

National population projections, fertility assumptions: 2018-based

The data sources and methodology used to produce fertility assumptions in the 2018-based national population projections.

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1 . Main points

- The long-term principal assumption for completed family size for the UK will be 1.78 children per woman by mid-2043, which is lower than the principal assumption for the 2016-based projections (1.84 children per woman).
- Compared with the 2016-based projections, the assumptions are lower for each country of the UK (see Table 4), reflecting recent trends in fertility and taking into account advice from an expert advisory panel.
- The variant widths around the principal assumption have remained the same as the 2016-based projections.
- The long-term low fertility assumption is calculated as the principal assumption minus 0.2, whereas the high fertility assumption is the principal assumption plus 0.1; these widths are applied to each country of the UK.
- The methodology used to set the fertility assumptions ([Section 7](#)) is broadly similar to the method used for previous rounds of projections.
- Unlike for previous projections rounds, we have not used a parity progression ratio analysis to inform the assumptions for England and Wales; we have used a consistent approach for all four countries of the UK.

Table 1 shows the long-term principal, low and high fertility assumptions used in the 2018-based national population projections (NPPs).

Table 1: Long-term assumptions for completed family size
UK and constituent countries, 2018-based projections for the year ending mid-2043

	Principal	Low fertility	High fertility
England	1.81	1.61	1.91
Wales	1.71	1.51	1.81
Scotland	1.50	1.30	1.60
Northern Ireland	1.92	1.72	2.02
UK	1.78	1.58	1.88

Source: Office for National Statistics – National population projections

2 . Introduction

This article provides information on the principal and variant fertility assumptions used in the 2018-based national population projections (NPPs). It shows how recent trends in UK fertility ([Section 3](#)) and advice from an expert advisory panel ([Section 4](#)) have informed the future fertility assumptions for the countries of the UK over the projection period.

[Section 7](#) provides an overview of the fertility assumptions-setting process, including points where input is sought from the devolved administrations, experts and stakeholders. More general information on the [projections process](#) is available.

Fertility rates are presented in this article on a calendar year-basis unless otherwise stated. The fertility assumptions underlying the population projections are on a mid-year basis so there may be small differences between the figures presented in this article and the national population projections [published datasets](#).

3 . Recent trends in fertility

Total fertility rate

The total fertility rate (TFR) represents the hypothetical average number of children born per woman if women experienced the age-specific fertility rates (ASFR) of the year in question throughout their childbearing lives.

Period fertility rates such as the TFR will rise or fall if births are brought forward or delayed for any reason. This is in contrast to cohort measures of fertility, which are affected only by changes in the number of children women have and not by the timing of births within women's lives.

It should be noted that when projecting fertility in the long term, the TFR and completed family size (CFS) converge to the same value.

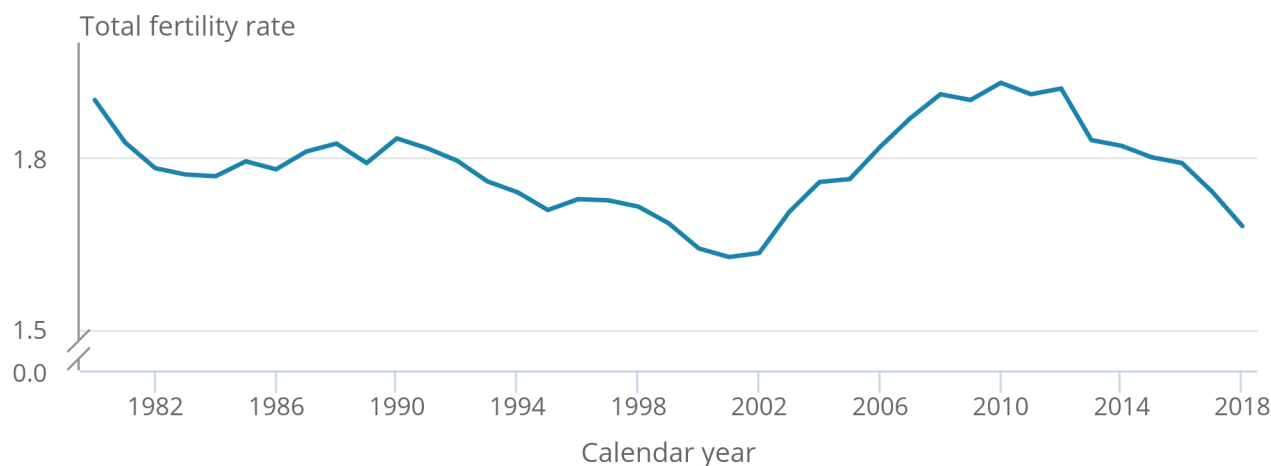
Fertility rates up to 2018 were used in the assumptions-setting process. As the 2018 figures for Northern Ireland were unpublished at the time of writing, only data up to 2017 are presented in this report for Northern Ireland. Northern Ireland 2018 birth figures will be released following the publication of the 2018 [Registrar General Annual Report](#).

