HSC Pension Scheme (Northern Ireland)

Actuarial valuation as at 31 March 2016
Advice on assumptions

Date: 13 March 2019
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Government
Actuary's
Department

Contents

1 Executive summary

> *This report contains our recommendations for the best estimate assumptions to be set by the Department of Health for the 2016 valuation of the HSC Pension Schemes (Northern Ireland) ('the Schemes").*

1.1 An actuarial valuation of the HSC Pension Schemes (Northern Ireland)[1] 'the Schemes', is being carried out as at 31 March 2016. The Public Service Pensions (Valuations and Employer Cost Cap) Directions (Northern Ireland) 2014 as amended ("the Directions") require that, unless specified otherwise[2], the assumptions to be adopted for this valuation will be set by the Department of Health (the Department), having obtained advice from the scheme actuary. Direction 19(c) requires the assumptions to be the Department's best estimates.

1.2 GAD is the appointed scheme actuary to the Schemes. This report sets out GAD's formal advice to the Department on the actuarial assumptions to be adopted where these are not otherwise specified. The advice covers the assumptions to be set by the Department. The main advised assumptions are summarised in Table 1 with further detail in Appendix A. This report was provided to the Department in draft form, and was also provided to the Scheme's member and employer representatives, in October 2017. It has been signed alongside the formal valuation report. There are no material changes since the draft report. The Department has already confirmed to GAD, having consulted with relevant stakeholders, that the actuarial assumptions to be adopted for the valuation should be those set out in this report.

1.3 This report relates to demographic assumptions i.e. assumptions about member behaviours. When considering appropriate assumptions experience, both recent and longer term, generally provides the most reliable evidence when considering best estimates of future experience. Anticipated future events may also influence how assumptions are set. This advice sets out relevant analysis of recent experience and indicates which other factors have been considered in deriving recommendations of best estimate assumptions.

1.4 The previous completed actuarial valuation of the HSCPS (NI) was carried out as at 31 March 2012. Many of the assumptions put forward in this report are the same as adopted for that valuation. The most significant changes are:

> Rates of pensioner mortality have been updated to reflect recent experience and to reflect changes in population mortality as reflected in the updated ONS population projections[3].

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[1] As provided by The Health and Social Care Pension Scheme Regulations (Northern Ireland) as amended (SR 1995/95 and SR 2008/256) and The Health and Social Care Pension Scheme Regulations 2015 (SR 2015/120)

[2] Certain assumptions are specified in the Directions.

[3] From the 2012 based projections to the 2016 based projections.

> Age retirement rates for transitionally protected members of the 1995 section have been updated to anticipate earlier retirements.

> The amount of pension assumed commuted for additional retirement cash has been changed for 1995 section members from a unisex rate of 8.5% to sex dependent rates of 8% and 11% for men and women respectively.

1.5   The following chapters and appendices provide more detail on the advice, supporting analysis and an indication of the magnitude of financial impact of each assumption on valuation results. They also contain important background information about the context of this advice and its limitations.

1.6   Where the Scheme membership data is not sufficient for the scheme actuary to carry out a robust analysis of that aspect, the Directions require the report to include a statement to that effect. Most of the movements data provided was not considered sufficiently reliable to form a basis for setting assumptions in isolation. As in previous valuations our advice has been informed by the analysis undertaken for the larger NHS England & Wales Pension Scheme and other available information.

1.7   This work has been carried out in accordance with the applicable Technical Actuarial Standards: TAS 100 and TAS 300 issued by the Financial Reporting Council (FRC). The FRC sets technical standards for actuarial work in the UK.

Table 1: Summary of recommended assumptions consistent with the 'best estimate' requirement

Assumption	Summary of recommended assumptions	Rationale for recommendation	Magnitude of financial impact of change from 2016 valuation assumptions	
			Past service	**SCR (2019-23)**
Pensioner baseline mortality[4]	Aligned to standard SAPS table[5,6]	In light of NHSPS E&W 2012-2016 experience and informed by wider analysis of mortality differentials experienced by members of public service scheme members in Northern Ireland compared to England and Wales*.	Minimal	Minimal
Normal health	83%(M) / 85%(F) x S2NXA			
Ill-health (current)	83%(M) / 85%(F) x S2IXA			
Ill-health (future)	100%(M) / 100%(F) x S2IXA			
Dependants	100%(M)[7] / 100%(F) x S2NXA			

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[4] As directed by DoF, future improvements in mortality assumed to be in line with those underlying the most recent ONS population projections. The financial impact shown relates only to the change in baseline mortality.

[5] SAPS tables are published by the Actuarial Profession and are based on the experience of self-administered pension schemes from 2004 to 2011. The S2 series has separate standard tables based on experience of members retiring in normal health (S2NXA), in ill health (S2IXA) and for widows (S2DFA).

[6] Adjusted to take account of improvements in population mortality between the base year for the tables and the date the future improvements are applied from.

[7] Adjusted so that a consistent approach is taken for both male and female dependants, using 100% of the standard S2NXA tables, in line with recommendations from NHSPS Scheme Advisory Board in report dated 18 July 2017.

Age retirement

Members expecting benefits wholly or mainly from the pre-2015 scheme (those remaining in the existing scheme after 31 March 2015):

In 1995 section after 31 March 2015. Rates apply for all service. (NPA 60 or 55).	Age, sex, NPA and occupation dependent rates. On average around 30% retire before NPA, 30% at NPA, with remainder spread over higher ages.	In line with 2012-2016 experience of both HSCPS (NI) and NHSPS experience. Recent experience has shown a continuation of a trend to earlier retirements. The reasons for the changes in behaviour are expected to persist over the key period these assumptions will be relevant for (relatively short term).	+0.1%	+0.1%
In 2008 section after 31 March 2015. Rates apply for all service. (NPA 65)	Age, sex, NPA and occupation dependent rates.	No change Not financially significant.		

Other transitionally protected members (transferring to the new scheme on 1 April 2015), and new entrants from 2015

Pre and post 2015 accrual (NPA = SPA in new scheme, existing scheme NPA 55,60,65)	Single set of unisex assumptions for early retirement dependent only on NPA in 2015 scheme.	No change Little evidence to support any change.	No change in assumption

Ill-health retirement

Incidence	Sex dependent. Increasing by age: 0.02% at age 20, around 0.1% at age 40, about 1% at age 60.	No change to male rates, Female rates increased to 105% of 2012 rates. In light of 2012-2016 of both HSCPS (NI) and NHSPS experience*.	Immaterial	Immaterial
Upper/lower tier split	75% on upper tier		No change in assumption	

Withdrawal	No (net) withdrawals assumed for closed groups and practitioners. Single set of net of re-entry within 5 years rates for all other members. Rates are unisex, age and duration dependent (up to 3 years' service).	No change as limited evidence to support any change. Recommendation to retain 2012 valuation assumption.	No change in assumption

Death before retirement	Sex dependent rates increasing by age: 0.02% / 0.02% (M/F) at age 25, about 0.09% / 0.06% (M/F) at age 45, 0.48% / 0.25% (M/F) at age 65	Rates reduced to 95%/90% of 2012 rates for males/females respectively for ages close to retirement, with the difference reducing at younger ages. HSCPS NI-specific data is not available from 2016 valuation. Recommendation to retain the same assumption as adopted for the NHSPS valuation.	Immaterial	Immaterial
Promotional salary scale	Age, sex and manual/non-manual dependent scales. Steeper at younger ages: about 5% a year at age 25, 1% at age 45 and nil at age 65.	No change. Analysis of data available is not sufficient to suggest a change to the 2012 valuation assumptions is appropriate.	No change in assumption	
Commutation				
1995 section (Automatic lump sum of 3 times pension)	8% / 11% for men / women of pension commuted (to provide total cash of 75% of HMRC maximum)	In light of 2012-2016 experience of NHSPS*.	-0.2%	Immaterial
Family statistics				
Proportion married/partnered	Age and sex dependent rates of proportions married or partnered at death. 72% / 52% (M/F) assumed married at age 60; 76% / 54% (M/F) assumed partnered at age 60.	No change (no evidence)	No change in assumption	
Age difference	Male member 3 years older than partner Female 3 years younger than partner	No change (no evidence)	No change in assumption	
Gender of dependant	Opposite gender to member	No change (no evidence)	No change in assumption	
Remarriage	No allowance	No change (no evidence)	No change in assumption	

* In general 50% of the observed difference in experience since the 2012 assumptions were set has been taken into account when resetting assumptions.

2   Introduction

> *This report contains our advice to the Department of Health but will be of interest to other parties who should note the limitations.*

2.1   An actuarial valuation of the HSC Pension Schemes (Northern Ireland) (HSCPS (NI) or 'the Schemes') is being undertaken as at 31 March 2016. The Public Service Pensions (Valuations and Employer Cost Cap) Directions (Northern Ireland) 2014 as amended ("the Directions") require that, unless specified otherwise[7], the actuarial assumptions to be adopted for this valuation are the responsibility of the Department, having taken advice from the scheme actuary. Direction 19(c) requires the assumptions to be the Department's best estimates.

2.2   GAD is the appointed scheme actuary to the Schemes. This report is addressed to the Department and contains our formal advice on the appropriate assumptions to be adopted for the 2016 valuation, as required by the Directions. The purpose of this advice is to enable the Department to determine the required best estimate assumptions.

2.3   The advice covers the main assumptions to be set by the Department. In particular, we consider the following sets of demographic assumptions in this report:

   > Pensioner mortality
   > Age retirement from service
   > Ill-health retirement from service
   > Voluntary withdrawal from service
   > Death before retirement
   > Promotional pay progression
   > Commutation of pension for cash at retirement
   > Family statistics

   Appendix B includes other calculation assumptions as required to complete the valuation and Appendix C sets out assumptions made for data uncertainties.

2.4   This report was provided to the Department of Health in draft form in October 2017. The Department consulted with the HSC Pension Scheme SAB ('SAB') in accordance with direction 19(b) and based on the draft report. No changes have been made to the assumptions as a result of that consultation.

2.5   The Secretary of State has already confirmed to GAD, having consulted with relevant stakeholders, that the actuarial assumptions to be adopted for the valuation should be those set out in this report.

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[7] Certain assumptions are specified in the Directions.

2.6   HSC, the Scheme's administrator, supplied data on the experience of the Scheme membership over the four-year period to 31 March 2016. Where possible we have used this data to analyse the Scheme's experience in order to develop our advice on the assumptions. Our report, *HSCPS (Northern Ireland) Actuarial Valuation at 31 March* 2016*: Report on valuation data* also finalised today, provides information about this data and should be read in conjunction with this advice. The report includes details of the checks carried out on the data, the amendments made to the data and our residual concerns about the quality of the data. In preparing our advice, we have relied upon the general completeness and accuracy of the data provided.

2.7   When considering appropriate assumptions experience, both recent and longer term, generally provides the most reliable evidence when considering best estimates of future experience. In some cases the data available to analyse inter-valuation experience for the HSCPS is less reliable and complete than corresponding information for the NHS Pension Scheme for England and Wales (NHSPS). Where there is no reason to believe experience across the membership of the two schemes should be materially different we have also considered the conclusions reached based on the NHSPS experience in formulating our recommendations for the HSCPS. This is consistent with the approach used in previous valuations where in many cases the same assumptions have been used for both schemes. Anticipated future events may also influence how assumptions are set. This advice sets out relevant analysis of recent experience and indicates which other factors have been considered in deriving recommendations of best estimate assumption.

2.8   For both the 2012 and 2016 valuation the assumptions which differ for the HSCPS (NI) and the NHSPS are:

> Rates of early withdrawal: members of the HSCPS (NI) are assumed to have a low rate of withdrawal before retirement than for the NHSPS

> Allowance for promotional pay increases: members of the HSCPS (NI) are assumed to have flatter promotional progression than for the NHSPS.

> Rates of ill health retirement: members of the HSCPS (NI) are assumed to experience higher rates of ill health than from the NHSPS.

2.9   The Department should consider whether there is any reason why the previous approach taken to setting the assumptions would be inappropriate for this valuation.

2.10   We are content for the Department to release this report to third parties, provided that:

> it is released in full
> the advice is not quoted selectively or partially
> GAD is identified as the source of the report, and
> GAD is notified of such release.

