

Article

# Changing trends in mortality: a cross-UK comparison, 1981 to 2016

Analysis of age-specific and age-standardised mortality rates for the UK, England, Wales, Scotland and Northern Ireland from 1981 to 2016.

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Release date:  
7 August 2018

Next release:  
To be announced

## Correction

**29 August 2018 14:48**

A correction has been made to the wording used to describe some of the figures presented in this article. This was due to a small error when disseminating the results of the analysis. You can see the original content in the superseded version. We apologise for any inconvenience.

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# 1 . Main points

- As people have been living longer we have seen steady increases in life expectancy for many decades, however, since 2011 these increases have been slowing down.
- Mortality rates have generally continued to improve for those aged 55 to 89 years in the UK, however the rate of improvement has slowed, mortality rates for those aged 90 years and over in the UK have shown no improvement since 2011.
- Mortality rates have worsened among those aged 15 to 54 years since 2012 in the UK, this contrasts with children aged 0 to 14 years who are continuing to show improvements in mortality rates.
- The rise in mortality rates for people aged 90 years and over reflects increases in mortality rates for mental and behavioural disorders, such as dementia.
- A slowdown in the decline in mortality rates for circulatory diseases from 2011 has been a major factor that has driven the slowdown in mortality improvements for people aged 55 and over.
- At the country level, England and Wales have seen a greater slowdown in overall mortality improvements for males compared with Northern Ireland and Scotland.
- In Wales, female mortality rates have worsened from 2011 to 2016, Northern Ireland has seen no improvement in female mortality rates from 2011 to 2016 whilst mortality rates have continued to improve in England and Scotland although at a slower rate than previously.
- The slowdown in mortality improvements at the oldest ages is seen for males and females and across all four UK countries; patterns in mortality at the younger ages are more complex and vary by sex and between the UK countries.

## 2 . Statistician's comment

“As people have been living longer we have seen steady increases in life expectancy for many decades. However, since 2011 these increases have been slowing down across the four UK countries, and this has been driven particularly by slower improvements for females and those aged 90 years and over. With people living longer and surviving other illnesses, the number of people developing dementia is increasing.

“Mortality rates at younger ages (under 55 years) have increased over the last few years in the UK, although this age group has a smaller influence on the overall picture.”

Sophie Sanders, Office for National Statistics

## 3 . Introduction

After decades of steady improvements, increases in life expectancy in the UK in recent years have visibly slowed. Life expectancy is an important indicator of the nation's health and underlies crucial policies including the State Pension Age. Changes in the trend in life expectancy can therefore have widespread implications and it's important to understand what is driving these.

This article examines changes in mortality rates – the number of deaths divided by the population. It extends an earlier [report](#) that showed there has been a significant slowdown of the improvements to mortality rates and is part of a series of analytical reports exploring recent mortality trends in more detail. This article explores where in the UK mortality is worsening, or improvements in mortality are slowing down, and looks at changing trends in mortality by age and sex over the period 1981 to 2016. The analysis also compares cause of death data from 2001 to 2016 to identify possible drivers of the patterns observed.

Alongside this article, we have [published analysis](#) which shows that the slowdown in mortality improvements observed in the UK is reflected in a number of other countries globally.

## **4 . How is life expectancy in the UK changing?**

Beginning in the 19th century, throughout the 20th century and into this century, the UK experienced continually falling mortality rates and rising life expectancy. As health care and people's lifestyles improved, there has been a change from high infant mortality and high mortality caused by infectious diseases, to a new pattern in which old age mortality dominates and degenerative diseases are the most common causes of death.