Figure 1: The UK total fertility rate has been declining since 2012

Total fertility rates, UK, 1980 to 2018

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Total fertility rates, UK, 1980 to 2018



Source: Office for National Statistics, National Records of Scotland, and Northern Ireland Statistics and Research Agency – Birth registration data and mid-year population estimates

Following declines in the 1990s, fertility rates hit an all-time low in 2001 at a TFR of 1.63. The TFR then increased until 2008, reaching 1.91 children per woman, the highest rate since 1974. Between 2008 and 2012, the TFR fluctuated slightly but remained fairly stable at around 1.90. In 2013, there was a substantial drop in the UK TFR to 1.83 (the largest single-year change since 1975). The TFR then continued to fall each year reaching 1.68 in 2018 (declining from 1.74 in 2017), the largest single-year change since 2013.

Differences in total fertility rate between UK countries

Figure 2 shows the differences in TFR for the countries of the UK since 1971. Northern Ireland has traditionally had a much higher TFR than the other countries of the UK but over time the difference has narrowed.

In contrast, there was little difference between the TFRs of Scotland, England and Wales in 1971 but since 1980, Scotland's TFR has been lower than England and Wales'. By 2018, Scotland's TFR was 0.3 lower than England and 0.2 lower than Wales.

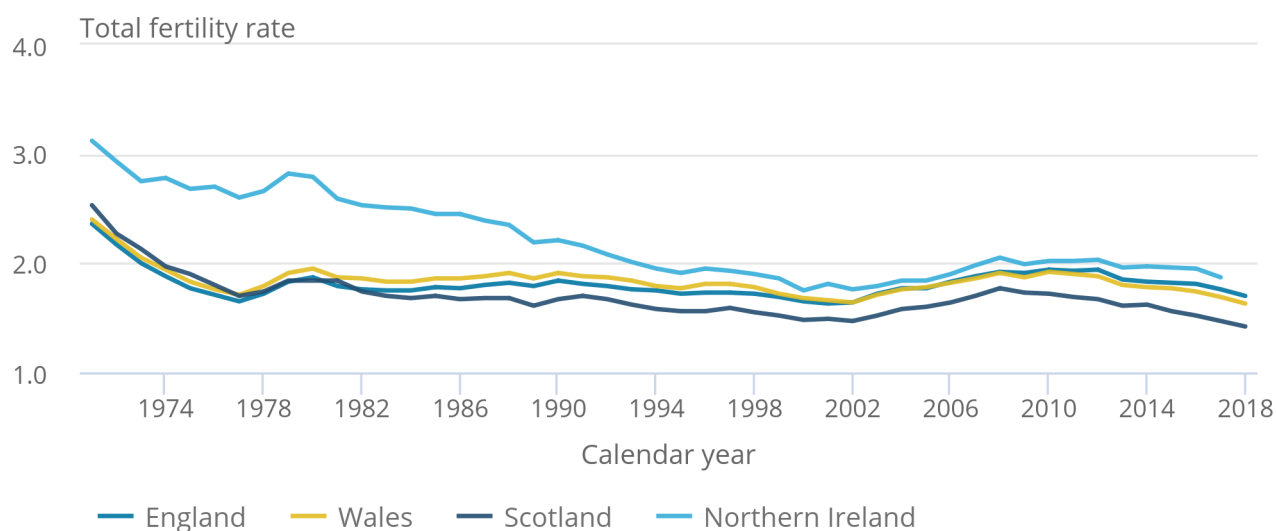
The TFR of Wales was slightly higher than England's TFR until 2002, when it converged. Since then, the TFR for Wales has been lower than England's, with the rates diverging in the most recent years. All four countries show a similar trajectory over time, although Scotland's TFR declined from 2008 onwards; this is compared with the roughly stable TFRs of England, Wales and Northern Ireland between 2008 and 2012. In 2013, the TFR fell in all four countries of the UK, as Figure 2 shows, and it has since continued to decline in each country.

Figure 2: Northern Ireland has the highest, and Scotland the lowest, TFR of the UK countries

Total fertility rate for constituent countries of UK, 1971 to 2018

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Total fertility rate for constituent countries of UK, 1971 to 2018



Source: Office for National Statistics, National Records of Scotland, and Northern Ireland Statistics and Research Agency – Birth registration data and mid-year population estimates

Notes:

1. 2018 births data for Northern Ireland are not yet publicly available.
2. Please note that the figures within the chart were updated to include 2 decimal points on 28 October 2019. They were originally published with 1 decimal point.

In the 2018-based projections, we have assumed the following:

- Northern Ireland will continue to have the highest TFR of all UK countries and Scotland the lowest
- the TFRs for all four countries will decline in the short term but will increase in the long term
- England will have a higher TFR than Wales, reflecting recent trends

Age-specific fertility rates in the UK

From 1982 to 2002, the general trend in the UK and its constituent countries was a decline in fertility rates at lower ages and rises at older ages; this can be seen in Figure 3. From 2002 to 2008, fertility rates for all age groups increased, with the exception of 20- to 24-year-olds who had roughly stable fertility rates and women aged under 20 years who saw continued declines.

In 2004, the 30 to 34 years age group overtook the 25 to 29 years age group as the group with the highest age-specific fertility rate.