2.11   Third parties whose interests may differ from those of the Department should be encouraged to seek their own actuarial advice where appropriate. Other than to the Department GAD has no liability to any person or third party for any act or omission taken, either in whole or in part, on the basis of this report.

3   General considerations

> *This chapter sets out a number of general considerations common to the setting of the different assumptions considered in this report.*

3.1   The key considerations taken into account in formulating the advice in this report are explained in this section.

Directions

3.2   The advice in this report reflects the requirements of the Directions issued by the Department of Finance ("DoF") that assumptions should be set as the Department's 'best estimates' of future experience and should contain no margin for prudence or optimism. They should be set having regard to:

> \> assumptions set for previous valuations
> \> analysis of demographic experience in the period up to the valuation date
> \> historic long term trends and emerging evidence which may illustrate long-term trends in the future
> \> relevant data from any other sources.

Different populations

3.3   Regulation 7 of the HSCPS (NI) Regulations[8] requires this actuarial valuation to cover both the scheme established under the Public Service Pensions Act (Northern Ireland) 2014[9] ("2015 scheme") and the previous pension scheme for Health workers ("pre-2015 scheme"). Assumptions appropriate to both the 2015 scheme and the pre-2015 scheme are required for the valuation. The Directions also require assessment of benefit accrual costs over the *implementation period*[10]. This requires assumptions about anticipated member behaviour and characteristics during 2019 - 2023 as well as assumptions about member behaviour and characteristics in the longer term.

3.4   There are currently 3 distinct groups of members.

> \> Those with full protection and remaining in the pre-2015 scheme to retirement. The introduction of the 2015 scheme is not expected to have any impact on this group's behaviours
> \> New members to the 2015 scheme. These members' retirement behaviours are expected to be heavily influenced by the provisions of the 2015 scheme
> \> Members with service in both the 2015 scheme and pre-2015 scheme (including members with tapered protection). Over time, as the proportion of 2015 scheme service increases, the retirement behaviours are expected to become increasingly influenced by the provisions of that scheme.

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[8] SR 2015/94
[9] Public Service Pensions Act (Northern Ireland) 2014.
[10] 1 April 2019 to 31 March 2023.

3.5   Where relevant we indicate in each of the following chapters the relative importance of each set of assumptions to the groups of members identified above.

Relative importance of assumptions

3.6   The Directions require the valuation results to be estimated to the nearest 0.1% of pensionable payroll. This is a required level of accuracy for a particular calculation and based on a particular set of assumptions. Appendix E provides an indication of the sensitivity of the valuation results to the particular assumptions under consideration.

4   Pensioner Mortality

> *This chapter sets out our recommendation for the baseline pensioner mortality assumptions and summarises the analysis undertaken in order to inform that recommendation.*

4.1   The assumptions we recommend for baseline pensioner mortality for the 2016 valuation may be summarised by reference to standard mortality tables as follows. The corresponding assumptions for the 2012 valuation are also shown.

Table 4.1: Recommended mortality assumptions

	2016 valuation		2012 valuation	
Baseline mortality	**Standard table[11]**	**Adjustment**	**Standard table**	**Adjustment**
Males				
Retirements in normal health	S2NMA	83%	S1NMA	80%
Current ill-health pensioners	S2IMA	83%	S1IMA	80%
Future ill-health pensioners	S2IMA	100%	S1IMA	100%
Dependants	S2NMA	100%	S1NMA	80%
Females				
Retirements in normal health	S2NFA	85%	S1NFA	85%
Current ill-health pensioners	S2IFA	85%	S1IFA	85%
Future ill-health pensioners	S2IFA	100%	S1IFA	100%
Dependants	S2NFA	100%	S1NFA	85%

4.2   As specified by DoF, future improvements in mortality will be assumed to be in line with those underlying the most recent ONS principal population projections for the UK, ONS-2016.

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[11] SAPS (S2) tables are published by the Actuarial Profession and based on the experience of self-administered pension schemes over the period 2004 to 2011. The 'S2' series includes separate standard tables based on experience of members retiring in normal health (S2NXA) and in ill health (S2IXA) and for female dependants (S2DFA). The S3 series of tables were released by CMI on 5 December 2018, these updated mortality tables cover experience between 2009 and 2016. The final tables are unchanged from the working paper issued during 2018, from which GAD concluded that moving to the S3 tables would likely have no material impact on the valuation results as a whole. It therefore remains appropriate to use the S2 tables for the current valuation.

4.3 The above assumptions are the same as those recommended for the 2016 valuation of the NHSPS. The same assumptions were set for the two schemes for the 2012 valuation.

Comparison of expected pensioner longevity

4.4 The table below gives a comparison of the resulting life expectancies[12] (allowing for future improvements) assumed and recommended for the 2012 and 2016 valuations. The final column shows life expectancies on the proposed 2016 base tables but with future improvements based on the ONS 2012 projections. This column is provided to illustrate the impact of the change in allowance for future improvements on expected life expectancy. The Directions specify that the future improvement basis for the 2016 valuation should be the ONS 2016 projections.

Table 4.2: Comparison of life expectancies (years) at the valuation date

Baseline:	2012 valuation	2016 valuation	2016 baseline
Future mortality improvements:	ONS 2012	ONS 2016	ONS 2012
Current pensioners			
Male aged 60	30.1	29.2	30.6
Male aged 65	25.1	24.2	25.7
Female aged 60	32.1	30.8	32.6
Female aged 65	27.1	25.8	27.6
Future pensioners – current age 45			
Male life expectancy from age 60	31.9	30.8	32.4
Male life expectancy from age 65	27.4	25.7	27.8
Female life expectancy from age 60	33.9	32.1	34.3
Female life expectancy from age 65	29.3	27.1	29.7

Use of the assumption

4.5 Pensioner mortality is a key valuation assumption and is a measure of how long members retiring in normal or ill-health, or their dependants, expect to live and receive benefits.

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[12] Cohort life expectancies based on the ages shown as at the valuation date, i.e. allowing for future mortality improvement.

Analysis and setting the assumption

4.6 The pensioner movements data supplied did not provide for a reliable reconciliation of pensioners between the 2012 and 2016 valuations. The reconciliation is shown in chart 4.1 below and illustrates there is some discrepancy (831) between the number of expected pensioners at 2016 and those within the valuation dataset. This compares with 3,632 deaths within the movements data ie around 25% of the deaths reported. There are more pensioners within the valuation dataset at the valuation date than suggested by the movements data. Although this could suggest the number of deaths is overstated, it is also possible that both the number of new pensioners and number of deaths are unreliable to some extent. For this reason the results of any analysis should be treated with some caution. The analysis is carried out using ONS 2014 projections, being the set of projections available at the time that the analysis was carried out. Previous analysis carried out by GAD suggested that the impact of using ONS 2014 or 2016 projections for mortality analysis would be minimal.

Chart 4.1: Reconciliation between 2012 and 2016 pensioner data
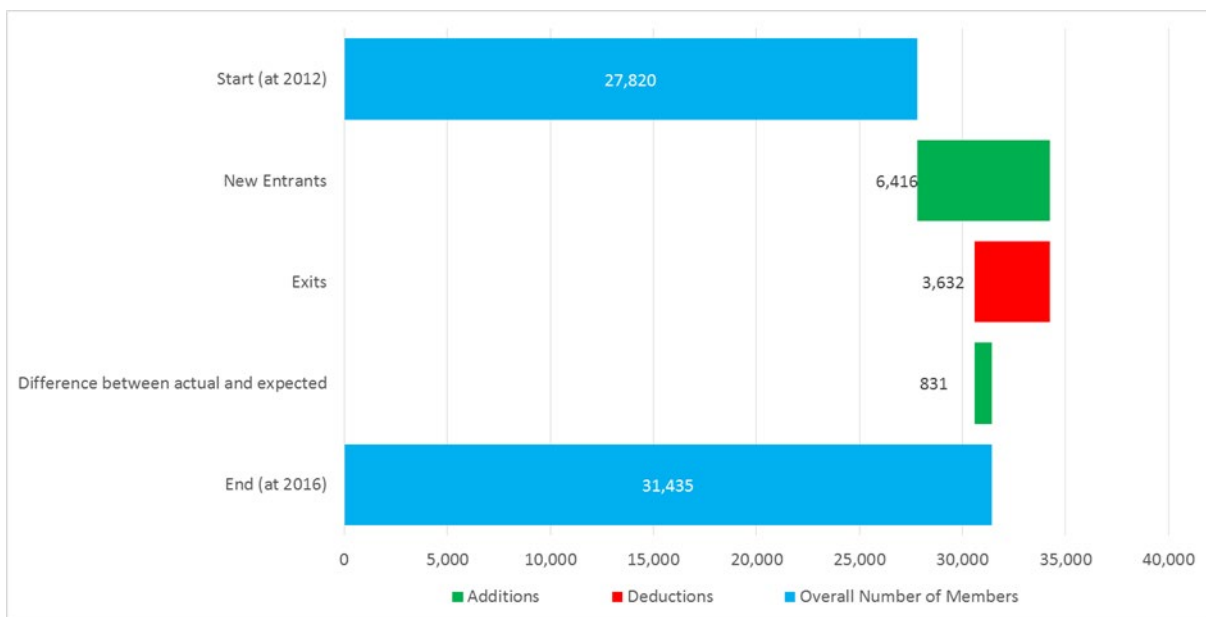
4.7 We analysed the pensioner mortality experience (based on the data provided) over the four-year period to 31 March 2016 on a 'lives' basis. A lives basis considers mortality experience by considering each death equally. By contrast an 'amounts' analysis weights the experience by the size of each member's pension. An amounts analysis was undertaken for the NHSPS E&W and the recommended assumptions were set by reference to that analysis. Data limitations meant we were unable to undertake an amounts analysis for the NI scheme.

4.8 In line with the approach taken for the 2012 valuation as well as considering the analysis of the deaths as provided we also considered the similar analysis carried out for the NHSPS E&W. In formulating our advice we additionally referred to general population statistics which demonstrate the differences between aggregate population mortality rates for Northern Ireland and England and Wales. We are also able to refer to the conclusions reached for the Teachers scheme in Northern Ireland (and its relativity to the corresponding E&W scheme).

4.9 When setting the baseline pensioner mortality assumption we recommend the assumption is expressed both by reference to suitable adjustments to the rates in a suitable reference table - the relevant S2 table ("the base table") and, if appropriate, by reference to suitable adjustments to the NHSPS basis.

Results of analysis

4.10 Table 4.3 sets out the number of pensioner deaths over the inter-valuation period as provided in the data. Figures are shown separately for males and females retiring in normal or ill-health and for dependants. Also shown is the ratio of actual deaths to expected deaths based on the 2012 valuation assumption (with ONS-2014 improvements).

4.11 This comparison suggests the actual mortality experience has been considerably heavier (i.e. more deaths) than expected based on the 2012 valuation assumptions. Although some volatility may be expected given the relatively small size of the experience we believe the large difference between assumed and expected deaths is due to issues with the data used for the analysis rather than being reflective of the actual mortality experience (as mentioned in paragraph 4.6 there is a considerable discrepancy between the number of pensioners in the valuation data at 2016 compared to that expected based on the 2012 data and the movements data provided). Chart 4.1 above shows that there are 831 more pensioners at the 2016 valuation date than implied from the 2012 data and movements. If this is because that many pensioners were missing from the 2012 data then our expected number of deaths in the following analysis is too low (as we calculate the expected number based on the overall population at risk of death). For this reason we recommend that alternative data sources are used for the purposes of informing the mortality assumptions for the 2016 valuation.

Table 4.3: Pensioner mortality experience 2012-16

Category	Number of Pensions ceasing due to death	A/E* relative to the 2012 valuation assumption[†]
Normal Health:		
Males	516	130.6%
Females	1,419	134.4%
Ill Health[**]**:**		
Males	237	157.5%
Females	555	128.2%
Dependants:		
Males	148	174.0%
Females	386	151.9%

*A/E is actual over expected.
[†] With ONS-2014 improvements.

**There were a number of exits that were classified as serious ill health retirements; we have reclassified these as ill health deaths. On serious ill health retirement a lump sum is paid in lieu of any entitlement to future pension instalments. To qualify for this payment a member must have limited life expectancy. In light of this a death record will not be recorded as death will occur when no entitlement exists. As these members have a short life expectancy it is reasonable to include them in the analysis as deaths from the ill health pensioner population with an assumed date of death of when the lump sum payment was made.