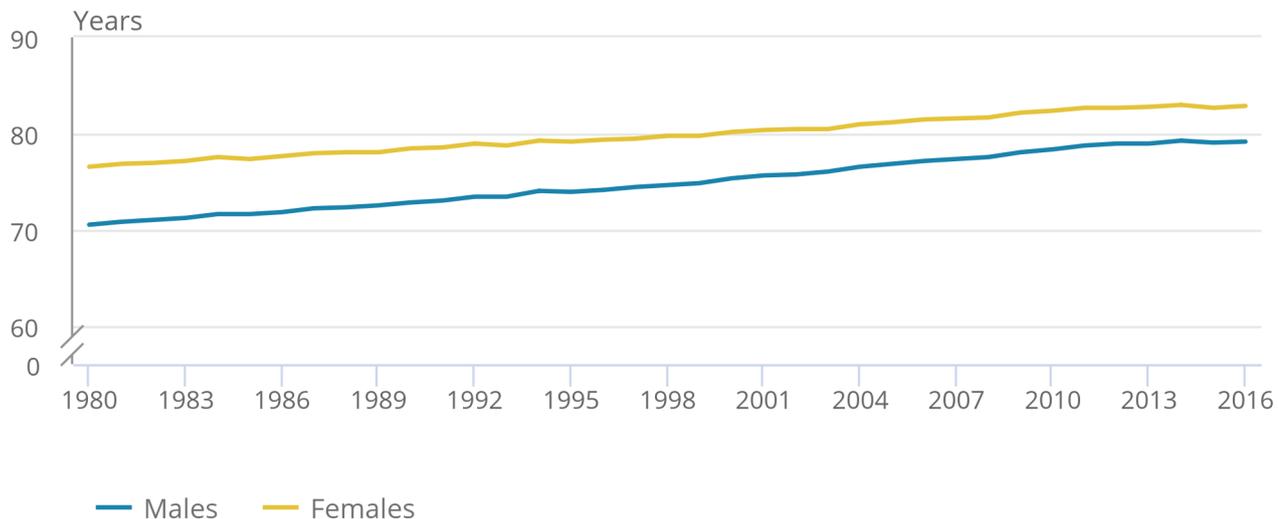
In recent years however, these previous increases in UK life expectancy have not been seen. From 2011 to 2016, life expectancy at birth for females in the UK increased by 0.2 years from 82.7 to 82.9 years. This compares with an increase of 1.2 years over the previous period from 2006 to 2011. For males there has been a similar contrast in improvements; from 2011 to 2016 life expectancy at birth increased by 0.4 years from 78.8 to 79.2 years, compared with an increase of 1.6 years in the previous period from 2006 to 2011.

**Figure 1: Life expectancy at birth**

UK, 1981 to 2016

## Figure 1: Life expectancy at birth

UK, 1981 to 2016



**Source: Office for National Statistics**

This has not only been observed in life expectancy at birth, which is more sensitive to mortality at the youngest ages, but across all ages. Life expectancy at age 65 for females from 2011 to 2016 saw a tenth of the increase seen in the previous period (0.1 years from 2011 to 2016 compared with 1 year from 2006 to 2011). Similarly, life expectancy at age 65 for males increased by 0.3 years from 2011 to 2016 compared with 1.1 years from 2006 to 2011.

Life expectancy for males has always been lower than for females, although over time the gap has narrowed as improvements for males have been higher. Factors such as smoking rates for males having fallen, the move away from physical labour and manufacturing industries towards the service sector and jobs carried out by males and females becoming more similar are all likely contributors to this. Comparing improvements in life expectancy from 2011 to 2016 with those from 2006 to 2011, males have seen less of a slowdown than females. This may partly be due to the greater gains still to be made in male life expectancy to “catch up” with females.

Life expectancies are calculated from mortality rates, which are the number of deaths divided by the population. The numbers of deaths per 100,000 people, shown in Figure 2, have also been standardised to account for differences in the size and age structure of the UK population over time. The trendline for age-standardised mortality rates from 2001 to 2011 extended to 2016 is also shown. This provides an indicator of likely levels of mortality rates from 2011 to 2016 had the rates of improvement seen prior to this continued.

