

Statistical bulletin

Past and projected data from the period and cohort life tables, 2016-based, UK: 1981 to 2066

Life expectancy (ex), probability of dying (qx) and numbers surviving (lx) from the period and cohort life tables, past and projected, for the UK and constituent countries.



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1 . Main points

- Period life expectancy at birth in the UK in 2016 was 82.9 years for females and 79.2 years for males.
- In 50 years time, by 2066, period life expectancy at birth in the UK is projected to reach 88.9 years for females and 86.4 years for males.
- Cohort life expectancy at birth in the UK in 2016 was 91.9 years for females and 89.3 years for males.
- In 50 years time, by 2066, cohort life expectancy at birth in the UK is projected to reach 98.1 years for females and 96.1 years for males.
- In 2066 in the UK, 50.0% of new born baby girls and 44.2% of new born baby boys are projected to live to at least 100 years old.

2 . Statistician's comment

“Improvements in life expectancy in the 2016-based projections are slightly lower than those projected in the 2014-based projections. This has been driven by higher mortality rates in 2015 and 2016 than were projected in the 2014-based projections and lower rates of mortality improvement at older ages over the first 25 years of the projections.”

Sophie Sanders, Population Statistics Division, Office for National Statistics

3 . Things you need to know about this release

Our period and cohort life tables give historical and projected statistics by single year of age and sex, from 1981 to 2016 and then 50 years into the future (2017 to 2066). They are produced biennially for the UK based on the assumptions for future mortality from the national population projections (NPP). This release relates to the 2016-based NPP published on the 26 October 2017.

Period life expectancies use mortality rates from a single year (or group of years) and assume that those rates apply throughout the remainder of a person's life. This means that any subsequent changes to mortality rates would not be taken into account. A period life expectancy is therefore the average number of additional years a person would live if he or she experienced the age-specific mortality rates of the given area and time period for the rest of their life. For example, a period life expectancy at age 65 years in 2016 would use the observed mortality rates for 2016 for ages 65, 66 and 67 years and so on. A period life expectancy at age 65 years in 2020 would use the projected mortality rates for 2020 for ages 65, 66 and 67 years and so on.

Cohort life expectancies make allowances for future mortality improvements by taking into account observed and projected improvements in mortality for the cohort throughout its lifetime. For example, cohort life expectancy at age 65 years in 2016 would be worked out using the observed mortality rate for age 65 years in 2016 and the projected mortality rates for age 66 years in 2017, for age 67 years in 2018 and so on. Cohort life expectancy at age 65 years in 2020 would be worked out using the projected mortality rates for age 65 years in 2020, for age 66 years in 2021, for age 67 years in 2022 and so on.

A more detailed explanation of the difference between period and cohort life expectancies can be found in [Period and cohort life expectancy explained](#).

It should be noted the projections are not forecasts and will inevitably differ to a greater or lesser extent from actual future figures. The further ahead from the projection base year (2016) the more uncertain the statistics become.

4 . How long can you expect to live?

Enter your details into our [life expectancy calculator](#) for the UK to find out how long you are expected to live given assumed future mortality improvements (your cohort life expectancy). You can also find out your chances of surviving to age 100 years.

5 . How have recent trends in mortality affected projected life expectancy at birth?

2016-based projections of life expectancy at birth are lower than 2014-based projections

Period life expectancy at birth in the UK is projected to reach 88.9 years for females and 86.4 years for males in 2066 (Figure 1). This is a projected increase of 6.0 years for females and 7.2 years for males over the 50-year projection period from 82.9 years for females and 79.2 years for males in 2016.

For females, this is equivalent to the increase in period life expectancy at birth experienced over the previous 25 years from 1981 to 2016. The increase projected for males over the next 50 years (7.2 years) is slightly lower than the improvement experienced over the last 25 years (8.3 years).

Improvements in period life expectancy are slightly lower than those projected in the 2014-based projections by around one year for both females (90.0 years in 2066) and males (87.4 years in 2066). This is because mortality rates in 2015 and 2016 have been slightly higher than were projected in the 2014-based projections at most ages and lower rates of mortality improvement are projected at older ages over the first 25 years of the projections.