Comparison of population mortality Northern Ireland v England and Wales

4.12   Chart 4.2 below illustrates the differences between the aggregate population mortality rates for Northern Ireland compared to England and Wales. This comparison remains similar to that taken into account when setting the 2012 valuation assumption. Looking at ages 60 and older (as relevant for pensioner mortality), mortality rates for Northern Ireland are generally slightly higher for ages 60 to 70; the ratio then declines in a relatively linear fashion until around age 90 after which mortality rates in Northern Ireland are broadly similar to those in England and Wales for males and a little higher for females.

Chart 4.2: Ratio of Northern Irish mortality rates to England and Wales rates from 2013-15 Interim Life tables

Ratio of NI mortality rates to England and Wales rates from 2013-15 National Life Tables
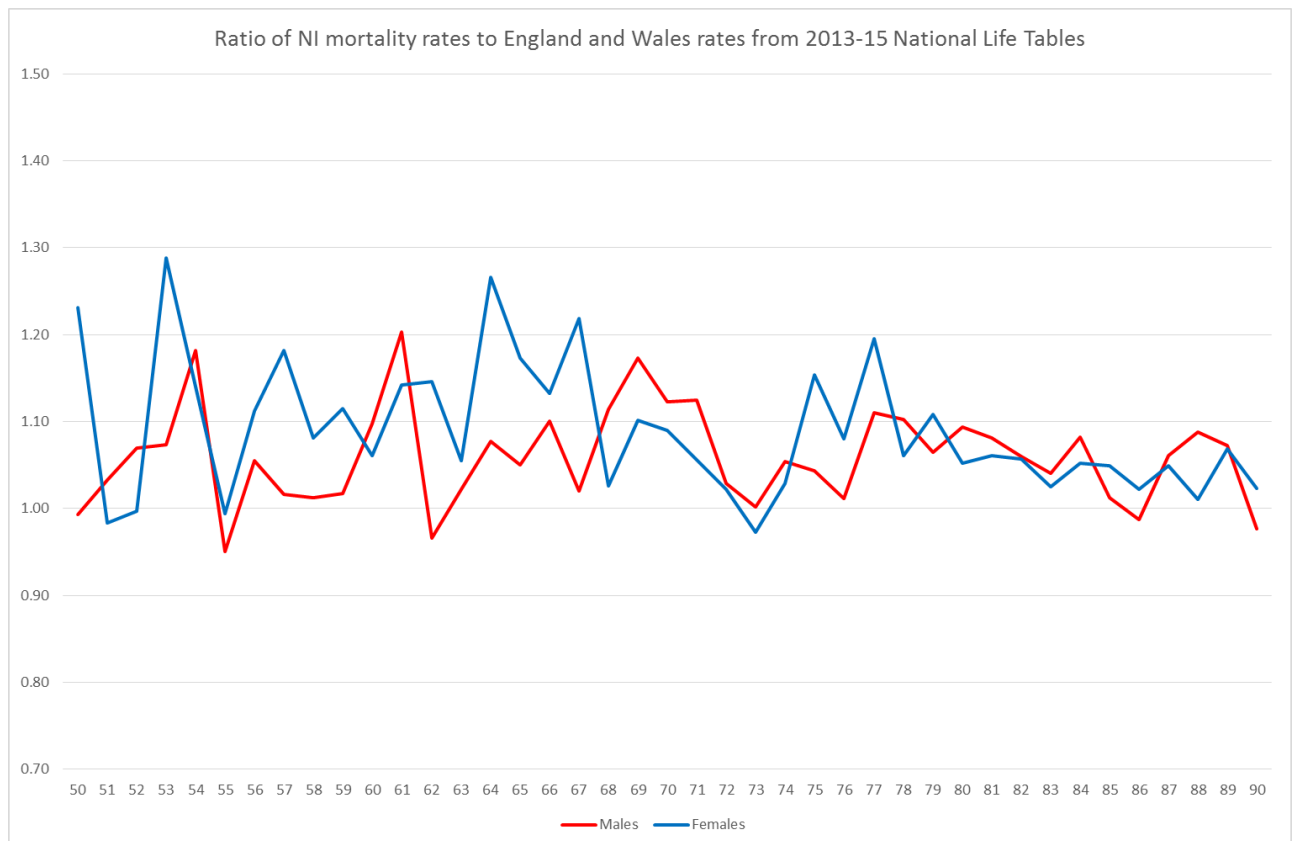
4.13   Although the aggregate population mortality rates are slightly higher for Northern Ireland compared to England and Wales, there is an argument that it is reasonable to expect there is greater similarity in the mortality rates in retirement for healthy, working individuals across the geographical regions than for the population as a whole. This is consistent with the conclusion of analysis carried out for other Northern Ireland public sector schemes (notably the Teachers scheme which concluded that the same mortality assumptions should be adopted as for E&W) and also in line with the conclusions reached when setting the 2012 valuation assumptions. It is therefore reasonable to assume life expectancies for HSC members are reasonably similar for comparable workers in NHS E&W, even when there are differences in the wider population, especially when it is not possible to carry out detailed analysis on the smaller HSC experience data.

Comments on analysis

4.14   Taking into account the limitations of the analysis possible based on scheme data and a reasonable expectation that the Health workforce in Northern Ireland would continue to exhibit similar life expectancies in retirement to their England and Wales NHS counterparts, we recommend the continued alignment of pensioner mortality assumptions for the Northern Ireland Health schemes and the NHS E&W.

5 Age retirement from service

> *This chapter sets out our recommendation for the assumed patterns of retirement on grounds other than ill-health, and summarises the analysis undertaken in order to inform that recommendation.*

Proposed assumptions for 2016 valuation

5.1 We recommend that rates of age retirement are set separately for members who continued in the pre-2015 scheme after April 2015 and for those members who transferred to the new scheme on 1 April 2015, or join as new entrants thereafter. Sample age retirement rates are provided in Appendix A. This approach to setting assumptions was adopted for the previous valuation and in recognition that retirement behaviours are expected to be driven by the provisions of the scheme in which a member has accrued most benefits. When determining in which scheme a member will have accrued most benefits we are effectively saying it is the pre-2015 scheme for those within 13.5 years of normal pension age (NPA) at 1 April 2012 and the post-2015 scheme for all other members[13]. It is recognised this is not the most realistic scenario, but represents a proportionate approach to setting the assumption, recognising that a more gradual change in retirement patterns is expected to emerge over time. At the current time retirements are almost entirely from the pre-2015 scheme (with most retirements from the 1995 section). There is not yet any evidence on which to reconsider the approach.

Members who remained in the existing scheme after April 2015 (including those in tapering)

5.2 We recommend that members are assumed to retire in line with recent retirement patterns, which cover both early and late retirement. We recommend different assumptions based on pre-2015 scheme NPA and further split by gender and occupation type (manual officers, non-manual officers and practitioners). For the 1995 section on average, the assumptions assume around 30% of members will retire before normal pension age (NPA), about 30% at NPA, with the remainder retiring after NPA. The average assumed retirement age for NPA 55 members is about 58, for NPA 60 members 62. For the 2008 section the assumptions assume around 20% of members will retire before normal pension age (NPA) and the remainder at NPA. The average assumed retirement age for NPA 65 members is around 64.

New entrants to the 2015 scheme and members who transferred to that scheme on 1 April 2015

5.3 We recommend a common assumption for all members allowing for retirements before or at each member's NPA in the 2015 scheme. The same pattern of retirements is assumed for benefits accrued in both the pre-2015 scheme and the 2015 scheme. On average members are assumed to retire 1.7 years before their NPA in the 2015 scheme.

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[13] See also Sections 3.3 – 3.5.

The recommended rates are identical to those proposed for the 2016 valuation of the NHSPS.

Previous valuation assumptions

5.4   The proposed assumptions are similar in nature and effect to those which were adopted for the 2012 valuation. These 2012 assumptions were the same as adopted for the NHSPS valuation. Some changes to the 2012 assumptions have been recommended for 1995 section members in recognition of a continued trend towards earlier retirement from that section. In effect the changes proposed bring forward the assumed average retirement age for most members of the 1995 section by around 3 months compared to the 2012 valuation assumptions.

Use of the assumption

5.5   Age retirement rates specify the rate at which members are assumed to retire on grounds other than ill-health and therefore potentially include allowance for retirements before and after normal pension age.

5.6   In both schemes an actuarial reduction is applied to a pension payable on retirement before NPA. The actuarial reduction is set to give the early retirement pension the same value as the deferred benefits payable following withdrawal at the same age. Early retirement has not historically been common in the HSCPS NI although there have been considerably more such retirements in the recent past.

5.7   An actuarial uplift is applied for retirement after NPA in the 2008 section and in the 2015 scheme. However, in the 1995 section the pension payable on retirement after NPA is not subject to actuarial adjustment. This means pensions paid from the 1995 section on retirement after NPA are less costly to the scheme (i.e. the value of the benefit payable to a member is lower) than a pension paid at or before NPA. The rates of retirement of members of the 1995 section at or after NPA are therefore the most financially significant components of the assumption.

Analysis and setting the assumption

5.8   An analysis of age retirements from active membership was carried out by scheme, section and NPA. The analysis was carried out over the three year period to 31 March 2015, it was not possible to carry our analysis for the year ending 31 March 2016 due to data limitations. We considered the pattern of age retirements and compared this to the experience of the NHSPS over the same period. The patterns observed between the two schemes were very similar, and in both cases showed differences between expected retirement behaviours (which are based on historic experience) and actual retirement behaviours.

5.9   There were some 2,452 reported age retirements over the three-year period to 31 March 2015 compared to an expected 3,699 retirements based on the 2012 valuation assumptions. This includes all age retirements including those subject to actuarial reduction (or otherwise owing to redundancy). There was some discrepancy between the number of active members in the valuation data at 2016 compared to that at 2012 and taking into account reported movements. We believe the number of movements are understated.

