

## Research Report

### International research on the treatment of mortality rates in International Accounting Standard 19 (IAS 19 Employee Benefits)

This is an English translation of the summary portion of “国際会計基準 19 号 (IAS19、被用者給付 (Employee Benefits)) における死亡率の取扱いに関する国際調査.” The original was issued in Japanese.

December 2012



The Japanese Society of Certified Pension Actuaries

## Preface

This Report summarizes the results of the research regarding the treatment of mortality rates under the International Accounting Standard 19 (IAS 19 Employee Benefits), covering 27 countries or regions including Japan.

IAS 19 was amended on June 16, 2011 to provide clarity with regard to the expected future improvements of mortality rates into the measurement of defined benefit obligations and costs. In response, the Japanese Society of Certified Pension Actuaries launched the Mortality Subcommittee of the Accounting Standards Committee in August 2011 and embarked on a study of mortality rates and their expected improvements.

While the Japanese Accounting Standard of Post-employment Benefits was subsequently amended on May 17, 2012 with the intent of converging with IAS 19, the expectation of future improvements in mortality rates was not clearly incorporated into the amendment. This is because mortality rates have a relatively small influence on many of Japan's Defined Benefit Plans, and not many companies have yet incorporated considerations around expected improvements in mortality rates. Hence, the view that Japan has not yet reached a stage where the expected improvements of mortality rates should be incorporated may have had an impact on this not being clearly incorporated into the amendment. Although IAS19 was amended, the application of IFRS remains optional for Japanese corporations at present. No strong indicators that Japanese companies are showing an increased interest in incorporating the expectation of improvements in mortality rates have been noted. While the overall intention of amending the Japanese Accounting Standard for Post-employment Benefits was to converge with IAS 19, it cannot be concluded that incorporating the expected improvements of mortality rates would have only a minor influence on life annuity pensions. Further, although the application of IFRS is presently optional, it is considered likely that as IFRS continues to be adopted in Japan, interest in mortality rate improvements will also gradually increase in the future.

The Mortality Subcommittee conducted, as one of its projects, international research through the international networks of the Big Four accounting firms. This Report summarizes the results of this research.

This research was made possible thanks to the input of a number of contributors. A special mention of appreciation for the input of Takuma Fukuhara should be made for his support of this research initiative through the meetings of the Subcommittee, leadership in coordinating fellow Japanese Certified Pension Actuaries of Big Four member firms, and reporting the findings of this research.

The research mainly focused on the methodology and background of mortality rates rather than

the mortality tables themselves, as used in defined benefit accounting. Refer also to the useful research on mortality tables conducted by the UK Actuarial Profession.

The research was conducted by sending a questionnaire and obtaining answers thereafter. Additional questions were sometimes sent subsequently, depending on the answers. The people who cooperated in conducting research in their respective countries and regions are listed on the following pages. They are experts in this field at each member firm of the Big Four (Deloitte Touche Tohmatsu (DTT), Ernst&Young (EY), KPMG and PricewaterhouseCoopers (PwC)). Note that statistical support was not always provided and it is possible that inaccuracies may exist in our responses. This Report was prepared for the purpose of providing an understanding of the current international situation, in broad terms only.

Lastly, we thank the following contributors of research for the preparation of this Report.

Project members:

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Takuma Fukuhara	Ernst & Young Transaction Advisory Services Co., Ltd.
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Satoshi Nakano	Nippon Life Insurance Company

Cooperators in Japan who communicated with other member firms of the Big Four:

DTT	Akihiro Hotta (Deloitte Touche Tohmatsu LLC)
EY	Takuma Fukuhara (Ernst & Young Transaction Advisory Services Co., Ltd.)
KPMG	Takanobu Miwa (KPMG Azusa LLC)
PwC	Asahiro Kishimoto (PricewaterhouseCoopers Aarata)

Countries and regions where the research was conducted:

- Europe and Africa (10)  
Austria, Belgium, France, Germany, Italy, the Netherlands, South Africa, Spain, Switzerland and the UK.
- Americas (4)  
Brazil, Canada, Chile and the USA

- Asia and Oceania (13)  
Australia, China, Hong Kong, Indonesia, South Korea, Malaysia, New Zealand, the Philippines, Singapore, Taiwan, Thailand, Vietnam and Japan

December 2012

Yasuyuki Fujii, Chairperson,

The Mortality Subcommittee of the Accounting Standards Committee,

The Japanese Society of Certified Pension Actuaries

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This English translation does not include Chapters 3 and 4, though they exist in the original Report in Japanese.