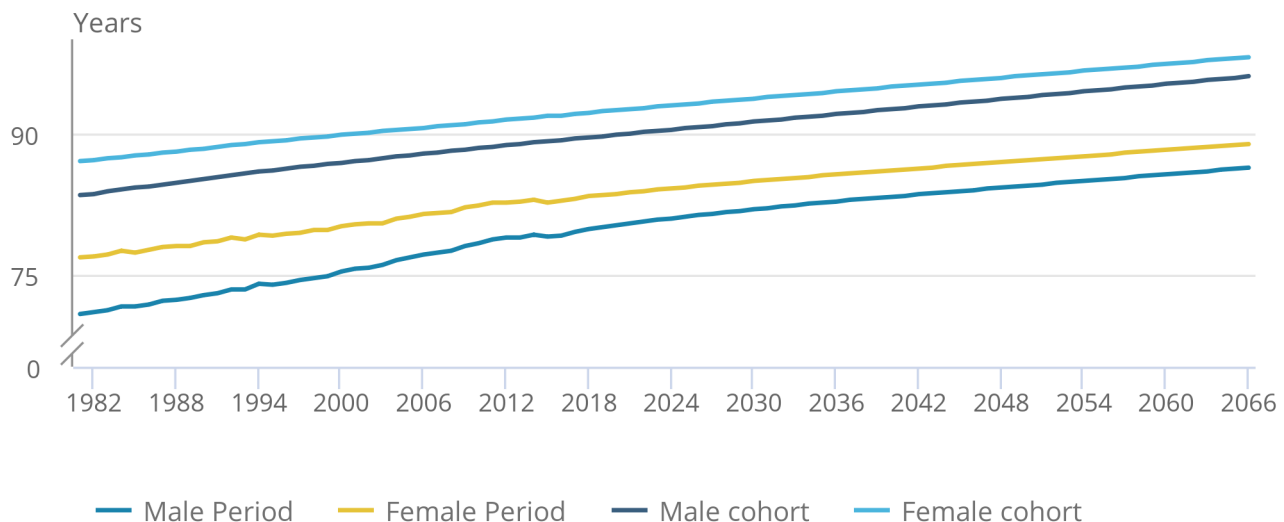
Allowing for expected future improvements in mortality, cohort life expectancy at birth in 2016 was 91.9 years for females and 89.3 years for males. This is projected to rise to 98.1 years for females and 96.1 years for males by 2066, an increase of 6.2 years for females and 6.8 years for males over the 50-year projection period. These increases are again slightly lower than those projected in the 2014-based projections (6.6 years for females and 7.0 years for males by 2066).

Figure 1: Period and cohort life expectancy at birth, males and females

UK, 1981 to 2066¹

Figure 1: Period and cohort life expectancy at birth, males and females

UK, 1981 to 2066¹



Source: Office for National Statistics

Notes:

1. Data from 1981 to 2016 are based on historical mortality rates, while data from 2017 to 2066 use projected mortality rates.

Less optimistic projections have brought period and cohort life expectancy closer together

Anticipated improvements in mortality in future years have resulted in higher cohort life expectancies than period life expectancies historically. This remains the case, however, due to less optimistic views on the influences of factors such as improvements in medical science, re-emergence of existing diseases and increases in anti-microbial resistance, the difference between period and cohort figures has reduced for both males and females in the most recent projections.

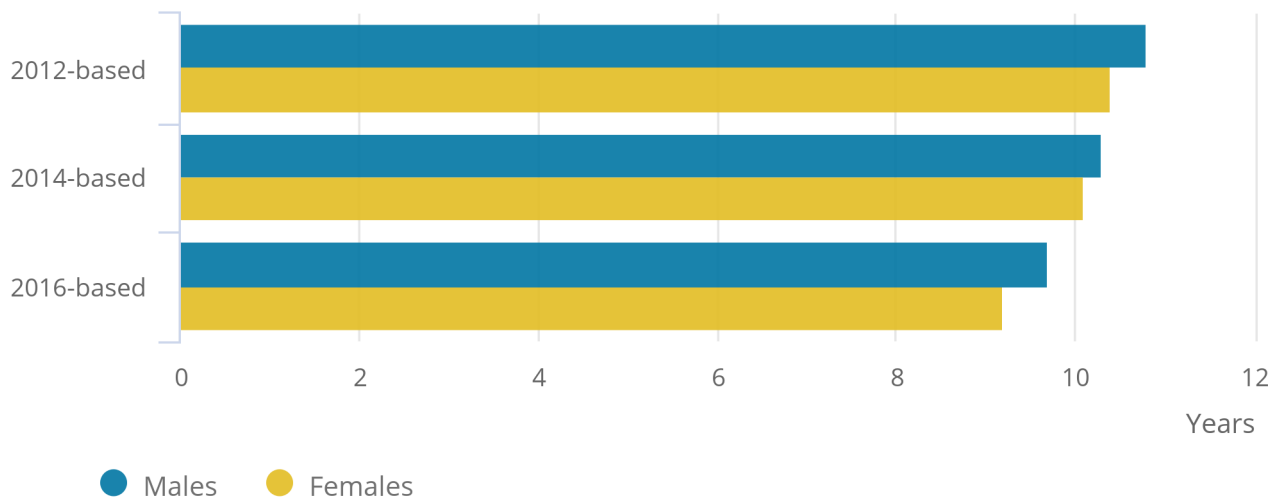
Figure 2 shows that the gap between period and cohort life expectancy at birth has closed at a slightly faster rate for females compared with males, reducing from a difference of 10.4 years in 2066 in the 2012-based projections to 9.2 years in 2066 in the 2016-based projections. For males, this has reduced from 10.8 years to 9.7 years over the same period, reflecting the greater mortality improvements experienced by males compared with females in recent years.