5.10   Owing to the uncertainty over the absolute number of retirements we compared the distribution of reported retirements from the scheme with the distribution of retirements in the NHSPS[14] (shown in charts 5.1 to 5.4; numbers for NHSPS (E&W) have been scaled down for this purpose). The patterns observed were similar; the average age of age retirements in the two schemes over the three-year period ending 31 March 2015 were as shown in Table 5.1.
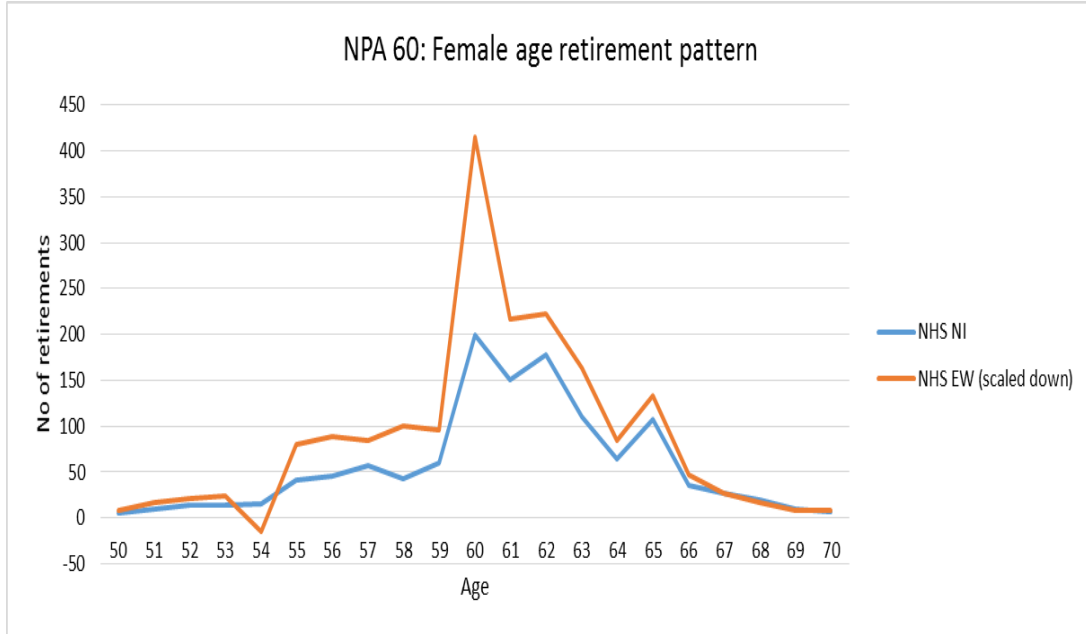
Chart 5.1: comparison of age retirement patterns against NHSPS EW – NPA 60 Males
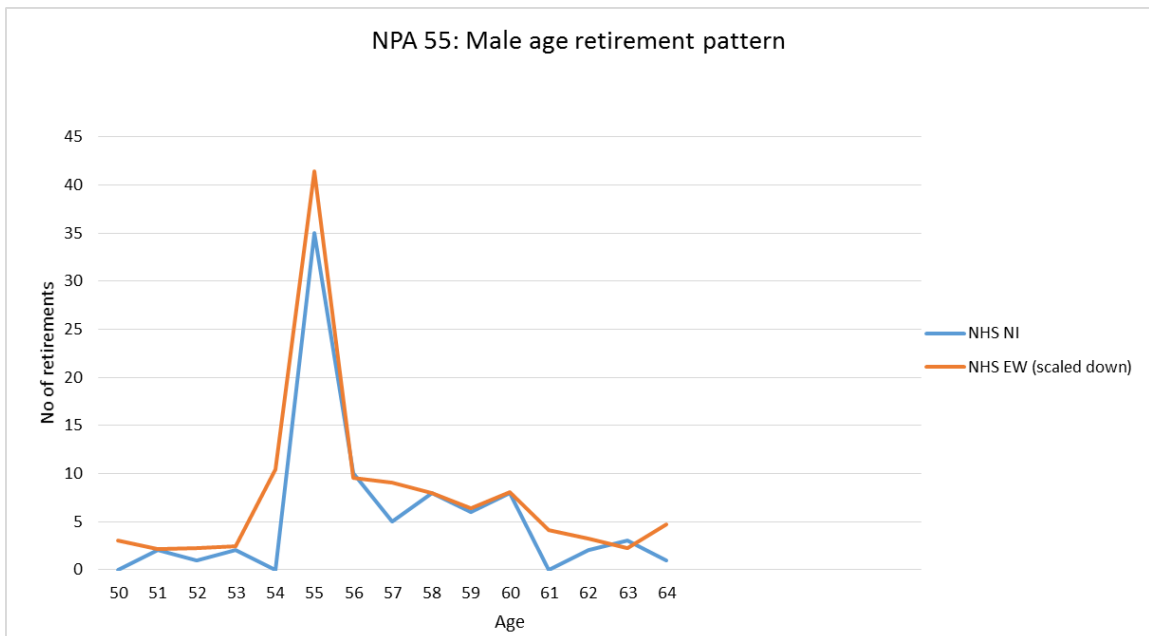

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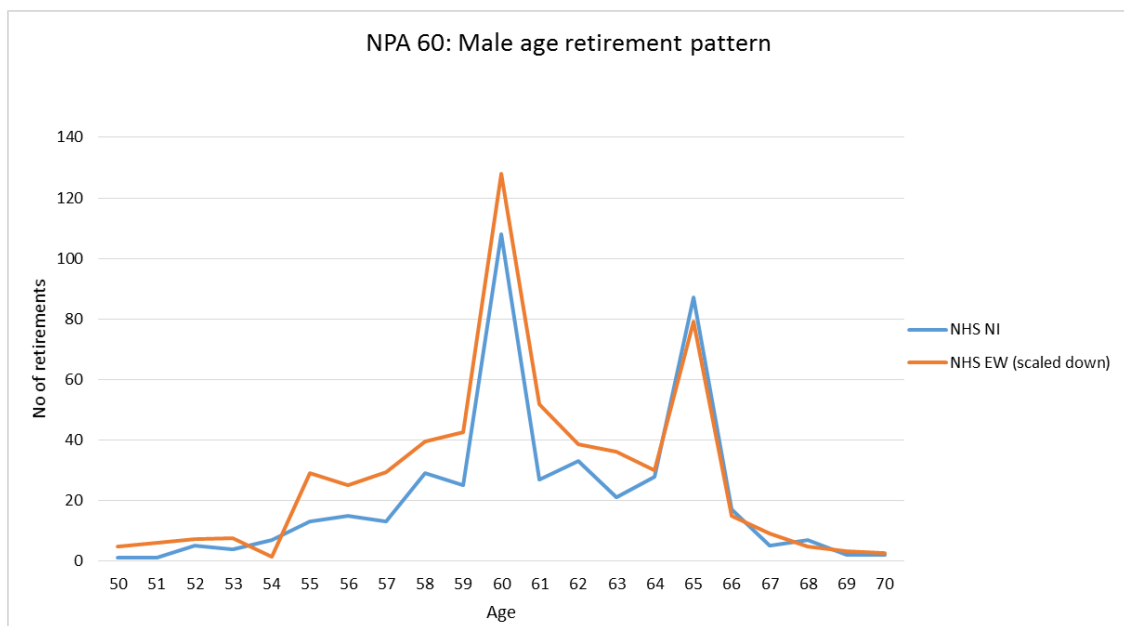
[14] See NHS Pension Scheme actuarial valuation as at 31 March 2016: Advice on assumptions dated XX [insert link]

Chart 5.2: comparison of age retirement patterns against NHSPS EW – NPA 60 Females

Chart 5.3: comparison of age retirement patterns against NHSPS EW – NPA 55 Males

Chart 5.4: comparison of age retirement patterns against NHSPS EW – NPA 55 Females
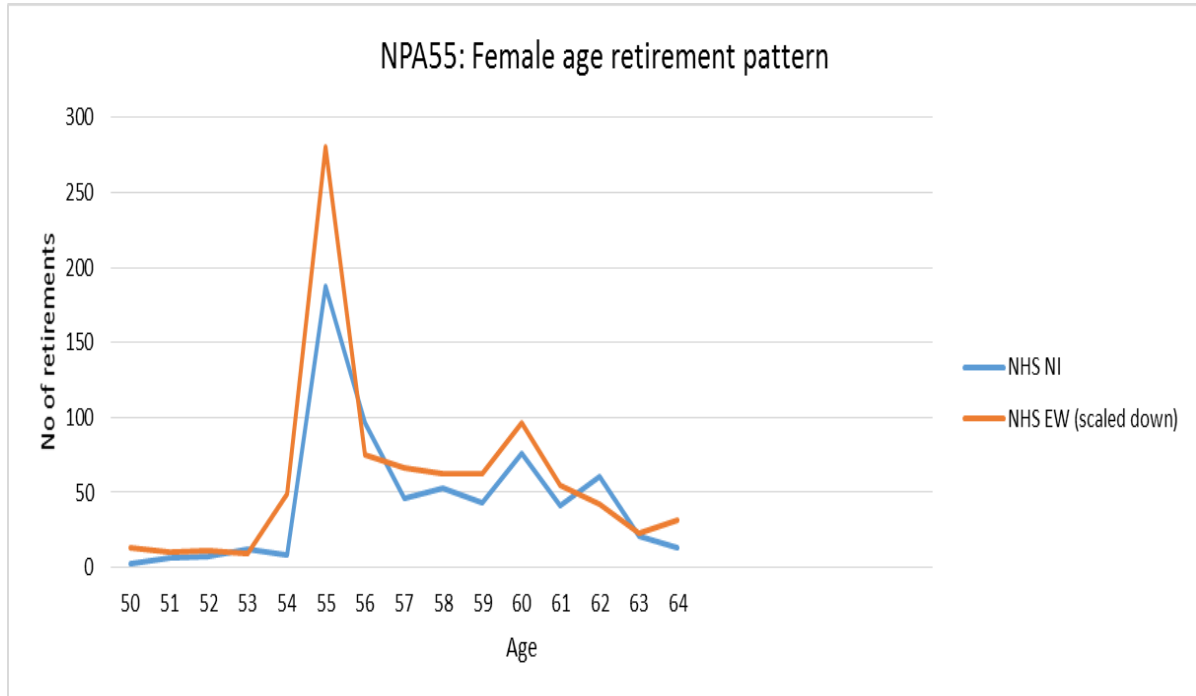
Table 5.1: Comparison of average age at retirement of members retiring in normal health

Retirements from HSCPS (NI)	Retirements from NHSPS
60.0	60.1

Comments on results of age at retirement analysis

5.11   The analysis undertaken for the NHSPS showed that retirements from the 1995 section had generally been slightly earlier than expected by the assumptions. A similar trend was observed at the 2012 valuation and believed to be a result of the changes made to the service together with the introduction of tiered member contributions and tax changes. Further tax changes since 2012 appear to have had a further impact over the more recent period. Since these influences may be expected to continue to influence behaviours for the population under consideration i.e. those expected to retire over the next couple of valuation cycles we recommend that for the 2016 valuation these 1995 section members are assumed to retire in line with the rates observed between 2012 and 2016 and the assumptions continue to be aligned to the NHSPS rates.

New entrants to the 2015 scheme and members who transferred to that scheme on 1 April 2015

5.12   In the absence of directly relevant experience, the same approach to setting this assumption was adopted as for the 2012 valuation. This approach assumes that members joining the 2015 scheme on or after 1 April 2015 will take all NHS pension benefits in line with recent experience of patterns of early retirements, or otherwise at NPA. Experience relative to the current NPAs is translated to be relative to members' NPA in the 2015 scheme for the purposes of setting the appropriate assumption.

6   Ill-health retirement from service

This chapter sets out our recommendation for the assumed rates of retirement on grounds of ill-health, and summarises the analysis undertaken in order to inform that recommendation.

Proposed assumptions for 2016 valuation

6.1   We recommend that a single set of assumptions (separate for men and women) is used to allow for the incidence of ill-health retirement, i.e. applying both to those members who remain in the pre-2015 scheme and members of the new scheme. The recommended rates are aligned to the rates proposed for the 2016 valuation of the NHSPS, but at a higher level (double). Assumed rates of ill-health increase with age but fewer than 2% of members are assumed to retire on ill-health grounds each year, even at the highest ages. Sample rates are provided in Appendix A.

6.2   We also recommend assuming that 75% of members retiring on ill-health grounds will receive the upper-tier benefit and the remainder will receive the lower-tier benefit.

Previous valuation assumptions

6.3   The proposed 2016 assumptions are 100% and 105% for men and women respectively of the rates adopted for the previous valuation. The previous valuation assumptions were double those adopted for the NHSPS.

6.4   The assumed proportion of members eligible for upper-tier[15] benefits is unchanged from that adopted for the previous valuation.

Use of the assumptions

6.5   Ill-health retirement rates specify the rate at which members are assumed to retire on grounds of ill-health. The assumed eligibility for upper or lower tier awards specifies the benefits which will be provided. The rates of mortality experienced after ill-health retirement are also relevant to the valuation calculations. Post retirement mortality is addressed in Chapter 4.

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[15] A lower tier award provides for immediate payment of accrued benefits with no actuarial reduction, regardless of age. A higher tier award provides for enhancement of accrued benefits.

Analysis and setting the assumption

Ill health incidence

6.6   There were some 496 ill-health retirements over the three-year period to
31 March 2015 compared to an expected 437 retirements based on the 2012
assumptions. There was a noticeable decrease of the number of ill health retirements
provided for the 2015-16 period suggesting there are gaps in the data therefore we
have not considered this year in our analysis. Further data has been received but
does not provide the necessary information.

	Total	Males	Females
Actual	496	98	398
Expected	437	111	327
A vs E	1.14	0.88	1.22

6.7   We have compared the actual rate of ill-health retirements (by gender and age of
retirement) to the expected rate from the 2012 actuarial valuation[16] adjusted in line
with the recommendation made for the NHSPS assumption (equal to the 2012
assumption with a 5% uplift in the case of female rates) in charts 6.1 and 6.2 below.

6.8   As for the 2012 valuation rates have been proposed for older ages by linearly
extrapolating actual experience to older ages. There is currently limited experience
beyond the pre-2015 sections' NPAs.