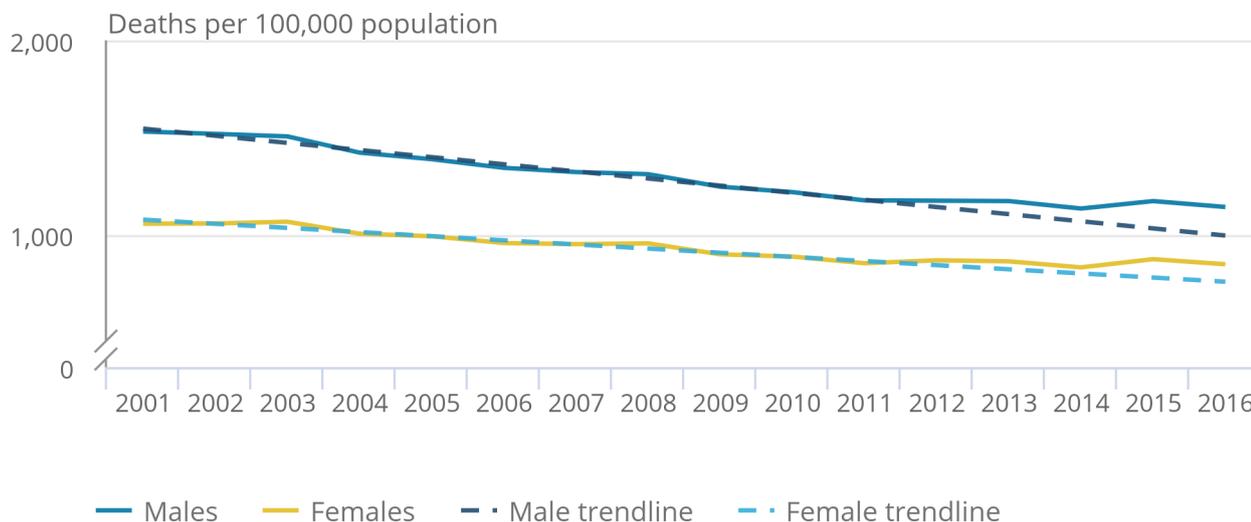
Age-standardised mortality rates for males and females in the UK have been steadily decreasing since 2001, however from 2011 the rate of decrease has slowed.

**Figure 2: Age-standardised mortality rates, all ages**

UK, 2001 to 2016

Figure 2: Age-standardised mortality rates, all ages

UK, 2001 to 2016



Source: Office for National Statistics

Notes:

1. Figures are based on deaths registered, rather than deaths occurring between 2001 and 2016. Age-standardised mortality rates shown are per 100,000 population and standardised to the 2013 European Standard Population.

## 5 . How is mortality changing across UK countries?

All four constituent countries of the UK have experienced a slowdown in mortality improvements from around 2011. Mortality rates for England have been the lowest of the constituent countries throughout the period 1981 to 2016 for both males and females, whilst mortality rates in Scotland<sup>1</sup> have been highest. When considering the influence of each constituent country on the UK trend, trends in England are most dominant as England makes up the largest proportion of the UK population.

**Figure 3: Age-standardised mortality rates, all ages**

UK and UK countries, 1981 to 2016

Figures 4 and 5 show the percentage change in mortality rates for the period from 2011 to 2016, compared with the preceding years from 2006 to 2011 for the UK and constituent countries. Males and females are shown separately to illustrate the differences in mortality. The countries have been ordered to indicate the extent of the slowdown between the periods from the greatest to the least, for example England (greatest) and Northern Ireland (least) in Figure 4.

Figure 4 shows that age-standardised mortality rates for males from 2011 to 2016 decreased across all four UK constituent countries, but by less than compared with the previous period from 2006 to 2011. Males in England and Wales saw the greatest slowdown between the two periods as improvements in mortality rates over the period 2011 to 2016 for both countries slowed to less than one quarter of the rate of improvement from 2006 to 2011.