Figure 2: Difference between period and cohort life expectancy at birth in 2066

Males and females, UK

Figure 2: Difference between period and cohort life expectancy at birth in 2066

Males and females, UK



Source: Office for National Statistics

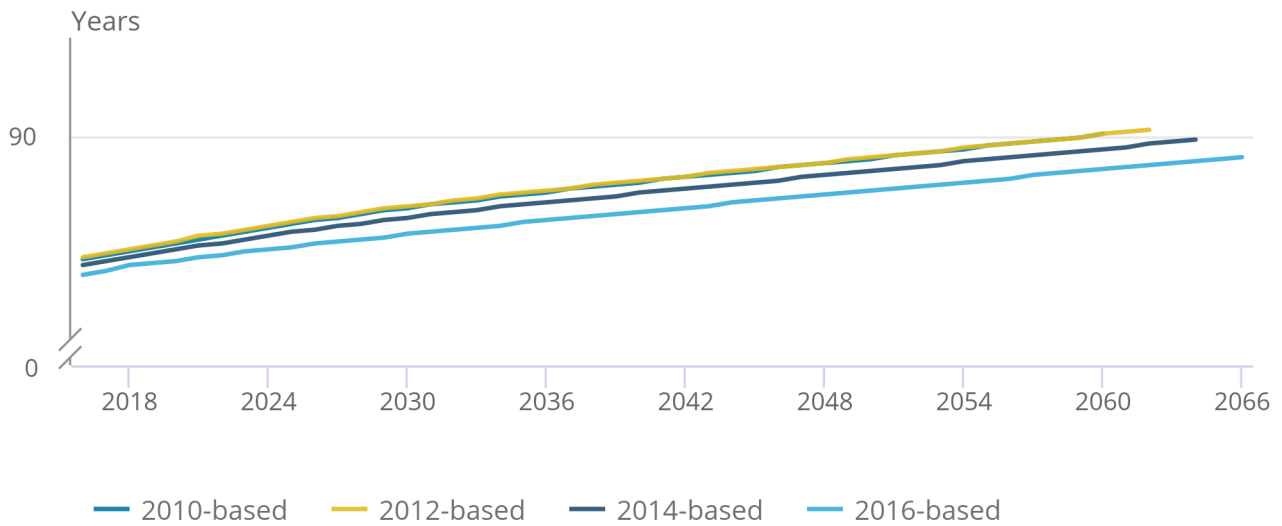
Looking at the four most recent sets of projections, Figures 3 and 4 show projected period life expectancy at birth has been lower in each projection. This is also true for cohort life expectancy. The difference in period life expectancy at birth between the 2016-based and 2014-based projections was 0.5 years for females and 0.7 years for males. This difference is projected to grow to one year for both males and females in 2041 and remain at around this level until the end of the 50-year period.