After 2009, there were decreases for younger women aged below 30 years and continued small increases for women aged over 30 years.

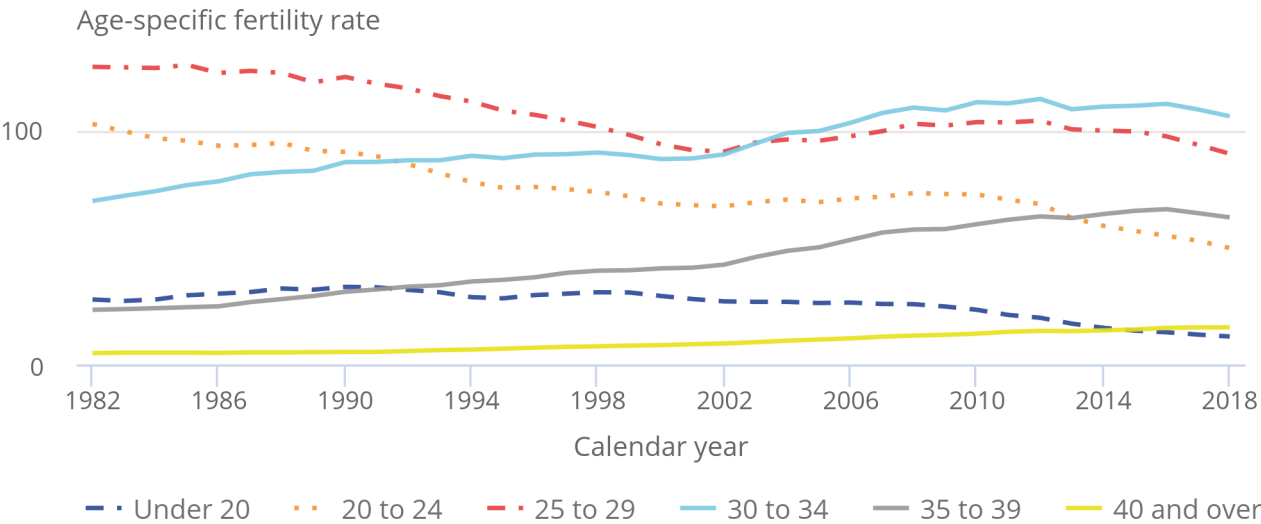
Since 2016, all age groups, except women aged over 40 years, have seen decreases in fertility rates. Women aged over 40 years have continued to have higher age-specific fertility rates than those aged under 20 years.

Figure 3: Fertility rates have generally been rising for women aged 30 years and over and declining for women aged under 30 years in recent years

Age-specific fertility rates, UK, 1982 to 2018

Figure 3: Fertility rates have generally been rising for women aged 30 years and over and declining for women aged under 30 years in recent years

Age-specific fertility rates, UK, 1982 to 2018



Source: Office for National Statistics, National Records of Scotland, and Northern Ireland Statistics and Research Agency – Birth registration data and mid-year population estimates

For the 2018-based projections, we have assumed that fertility rates for women aged under 20 years will continue to decline and rates for women aged 40 years and over will continue to rise in the UK and all four constituent countries.

Mean age at childbearing

Changes in the age patterns of fertility over the past two decades have led to steady increases in the mean age of childbearing in the UK and its constituent countries (Table 2). This is a standardised measure that eliminates the impact of any changes in the distribution of the population by age and therefore enables trends over time to be analysed.

Table 2: Mean age at childbirth (age-standardised)
UK and constituent countries, 1985 to 2018

Year	UK	England	Wales	Scotland	Northern Ireland
1985	27.3	27.3	26.9	27.0	28.2
1990	27.7	27.7	27.0	27.4	28.3
1995	28.2	28.2	27.5	28.0	28.7
2000	28.5	28.5	27.8	28.4	28.9
2005	29.1	29.1	28.4	29.1	29.5
2010	29.5	29.5	28.8	29.6	29.9
2015	30.3	30.3	29.6	30.3	30.5
2017	30.5	30.5	29.8	30.5	30.7
2018	30.6	30.6	29.8	30.6	n/a

Source: Office for National Statistics, National Records of Scotland, and Northern Ireland Statistics and Research Agency – Birth registration data and mid-year population estimates

Notes

1. 2018 births data for Northern Ireland are not yet publicly available. [Back to table](#)

The UK mean age of childbearing has continued to rise in recent years, from 27.3 years in 1985 to 29.1 years in 2005. Since then, it has increased even faster, to 30.5 years in 2017, with a further increase to 30.6 years in 2018. This rapid rise has occurred in all four UK countries, with Northern Ireland having the highest mean age of childbearing in 2017, at 30.7 years. The largest change in mean age of childbearing between 1985 and 2017 occurred in England, with an increase of 3.2 years.

The rising mean age of childbearing justified increasing the ASFRs for women aged 30 years and over and decreasing rates for younger women in the fertility assumptions.

Completed family size

Long-term fertility assumptions are formulated in terms of the average number of children for women born in different years (completed family size or CFS) as well as the TFR.

It should be noted that when projecting fertility in the long term, the TFR and CFS converge to the same value.