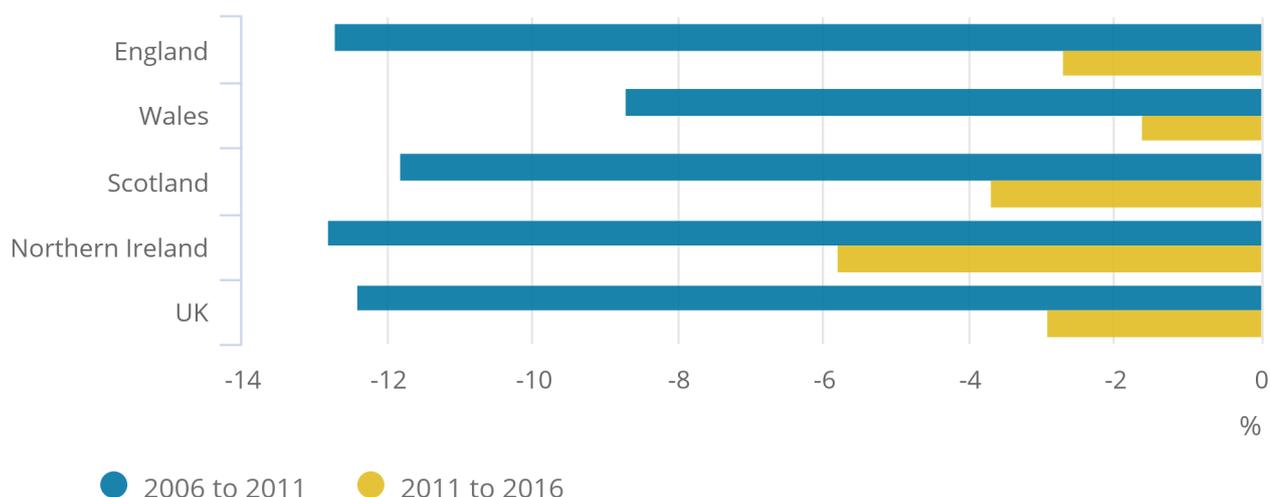
As mortality rates for males in Northern Ireland and Scotland have traditionally been higher than in England and Wales they may have seen less of a slowdown in improvements because the gains made by males in England and Wales might not yet be fully realised in Scotland and Northern Ireland.

**Figure 4: Percentage change in age-standardised mortality rates, males**

UK and UK countries, 2006 to 2011 and 2011 to 2016

Figure 4: Percentage change in age-standardised mortality rates, males

UK and UK countries, 2006 to 2011 and 2011 to 2016



Source: Office for National Statistics

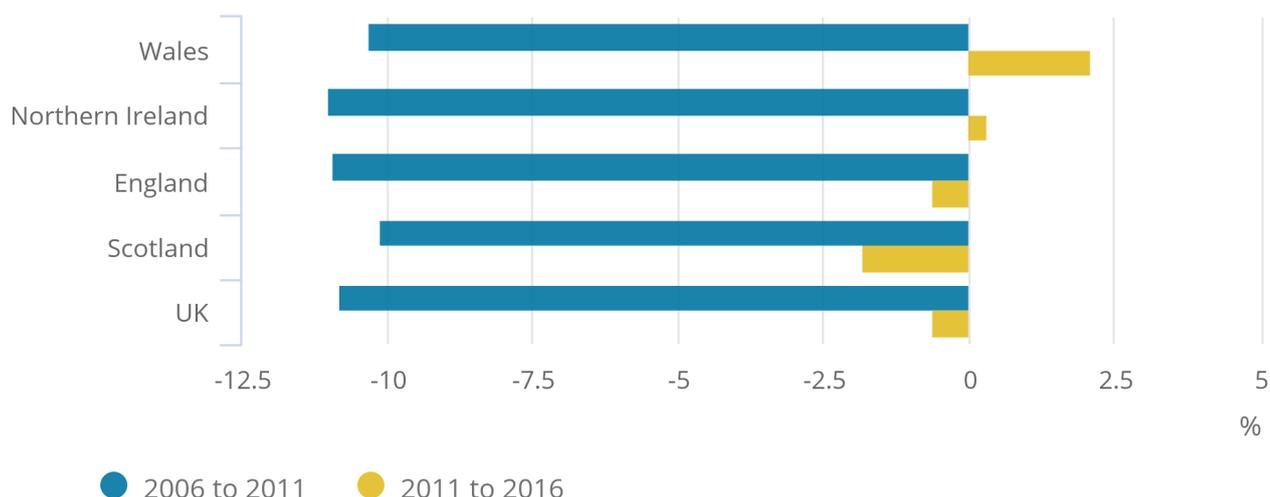
Figure 5 shows that between 2011 and 2016 age-standardised mortality rates have slightly increased for females in Wales (by 2.1%) and seen no improvement in Northern Ireland. In England and Scotland, mortality rates for females decreased slightly from 2011 to 2016, although also by substantially less than over the previous period. In contrast to males, females in Northern Ireland have seen a greater slowdown in improvements than in England and Scotland when comparing 2011 to 2016 with 2006 to 2011.