Figure 3: Female period life expectancy at birth for selected projection periods

UK, 2016 to 2066

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UK, 2016 to 2066



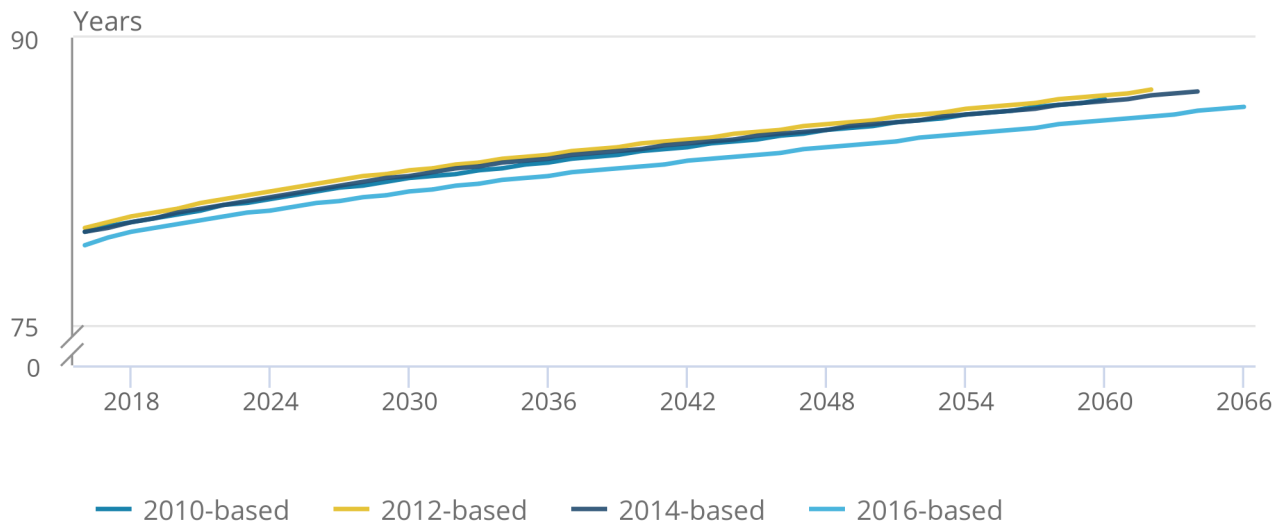
Source: Office for National Statistics

Figure 4: Male period life expectancy at birth for selected projection periods

UK, 2016 to 2066

Figure 4: Male period life expectancy at birth for selected projection periods

UK, 2016 to 2066



Source: Office for National Statistics

High life expectancy variant projection has reduced

Variant projections of cohort life expectancy at birth are shown in Figure 5 and give plausible alternative scenarios to the principal by assuming different levels of annual improvements in mortality.

The high life expectancy variant assumes greater improvements in mortality than the principal projection. Cohort life expectancy at birth in 2066 for the high variant was 108.3 years for females and 106.8 for males. This is lower than the 2014-based projection (116.8 years for females and 115.6 for males), due partly to the higher mortality rates experienced in 2015 and 2016 but also due to assuming a lower rate of improvement for this variant than previously.

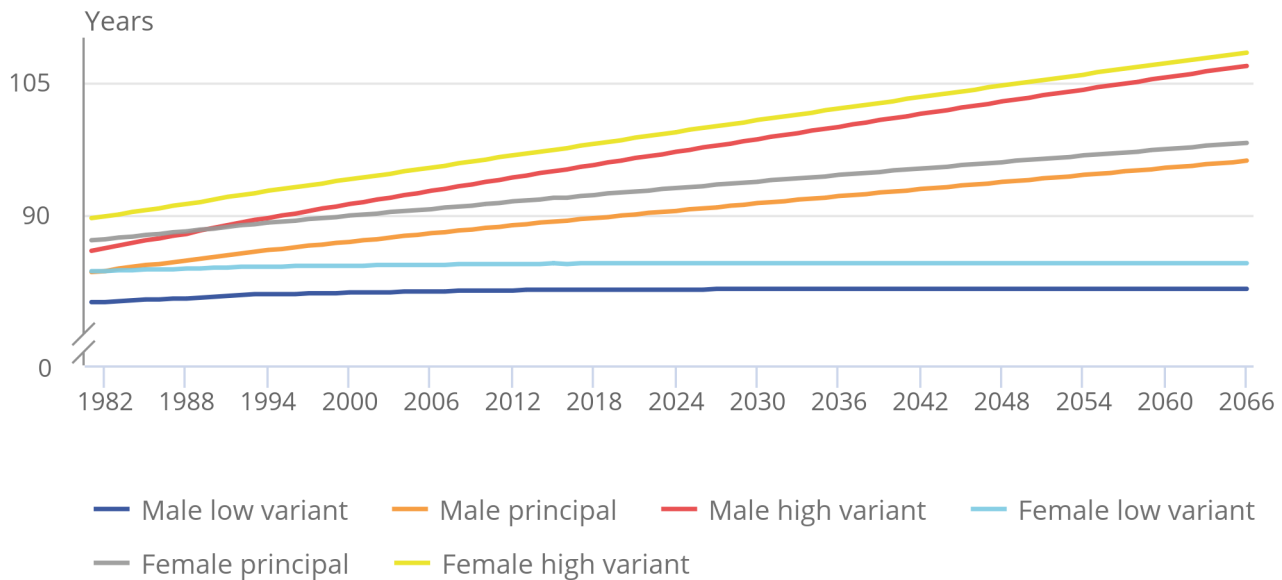
The low life expectancy variant, which assumes very little improvement in mortality, projects cohort life expectancy to increase to 84.5 years for females and 81.6 years for males in 2066. This is also a reduction for both females and males from the corresponding 2014-based figures (85.2 years and 82.2 years respectively).