## Chapter 1 Outline of the Research

### 1. Timing of the research

The research was conducted from late November 2011 through May 2012.

### 2. Method of research

Research on mortality in each country or region was conducted through the networks of the Big Four accounting firms (Deloitte Touche Tohmatsu (DDT), Ernst & Young (EY), KPMG and PricewaterhouseCoopers (PwC)). Specifically, request letters and research questionnaires were sent by e-mail to the offices of each country or region by Japanese certified pension actuaries belonging to Big Four member firms in Japan. Further, additional questions were issued once the answers were received to obtain clarification as necessary. The original request letter and research questionnaire are both presented on the following pages.

Cooperators in Japan who communicated with other member firms of the Big Four

	DTT	EY	KPMG	PwC
Firm	Deloitte Touche Tohmatsu LLC	Ernst & Young Transaction Advisory Services Co., Ltd.	KPMG Azusa LLC	PricewaterhouseCoopers Arata
Name	Akihiro Hotta	Takuma Fukuhara	Takanobu Miwa	Asahiro Kishimoto

- Request letter



The Japanese Society of Certified Pension Actuaries

November 2011

Dear sir or madam

**Study of the mortality assumptions used in the valuation of defined benefit obligations based on IAS19**

The Japanese Society of Certified Pension Actuaries is a professional organization consisting of the certified pension actuaries in Japan. It engages in actuarial business activities in Japan, including establishing practice standards, investigative research, education, and continuing professional development.

<http://www.jscpa.or.jp/>

The amendments to IAS19 issued in June 2011 specified that expected changes in mortality assumptions (such as expected mortality improvement) should be taken into consideration when determining defined benefit obligations.

In Japan, since most defined benefit plans consist of lump sums, fixed-term annuities, or life annuities with guarantee periods, the effects of changes in mortality are limited. Therefore, mortality has not been considered to be an important assumption, and it has not been common to incorporate future improvement of mortality in valuations. However, even in Japan, in a plan whose benefits are influenced by changes in mortality, there should be room for further consideration about reasonably incorporating expected improvements in mortality.

The Society has commenced work on mortality improvements by launching the Mortality Subcommittee. The Subcommittee wishes to study international experiences in considering the treatment of mortality improvements. A questionnaire is being distributed to the Big 4 international professional services networks in accountancy.

Please fill in the attached questionnaire regarding the mortality assumptions in your country. It would be appreciated if you could please reply by 31 Dec 2011. It is preferable but not required that it be completed by an actuary. Answers only need be provided for portions that apply to your country, and to the best of your knowledge.

We would like to focus our study more on methodologies and backgrounds than mortality rates themselves, whereas the Actuarial Profession of the UK issued an excellent discussion paper regarding its international comparative study of mortality tables for pension fund retirees, looking at the results of these assumptions about the future direction of life expectancy and comparing them across different countries.

<http://www.actuaries.org.uk/research-and-resources/documents/second-international-comparative-study-mortality-tables-pension-f-0>

Our report will be translated into English and shared with you. Your answers to the survey will not be simply included in the report as received from you; it is our plan to summarize answers per country. You and your company name will be presented with gratitude as a cooperator in the report.