Cohort analysis in this document is based on live births and population estimates up to and including 2017. Women born in 1971 reached age 46 years by 2017 and can be regarded as the most recent cohort to have completed childbearing. Although fertility measures published routinely by the Office for National Statistics (ONS) go up to age 44 or 49 years, age 46 years has traditionally been used as the upper limit in the national population projections (NPPs).

A steady decline in CFS has been witnessed for cohorts born since the mid-1930s. Table 3 shows the average number of children born by each age for different cohorts of women in the UK. Among women who have completed their childbearing, average achieved fertility has fallen from 2.22 children for the 1945 cohort to 1.90 for the 1970 cohort.

Table 3: Achieved family size by exact age
Selected cohorts, UK, 1945 to 1995

Year of birth of woman	20	25	30	35	40	45	Final
1945	0.21	1.06	1.79	2.09	2.20	2.22	2.22
1950	0.23	0.93	1.56	1.93	2.06	2.09	2.09
1955	0.22	0.78	1.43	1.83	2.00	2.03	2.03
1960	0.16	0.68	1.31	1.75	1.94	1.98	1.98
1965	0.13	0.59	1.18	1.64	1.85	1.91	1.91
1970	0.15	0.57	1.09	1.56	1.83	1.90	1.90
1975	0.15	0.51	0.98	1.51	1.83		
1980	0.15	0.50	1.00	1.55			
1985	0.14	0.49	1.01				
1990	0.13	0.47					
1995	0.09						

Source: Office for National Statistics, National Records of Scotland, and Northern Ireland Statistics and Research Agency – Birth registration data

Notes

1. The ages of women are presented in “exact years”. Therefore [Back to table](#)
2. figures should be interpreted as the average number of children a woman has had up to that actual birthday. For the purposes of population projection, “final” completed family size is that achieved by the end of age 46 years. [Back to table](#)

Achieved family size

Of greater interest for projections is the achieved fertility of women who have not yet completed their childbearing. The 1975, 1980 and 1985 cohorts have had steadily fewer children by the ages of 20 and 25 years than earlier cohorts, and this trend continues with the data now available for the 1990-onwards cohorts.

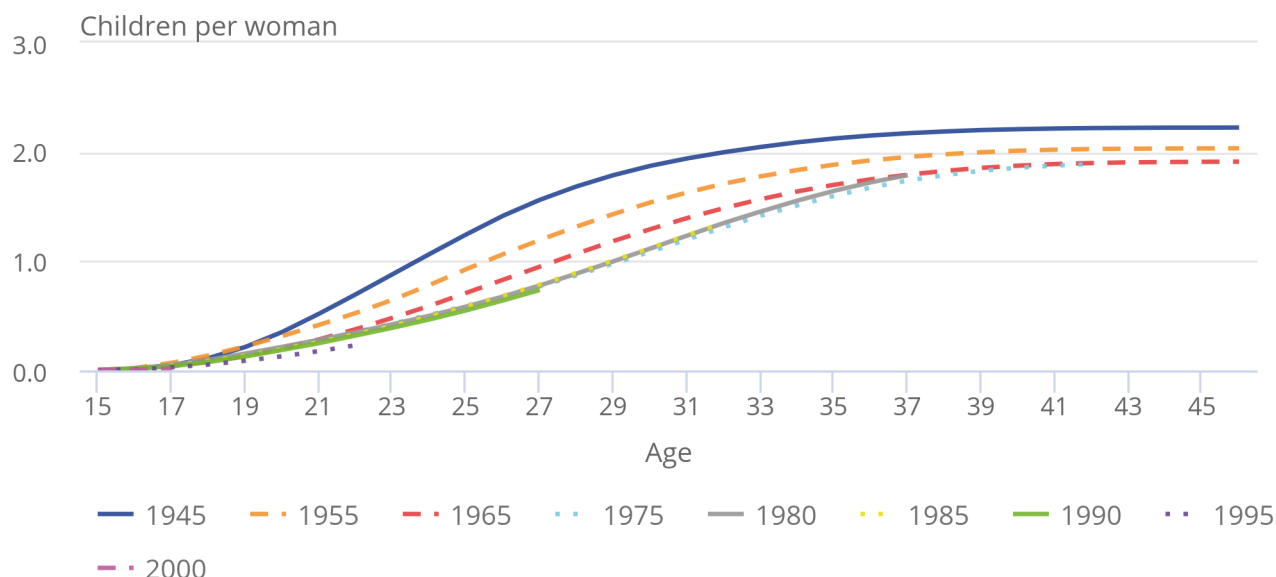
As seen in Figure 4, the achieved family sizes of the 1980 cohort at ages 30 and 35 years, and of the 1985 cohort at age 30 years, are slightly higher than that of the 1975 cohort. This increase corresponds to the rising fertility rates for 25- to 29-year-olds in the period 2002 to 2008.