Figure 5: Cohort life expectancy at birth

Males and females, UK, 1981 to 2066

Figure 5: Cohort life expectancy at birth

Males and females, UK, 1981 to 2066



Source: Office for National Statistics

Notes:

1. Data from 1981 to 2016 are based on historical mortality rates, while data from 2017 to 2066 use projected mortality rates.

Differences in life expectancy at birth within the UK are projected to narrow

In 2016, England had the highest cohort life expectancy at birth of the constituent countries, 1.8 years higher than Scotland, which had the lowest life expectancy at birth. The gap in cohort life expectancy at birth between England and Scotland is projected to reduce to 1.4 years for both females and males by 2066. The gap in period life expectancy at birth between England and Scotland is slightly larger than for cohort life expectancy at birth in 2016, but is projected to reduce over the 50-year projection period by a similar amount. This convergence is due to higher assumed base rates of mortality improvement for Scotland than the UK, in particular for the youngest and oldest ages.

Table 1: Period and cohort life expectancy at birth for selected years, the UK and constituent countries

	2016		2041		2066	
	Period	Cohort	Period	Cohort	Period	Cohort
Males						
United Kingdom	79.2	89.3	83.4	92.7	86.4	96.1
England	79.5	89.5	83.7	92.9	86.6	96.2
Wales	78.2	88.8	82.9	92.2	85.9	95.6
Northern Ireland	78.8	88.8	82.9	92.2	85.9	95.6
Scotland	77	87.7	81.8	91.3	84.9	94.8
Females						
United Kingdom	82.9	91.9	86.2	95.1	88.9	98.1
England	83.1	92.2	86.5	95.3	89.1	98.3
Wales	82.4	91.6	85.8	94.7	88.5	97.8
Northern Ireland	82.3	91.5	85.8	94.7	88.5	97.8
Scotland	81.1	90.4	84.6	93.7	87.4	96.9

Source: Office for National Statistics

Notes for How have recent trends in mortality affected projected life expectancy at birth?

1. Data from 1981 to 2016 are historical, while data from 2017 to 2066 are projected.

6 . How have recent trends in mortality affected projected life expectancy at older ages?

2016-based projections of life expectancy at age 65 years are lower than 2014-based projections

As for life expectancy at birth, each subsequent set of projections for life expectancy at age 65 years since the 2010-based projections has been gradually less optimistic. This is illustrated by Figures 6 and 7, which show that between 2016 and 2064, the difference in period life expectancy at age 65 years between the 2014-based and 2016-based projections has grown from around half a year to one year for both males and females.

A female aged 65 years in the UK in 2016 had a period life expectancy of 21.0 years, while a male had a period life expectancy of 18.6 years. A 65-year-old female in 2016 could therefore expect to live to age 86.0 years, while a 65-year-old male could expect to live to age 83.6 years, that is, if they both experienced the age-specific mortality rates for 2016 for the rest of their life. By 2066 this is expected to increase by 4.7 years for females to 90.7 years and by 5.3 years for males to 88.9 years.