**Figure 5: Percentage change in age-standardised mortality rates, females**

UK and UK countries, 2006 to 2011 and 2011 to 2016

Figure 5: Percentage change in age-standardised mortality rates, females

UK and UK countries, 2006 to 2011 and 2011 to 2016



Source: Office for National Statistics

#### Notes for: How is mortality changing across UK countries?

1. National Records of Scotland (NRS) have recently identified an error in the Scottish mid-year population estimates for 2002 to 2010 affecting the age distribution of older age groups, which made the 90 years and over population too small and the population of those aged 81 to 89 years too large. NRS plan to publish corrected population estimates for the affected years on 25 September 2018. The analysis in this article uses the unrevised estimates as the impact of the error on Scottish and UK mortality rates was small and did not change the findings presented. NRS have published further information on their [Revisions and Corrections page](#).

## 6 . How is UK mortality changing across different ages?

Figures 6 (males) and 7 (females) show standardised age-specific deaths indexed to a base of 100 in 1981. Standardised age specific deaths account for differences in the size and age structure of the UK population over time. They have been calculated by applying five-year mortality rates to the corresponding age specific population and summing over the relevant age ranges. The index illustrates the change in standardised deaths relative to the level in 1981 for each age group, but not the relative size of deaths, which increases with age. For example, in 2016 deaths for males aged 90 years and over were 20% lower than in 1981 (an index of 80).

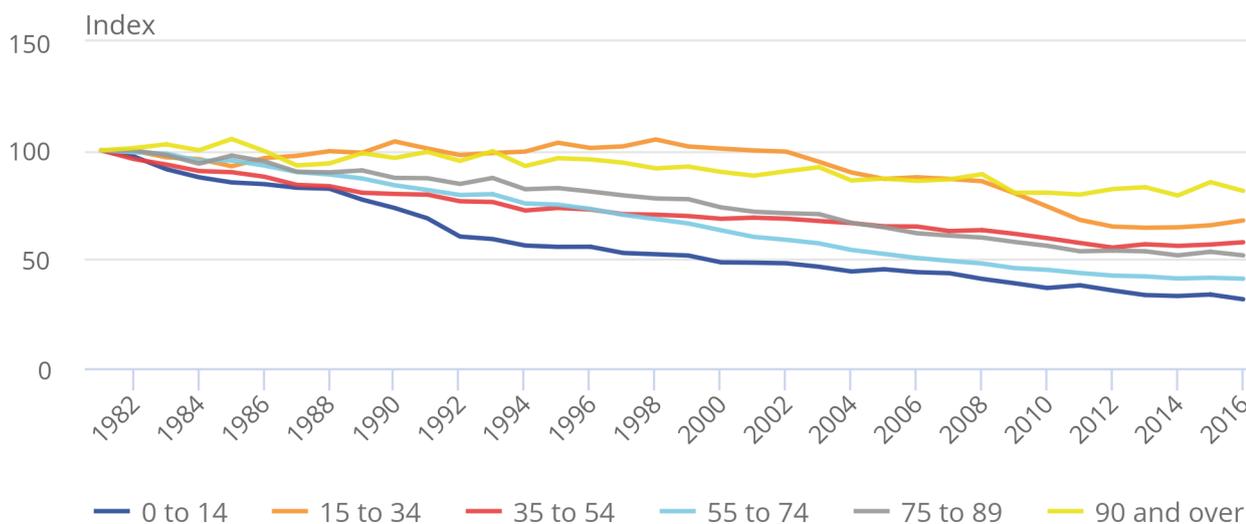
When considering the influence of an age group on the overall trend, due to the largest number of deaths occurring at the oldest ages, changes in trend for the older ages have a larger influence. In 2016, 74% of female and 61% of male deaths in the UK were at age 75 years and over.

**Figure 6: Standardised age-specific deaths indexed to 100 in 1981, males**

UK, 1981 to 2016

Figure 6: Standardised age-specific deaths indexed to 100 in 1981, males

UK, 1981 to 2016



Source: Office for National Statistics

### Slowdown in mortality improvements at older ages

Mortality rates are most volatile for those aged 90 years and over due to the increased vulnerability of older people to seasonal risk factors such as cold or hot weather. Until 2009, mortality rates were generally decreasing for males and females aged 90 years and over, after this, up to 2016, mortality rates have remained at broadly the same level for males and females.