Yours sincerely,

Yasuyuki Fujii

Chair, the Mortality Subcommittee of the Accounting Standards Committee of the Japanese Society of Certified Pension Actuaries

Cooperators: Takuma Fukuhara (Ernst & Young)  
Akihiro Hotta (Deloitte Touche Tohmatsu)  
Asahiro Kishimoto (PricewaterhouseCoopers)  
Takanobu Miwa (KPMG)

- Research questionnaire

Country	
Company name	
Respondent name(s)	
Actuary? ( Y / N )	
E-mail address(es)	
Phone number(s)	
Question	Answer
(1) Does your country have defined benefit plans, and if so, are mortality rates used to calculate their DBO?	
(2) If your country has DB plans, which type is most common: plans that are easily impacted by mortality rates (e.g., life annuity plans), plans that are not easily impacted by mortality rates (e.g., lump-sum plans), or other types of plans that fall somewhere in between? In the event that the latter is most common, please describe the plan type.	
(3) In your country, is it common practice to incorporate expected improvements into the mortality rates used in DBO valuation?	
(4) In the event that expected improvements in mortality are incorporated into the mortality rate used in DBO valuation, what was the driver behind incorporating them?	
(5) Are future mortality rate estimates issued? If so, please provide the following information. <ul style="list-style-type: none"> <li>· Name of the organization that issues the rate estimates</li> <li>· Portion of the population upon which the rate estimates are based</li> <li>· Basic principle behind the methodology used to estimate future mortality rates</li> <li>· Specific age group upon which the rate estimates are based, if applicable</li> <li>· Date of the census upon which the most recently issued mortality rate estimates are based</li> <li>· Frequency of the census and issuance of mortality rates</li> </ul>	
(6) What is the relationship between the issued mortality rate estimates and the mortality rates used in individual companies for DBO valuation purposes? For example, do any of the following apply? If so, which method is most commonly used? <ul style="list-style-type: none"> <li>· Mortality rates are developed based on the company's (or industry's) experiential data.</li> <li>· Issued mortality rate estimates are adapted in some way, taking into account the company's (or industry's) experiential data. <ul style="list-style-type: none"> <li>→ What adaptations are made under what circumstances?</li> </ul> </li> <li>· Assuming future mortality improvements are taken into consideration, in the event that the issued mortality rate estimate period is finite, how are improvements subsequent to the final year of said estimate period figured in?</li> <li>· Issued mortality rate estimates are used as-is.</li> </ul>	
(7) Do mortality rates used for DBO valuation differ between periods during and after an individual's employment?	
(8) Please indicate the life expectancy of 65 year old males and females as calculated based on each of the following. <ul style="list-style-type: none"> <li>· Total population census (please indicate the date of the latest census)</li> <li>· Mortality rate used for DBO valuation (including whether or not future mortality improvements have been taken into account, and if they have, the mortality rate for a 65 year old individual as of 1 January 2011)</li> </ul>	
(9) Is the mortality rate used for DBO valuation the same as the mortality rates used for funding purposes? If the two differ, please explain how.	
(10) In the event that expected improvements in mortality are incorporated into the mortality rate used in DBO valuation, no matter what the methodology for incorporating the improved mortality, we assume that the mortality table is a matrix comprised of age and years. If you use a different method, please describe the basic concept behind it.	
(11) What, if any, consideration has been given to taking action regarding mortality rates in response to IAS19 amendments made in June 2011?	
(12) In relation to mortality rates, what points are confirmed during audits?	



### 3. Countries where the research was conducted and respondents

Country / region	DTT	EY	KPMG	PwC
Europe and Africa				
Austria	—	Karin Kühner-Hugo	—	—
Belgium	—	Martine Blockx	L. Botes	Monique Mariamé
France	Anthony Pouzeaud	Franck Chevalier Erika Beng	Pascal Meslin Ludovic Rossiaud	—
Germany	Peter Devlin	Philipp Schoepffer	Andreas Johannleweling	Bernd Hackenbroich
Italy	—	Nicola Ciaraldi	—	—
Netherlands	Sebastiaan de Leeuw den Bouter  Maaïke Schakenbos	Hans de Mik	Alexander van Stee  Machiel Koper	Mischa Borst  Dirk-Symon Siesling
South Africa	—	James Chemirmir	—	Colin van Son  Nanie Rothman  Madri Jacobs
Spain	Rocío de Padura	Enrique García-Hidalgo	Ana del Solar  Pilar Checa	Marian Moreno
Switzerland	Björn Thijssen	Frank Meisinger	—	Oliver Stoll  Andrea Rem
UK	Paul Yates	Christopher Bown	Alex Burton	Chris Haralambous  Boris Zlatopolsky
Americas				
Brazil	—	Carla Abrantes	Roberta Porcel	—
Canada	—	Uros Karadzic  Moira Graham	—	—
Chile	—	—	Hector Benavente	—
USA	Robert Maciejewski	Art Conat	James Kreamer	Cindy Fraterrigo