Figure 4: Completed family sizes have been declining, but there is evidence that the 1980s cohorts might exceed the levels seen for the 1970s cohorts

Average achieved family size by age, UK, 1945 to 2000 birth cohorts

Figure 4: Completed family sizes have been declining, but there is evidence that the 1980s cohorts might exceed the levels seen for the 1970s cohorts

Average achieved family size by age, UK, 1945 to 2000 birth cohorts



Source: Office for National Statistics, National Records of Scotland, and Northern Ireland Statistics and Research Agency – Birth registration data

The fertility assumptions have been set so that projected completed family sizes for the 1980 and 1985 cohorts will exceed those achieved by the 1975 cohort. The CFSs for the 1990, 1995 and 2000 cohorts are assumed to be lower than for women born in the 1970s and 1980s.

4 . Expert views on future fertility

Introduction

In March 2019, five academic experts working in the field of fertility were asked for their views on UK fertility trends over the next 25 years, via a questionnaire. This was followed by the national population projections (NPPs) expert advisory panel discussion in April 2019, which three of the five experts attended, accompanied by three other demographic experts who did not complete the questionnaire but who contributed to discussions on the current and emerging trends in fertility.

There is considerable uncertainty around future trends in fertility, and longer-term trends are impossible to predict. This section provides a summary of the expert advisory panel's views on future fertility, which may not be representative of the views of others.

Comparisons are made in this section between the future levels of fertility suggested by the 2018-based NPPs expert advisory panel and the views of the panel for the 2016-based NPPs. The membership of the panel changed between the two rounds of projections. In addition, for the 2016-based NPPs, each expert responded to the questions on fertility, mortality and migration. For the 2018-based NPPs, there were three separate questionnaires, with experts only responding to their specialist area(s) of expertise. For the 2016-based NPPs, eight experts responded to the questionnaire. For the 2018-based NPPs, there were five respondents to the fertility questionnaire, three of whom also responded two years previously.

For more information on the expert advisory panel, please see [National population projections, how the assumptions are set: 2018-based](#).

Expert assessment of UK fertility trends in the short term

The advisory panel was asked to assess the likely trend in fertility up to 2022 and provide their reasoning, and to estimate the likely total fertility rate (TFR) in 2022.

Recent data have suggested that there is no evidence that postponement of childbirth has finished and, as such, the panel felt that a decline in the assumed TFR could be justified. Future effects of technology may also lead to a shift in timings, with women postponing until later in the childbearing period. This may lead to a decline in overall TFR in the short term but potentially a catch-up in the long term.

The experts were asked to quantify the most likely level of the UK TFR in 2022, together with plausible ranges that would cover 95% of possible values. Projected TFRs for 2022 ranged from 1.61 to 1.80. The mean was 1.70, a lower prediction than four previous projection rounds from the 2010-based NPPs onwards.

On average, experts believed that there was a 95% chance of the TFR in 2022 lying between 1.59 and 1.85. This underlines the uncertainty inherent in estimating future fertility, even within a short timescale. Both the average upper and lower bounds were lowered from the 2016-based projections, where the experts' range was between 1.64 and 1.94 for 2020.

The experts' views validated the decision to continue the decline in fertility over the next five years. For the 2018-based assumptions, we have assumed a UK TFR of 1.65 children per woman in the short term, which is within, but at the lower end of, the experts' range. A further decline in UK fertility in 2018, a figure that was not available at the time of the expert advisory panel meeting, justified selecting a short-term assumption lower than the experts' average.

The general consensus of the experts was that the expected rate of change from the short term (2022) to the long term (2042) was difficult to anticipate; two of the experts thought there may be a slight decline initially followed by an increase and stabilisation, while others thought there would be a gradual change over the period or fluctuation, with a higher rate in the 2030s before declining.

When the experts' views on the rate of change were discussed at the expert advisory panel meeting, it was suggested that if 18- to 25-year-olds are postponing now but it is believed there will be recuperation, then we are justified in assuming an initial decline in the TFR over the next five years, followed by an increase in the long term.

Expert assessment of long-term UK fertility level

The experts were asked for their views on the most likely level of the TFR in 2042. Their TFR predictions ranged from 1.70 to 1.80.

The average TFR predicted for 2042 was 1.77, which is marginally below the average expert predictions from the previous projection round (1.79 in the 2016-based projections, for 2040). For the 2018-based assumptions, a long-term UK TFR of 1.78 children per woman was agreed.

The experts were asked to provide 95% upper- and lower-bound confidence intervals for a long-term UK TFR. From these predictions, the average 95% upper bound was 1.95 and the average lower bound was 1.53.

The experts provided good evidence to support lowering the long-term fertility assumption compared with the 2016-based projection to a level below 1.80 children per woman. For the 2018-based assumptions, we have assumed a UK TFR of 1.78 children per woman by mid-2043, slightly increasing to close to 1.79 later in the projection.

Expert assessment of how fertility for the UK countries will differ

Views on short- and long-term trends for the countries of the UK were also provided by the experts, in particular how they will differ from each other and the UK as a whole.

For Wales, differences to the UK TFR ranged from 0.05 lower to no difference in the short term and 0.1 lower to no difference in the longer term. The majority of experts felt that the TFR for Wales should be slightly lower than England's, with a suggestion that this could in part be because of lower immigration to Wales.