Results of analysis

**Chart 6.1: Male ill-health retirement rates – comparison of experience with 2012
valuation assumption**

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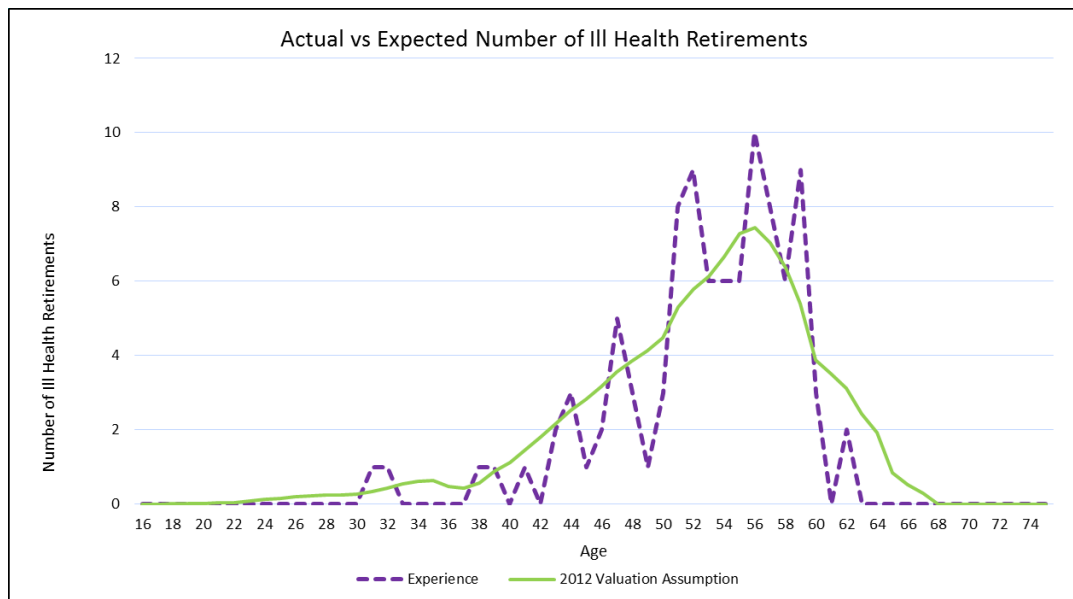
[16] See General Considerations in Section 3

Chart 6.2: Female ill-health retirement rates – comparison of experience with 2012 valuation assumption
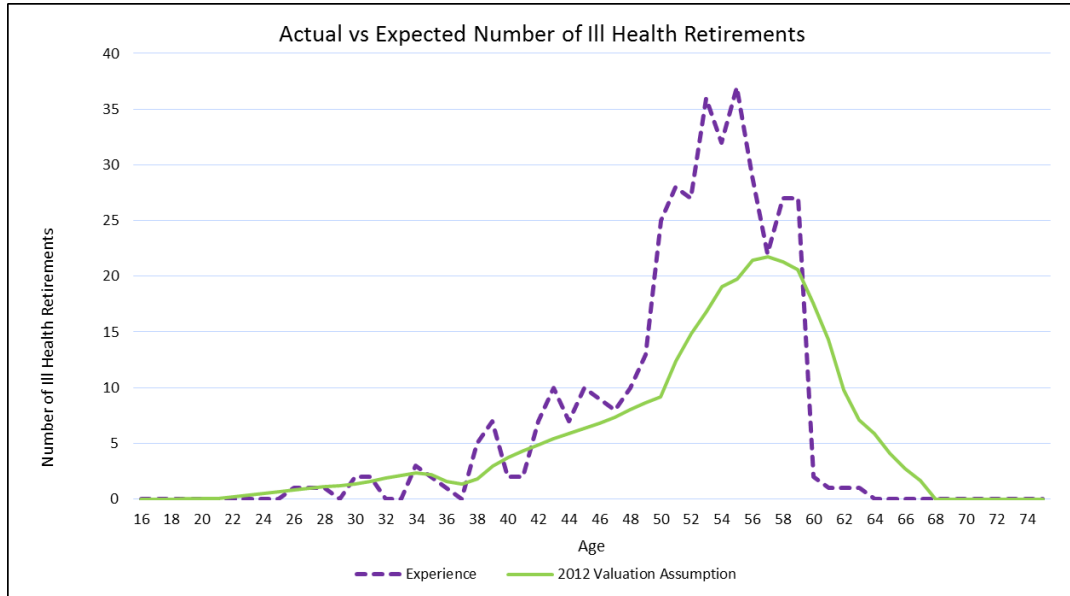
Comments on analysis

6.9   The above charts show that the assumption is reasonably close to actual experience for male members and slightly lighter than actual experience for female members. However, there is a relatively small number of member movements on which to base the analysis and we expect a reasonable level of volatility from period to period.   As a result, we recommend retaining the assumption relative to that for the NHSPS.

Split between tiers

6.10   The table below shows the percentage of members retiring on ill-health grounds over the four-year period which qualified for upper tier benefits. Over the period 2012-2015 the percentage of upper tier awards was 63% i.e. the current intervaluation experience is very similar to that from the previous period. In both cases these figures exclude members retiring with lower tier benefits and later qualifying for upper tier.

Table 6.1: Ill-health retirements on upper tier

	2012/13	2013/14	2014/15	2015/16	Total	NHSPS (aggregate over 2012-16)
Males	58%	60%	72%	n/a	63%	61%
Females	51%	68%	70%	n/a	63%	69%

6.11   Additional evidence was available for the NHSPS analysis which supported an assumption that 75% of members would ultimately qualify for upper tier benefits. We therefore recommend retention of the assumption that 75% of ill-health retirements will receive upper tier benefits.

7 Voluntary withdrawal from service

This chapter sets out our recommendation for the assumed rates of withdrawal from active service, and summarises the analysis undertaken in order to inform that recommendation.

Proposed assumptions for 2016 valuation

7.1 We recommend that a common set of net rates of withdrawal are used for the purposes of the valuation i.e. applying equally to those members who remain in the pre-2015 scheme and members of the 2015 scheme. The recommended rates are the same as proposed for the 2012 valuation of the HSCPS (NI). The recommended rates are net of re-entry within five years, age and service related and unisex and apply for all members with the exception of practitioner and special class members. For these members we recommend no net withdrawals are assumed. Prior analysis shows the pattern of withdrawals has a strong service relation with considerably higher rates experienced in the first year of service. The recommended rates reflect this relation. Sample rates are provided in Appendix A.

Previous valuation assumptions

7.2 The proposed 2016 assumptions are the same as the rates adopted for the previous valuation.

Use of the assumption

7.3 Withdrawal rates specify the rate at which members are assumed to leave voluntarily before retirement becoming entitled to either deferred benefits or, for those with less than two years' service, a refund of contributions. In all cases the withdrawal rates are 'net' rates, i.e. they are intended to reflect the probability of leaving service and not re-joining within five years, and therefore the member's benefits not being linked to their final salary at retirement (or the in-service revaluation rate in the CARE scheme).

Analysis and setting the assumption

7.4 As noted earlier in this paper and as set out in our data report, we believe there is some underreporting of the active member movements in the data provided and therefore it has not been possible to carry out a reliable analysis of the pattern of (net) withdrawals from active membership. The following table sets out the number of movements we have taken into account.

Table 7.1: Net withdrawals

Withdrawal data *	2012/13	2013/14	2014/15	2015/16	Total
Total number of withdrawals	1,367	1,366	n/a	785	3,518
Number of rejoiners	651	617	n/a	314	1,582
Net withdrawals	716	749	n/a	471	1,936

* This data reflects the aggregate of data provided by HSC. The number of leavers provided for the 2014/15 year appears too low and has been excluded in the above table.

7.5   The average number of net withdrawals implied from the above is 645 per year. The average number of active members over the intervaluation period was 59,451. The average rate of net withdrawals implied is just over 1% p.a. This compares with the 2012 assumption of around 2%.

Comments on analysis

7.6   Given the issues with the data and expected underreporting of movements we do not believe there is conclusive evidence to support a change in net withdrawal assumption. For this reason we recommend retaining the same assumption as used for the 2012 valuation.

8   Death before retirement

> *This chapter sets out our recommendation for the assumed rates of death before retirement, and summarises the analysis undertaken in order to inform that recommendation.*

Proposed assumptions for 2016 valuation

8.1   We recommend a single set of assumptions (separate for men and women) to allow for the possibility of death before retirement. The recommended rates are the same as proposed for the 2016 valuation of the NHSPS. Assumed rates of death in service increase with age but fewer than 0.5% of members are assumed to die each year, even at the highest ages. Sample rates are provided in Appendix A.

Previous valuation assumptions

8.2   The proposed 2016 assumptions are 95% and 90% for men and women respectively of the rates adopted for the previous valuation for ages close to retirement, with the difference reducing at younger ages. The 2012 valuation assumptions were the same as those adopted for the NHSPS 2012 valuation.

Use of the assumption

8.3   Death before retirement rates are used to allow for the possibility of deaths whilst in active service or whilst entitled to a deferred pension. The numbers of deaths observed annually, and the recommended rates to be assumed are low, and thus this assumption has relatively little financial significance.

Analysis and setting the assumption

8.4   There were only 60 deaths of active members reported in the movements data over the intervaluation period. Given the small numbers involved it is not appropriate to set a scheme specific assumption based on scheme data only. We recommend this assumption continues to be set equal to the assumption proposed for the NHSPS 2016 valuation.

9   Promotional pay increases

> *This chapter sets out our recommendation for the assumed promotional pay increases of active members, and summarises the analysis undertaken in order to inform that recommendation.*

Proposed assumptions for 2016 valuation

9.1   We recommend assuming separate scales of promotional increases for manual and other staff (separate for men and women). The increases are dependent on age and are steeper at younger ages. Sample values of the scales are provided in Appendix A.

Previous valuation assumptions

9.2   The assumptions adopted for the 2012 valuation are the same as those recommended for the 2016 valuation. The assumptions are the lower than those adopted by the NHSPS for the 2012 and 2016 valuations.

Use of the assumption

9.3   For most members of the pre-2015 scheme benefits earned in that scheme are linked to pay at or near retirement. Members' pay can increase through a combination of general annual pay awards and promotional, or other increases, to pensionable pay. To calculate an estimate of the level of benefit payable in the future requires assumptions for both these components. The assumption for general pay awards is directed by DoF. The assumption for promotional pay increases is set by the Department.

9.4   It should be noted that the data available only allows analysis of non-general pay growth. The non-general pay growth relates to promotional pay growth and changes in non-basic pay i.e. pensionable allowances. It is possible that in a period of general pay restraint, such as the inter-valuation period, that increases in other elements of pay may not be representative of the level of increases in periods of more normal pay growth. For this reason care should be applied when considering if the evidence from recent periods would be equally applicable to periods with more 'normal' general pay policy.

9.5   Future pay progression will be more significant (in terms of expected pension) for those members with either full or tapered protection because they continue to have benefits linked to final pensionable pay for service beyond 31 March 2015.

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Analysis and setting the assumption

9.6   When considering the assumption for non-general pay growth we compared a 'profile analysis' of the scheme experience to the assumption adopted for the 2012 valuation. This analysis considers the overall active membership as at 31 March 2016 and compares average (WTE[17]) pensionable pay at each year of age with that at other ages. This analysis illustrates how (average WTE) pay varies by age and may form a suitable means of setting an age related pay scale. For this analysis only pensionable pay at the valuation date is considered.

9.7   A starter/ender analysis may also be helpful when considering the assumption for non-general pay growth. This analysis considers only those members who were in active membership at both the 2012 and 2016 valuation dates and compares the increase in their pensionable pay (WTE[1]) over the period (net of assumed general pay increases[18]) with that assumed. The rates of assumed increase being based on the members' ages over the intervaluation period and the 2012 valuation assumptions. This analysis can illustrate how actual promotional pay increases (or rather actual non-general increases) have impacted the rates of earnings of members remaining in service over the intervaluation period. Data limitations meant we were unable to undertake this type analysis.

Results of profile analysis

9.8   Charts 9.1 and 9.2 below show the implied age related salary increases in non-general pensionable pay for men and women respectively based on the pay profile of all members at the valuation date. This has been calculated as the salary at a particular age compared to the salary for the previous age, as a proxy for promotional salary increases. The actual profile is compared with the assumed age related promotional scales adopted for the 2012 valuation. The charts show that the rate of actual non-general pay is fairly unpredictable.

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[17] Whole time equivalent pay.
[18] General pay increases have been assumed to be in line with stated government pay policy i.e. 0% for 2012-13 and 1% pa from 2013-16.