Country / region	DTT	EY	KPMG	PwC
Asia and Oceania				
Australia	Peter Larsen Diane Somerville	Steven Wood	—	Jo-Anne Morgan
China	Warren Zhao	Hilda Tse Nelson Huang	Bill Cheung	Xin Ying Chua
Hong Kong	—	Hilda Tse Nelson Huang	Bill Cheung	Xin Ying Chua
Indonesia	—	—	Mellin	Xin Ying Chua
South Korea	Byung Seop, Shim Eun Kyung, Kang	Kyeong-mun.kwak	Jin Kyu Kim	Xin Ying Chua
Malaysia	—	—	—	Xin Ying Chua
New Zealand	Charles Hett	Steven Wood	—	Christine Ormrod
Philippines	—	—	—	Xin Ying Chua
Singapore	—	—	Lim Sio Hoon	Xin Ying Chua
Taiwan	—	—	Amanda Chien	Xin Ying Chua
Thailand	—	Nonglak Pumnoi Waraporn Prapasirikul Piyarat Vudjakorn Pentip Sirathanaran	—	Xin Ying Chua
Vietnam	—	—	Tran Anh Quan	—

\*Countries in each region are listed in alphabetical order.

The project members prepared the answers for Japan.

## Chapter 2 Summary

1. Does your country have defined benefit plans, and if so, are mortality rates used to calculate their DBO?

Of the 27 countries where the research was conducted, 26 countries other than Vietnam answered that ‘they have DB plans and use mortality rates for the calculation of DBO.’ Vietnam answered that the ‘DB plans are extremely rare in Vietnam.’ (Since Vietnam answered N/A to the other questions, it has been precluded from the summarization hereinafter.)

2. Are your DB plans easily impacted by mortality rates?

- 7 countries (Germany, the Netherlands, South Africa, the UK, Brazil, Canada and China) answered that ‘the life annuity is a popular benefit and there are often cases where DB plans are easily impacted by mortality rates.’
- 12 countries (Belgium, France, Italy, Spain, Australia, Hong Kong, South Korea, Malaysia, the Philippines, Singapore, Taiwan and Thailand) answered that ‘the lump-sum is a popular benefit.’
- 7 countries (Austria, Switzerland, Chile, the USA, Indonesia, New Zealand and Japan) answered that ‘both the life annuity and lump-sum are popular benefits.’

3. Is it common practice to incorporate expected improvements into the mortality rates used in DBO valuation?

- 9 countries (Austria, France, Germany, the Netherlands, Spain, the UK, Canada, Chile and the USA) answered that ‘it is common to incorporate expected improvements of mortality rates.’ However, France also replied that ‘expected improvements of mortality rates are not incorporated into the lump-sum plan which is not significantly impacted by mortality rates.’
- Switzerland answered that ‘it is currently common not to incorporate expected improvements but it is expected that incorporation thereof will increase going forward.’
- 4 countries (South Africa, Australia, Hong Kong and New Zealand) gave both answers that ‘they incorporate expected improvements of mortality rates’ and ‘they do not incorporate them.’
- 3 countries (Belgium, Italy and Switzerland) answered that ‘while expected improvements of mortality rates are not normally incorporated, improvements of mortality rates from the base date of the mortality rate until the base date of calculating obligations are incorporated.’