For Northern Ireland and Scotland, the consensus was that Northern Ireland will continue to have the highest TFR of the four countries of the UK, and Scotland the lowest TFR. There were some different views on whether Scotland's TFR will move towards or away from the UK TFR. When asked to comment on the projected trends for the UK countries, two of the experts' responses included reference to an expectation that rates for Northern Ireland will move towards the UK figure in the long term.

The long-term assumptions for the countries of the UK were mainly determined by applying the selected UK scenario to the country level data. The resulting differentials were then compared to those seen in recent years. Experts' views supported the decision to set the long-term assumption for Wales lower than England. They were also used to validate the relative positions of each country's TFR to the other countries of the UK.

Underlying forces that may influence future fertility

The advisory panel was asked to consider six forces with the potential to affect fertility levels in the long term (to 2042). By considering a range of arguments within each force, they were asked to assess the overall likely impact on future family size.

A summary of the experts' questionnaire responses showed that there were no significantly opposing views. The experts anticipate a small downward impact or little or no influence for:

- the influence of ideal family size
- education and work
- income and cost of living

There was also broad agreement that changing biomedical conditions will lead to a small upward or little or no influence on fertility.

Responses to the influence of the changing nature and stability of partnerships and changes in population composition were more varied, with views for both ranging from a small upward to a small downward influence.

Other forces that experts identified as being important drivers of family size over the next 25 years were identified as:

- availability and affordability of housing
- an increase in the proportion of families with children in poverty
- financial insecurity of millennials
- climate change potentially leading to a shift in attitudes towards having children
- future childbearing patterns of second- and third-generation ethnic minority groups
- development in contraceptive technologies
- increases in gender equality policies and other new government policies to promote the compatibility of employment and parenthood

As the majority of forces identified are likely to reduce fertility over the next 25 years, this justified reducing the long-term fertility assumption.

5 . Principal fertility assumptions

Fertility rates for the projections were created at the UK level, taking into account historical trends up to 2018 ([Section 3](#)), advice from the expert advisory panel ([Section 4](#)) and further analysis and research. The following goals informed our assumptions-setting process:

- the long-term total fertility rate (TFR) and completed family size (CFS) to be lower than the 2016-based projections at around 1.78
- the TFR to decline in the short term but then rise in the long term
- CFS for the 1980 and 1985 cohorts to exceed levels achieved by the 1965, 1970 and 1975 cohorts
- age-specific fertility rates (ASFRs) for the over 40s to continue to increase
- ASFRs for the under 20s to continue to decline
- the 30 to 34 years age group to remain peak childbearing age group

We assessed several alternative scenarios, representing a range of possible trajectories of the UK fertility measures, both period (TFR) and cohort (CFS). These same trajectories were applied to each country of the UK.

The preferred scenario was agreed via a process of consulting with experts and the devolved administrations, as described in [National population projections, how the assumptions are set: 2018-based](#).

Once the 2018 births data became available, the projected ASFRs were adjusted to take into account the latest data while ensuring long-term assumptions remained at the levels agreed.

Table 4 shows the assumptions for long-term average CFS for the UK and its constituent countries used in the [2010- to 2016-based national population projections \(NPPs\)](#), compared with the 2018-based assumptions.

Table 4: Long-term assumptions for completed family size
2010-based to 2018-based projections, UK

	2018-based	2016-based	2014-based	2012-based	2010-based
England	1.81	1.85	1.90	1.90	1.85
Wales	1.71	1.85	1.90	1.90	1.85
Scotland	1.50	1.65	1.70	1.75	1.70
Northern Ireland	1.92	2.00	2.00	2.00	1.95
UK	1.78	1.84	1.89	1.89	1.84

Source: Office for National Statistics – Population projections data

Recent trends and expert opinion justified a reduction in the long-term assumption for each country compared with the 2016-based projections.

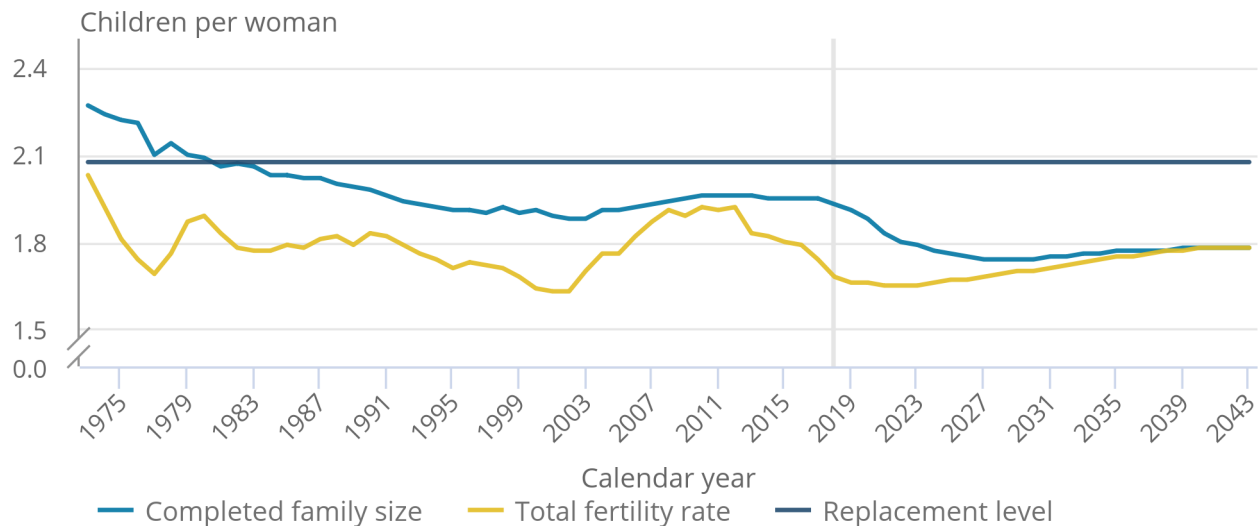
Figures 5 to 7 show the past and projected TFR and average CFS for the UK and its constituent countries. The 2018 and 2019 calendar year figures incorporate the latest provisional observed births data for the year ending mid-2019. The projections methodology adjusts the projected ASFRs for the first year of the projection (year ending mid-2019) to ensure the derived projected total births for that year are in line with provisional estimates for each country. This explains why the TFRs of the UK, England, Wales and Scotland decline in 2019 and then increase in 2020 before declining again, rather than showing a continuous decline from 2018 to 2022.