Chart 9.1: Male Salary Increases
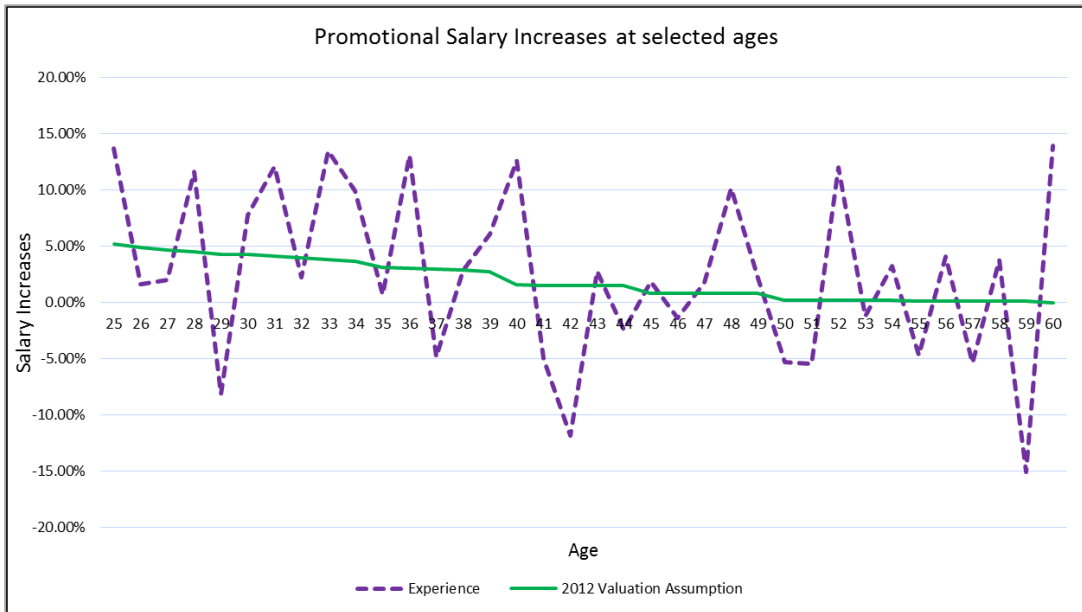
Chart 9.2: Female Salary Increases
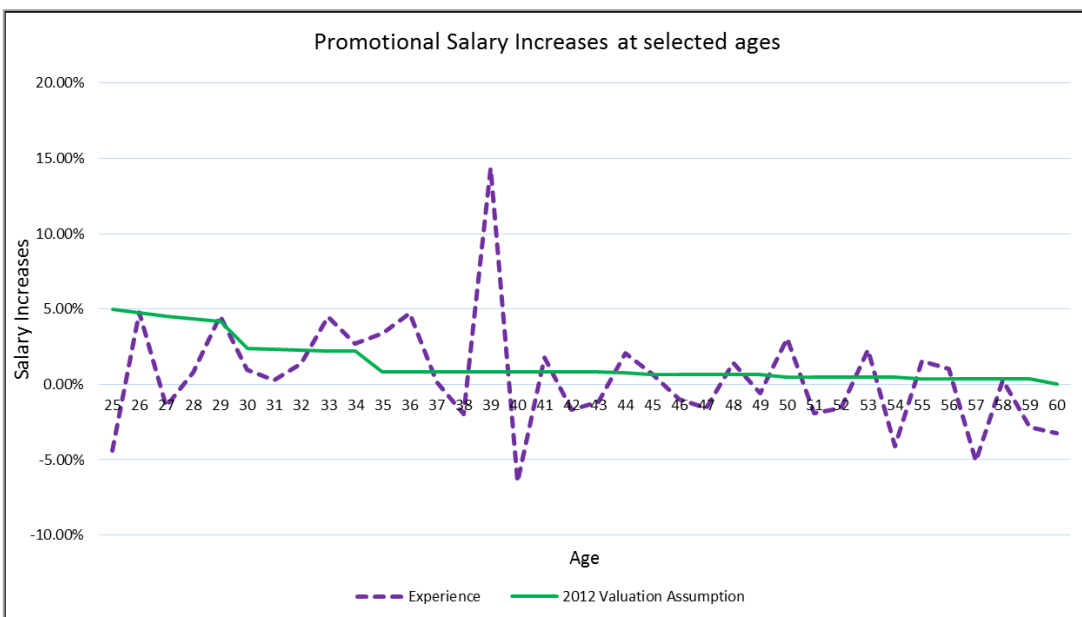
Comments on the analysis

9.9   The results of the profile analysis should be treated with some caution when considering how to set forward looking assumptions for promotional pay growth. The population at each age is not homogeneous thus the analysis could be distorted by a changing mix of members and different behaviours at different ages and therefore may not be purely due to promotional salary increases. Further when considering the appropriate forward looking assumption for non-general pay growth due account should be taken of how this interrelates to the directed assumption for general pay growth.

9.10   It is likely that a number of factors have contributed to intervaluation pay growth at an individual level, likely influenced by both the general pay restraint policy and member behaviours. In this light our view is that the analysis available is not sufficient to suggest a change to the 2012 valuation assumptions is appropriate.

10   Commutation of pension for cash at retirement

> *This chapter sets out our recommendation for the assumed level of pension commutation at retirement (where this is not specified in the DoF valuation directions), and summarises the analysis undertaken in order to inform that recommendation.*

Proposed assumptions for 2016 valuation

10.1   An assumption is required about the amount of pension commuted by 1995 section members to increase their automatic entitlement to retirement lump sum. The assumption for the 2008 section and 2015 scheme is specified in the DoF directions. Table 10.1 shows the recommended proportion of pension that members are assumed to commute (the assumptions for the 2008 section and 2015 scheme are included for completeness). The proposed assumption is the same as that proposed to be adopted by the NHSPS for the 2016 valuation.

Table 10.1: Recommended commutation assumption for the 2016 valuation

1995 section	2008 section (directed)	2015 scheme (directed)
8% (M) / 11% (F)	17.5%	17.5%

10.2   The recommended assumption for the 1995 section is equivalent to assuming on average members take a total lump sum of 78% of the HMRC maximum permitted lump sum.

Previous valuation assumptions

10.3   A unisex assumption of 8.5% of pension commuted for retirement lump sum was adopted for the previous valuation, which was slightly lower on average compared to the current proposal. This was in line with the assumption made for the NHSPS valuation.

Use of the assumption

10.4   Members may commute part of their pension for a lump sum at a rate of £12 for each £1 of annual pension given up. The assumption is important because the value of the pension given up, as assessed using the actuarial assumptions underlying the valuation is, on average, more than £12 and so commutation has a significant impact on total liabilities and contribution rates. Differences between assumed and actual experience in the 2015 scheme will feed through into the cost cap fund but experience in the 1995 and 2008 sections of the existing scheme will not.

Analysis

10.5   Owing to data limitations it has not been possible to analyse recent commutation experience by considering the amounts of pension exchanged for cash at retirement in respect of members retiring since the 2012 valuation. Such an analysis was carried out for the NHSPS, leading to a recommended 2016 assumption for the 1995 section of exchanging 8% of pension for males and 11% of pension for females.

10.6   The annual accounts set out the amount of retirement lump sums each year and we have reviewed the ratio of these retirement lump sums with pensions coming into payment since the 2012 valuation, comparing HSCPS (NI) with the NHSPS to consider whether the two schemes have had similar experience and hence whether the same assumption could be justified for the HSCPS (NI) as has been proposed based on experience in the NHSPS. This is shown in Chart 10.1.

Chart 10.1: Lump sum experience since 2012 valuation
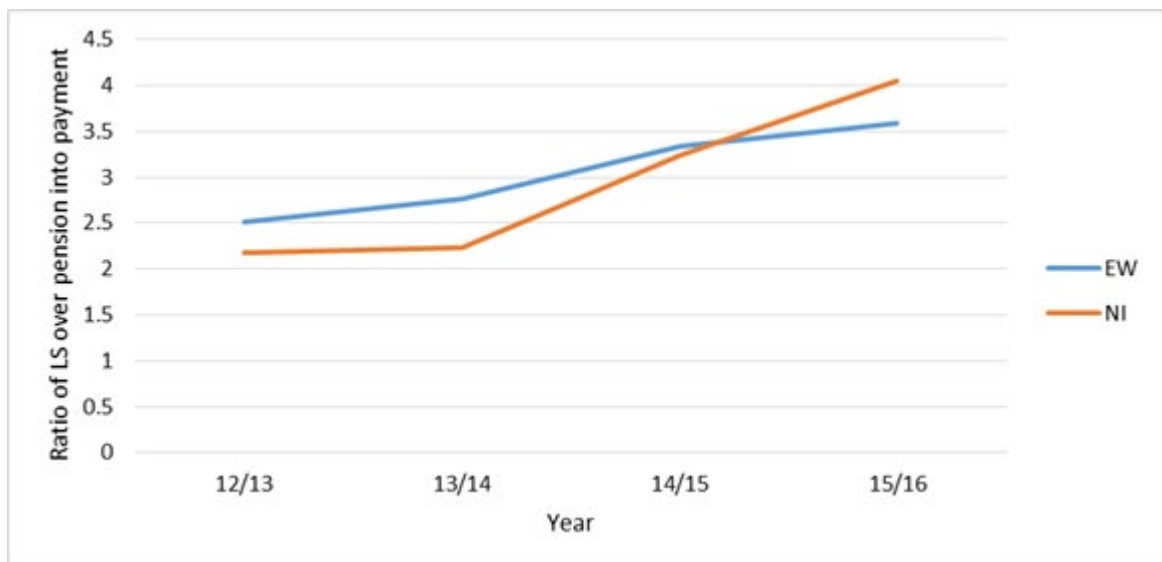
* Note: the figures for the retirement lump sums are taken from annual accounts and include both automatic lump sums and lump sums by commutation, as the information in the accounts does not provide a breakdown of these figures.

Comments on analysis

10.7   Chart 10.1 shows that the year-on-year experience for the HSCPS (NI) has followed a similar, although not identical, pattern as the NHSPS, with the ratio increasing over the period. We have no reason to expect that commutation experience in the HSCPS (NI) should be substantially different to that in the NHSPS. We recommend that the commutation assumption should remain aligned to that proposed for the 2016 valuation of the NHSPS, being 8% of pension for males and 11% of pension for females based on an analysis of NHSPS experience since the 2012 valuation.

11 Family statistics

This chapter sets out our recommendation for the assumptions around dependants' pensions for current pensioners, and summarises the analysis undertaken in order to inform that recommendation.

Proposed assumptions for 2016 valuation

11.1 We recommend the following assumptions.

> 72% of men and 52% of women are assumed to be married (including civil partner) at death at age 60

> 76% of men and 54% of women are assumed to be partnered at death at age 60

> Male members are assumed to be three years older than their partners and female members are assumed to be three younger than their partners

> No allowance is made for remarriage on the grounds of materiality

> All dependants are assumed to be the opposite sex as the member.

11.2 This section refers to assumptions made for current pensioners. No robust analysis is possible for non-pensioner members and corresponding assumptions for proportions married are based on population statistics.

Previous valuation assumptions

11.3 All family statistic assumptions are the same as those adopted for the 2012 valuation and the same as adopted for the NHSPS 2012 valuation.

Use of the assumptions

11.4 Dependants' pensions[19] are provided on the death of a member. The Scheme's benefit provisions for dependants differ according to when the service ended. For members who left service before 1 April 2008 only legal spouses and civil partners are eligible for a survivor's pension. For members in service on or after 1 April 2008, survivors pensions are payable to a qualifying partner[20].

11.5 Where the member has no service on or after 1 April 2008, the spouse's pension will cease if the spouse remarries.

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[19] Pensions are also payable to dependent children on a member's death but the costs are not material overall. No allowance is included for children pensions following pensioner deaths and an allowance is incorporated in the population proportions assumed for non-pensioner deaths.
[20] Qualifying partners includes legal spouse, civil partner and 'surviving nominated partner'. To satisfy the latter definition requires a 2-year exclusive relationship between parties able to legally marry or enter a civil partnership, and financial interdependency.