- 10 countries (Brazil, China, Indonesia, South Korea, Malaysia, the Philippines, Singapore, Taiwan, Thailand and Japan) answered that ‘improvements of mortality rates are not normally incorporated.’
4. What was the driver behind incorporating expected improvements?
- 13 countries (Austria, Belgium, France, Germany, Italy, the Netherlands, South Africa, Spain, Switzerland, the UK, Australia, Hong Kong and New Zealand) answered that the ‘average life expectancy is extending’ or ‘improvements of mortality rates are advancing.’
  - 3 countries (the Netherlands, the UK and the USA) answered that ‘we are required to incorporate expected improvements of mortality rates in pension financing.’
  - The USA answered that the ‘Actuarial Standards Board requires us to incorporate expected improvements of mortality rates.’
  - Canada answered that ‘expected improvements are included in mortality rates prescribed by the Canadian Institute of Actuaries (CIA).’
  - Switzerland answered that the ‘way of thinking about setting of mortality rates has been made clear by the amendments of IAS 19.’
  - Australia answered that the ‘Institute of Actuaries of Australia encourages us to consider improvements of mortality rates.’
  - 11 countries (Brazil, Chile, China, Indonesia, South Korea, Malaysia, the Philippines, Singapore, Taiwan, Thailand and Japan) answered ‘N/A.’
5. Are future mortality rate estimates released?
- 20 countries (Austria, Belgium, France, Germany, Italy, the Netherlands, South Africa, Spain, Switzerland, the UK, Brazil, Canada, the USA, Australia, Hong Kong, Indonesia, South Korea, New Zealand, Taiwan and Japan) answered that the ‘future estimation of mortality rates has been released.’
  - The UK answered that the ‘forecasting model of improvement rates of mortality rates has been made public.’
  - 5 countries (China, Malaysia, the Philippines, Singapore and Thailand) answered that the ‘future estimation of mortality rates has not been released.’
  - One country (Chile) answered ‘N/A.’
- (1) If future mortality rate estimates have been released, what organization releases them?
- 14 countries (Austria, Belgium, France, Germany, Italy, the Netherlands, Spain, the UK, Brazil, Australia, Hong Kong, South Korea, New Zealand and Japan) answered that a ‘government agency releases them.’

- 4 countries (the Netherlands, Indonesia, South Korea and Taiwan) answered the ‘Insurance Association has made them public.’
- 7 countries (France, the Netherlands, South Africa, Spain, the UK, Canada and the USA) answered that the Institute of Actuaries makes them public.’ However, Canada replied that Canada uses the mortality rates made public by the U.S. Society of Actuaries instead of its own Institute of Actuaries.
- Two countries (Germany and Switzerland) answered that a ‘private company makes them public.’

(2) If they have been released, what is the population subject to future estimation of mortality rates?

- 11 countries (Austria, France, Germany, Italy, the Netherlands, Spain, the UK, Brazil, Australia, Hong Kong and Japan) answered that the ‘population subject to future estimation made public is all the people of the country or data of all residents.’
- The UK answered that it is based on the ‘data from life insurance companies and those from occupational pension schemes.’
- The USA answered that it is based on ‘data from pension scheme members, pensioners and also from the Social Security data.’
- Germany answered that the ‘population subject to future estimation made public is based on Social Security System data.’

6. What is the relationship between the issued mortality rate estimates and the mortality rates used for DBO calculation purposes?

(Note that the mortality rates described below may be different from those cited in the Question 5.)

- 18 countries (Austria, France, Germany, Italy, Spain, Switzerland, Canada, Chile, the USA, China, Hong Kong, South Korea, Malaysia, the Philippines, Singapore, Taiwan, Thailand and Japan) answered that the ‘mortality rates released are normally used as they are without any adjustments.’
  - Italy responded that with regard to plans that are easily impacted by mortality rates, for those mortality rates with improvements from the census base date up to the base date of DBO valuation, there are cases where a certain percentage (e.g., 30% or -30%) is added/decreased to/from mortality rates made public to reflect the population subject to DBO calculation.
  - Canada answered that when actual mortality rates are lower (higher) than those presented in the UP94, there may be cases where a multiplying factor (e.g., 85%,

110%) is multiplied against the mortality rates.