Mortality rates for both 75- to 89-year-olds and 55- to 74-year-olds have continued to decline over time, however a slowing down in the rate of improvements can also be seen from around 2011.

### Increasing mortality for younger ages

Both males and females aged 15 to 34 years and 35 to 54 years have seen mortality rates rise from 2012. For males aged 15 to 34 years there was previously a sustained increasing trend in mortality from 1987 to 1999.

## Earlier slowdown in improvements for those aged 0 to 14 years

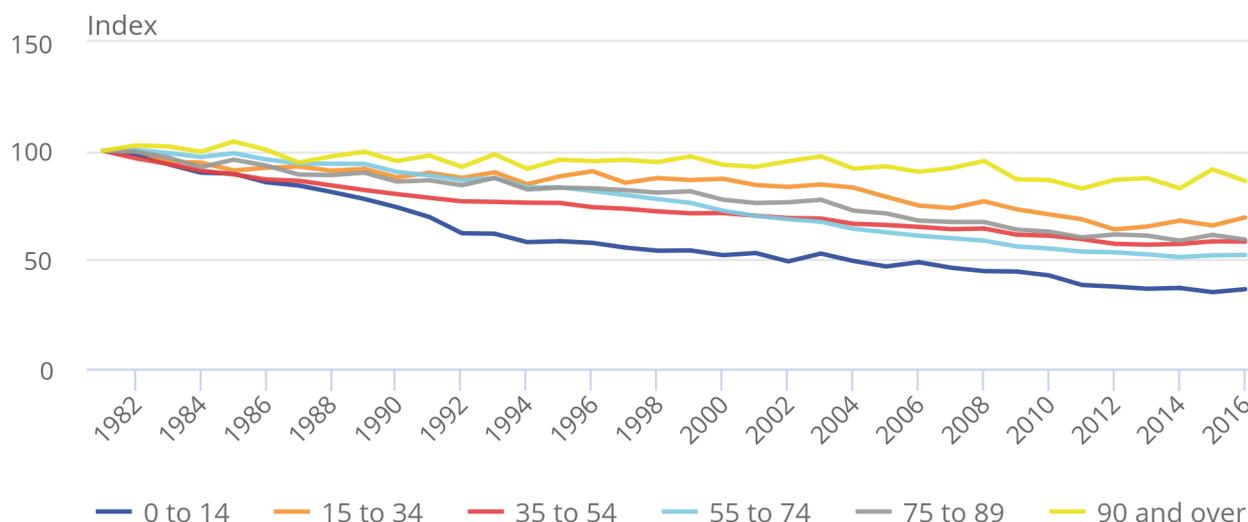
Since 1981, mortality has improved by the most for the youngest ages, with mortality rates for those aged 0 to 14 years in 2016 around one third of those in 1981. There was a rapid decline in mortality rates for 0- to 14-year-olds throughout the 1980s, largely due to the decline in the number of sudden infant deaths. Risk factors associated with sudden infant deaths include maternal smoking during pregnancy and postnatal exposure to tobacco smoke, as well as an unsafe sleeping environment. This period of rapid improvement was followed by a slowing in improvements from 1992. Since then this age group has continued to show steady improvements in mortality rates.

**Figure 7: Standardised age-specific deaths indexed to 100 in 1981, females**

UK, 1981 to 2016

Figure 7: Standardised age-specific deaths indexed to 100 in 1981, females

UK, 1981 to 2016



Source: Office for National Statistics

## 7 . How do trends in mortality in the UK countries vary by age?

**The slowdown in mortality improvements at the oldest ages is similar across the four UK countries.**

Figure 8 is an interactive chart showing standardised deaths for the different age groups from 2001 to 2016 for each of the four UK countries. The trendline from 2001 to 2011 extended to 2016 is also shown and provides an indicator of likely levels of mortality from 2011 to 2016 had the rates of improvement seen prior to this continued.

Mortality rates for both males and females aged 90 years and over saw virtually no improvement from 2011 to 2016 across all four UK countries. For those aged 75 to 89 years, mortality rates have remained generally decreasing across the UK but there has been a clear slowdown in improvements since 2011. The exception to this is males aged 75 to 89 years in Northern Ireland, for which mortality rates have remained on a steady downward trend.