Analysis

11.6   Owing to data limitations it has not been possible to analyse recent experience of family circumstances.

11.7   We have no reason to expect that family circumstances in the HSCPS (NI) should be substantially different to those in the NHSPS. The assumptions used for the 2012 valuations were consistent across the two schemes. We recommend that the family statistic assumptions should remain aligned to those proposed for the 2016 valuation of the NHSPS.

Appendix A: Details of assumptions

This appendix contains details of the recommended assumptions including sample rates and values.

Pensioner mortality

Table A1: Baseline mortality assumptions

Baseline mortality	Standard table[21]	Adjustment
Males		
Retirements in normal health	S2NMA	83%
Current ill-health pensioners	S2IMA	83%
Future ill-health pensioners	S2IMA	100%
Dependants	S2NMA	100%
Females		
Retirements in normal health	S2NFA	85%
Current ill-health pensioners	S2IFA	85%
Future ill-health pensioners	S2IFA	100%
Dependants	S2NFA	100%

As specified by DoF, future improvements in mortality will be assumed to be in line with those underlying the ONS 2016-based principal population projections for the UK.

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[21] From the 'S2' series of standard tables published by the CMI and based on the experience of self-administered pension schemes. Separate tables are available based on experience of members retiring in normal and ill-health and for dependants.

Age retirement from service

Table A2: 1995 section: Age retirement rates

Age	Male rates					Female rates				
	Non-manual	MHO	Manual	Practitioner	Special Class Nurses	Non-manual	MHO	Manual	Practitioner	Special Class Nurses
50	0.01	0.03	0.02	0.01	0.02	0.01	0.03	0.01	0.00	0.01
51	0.01	0.02	0.01	0.01	0.02	0.01	0.02	0.01	0.00	0.01
52	0.01	0.02	0.02	0.01	0.02	0.01	0.02	0.01	0.00	0.01
53	0.01	0.02	0.02	0.01	0.02	0.01	0.02	0.01	0.00	0.01
54	0.02	0.13	0.02	0.02	0.05	0.01	0.11	0.01	0.01	0.05
55	0.04	0.50	0.05	0.06	0.30	0.05	0.48	0.03	0.05	0.35
56	0.04	0.24	0.05	0.05	0.13	0.04	0.22	0.02	0.05	0.15
57	0.05	0.27	0.06	0.10	0.16	0.05	0.20	0.04	0.07	0.16
58	0.08	0.25	0.06	0.16	0.21	0.06	0.23	0.04	0.14	0.18
59	0.12	0.29	0.09	0.28	0.16	0.10	0.26	0.07	0.21	0.20
60	0.33	0.33	0.25	0.63	0.42	0.30	0.35	0.19	0.69	0.39
61	0.19	0.27	0.14	0.32	0.31	0.24	0.30	0.23	0.27	0.35
62	0.20	0.34	0.17	0.25	0.24	0.31	0.38	0.31	0.35	0.40
63	0.22	0.28	0.17	0.25	0.29	0.27	0.35	0.23	0.23	0.34
64	0.32	0.72	0.37	0.28	0.76	0.30	0.69	0.25	0.29	0.62
65	0.51	1.00	0.59	0.47	1.00	0.39	1.00	0.35	0.57	1.00
66	0.30		0.32	0.23		0.27		0.25	0.26	
67	0.28		0.29	0.33		0.28		0.19	0.28	
68	1.00		1.00	1.00		1.00		1.00	1.00	

Table A3: 2008 section: Age retirement rates

Age	Male rates			Female rates		
	Non-Manual	Manual	Practitioner	Non-Manual	Manual	Practitioner
55	0.02	0.02	0.02	0.02	0.02	0.02
56	0.02	0.02	0.02	0.02	0.02	0.02
57	0.02	0.02	0.02	0.02	0.02	0.02
58	0.02	0.02	0.02	0.02	0.02	0.02
59	0.03	0.03	0.03	0.03	0.03	0.03
60	0.04	0.04	0.04	0.04	0.04	0.04
61	0.05	0.05	0.05	0.05	0.05	0.05
62	0.06	0.06	0.06	0.06	0.06	0.06
63	0.07	0.07	0.07	0.07	0.07	0.07
64	0.08	0.08	0.08	0.08	0.08	0.08
65	0.94	0.90	0.87	0.92	0.94	0.87
66	0.55	0.70	0.32	0.45	0.50	0.40
67	0.50	0.55	0.32	0.40	0.50	0.40
68	0.50	0.50	0.32	0.35	0.50	0.40
69	0.55	0.40	0.32	0.35	0.50	0.40
70	1.00	1.00	1.00	1.00	1.00	1.00

Table A4: Age retirement rates for members joining the 2015 scheme on or after 1 April 2015

	All members (and applicable to all service)
NPA*	1
NPA-1	0.08
NPA-2	0.07
NPA-3	0.06
NPA-4	0.05
NPA-5	0.04
NPA-6	0.03
NPA-7	0.02
NPA-8	0.02
NPA-9	0.02
NPA-10	0.02
NPA-11}	0.01
NPA-12} to min age 55	0.01
NPA-13}	0.01

* NPA in 2015 scheme in all cases

Retirements are assumed to occur on a member's birthday

Ill-health retirement from service

Table A5: Ill-health retirement rates for all members

Age	Males	Females
20	0.0002	0.0002
25	0.0003	0.0003
30	0.0004	0.0004
35	0.0008	0.0007
40	0.0012	0.0010
45	0.0026	0.0015
50	0.004	0.002
55	0.008	0.006
60	0.010	0.012
62	0.012	0.014
64	0.012	0.016
66	0.014	0.018
68	0	0

*rates are zero if above the NPA of the relevant section

In all scheme sections, 75% of ill-health retirements are assumed to qualify for upper tier awards.

Voluntary withdrawal from service

No net withdrawals are assumed for practitioner or special class members in the 1995 section.

Table A6: Withdrawal rates (net of re-entry within 5 years) for all other members

Age	Duration of service	
	0-1 year	Over 1 year
≤ 17	0.20	0.03
20	0.10	0.02
25	0.02	0.02
30	0.02	0.02
45+	0.02	0.02

Death before retirement

Table A7: Death before retirement rates for all members

Age	Males	Females
20	0.0002	0.0002
25	0.0002	0.0002
30	0.0003	0.0002
35	0.0005	0.0003
40	0.0006	0.0003
45	0.0009	0.0005
50	0.0012	0.0008
55	0.0019	0.0011
60	0.0030	0.0017
65	0.0048	0.0025

Promotional pay increases

Table A8: Promotional salary scales for all members

Age	Males	Females
	Index value*	Index value*
20	74	77
25	100	100
30	126	125
35	153	140
40	177	146
45	191	152
50	199	157
55	201	161
60	202	164
65	202	164

*Relative to an index value of 100 at age 25

Commutation of pension for cash at retirement

Table A9: Recommended commutation assumptions for the 2016 valuation

	1995 section	2008 section	2015 scheme
Males and females	8% (M) / 11% (F)	17.5%	17.5%

Family statistics

Table A10: Proportion married or partnered at death

Age	Members leaving service before 31 March 2008		Members in service on or after 31 March 2008	
	Males	Females	Males	Females
50	72%	52%	76%	54%
60	72%	52%	76%	54%
70	72%	45%	74%	46%
80	60%	22%	61%	23%
90	34%	7%	34%	7%

Only a legal spouse of a member leaving before 31 March 2008 is eligible for a dependant's pension. Other dependants may be eligible to dependant's pension for members in service on or after 1 April 2008.

Dependants are assumed to be of the opposite gender as the member. Male members are assumed to be three years older than their partners and female members are assumed to be three years younger than their partners.

Appendix B: Modelling approach and minor assumptions

Active membership projections

B.1   Direction 11[22] requires the actuary to use the 'projected unit methodology' to calculate the valuation results. The valuation results require the calculation of the cost of benefit accrual over periods after the effective date (31 March 2016). The expected cost of benefits provided to members remaining in the pre-2015 scheme under the provisions of transitional protection differs from the expected cost of providing members with benefits in the 2015 scheme. Further the expected cost of providing benefits varies for members with differing benefit provisions within the pre-2015 scheme (notably for members with differing normal pension ages). This implicitly requires the actuary to estimate the membership to future dates in order to determine the valuation results.

B.2   Since the majority of members (around 80%) were accruing benefits in the 2015 scheme at the effective date, and further given that the remaining members continuing to accrue benefits in the pre-2015 scheme are expected to rapidly decline to close to nil over the future periods being considered in this valuation, a pragmatic approach to estimating the future membership of each section/scheme over the relevant future periods is suitable.

B.3   The expected cost of accruing benefits over periods after effective date have been determined by assuming an overall stable population (age and pay profile) to end of implementation period. In particular:

> Allow for the protected population to reduce over the projection period (ie to 2023) with a corresponding increase in those accruing benefits in the 2015 scheme to maintain the stable population. SPA in the projected populations is determined by implied dates of birth and so the SPA mix changes over time despite the assumed stable population.

> Mortality is projected forward to the relevant year of use in all cases.

> The run off of the protected population is broadly linear from the relevant calculation date to the average age at which members of each identified group (eg NPA 55, 60, 65) are expected to retire.

B.4   The expected cost of accruing benefits over periods after the effective date for cost cap purposes has been determined by assuming:

> The aggregate membership has the same age/pay profile over all projection periods (i.e. to 2023) (and assuming all in the 2015 scheme).

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[22] The Public Service Pensions (Valuations and Employer Cost Cap) (Northern Ireland) Directions 2014, as amended.

> Allow for the actual membership (assumed) accruing benefits in the 2015 scheme to change over the projection period (i.e. to 2023). SPA in the projected populations is determined by implied dates of birth and so the SPA mix changes over time despite the assumed stable population.

> Mortality is projected forward to the relevant year of use in all cases.

Grouping of individual active member records

B.5   Individual active members have been grouped together for the purposes of calculating liabilities. This grouping is necessary to accommodate the volume of data within our valuation system. The approach taken to grouping the data has been tested to ensure it does not result in any distortion of the valuation results. The groupings are made for each section/scheme (i.e. 1995, 2008 or 2015), protection status (i.e. protected, tapered or unprotected) and within each valuation group (i.e. based on the categorisation by benefit provision or occupation, a description of each valuation group is given in Appendix D) and based on the following criteria.

Age	*Age nearest*
Service	Duration (years nearest)

Accrual cost methodology

B.6   See B.3 and B.4. The cost over each relevant period has been taken as the average of the cost at the start and end of each period.

B.7   Direction 11 requires use of the projected unit methodology to determine the valuation results. Directions 14, 16 and 17 specify some modifications to the financial assumptions in the short term. An implication of the short term modifications is that the projected unit methodology is expected to result in an increasing standard contribution rate over successive periods. For example the cost of accrual under the existing scheme over the period 2016 - 2019 is lower than that over the period 2019 - 2023 (ignoring any redistribution of members between sections and into the 2015 scheme). This effect is not immaterial for final salary benefits but has no effect on the cost cap future service cost calculation since short term assumptions are explicitly disregarded for this purpose in Direction 40.

B.8   Non-accruing benefits such as lump sums payable on death in service have been recognised only when a benefit payment is expected.

B.9   Members accruing or expecting to accrue benefits at double rate (Mental Health Officers after completion of 20 years' service) are treated as though the overall expected benefit accrues uniformly over all service.

Guaranteed Minimum Pensions (GMPs)

B.10 A global adjustment was applied to reduce the past service liability in respect of estimated GMP entitlements for which provision of post SPA pension increases is not the responsibility of the scheme. The reduction is equivalent to a contribution rate of 0.3% over the 15 year period from the implementation date. This estimation has no impact on the calculation of the employer contribution correction cost.

Earnings cap

B.11 For members joining pensionable service on or after 1 June 1989 pensionable pay is restricted to a monetary cap for any reckonable service between 1 June 1989 and 31 March 2008. The cap was £149,400 for the 2015/16 scheme year and increases each year in line with the Retail Prices Index. A global adjustment was applied to allow for the restriction of benefits for affected members. The difference is equivalent to a contribution reduction of 0.1% over the 15 year period from the implementation date. This estimation only affects the uncorrected employer contribution rate. It has no impact on the employer contribution correction cost.

Public Service Transfer Club (PSTC)

B.12 Allowance has been made for the potential additional liabilities arising from inward transfers on PSTC terms. The volumes of transfers have historically been small and if they continue at these levels the financial impact is expected to be equivalent to a contribution cost of 0.1%.