- A respondent from the USA answered, as a personal view, that in the case where the 'number of pensioners is 2,000 or more or the number of active members is 50,000 or more' or 'typically the number of members is 3,000 or more,' there are cases where mortality rates are calculated.
- 6 countries (Belgium, the Netherlands, South Africa, the UK, Australia and New Zealand) answered that 'they are normally using what is arrived at by making adjustments to the mortality rates released.'
  - In Belgium, the answer given was that there are a number of adjustments by age shift (from three years to five years) in order to incorporate improvements from the date of researching the underlying mortality until the base date of DBO valuation.
  - In the Netherlands, most corporations refer to external data (e.g., experience data of corporate pension contracts) when making adjustments. It was noted that cases where adjustments are made based on a corporate's own experience are extremely rare.
  - In South Africa, there are cases where a shift of age by one or two years is applied to mortality rates to incorporate expected improvements. In addition, there are also cases where a 1% improvement per year by each age is incorporated. As regards the latter, it was noted that improvements on or after the base date of DBO valuation are not necessarily incorporated but there are also cases where they are incorporated from the year earlier than that.
  - In the UK, since mortality rates of pension members are thought to be different from general mortality rates, the mortality rates used are post-adjustment and include age shifting. However, it was noted that for very large plans (e.g., members of 10,000 or more), there are some cases where mortality rates are prepared in a unique manner by using the actual performance of the plan.
  - In Australia, it is common for adjustments to be made based on a corporate's features and experience. It was noted that for plans with members of 1,000 or more, there are some cases where mortality rates are calculated based on a corporate's experience. Where expected improvements are reflected, it is done via a shift of age or in the form of x% improvement per year. When x% improvement is expected, the rates used are based on improvements over the most recent 25 years. In addition, it was noted that expected improvements are not estimated for mortality rates of the current members but they are reflected only for those of pensioners.

- In New Zealand, it is common to make adjustments based on corporates' features. There are many cases where adjustments based on improvements on or after the release date of mortality rates and corporates' features are made by applying the table of mortality with a shift of ages. It was also noted that when expected improvements are assumed, there may be some cases where they are reflected in the form of x% per year.
  - 2 countries (Brazil and Indonesia) responded that 'there is no relationship between mortality rates used for DBO calculation and those released.'
7. Do mortality rates differ between periods during and after an individual's employment?
- 7 countries (Austria, France, South Africa, the UK, Chile, Australia and New Zealand) answered that 'they normally use different mortality rates.'
  - 18 countries (Belgium, Germany, the Netherlands, Spain, Switzerland, Brazil, Canada, the USA, China, Hong Kong, Indonesia, South Korea, Malaysia, the Philippines, Singapore, Taiwan, Thailand and Japan) answered that 'they normally use the same mortality rates.'
  - Italy answered that 'it sometimes uses different mortality rates.'
8. Life expectancy
- While the standard for the answer varies according to respondents because mortality rates used for DBO calculation are not always the same according to country and there may be a difference in the method to calculate the life expectancy, 15 countries (Austria, Belgium, Italy, the Netherlands, Spain, Switzerland, the UK, Brazil, Chile, the USA, Hong Kong, South Korea, Malaysia, Thailand and Japan) answered that the 'life expectancy of mortality rates used for DBO calculation is longer than the mortality rates of the total population.' On the contrary, 4 countries (France, Indonesia, New Zealand and Taiwan) gave some answers to the effect that the 'life expectancy of mortality rates used for DBO calculation is shorter than that of mortality rates of the total population.' For instances where both 'life expectancy in the case of incorporating improvements' and 'life expectancy in the case of not incorporating improvements', the 'life expectancy in the case of incorporating improvements' is by around one to two years longer than the 'life expectancy in the case of not incorporating improvements.'
9. What is the difference between the mortality rates used for DBO valuation for accounting purpose and the mortality rates used for funding purpose?
- 21 countries (Italy, the Netherlands, South Africa, Spain, Switzerland, Brazil, Canada, Chile, the USA, Australia, China, Hong Kong, Indonesia, South Korea, Malaysia, New