A clear slowdown in improvements from 2011 can be seen for both males and females across all countries for those aged 55 to 74 years.

## **Figure 8: Standardised age-specific deaths by age group and sex**

**UK countries, 2001 to 2016**

### **Patterns in mortality at the younger ages are more complex and vary between UK countries.**

It's important to note that due to the smaller populations of Scotland, Wales and Northern Ireland, trends in mortality are more prone to fluctuation, particularly for mortality at younger ages where numbers of deaths are low. It is therefore more difficult to tell whether increases observed here in the last couple of years of data might be short-term fluctuations in the trend rather than indicating a change in an overall long-term trend.

England has seen a small increasing trend in mortality rates for males aged 35 to 54 years since 2012 whilst in Northern Ireland the trend has remained broadly the same for males since 2011. In Wales and Scotland the trend has fluctuated in the most recent years, with 2016 being a high year for male mortality rates.

Mortality rates were also high for females in Scotland in 2016. However in Wales and Northern Ireland there has not been an obvious slowdown in mortality improvements in recent years. As for males, females in England have seen a recent slight increasing trend in mortality rates from 2013.

Figure 9 is an interactive chart displaying standardised age-specific deaths indexed to a base of 100 in 1981. Standardised age specific deaths account for differences in the size and age structure of the population over time. They have been calculated by applying five-year mortality rates to the corresponding age specific population and summing over the relevant age ranges. The index illustrates the change in standardised deaths relative to the level in 1981 for each UK country in each age group but not the relative size of deaths, which increases with age. For example, standardised deaths for males aged 15 to 34 years in Wales were 15% lower in 2016 than in 1981 (an index of 85), this was the smallest improvement of the UK countries over this period.

## **Figure 9: Standardised age-specific deaths by age and sex indexed to 100 in 1981**

**UK countries, 1981 to 2016**

Due to even smaller numbers of deaths occurring at ages 15 to 34 years mortality rates are more volatile still at these ages. The greatest differences in mortality trends historically between the UK countries is also for the 15 to 34 year age group, particularly for males.

At the start of the period from 1981 up to 2003 standardised deaths for males were diverging in the four UK countries. In Wales in 2003, standardised deaths for males aged 15 to 34 years were 36% higher than in 1981 and in Scotland in 2002 they were 20% higher than in 1981. From around 2004 mortality rates for males generally declined in all four UK countries although as for those aged 35 to 54 years, mortality rates were higher in 2015 and 2016 than in the preceding years.

For females aged 15 to 34 years in Northern Ireland, mortality rates have generally been on an increasing trend since 2001. By contrast in Scotland mortality rates were relatively stable over the long term from 1981 to 2010 and after this mortality rates have generally fallen. In England and Wales mortality rates for females at ages 15 to 34 years have also generally been decreasing although in England after 2012 rates have slightly risen.

Analysis of mortality at ages 0 to 14 years has not been included here since mortality rates for this age group are very low and driven by mortality for those aged 0 to 1. Figures 6 and 7 showed improvements in mortality rates at these ages have not noticeably slowed in recent years and therefore do not have a notable influence on the overall slowdown in mortality improvements in the UK. You can read more about [infant mortality in England and Wales here](#).

## 8 . How is mortality by cause of death changing in the UK?

Overall mortality rates for the three main broad disease groups (cancer, circulatory and respiratory diseases) have generally been decreasing since 2001 across the UK. In contrast, mortality rates for mental and behavioural disorders, such as dementia, have increased sharply in recent years.

There are several reasons why this has been the case. With people living longer and surviving other illnesses, the number of people developing dementia is increasing. Factors which have led to the increased reporting of deaths from these diseases include a better understanding of dementia, improved diagnosis and updates to the coding framework used to code cause of death which took place in 2011 and 2014 (more information on these updates is available in the Quality and Methodology section). It's also important to note analysis is of the registered cause of death; at older ages in particular individuals may have multiple morbidities.

Age-specific mortality rates indexed to a base of 100 in 2001 for selected causes of death and females aged 90 years and over are shown from 2001 to 2016 in Figure 10. They illustrate the change in age-specific mortality rates relative to the level in 2001 for each cause of death and country but not the relative size of mortality rates, which greatly varies between cause.