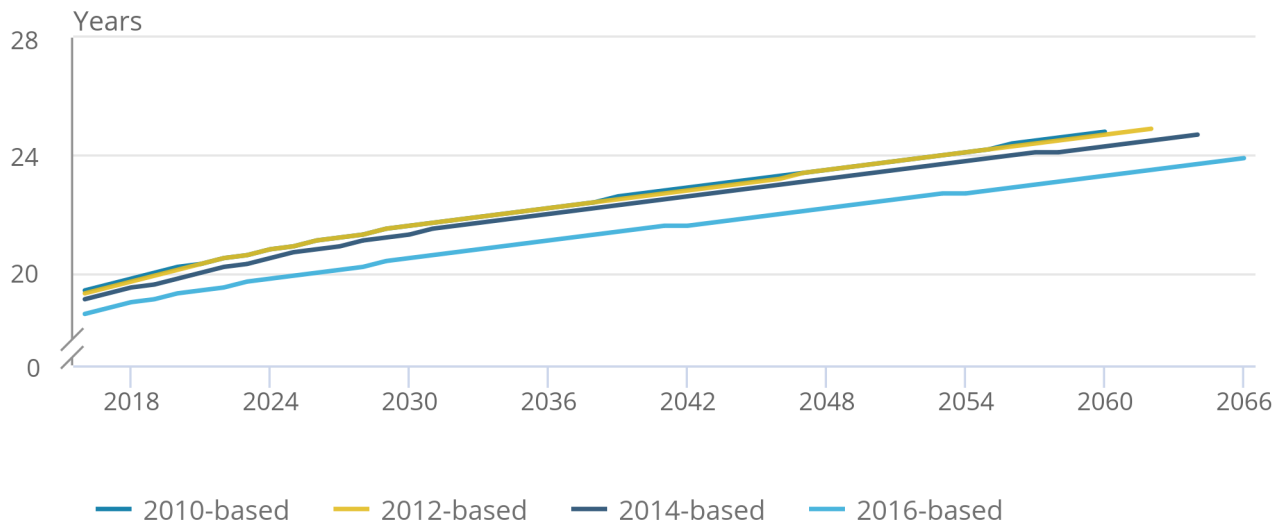
Taking into account assumed future improvements in mortality, the cohort life expectancy for a female aged 65 years in the UK in 2016 was 22.7 years and for a male was 20.5 years. A 65-year-old female in 2016 could therefore expect to live to age 87.7 years, while a 65-year-old male could expect to live to age 85.5 years. By 2066 this is expected to increase by 5.0 years for females to 27.7 years and by 5.2 years for males to 25.7 years.

Figure 6: Female period life expectancy at age 65 years for selected projection periods

UK, 2016 to 2066

Figure 6: Female period life expectancy at age 65 years for selected projection periods

UK, 2016 to 2066



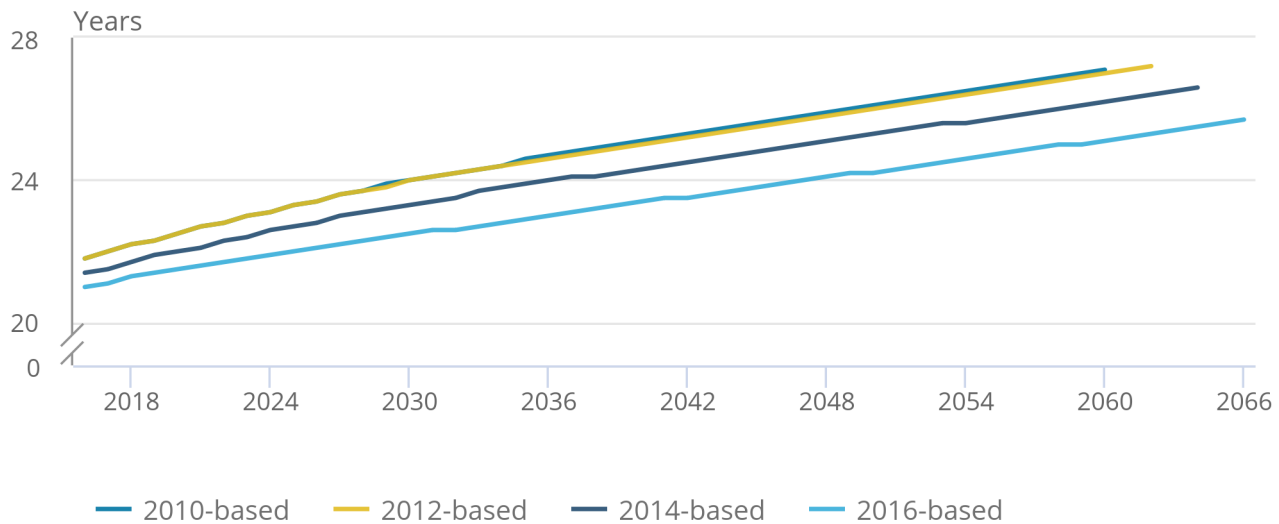
Source: Office for National Statistics

Figure 7: Male period life expectancy at age 65 years for selected projection periods

