country</th>
<th>Road Traffic Accident</th>
<th>Violence</th>
<th>Other</th>
<th>All Accidents</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Kingdom</td>
<td>5</td>
<td>1</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>United States</td>
<td>14</td>
<td>6</td>
<td>32</td>
<td>53</td>
</tr>
<tr>
<td>South Africa</td>
<td>20</td>
<td>29</td>
<td>23</td>
<td>72</td>
</tr>
<tr>
<td>Brazil</td>
<td>22</td>
<td>28</td>
<td>25</td>
<td>76</td>
</tr>
<tr>
<td>India</td>
<td>19</td>
<td>5</td>
<td>76</td>
<td>99</td>
</tr>
</tbody>
</table>
South Africa
South Africa

- Us and the world
  - What has been done?
  - Can’t the CSI just look at the data?
  - Are mortality improvements important?
  - Where to start -> Can we start?

- The more we considered South Africa
  - What do we want to measure?
South African Lives

Diversity is great but......
South African Lives

Heterogeneity

- Socio-economic class
- Race
- Region

- Higher socio-economic class
- Employed
- Insured

- Traditional Life Insurance
- Group Life Insurance
- Limited UW products

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South African Lives

- Different drivers of mortality within each group drive mortality improvements
- At population level - external forces
  - AIDS & ARV
  - Social upliftment
  - Primary Health Care
  - Income & Education -> middle class
- Traditional insurance market
  - Medical advances
  - Similar drivers to UK and US?
Data
South African Data

• The biggest obstacle?

• Population Tables
  • SALT since 1921 - last tables 1984 -1986 (by race)
  • Statistics South Africa post 1986 (combined)
  • Table for the period 1996 to 2001 (Dorrington, et al 2004)

• Insurance Tables
South African Data

- Insurance investigations
  - Assured Lives Mortality
  - Annuitant Mortality
    - CSI Annuitant Report 2001-2004
    - Annuitant Mortality Investigation, 1995 – 1999

- Standard Tables
  - SA85-90 Mortality Tables (Dorrington, RE, & Rosenberg, SB 1996)
  - SA56-62 Mortality Tables (Report: Mortality Standing Committee 1974)
Mortality Improvement Research


- Mortality improvements observed but disregarded:
  - The implied improvements of 3% for men and 6% for woman were much higher than those observed in the UK.
  - The period over which the trends were looked at was too short.
  - The improvements seen were not consistent with other mortality studies conducted.
  - The pattern of the improvements did not match that observed in the UK either.
South African Mortality Improvements
SA Mortality Improvements

- Crude calculations based on
  - SALT since 1921 - last tables 1984 -1986 (by race)
  - Table for the period 1996 to 2001 (Dorrington, et al 2004)
- Used data based on race and looked at white population group only
  - Longest recorded history
  - Minimise some of the AIDS impact
  - Potentially closest fit to assured lives
  - Results more comparable to other countries where improvement data is available
SA Mortality Improvements

- Looked at three scenarios in terms of duration

<table>
<thead>
<tr>
<th>Period</th>
<th>Years</th>
<th>Number of tables used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Term</td>
<td>1948–1998</td>
<td>50</td>
</tr>
<tr>
<td>Medium Term</td>
<td>1975–1998</td>
<td>23</td>
</tr>
<tr>
<td>Short Term</td>
<td>1982–1998</td>
<td>16</td>
</tr>
</tbody>
</table>
Crude Improvement Factors SA tables

Males
Crude Improvement Factors SA tables

Females

- Long
- Medium
- Short
Impact of Mortality Improvements
Impact of Mortality Improvements

• What does a 1% mortality improvement mean to me?

• Annuities and Insurance Products

• Impact on Present Value or Annual Level Premium

• Impact of interest rates
Increase in Present Value of Annuity

7% Discount Rate
Increase in Present Value of Annuity
Reduction in Level Premium for WOL

<table>
<thead>
<tr>
<th>Age</th>
<th>1% p.a. improvement</th>
<th>2% p.a. improvement</th>
<th>3% p.a. improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>2%</td>
<td>4%</td>
<td>6%</td>
</tr>
<tr>
<td>25</td>
<td>2%</td>
<td>4%</td>
<td>6%</td>
</tr>
<tr>
<td>30</td>
<td>2%</td>
<td>4%</td>
<td>6%</td>
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<tr>
<td>35</td>
<td>2%</td>
<td>4%</td>
<td>6%</td>
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<tr>
<td>40</td>
<td>2%</td>
<td>4%</td>
<td>6%</td>
</tr>
<tr>
<td>45</td>
<td>2%</td>
<td>4%</td>
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<tr>
<td>50</td>
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<tr>
<td>60</td>
<td>2%</td>
<td>4%</td>
<td>6%</td>
</tr>
<tr>
<td>65</td>
<td>2%</td>
<td>4%</td>
<td>6%</td>
</tr>
</tbody>
</table>
Industry Views
South African Actuaries

• Surveyed members of Life Assurance and Retirement Matters Committees

• 32 surveyed from Life Insurers and Consulting Actuaries

• Looking to ascertain
  • General views of mortality improvements
  • Views of research available
  • Assumptions being used in market
  • Importance of the topic
South African Industry Survey

- Work completed by the CSI is outdated and/or inconclusive
- Not enough reliable data in the SA industry to enable a credible mortality improvement analysis
- A lack of appreciation for the extent of longevity risk - other risks (e.g. HIV AIDS) have taken priority
- The resources in the industry are committed towards the most pressing short-term issues
  - Solvency Assessment and Management
  - Treating Customers Fairly
South African Industry Survey

• There is an overreliance on the research emanating from the United Kingdom
  • results from the UK are adjusted for use in SA (without substantive evidence for the adjustments) or;
  • they aren’t adjusted and there is concern that these are then overly conservative.
• There is some concern that this could have negative implications under the new “Treating Customers Fairly” framework.
• Pension fund trustees have taken actuaries to task for assumptions set by reference to overseas longevity
Are Mortality Improvements a Concern?

The bar chart shows the percentage of respondents who indicated no concern at all or highly concerning about mortality improvements. The percentages are as follows:

- No concern at all:
  - 1: 0%
  - 2: 0%
  - 3: 8%
  - 4: 8%
  - 5: 8%
  - 6: 17%
  - 7: 17%
  - 8: 33%
  - 9: 0%
  - 10: 8%

- Highly concerning:
  - 0%
Enough SA Specific Research?

Yes  No

0%  100%

0%  20%  40%  60%  80%  100%
Average Long-term mortality improvement experienced?

- 0% - 1%
- 1% - 1.5%
- >1.5%

Bar chart showing the distribution of average improvements.
Mortality Improvement Assumptions

- 0% - 10%
- 10% - 20%
- 20% - 30%
- 30% - 40%
- 40% - 50%
- 50% - 60%
- 60% - 70%
- 70% - 80%
- 80% - 90%
- 90% - 100%
- >2%
- 1.5% - 2%
- 1% - 1.5%
- 0.5% - 1%
- <0.5%
Conclusion

• An issue that seems to be very important
  • Based on views of those surveyed
  • Potential financial / economic impact
• Moving to action
  • Response to HIV and AIDS
• Solution
  • Longevity Committee?
  • Ensuring your data can be used for this purpose?
  • More involvement at national level?
  • Dedicate resources?