### Figure 10: Age-specific mortality rates by cause of death indexed to 100 in 2001, females aged 90 years and over

#### UK countries, 2001 to 2016

For those aged 90 years and over, mortality rates for mental and behavioural disorders (dominated by dementia) have more than doubled since 2010 for both males and females in England, Wales and Northern Ireland. In Scotland, mortality rates for mental and behavioral disorders have been increasing more gradually over time. Deaths caused by mental and behavioural disorders have similarly increased among 75- to 89-year-olds but this will have less of an influence on mortality for this age group due to accounting for a lower share of deaths.

Mortality rates for cancers have generally been increasing for both males and females aged 90 years and over across all four UK countries from around 2010 and 2011. By contrast for 75- to 89-year-olds mortality rates for cancer have generally remained flat or have decreased over the period across the UK countries.

The slowdown of the decline in mortality rates for diseases of the circulatory system, one of the leading causes of death, from 2011 has also been a large contributor to the changing trend in mortality for those aged 55 years and over in all four UK countries.

### Figure 11: Age-specific mortality rates by age, sex and cause of death indexed to 100 in 2001

## UK countries, 2001 to 2016

At younger ages mortality rates are substantially lower in comparison with those for older ages and therefore tend to be more volatile due to the smaller numbers of deaths, particularly for Scotland, Northern Ireland and Wales due to their smaller populations.

Among those aged 15 to 55 years external causes of death, which broadly include accidents, intentional self-harm and assault, are among the leading causes of death. Increases in mortality rates from external causes have influenced overall increases in mortality at these ages.

In Scotland, mortality rates for external causes of death overtook cancers and circulatory diseases for males aged 35 to 54 years in 2011. In Wales, external causes became the leading cause of death for 35- to 54-year-olds in 2015. Males in England have also seen increases in deaths due to external causes from 2010. For females, external causes for those aged 35 to 54 years account for a much lower share of deaths but have been higher in England, Scotland and Wales in recent years.

Similarly, for those aged 15 to 34 years, who saw the sharpest increase in overall mortality rates in the UK in recent years, increases in mortality for males in all four UK countries have been driven by an increase in death rates for external causes. For females aged 15 to 34 years death rates have also been increasing for cancers in England and Northern Ireland.

## 9 . Next steps

This article follows on from previous analysis, [Changing trends in mortality in England and Wales: 1990 to 2017](#), which established there had been a statistically significant slowdown in the long-term improvement in age-standardised mortality rates for England and Wales in the early 2010s.

This article continues a series of analytical reports exploring recent mortality trends in more detail. Here we have identified trends at different age groups in the UK and in each of the UK countries and compared these against recent changes in trend in broad causes of death. This article does not provide an explanation of why these trends in cause of death have been occurring or enable us to predict what will happen in the future.

Today we have also published Changing trends in mortality: an international comparison 1981 to 2016. This analysis compares trends in mortality in a selection of countries across the world and identifies to what extent a slowdown in life expectancy improvements has occurred, as well as for which age groups.

Later in this series of analysis we also expect to look at the trend in life expectancy by the National Statistics Socioeconomic Classification to encompass the period 2012 to 2016.

## 10 . Quality and methodology

In this article period life expectancies have been used. A period life expectancy is 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. Information on how life expectancies are produced can be found in the [National Life tables QMI](#).

All deaths data used in this analysis relate to death registrations. Information on how age-specific and age-standardised mortality rates are calculated can be found in the [User guide to mortality statistics](#). Standardised age specific deaths have been calculated by applying five-year mortality rates to the corresponding derived age specific population and summing over the relevant age ranges.

There is a large degree of comparability in death statistics between countries within the UK. There are some differences, although these are believed to have a negligible impact on the comparability of the statistics. These differences are outlined in the [Mortality Statistics Quality and Methodology Information document](#).

The cause of death analysis in this article has used cause of death chapters from the World Health Organization's (WHO) International Classification of Diseases 10th Revision ([ICD 10](#)) to enable comparisons between Northern Ireland, Scotland, England and Wales.

Since 2011 there have been some changes to the coding used to record causes of death. More information on this can be found in the [Results from the ICD-10 bridge coding study](#) (PDF, 81KB).