



## **IAA Mortality Working Group**

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Insights about the level of mortality rates around the world, and the trends of future rates of mortality, have never been more important. While mortality rates are declining in most countries, in other countries they are stable and in some instances are even increasing. Rates of mortality affect many aspects of society, including:

- The costs of old age income support in Social Security systems;
- The proportion of resources absorbed by government sponsored and private health arrangements;
- The financial position of defined benefit pension funds;
- The probability that assets will be sufficient for retirement needs for members of defined contribution funds;
- The solvency requirements of life insurers;
- Pricing of long term mortality related financial products;
- Work place practices relating to the employment of older workers;
- The growth of certain industries (such as aged care services) and the need for infrastructure (such as accessibility to transport).

Planning in all these areas requires knowledge and understanding about rates of mortality, and accordingly in January 2008, the International Actuarial Association set up a Mortality Task Force which transformed into the Mortality Working Group in November 2009.

This brochure provides basic information about the Working Group.

### **The International Actuarial Association**

Founded in 1895, the International Actuarial Association (IAA) is the worldwide association of local professional actuarial associations and their individual actuaries. The IAA exists to encourage the development of a global profession, acknowledged as technically competent and professionally reliable, which will ensure that the public interest is served.

## Areas of investigation

The areas under active study by the IAA Mortality Working Group are:

### Collection of global mortality tables

Mortality tables exist by country and by type (population, life insurance or pension). There exist a few comprehensive aggregations of such tables, each with its strengths and weaknesses. We aim to provide a central point of reference to enable simple web-based access to these websites or tables.

### Mortality trends

Past rates of mortality changes are documented in many parts of the world. In most countries, mortality has been improving most of the time. We aim to provide references to the documentation of such changes, and to projection methodologies, to help answer the following questions. What are the most likely future mortality trends? What could be said about the uncertainty of projections of future mortality trends?

### Pandemics

A pandemic is an outbreak of infectious disease on an international, regional or global scale. Pandemics can have a significant effect on rates of mortality and hence may impact financial services organisations and indeed all aspects of the community. What could be said about the possibility and severity of future pandemics? What evidence have we on the short- and long-term effects of past pandemics on population mortality? How is the impact of a possible future pandemic taken into account in financial calculations?

### Uncertainty

The values in tables of mortality, both present day and at future dates, are best estimates. However, there is uncertainty attaching to these best estimates. The first reason for the uncertainty is that the best estimates may be based on incomplete data and random elements may inevitably intervene. Secondly, even if the data is comprehensive, in many countries, the population is so small that the observed mortality pattern could be expected to show large random deviations from the underlying rate of mortality. Thirdly, future levels of mortality will depend on improvements yet to be seen. How can uncertainty be factored in to the calculations made by actuaries and others?

## Social and demographic stratification

Rates of mortality vary according to a person's social and demographic profile. Understanding this aspect of mortality can assist pricing and valuation decisions by financial institutions, and can influence future social policy. How are financial institutions dealing with questions relating to social difference in mortality rates? What support could the actuarial profession give?

## Analysis by cause of death

Social changes, medical breakthroughs and increased awareness of basic healthy lifestyle behaviour have resulted in enormous shifts in the cause of death (for example, in the UK, death from infectious diseases has virtually been eliminated). Studies of cause of death can assist in the analysis of medical and treatment outcomes and can affect pricing and valuation decisions by financial institutions. Understanding the trends in causes of death can assist in the projection of future rates of mortality.



## Graduation techniques

The first step in the construction of mortality tables is to calculate the 'raw' rates of number of deaths divided by the size of the relevant population. These raw rates often form a disjointed series, and hence they are graduated or smoothed to produce the final version of the mortality tables. The challenge of graduation is to achieve a relatively smooth outcome without discarding too much of the original information. What techniques are being used at present? Are these helpful in other countries? Are they useful when projecting mortality, or should other graduation techniques be used here?

## Projection techniques

Projection techniques refers to methods of forecasting future levels of mortality. There are three broad approaches: expectation, extrapolation and explanation.

Expectation utilises expert opinion to provide an assumed forecast; often accompanied by high and low scenarios. Extrapolation methods assume that future trends will essentially be a continuation of the past. Explanatory methods are based on structured or causal epidemiological models of certain causes of death involving disease processes and known risk factors. What techniques are being used at present, and are these helpful in other countries?

## Data availability

In a number of countries there are reliable data bases for births, deaths and the size of the population. In these countries it is relatively straight-forward to construct tables that are reliable estimators of the underlying rates of mortality. However, in many countries, data is very scarce, since data is lacking or of low quality, or since the country is too small. In these countries, special techniques must be used to construct mortality tables. What insights can the actuarial profession offer, internationally?

## Mortality related financial products

The traditional product supporting financial institutions in hedging their mortality risk has been reinsurance. Reinsurance solutions are developing also as hedging for longevity risk, but there has also been a development of other types of mortality related financial solutions and products. One example is the development of mortality and longevity bonds. Another example is commercial entities purchasing life policies from current policyholders, where one of the determinants of the price of the transaction is the purchaser's view of the mortality risk. What is being done at present, and where are these methodologies likely to lead?

## Society of Actuaries (SoA) International Experience Study

The SoA International Experience Study (IES) assists developing countries to produce credible actuarial experience. Through the IES, the SoA and the country actuaries jointly share responsibilities to successfully complete a mortality and persistency study of insured life experience. The IES services are provided to each participating company in each country at no charge on the sole condition that permission is given to publish the combined results for the country of the study.

## Contact us

The members of the IAA Mortality Working Group are listed on the IAA web site [www.actuaries.org/Mortality](http://www.actuaries.org/Mortality). Please feel free to contact any member of the Working Group with any requests for information.

We would be particularly interested in receiving advice of any papers, research or studies that you consider worthy of inclusion in our material.



**Association Actuarielle Internationale**  
**International Actuarial Association**

150 Metcalfe Street, Suite 800

Ottawa, Ontario

Canada K2P 1P1

[www.actuaries.org](http://www.actuaries.org)

Tel: 1-613-236-0886 Fax: 1-613-236-1386

Email: [secretariat@actuaries.org](mailto:secretariat@actuaries.org)



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## Terms of Reference

The Terms of Reference of the Mortality Working Group are:

- To monitor data collection efforts internationally and to facilitate continuous improvement in the quality and extent of data collection.
- To coordinate the work done by different sections and committees of the IAA in the area of mortality, especially when this involves cooperation with other international bodies.
- To extend the body of knowledge of the international actuarial community in respect of mortality through:
  - research;
  - encouraging actuarial research;
  - collection of research from both actuarial and non-actuarial sources;
  - making research accessible to actuaries globally;
  - presentations and papers at professional seminars, colloquia, conferences, etc.; and
  - encouraging and co-ordinating other actuaries to produce presentations and papers at professional seminars, colloquia, conferences, etc.

## Vision

**The vision of the IAA Mortality Working Group is:**

Whenever insights are required in respect of mortality and trends in mortality, the body of knowledge produced by the Mortality Working Group is sought for its valued and authoritative coverage.

## Disclaimer

The opinions put forward by the IAA Mortality Working Group are not necessarily the opinions of the International Actuarial Association or of the associations to which the individual members of the Working Group might belong, or of the companies or organisations where the individual members of the Working Group might be employed.