UK, 2016 to 2066

Figure 7: Male period life expectancy at age 65 years for selected projection periods

UK, 2016 to 2066



Source: Office for National Statistics

When the State Pension was introduced for 65-year-old males and 60-year-old females in 1948, a female could expect to spend 19.2 years in receipt of it and a male 12.1 years, based on their cohort life expectancy at these ages. If retirement was taken from this age, this would have equated to a female spending 24% of their life in retirement and a male 16% of their life. Since then factors such as improvements in medical science and healthier lifestyles have meant average life expectancy has increased and therefore it has been possible for people to spend longer in retirement.

The State Pension age is currently planned to increase for both men and women to age 67 years between 2026 and 2028 and age 68 years between 2044 and 2046. That means that under planned legislation, a person aged 30 years today could receive their State Pension from age 68 years in 2055. Using cohort life expectancy, a 68-year-old female is projected to live a further 23.6 years and a male a further 21.8 years in 2055. Therefore, if a male retired at age 68 years and lived until age 89.8 years they would spend 24% of their life in retirement, while a female retiring at age 68 years and living to age 91.6 years would spend 26% of their life in retirement.

Comparing this with males and females retiring at age 65 years in 1981 and living to age 79.0 years for males and age 83.0 years for females, this would equate to a female living 22% of their life in retirement and a male 18% of their life.

Notes for How have recent trends in mortality affected projected life expectancy at older ages?

1. Data for 1948 are for England and Wales.

7 . How have projected chances of survival to the oldest ages changed?

Chance of living to age 100 years is projected to almost double in 50 years

Although in the 2016-based projections future life expectancy across all ages is projected to be lower than in the 2014-based projections, life expectancy is still projected to increase from 2016. People are therefore on average projected to live longer and the chance of surviving to the oldest ages continues to be projected to increase.

Using cohort life tables, Figure 8 plots the percentage of population born in each year expected to survive to age 100 years from 1981 to 2066. In 2016, a new born baby girl had a 28.3% chance of living to age 100 years, while a new born baby boy had a 22.6% chance. Looking 50 years into the future, 50.0% of females born in 2066 and 44.2% of males are expected to live to age 100 years.

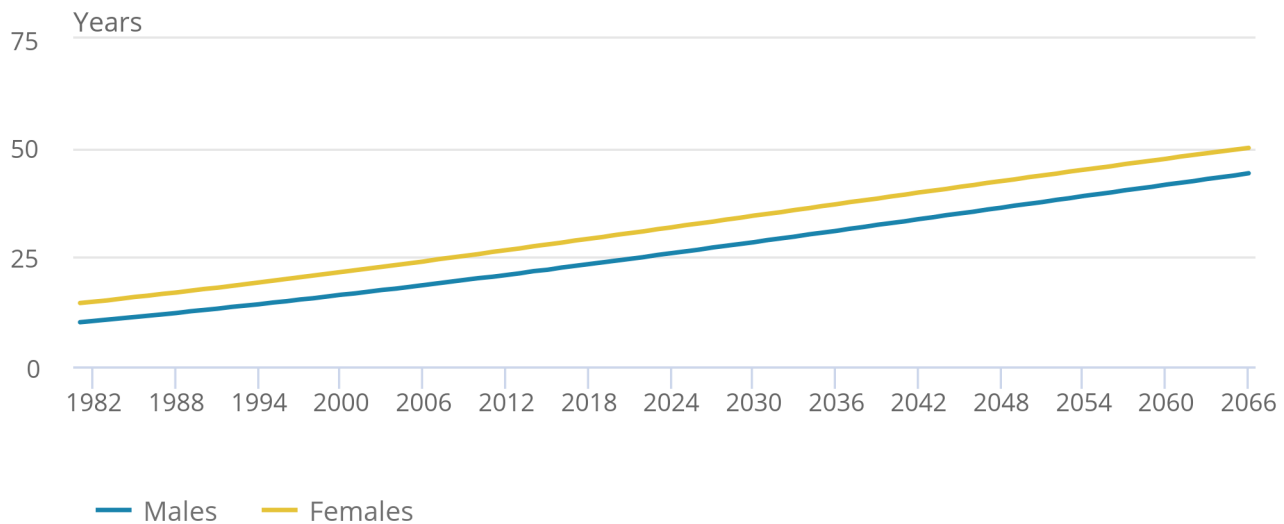
This is a small decline from the 2014-based projections where 56.5% of females and 50.1% of males born in 2066 were projected to live to age 100 years.