- Zealand, the Philippines, Singapore, Taiwan, Thailand and Japan) answered that ‘they are usually the same.’
- 4 countries (Austria, Belgium, France and the UK) answered that ‘they are usually the same’ and ‘they are different from each other.’
    - The UK also responded that ‘cases have increased where there are differences in the actuarial assumptions used in the calculation of obligations based on the funding standards which are regarded as prudent and actuarial assumptions for calculation of DBO which are regarded as the best estimation.’
  - Germany answered that ‘in the case of external funding, more cautious mortality rates are used.’
10. What is the method to incorporate expected improvements? Are there any approximated approaches other than the matrix?
- 14 countries (Austria, France, Germany, the Netherlands, South Africa, Spain, Switzerland, the UK, Canada, Chile, the USA, Australia, Hong Kong and New Zealand) answered that ‘they normally incorporate expected improvements of mortality rates by using a matrix table by age by gender and by year.’
    - In the Netherlands, calculations are made by using a matrix table. It was noted that ‘there are cases where some companies reflect expected improvements by using the approximated approach.’ The mortality rates by generation per the matrix table are identical to those used. Another respondent answered that ‘there are examples where the mortality rates of the calendar year 2033 and those of the calendar year 2035 are used for men and women respectively as an approximation of mortality rates in which expected improvements are estimated by the Actuarial Association of the Netherlands,’ which is considered an example where the approximated approach above was used.
    - Although at one time in the UK, simplified approximated approaches such as “Calendar year approximation,” “Year of birth approximation,” etc. were used, DBOs are currently valued using methods that are unapproximated methods (a mortality table which is a matrix comprised of age and calendar years) in 90% or more.
    - In Canada, DBOs are calculated by using a matrix comprised of age and calendar years. There was an answer that ‘Scale AA is used to reflect improvements until a specific calendar year (e.g., 2020) or improvements in all the future calendar years.’
    - In the USA, one respondent noted that static mortality rates are used, which must



be prepared for the IRS for funding purposes. (Mortality rates that estimate expected improvements of 7 years for pensioners and 15 years for pension members are released by SOA.) In addition, there was another answer that ‘expected improvements for a period within the duration of DBO are incorporated.’

- 12 countries (Belgium, Italy, Brazil, China, Indonesia, South Korea, Malaysia, the Philippines, Singapore, Taiwan, Thailand and Japan) answered that ‘they do not incorporate expected improvements.’

11. In response to IAS19 amendments made in June 2011, was a study of mortality rates made?

- 20 countries (Belgium, France, Germany, Italy, the Netherlands, South Africa, Spain, Switzerland, the UK, Brazil, Canada, the USA, Australia, China, Hong Kong, South Korea, New Zealand, Singapore, Taiwan and Thailand) answered that ‘no study of mortality rates was made in response to IAS19 amendments made in June 2011.’
- 5 countries (Austria, Chile, Indonesia, Malaysia and the Philippines) answered ‘N/A.’
- Switzerland answered that ‘while no study has been made in response to IAS19 amendments, it is thought that mortality rates by generation reflecting expected improvements will be increasingly used.’
- The USA answered that ‘instead of a response to IAS19 amendments, a study on mortality rates is being conducted at SOA.’

\*Mortality project at SOA

On March 19, 2012, the SOA publicly presented an exposure draft on mortality improvement rates. Scale BB was presented as a new mortality improvement model to be used temporarily until the succeeding model Scale AA is released. The concept of 2D (two-dimensional) improvement rates that vary according to age and calendar years by gender was introduced in the exposure draft.

- In Japan, in response to IAS19 amendments made in June 2011, the Japanese Society of Certified Pension Actuaries has commenced a study of mortality rates.

12. In relation to mortality rates, what points are checked during audits?

- 21 countries (Austria, France, Italy, the Netherlands, South Africa, Spain, Switzerland, Brazil, Canada, the USA, Australia, China, Hong Kong, Indonesia, South Korea, Malaysia, the Philippines, Singapore, Taiwan, Thailand and Japan) gave an answer to the effect of ‘whether or not the latest updated mortality rates are used.’

- 6 countries (Germany, Indonesia, South Korea, Malaysia, the Philippines and Thailand) gave an answer to the effect of ‘whether or not the standard mortality rates are used. (In the case where adjustments were made to the standard mortality rates that are used, is there any rationale for the adjustments?)’
- 14 countries (Italy, the Netherlands, Switzerland, the UK, Chile, the USA, Australia, Indonesia, South Korea, Malaysia, New Zealand, the Philippines, Singapore and Thailand) gave an answer to the effect of ‘whether or not the mortality rates used conform to the characteristics of the plan (or the relevant corporation).’
- 3 countries (the UK, the USA and New Zealand) gave an answer to the effect of ‘whether the expected improvements reflected are appropriate or not.’