Final pensionable pay

B.13 All liabilities have been based on pensionable pay at the effective date as provided by HSC. No explicit allowance has been made for the impact of prior years' earnings resulting in higher final pensionable pay for particular members since this effect is not expected to impact a material number of members.

Dependants' pensions

B.14 No allowance has been taken for short term dependant pensions or children's pensions (other than those already in payment), on ground of immateriality.

Expenses

B.15 No allowance has been made for expenses. Expenses are outside the valuation framework.

Early retirement factors

B.16 When modelling retirement before Normal Pension Age where an actuarial reduction would be applied early retirement factors have been set equal to current factors (applied for the appropriate period before the normal pension age).

Re-entry of members

B.17 Re-entry of members to pensionable service has been modelled by the use of a 'net' withdrawal assumption for active members. This explicitly allows for a proportion of those leaving active service to return. No explicit allowance has been made in the valuation for a proportion of those deferred at the effective date to subsequently rejoin. However the analysis undertaken for active members, and the resultant 'net' withdrawal rates include those rejoining from deferred status and hence the valuation of active members implicitly includes some provision for deferred members to return.

Additional voluntary contributions

B.18 Additional voluntary contributions paid to on a money purchase basis are paid in accordance with Regulations which are separate to the pension scheme regulations and have not been considered for the valuation. Additional voluntary contributions paid in accordance with the pension scheme regulations to secure added service or pension are taken into account as liabilities of the scheme.

Scheme pays

B.19 Members can opt to use the scheme pays facility to pay HMRC for an annual allowance or lifetime allowance tax charge (i.e. the scheme pays the tax charge on behalf of the member for a corresponding reduction to the member's pension). Where members have opted to use this facility a lower liability has been valued for these members, to reflect a scheme pays pension debit. The notional fund allows for actual cash flows and reflects any tax charges paid by the scheme, therefore a corresponding lower notional fund has been valued. The impact of these will broadly net off for valuation purposes.

Other Direction interpretations

Directions 27 and 28 (contribution rates)

B.20 27(1)(a) and 27(1)(c) : Payroll at effective date projected forward (only) in line with valuation earnings assumptions for purposes of spreading the deficit.

B.21 27(1)(c)(ii) and 28 : Member contributions since the effective date based on actual (or expected) yield for past periods and periods up to 31 March 2019. The average member contribution yield expected over the implementation period is 9.2%, assuming that member contribution rates and thresholds over 2019 to 2023 remain unchanged from current.

B.22 27(1)(b) and 27(1)(d) : See B.3 and B.4.

Directions 28, 31, 32(1), 33(2)(a) (and related) – member contribution yields

B.23 See paragraph B.21.

Directions 32(1) – expected cost of benefits for past periods (for cost cap purposes)

B.24 Assume that contribution rate required to cover cost of benefits over 2015-16 is the same as the rate required to cover cost of benefits over 2015-19.

Directions 32(1) and 40(1) – expected cost of benefits for future periods (for cost cap purposes)

B.25   See B.4

Direction 33 – cost cap income

B.26   For the CCNLL element this has been based on the liability discount rate used for the cost cap liabilities at 2016 rather than the investment roll up. The impact is immaterial to the results.

Appendix C: Assumptions made for data uncertainties

Summary

C1   Whilst comprehensive data was received from HSC for the 2016 valuation, some aspects of the data were incomplete and/or unreliable for certain elements of our valuation calculations. GAD has made adjustments to address these issues or relied on other data sources as appropriate. Inconsistencies between the current valuation data and prior data sets were observed at both this valuation and the previous valuation. In aggregate the impact of these inconsistences would introduce a material and unintended differential between the employer contribution rates payable to this scheme and to the corresponding health service schemes for both England and Wales and Scotland. For this reason the Department has agreed with DoF that an upwards adjustment to the notional fund of £500m should be made. This is reflected in the valuation Directions and the valuation results allow for this adjustment.

C2   It has not been possible to fully resolve all data issues in the timescale required for the valuation. Therefore to calculate results for the 2016 valuation of the Scheme requires assumptions in respect of incomplete and/or unreliable individual member records and movements data, the latter is used for setting assumptions and in the calculation of the Net Leavers Liability.

C3   Scheme specific assumptions are determined by the "responsible authority", which is the Department in the case of the Scheme, and must be set as best estimate assumptions and not include margins for prudence or optimism.

Individual member records

C4   Membership data is provided by HSC for the purpose of the 2016 valuation and we apply checks to these membership records to ensure all key data items are provided and reliable for valuation purposes. Following these checks, it was identified that individual member records at the relevant dates as required for valuation purposes were not fully complete and reliable. We worked with HSC to address a number of these issues, however where critical data items were missing from member records the general approach taken was to exclude that record for calculation purposes with calculations based on the remaining dataset being rated up incorporate an allowance for the excluded records.

C5   Uprating factors were determined for each membership category equal to the ratio of known valid records and the number of records with adequate data. Implicitly this uprating approach assumes that the records with omissions or errors have the same average profile (age, sex, pay, service) as fully complete records. Some 8% of records were excluded from the 2016 valuation data and around 16% of the data provided for the purposes of setting the initial cost cap fund.

C6   As noted, the approach taken to data omissions is to assume each record with missing data has the same average profile as the complete records and therefore there is a risk that this assumption is not appropriate. The table below indicates the extent to which the valuation results might be incorrect if the approach in fact under/overstates the liability for the omitted members by 10%.

	Impact of error in assumption for missing data (as % of pay)	
	Uncorrected Employer contribution rate	Employer contribution correction cost
Actives (uprating applied: 13%)	0.3%	0.3%
Deferreds (uprating applied: 7%)	<0.15%	nil
Pensioners (uprating applied: 1%)	nil	nil

C7   The table above illustrates the potential impact if known data omissions are subsequently found to have been handled incorrectly. Since it is not possible to undertake independent checks for all categories of members and a full reconciliation has not been achieved against all prior datasets there is the potential for currently unidentified problems with the data to emerge in future. For example a group of deferred members could be identified where no liability has previously been determined. The impact of such unknowns emerging at subsequent valuations could be considerably more than the sensitivity indicated above. This issue has arisen at both the current and previous valuation, resulting in the agreed adjustment to the notional fund for this valuation in recognition that certain liabilities were missed when that fund was originally set.

C8   Adjustments were also applied to certain data items to 'correct' identified issues with the extraction process. The most significant adjustments applied were as follows:

> Missing pay in the 2016 data was extracted from the corresponding 2015 records for 5.5k members
> Missing 2015 scheme pensions in the 2016 data were estimated for 4k members based on pay
> Deferred pensions for members of the 2008 section were estimated for most members based on the corresponding averages for similar members of the NHS Pension Scheme in England and Wales

The adjustments applied are intended to avoid the need for further data exclusions with the inherent introduction of uncertainty. However it should be recognised that these adjustments themselves do introduce some element of uncertainty into the valuation results which could be of greater magnitude than the impacts illustrated in the table above.

Movements data

Setting assumptions

C9 HSC supplied data on the experience of the scheme membership over the four-year period to 31 March 2016. Fully complete and comprehensive data about members moving status between certain dates (e.g. leaving active status due to death or retirement) was not able to be provided. Analysis of member movements is needed to inform scheme specific demographic assumptions as scheme-specific experience, both recent and longer term, generally provides the most reliable evidence when considering best estimates of future experience.

C10 Assumption setting relies on analysis of movements data in consideration with such other relevant information which is available. The setting of demographic assumptions is to some extent subjective and a matter of interpretation. Changes in assumptions may be expected at successive valuations as circumstances change even with full data. Thus the absence of fully complete movements data does not necessarily introduce uncertainty into the valuation results provided there is other relevant information available to inform those assumptions. It is to be expected that there is some volatility in the experience arising from an analysis of movements data. As assumptions are intended to reflect long term expectations it is reasonable to seek to smooth out the impact of these short term effects. A number of the recommendations we make for scheme-specific valuation assumptions smooth out the short term effects by taking only 50% of the difference in experience since the 2012 valuation, for example in recommending the assumption for baseline pensioner mortality.

C11 It should however be recognised that should movements data become available for future valuations it could result in recommendations regarding appropriate assumptions which lead to greater changes in valuation results than otherwise. It is difficult to quantify the potential scale of this discontinuity but it could be over +/-1% of pensionable pay on the employer contribution rates. For example, if the number of pensioner deaths assumed for setting assumptions for the 2016 valuation was subsequently found to be materially under or over stated relative to data available at a subsequent valuation, this could have an impact on the mortality assumptions adopted at future valuations and hence result in a large corresponding change in liability and employer cost.

Net Leavers Liability (NLL)

C12 The initial cost cap fund is set equal to the liability for actives members at 31 March 2015. The cost cap mechanism is intended to manage the costs of the reformed scheme and recognise any unexpected experience relating to pre-reformed entitlements of members in service at 1 April 2015, but only to the point at which they leave active service. NLL is a quantification of the amount of pre-reformed liabilities which fall out of the cost cap fund at a valuation owing to members which have left service since the previous valuation (or since the initial cost cap fund was set in the case of the 2016 valuation), net of the additional liabilities in respect of members with pre-reformed service who rejoined active membership during 2015-16.

C13   To accurately calculate NLL in accordance with the directions requires full movement data for all members who were active in 2015 and are no longer active at the 2016 valuation. The data available was not suitable for calculating NLL and it was not possible to make assumptions to adjust the data available to provide for a reasonable estimate of NLL to be calculated.

C14   For the purposes of determining the 2016 valuation results, we have adopted an approach which implicitly makes an assumption that there is no unidentified experience gain or loss arising over the period 2015 to 2016. A risk of this approach is that any upward or downward cost pressure that has occurred over the period but has not been explicitly identified will not be reflected in the 2016 valuation results.

C15   We expect that the uncertainty introduced by the approach above is not more than 0.2% of pay. Although it should be noted that the deficiencies in the membership data discussed above could compound this scale of uncertainty.

C16   We would not expect significant unidentified experience gains or losses to arise over the one year period 2015 to 2016 in the normal course of events, although such experience can occur.

Appendix D: Description of valuation groups

Description		Valuation Group*
Administrative and managerial staff not in GP practices; Manual staff (not MHOs); Clinical staff not in any other group; GP practice staff (except Practitioners and those with special class status who are included in the appropriate groups below).	Men	1
	Women	11
MHOs (including those not yet doubling service)	Men	2
	Women	12
Medical Practitioners	Men	7
	Women	17
Dental Practitioners	Men	8
	Women	18
Nurses, physiotherapists, midwives and health visitors with special class status.	Men	9
	Women	19

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Appendix E: Sensitivity of valuation results to Department set assumptions

E.1 The table below provides an indication of the sensitivity of the valuation results to the particular assumptions under consideration. The figures shown here are also provided in section 4 of the formal valuation report.

Table E1: Sensitivity of valuation results to Department set assumptions

	Addition to uncorrected employer contribution rate[12]	Addition to employer contribution correction cost
Membership profile: 2 years older on average over implementation period	0.6%	0.6%
Mortality rates: 5%* heavier rates of pensioner mortality	(0.7)%	(0.6)%
Age retirement rates: where no actuarial adjustment is applied): 5% more members of the 1995 section assumed to retire at normal pension age than currently assumed, with correspondingly fewer members assumed to retire later	0.1%	0.1%
Commutation (other than as directed): all eligible members of the 1995 section commute 2% of pension more than assumed	(0.1)%	(0.2)%
Ill-health retirement: 5%* increase to assumed rates	0.0%	0.0%
Ill-health retirement: 5%* increase in proportion assumed to receive [higher tier] benefits	0.0%	0.0%
Proportions partnered: 5%* more members assumed to have qualifying partners at death	0.2%	0.2%
Resignations and opt outs: 5%* higher numbers assumed to leave voluntarily before retirement (net of rejoiners)	(0.1)%	(0.3)%
Promotional pay increases: 0.5% higher promotional pay increases than assumed	1.0%	1.4%

* Opposite changes in the assumptions will produce approximately equal and opposite changes in the valuation results.

E.2 In each variant of the above table the sensitivity shown is in relation only to the change in assumption described. The impact of a combination of assumption changes will not necessarily equate to the sum of the relevant rows above.