Figure 8: Percentage of people expected to survive to age 100 by year of birth, males and females ¹

UK, 1981 to 2066

Figure 8: Percentage of people expected to survive to age 100 by year of birth, males and females¹

UK, 1981 to 2066



Source: Office for National Statistics

Notes:

1. Numbers of survivors are calculated from cohort life tables.

8 . How do life expectancy projections for the UK compare internationally?

Internationally there are examples of countries with higher life expectancies than the UK; for example, Japan and other countries in Europe such as Norway, Sweden, Iceland, France and the Netherlands.

In 2016 the UK had the lowest life expectancy at birth of the seven countries shown in Table 2 for both males and females. However, by 2060, life expectancy in the UK is projected to overtake Iceland for both males and females and overtake males in Japan. This suggests that we may be more optimistic than some other countries when setting the assumptions for future mortality.

Table 2: Period life expectancy at birth in selected countries¹, 2016 and 2060

Principal projection

Country	Life expectancy in years			
	2016		2060	
	Males	Females	Males	Females
United Kingdom	79.2	82.9	85.7	88.3
The Netherlands	79.9	83.1	87	89.9
Iceland	80.7	83.7	83.9	88.1
Norway	80.6	84.2	87.2	89.2
Sweden	80.6	84.1	86.7	89.1
Japan	80.9	87.1	84.7	91.1
France	79.3	85.4	88.5	90.1

Source: Office for National Statistics; CBS Statistics Netherlands; SCB Statistics Sweden; SSB Statistics Norway; Statistics Iceland, Ministry of Health, Labour & Welfare (Japan), INSEE (France)

Notes for How do life expectancy projections for the UK compare internationally?

1. Countries selected based on availability of data, which were taken from the latest published projections from each country's National Statistics website.

9 . Quality and methodology

This release contains tables of life expectancy (e_x), probability of death (q_x) and numbers of persons surviving (l_x) from the 2016-based national population projections (NPP). These tables contain historical and projected figures for 1981 to 2066 on a period and cohort basis from life tables calculated using observed and projected deaths and population estimates and projections.

The definitions of life expectancy (e_x), probability of death (q_x) and numbers of persons surviving (l_x) are as follows:

- q_x is the mortality rate between age x and $(x + 1)$, that is the probability that a person aged x exactly will die before reaching age $(x + 1)$
- l_x is the number of survivors to exact age x of 100,000 live births of the same sex who are assumed to be subject throughout their lives to the mortality rates experienced in the year or years to which the life table relates
- e_x is the average period expectation of life at exactly age x , that is the average number of years that those aged x exactly will live thereafter based on the mortality rates experienced in the year or years to which the life table relates

A more detailed explanation of the difference between period and cohort life expectancies can be found in [Period and cohort life expectancy explained](#).

Mortality projections are based largely on extrapolation of past trends in rates of mortality improvement. Expert opinion is used to inform the assumptions made about future mortality rates. Information on the assumption setting process for future mortality patterns is available in [the mortality assumptions chapter of the NPP publication](#).

The [National life tables Quality and Methodology Information](#) report and the [National population projections Quality and Methodology Information report](#) contain important information on:

- the strengths and limitations of the data and how it compares with related data
- uses and users
- how the output was created
- the quality of the output including the accuracy of the data

10 . What's new in this release?

The assumed mortality improvement for the high life expectancy variant has been lowered from 2.4% to 1.9% per year after 25 years. More information on the underlying assumptions can be found in the [mortality assumptions chapter of the NPP publication](#).

In addition to the high and low variants, life expectancy (ex), probability of death (qx) and numbers of persons surviving (lx) datasets are provided for two additional variants in this release: moderately high life expectancy and moderately low life expectancy. These variants assume annual improvement rates in mortality of 1.6% and 0.6% respectively.

11 . Links to related statistics

Enter your details into our updated [life expectancy calculator](#) for the UK to find out how long your pension will need to last and your chances of surviving to age 100 years.

More information on population projections and life expectancies can be found in the following publications:

- [National life tables UK: 2014 to 2016](#)
- [National population projections: 2016-based](#)