Figure 5: The UK total fertility rate and average completed family size are projected to have converged by 2040

Total fertility rate and average completed family size, UK, 1973 to 2043

Figure 5: The UK total fertility rate and average completed family size are projected to have converged by 2040

Total fertility rate and average completed family size, UK, 1973 to 2043



Source: Office for National Statistics, National Records of Scotland, and Northern Ireland Statistics and Research Agency – Birth registration data and mid-year population estimates; Office for National Statistics – Population projections data

Notes:

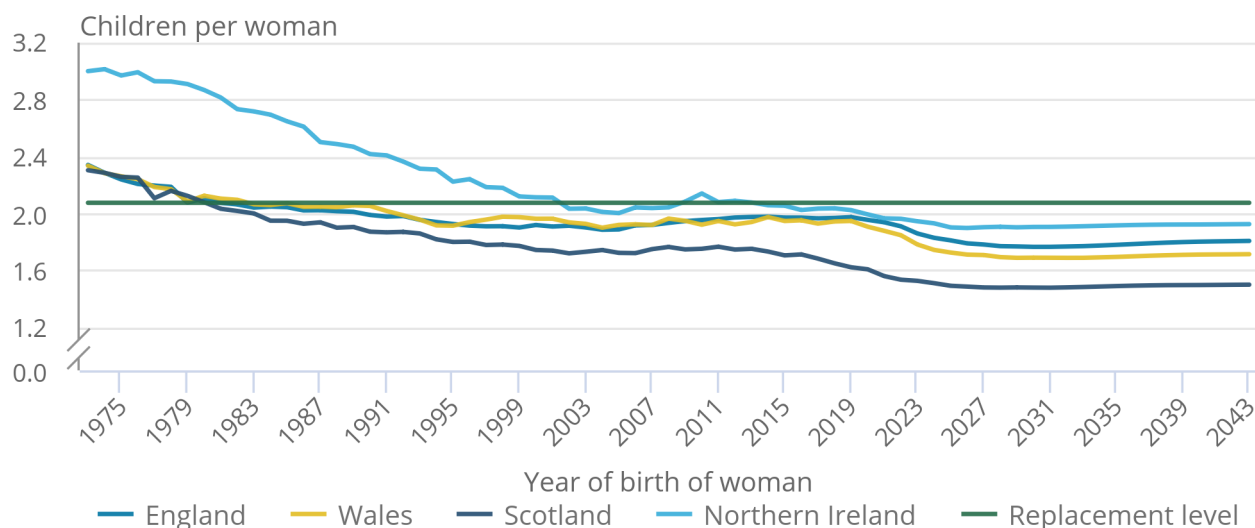
1. CFS relates to the cohort born 30 years earlier, with 30 years being the approximate midpoint of the childbearing ages. Projected CFS is given for cohorts that have not yet completed childbearing.
2. Replacement fertility is the level of fertility required for the population to replace itself in size in the long term. In the UK, women would need to have, on average, 2.075 children to ensure long-term “natural” replacement of the population.

Figure 6: The average completed family size has generally declined throughout the UK since 1943 but is largest in Northern Ireland and smallest in Scotland

Past and assumed average completed family size, UK constituent countries, women born 1943 to 2013

Figure 6: The average completed family size has generally declined throughout the UK since 1943 but is largest in Northern Ireland and smallest in Scotland

Past and assumed average completed family size, UK constituent countries, women born 1943 to 2013



Source: Office for National Statistics, National Records of Scotland, and Northern Ireland Statistics and Research Agency – Birth registration data and mid-year population estimates; Office for National Statistics – Population projections data

Notes:

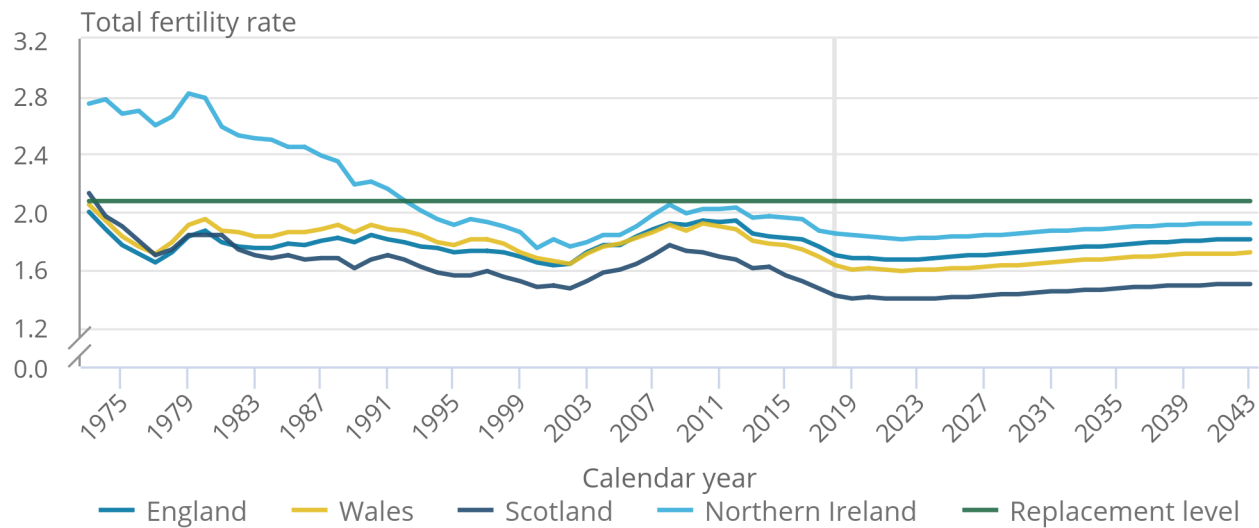
1. Replacement fertility is the level of fertility required for the population to replace itself in size in the long term. In the UK, women would need to have, on average, 2.075 children to ensure long-term “natural” replacement of the population.

Figure 7: The total fertility rate is assumed to gradually increase throughout the UK from 2023, following a short-term period of decline

Past and assumed total fertility rates, UK constituent countries, 1973 to 2043

Figure 7: The total fertility rate is assumed to gradually increase throughout the UK from 2023, following a short-term period of decline

Past and assumed total fertility rates, UK constituent countries, 1973 to 2043



Source: Office for National Statistics, National Records of Scotland, and Northern Ireland Statistics and Research Agency – Birth registration data and mid-year population estimates; Office for National Statistics – Population projections data

Notes:

1. Replacement fertility is the level of fertility required for the population to replace itself in size in the long term. In the UK, women would need to have, on average, 2.075 children to ensure long-term “natural” replacement of the population.

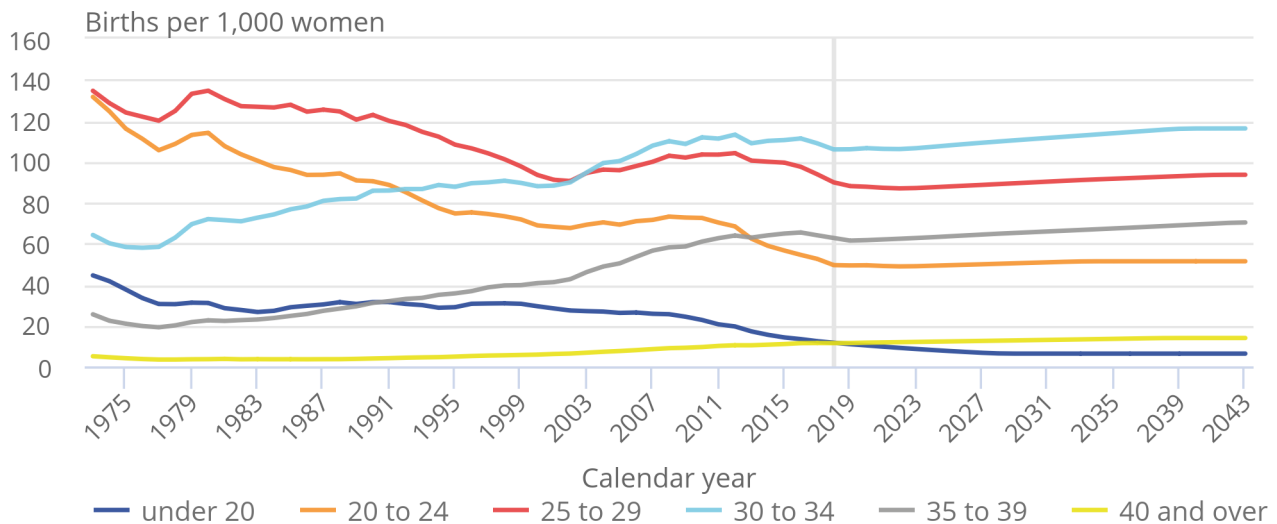
Figure 8 shows the estimated and projected ASFRs for the UK.

Figure 8: The age-specific fertility rate is assumed to gradually increase throughout the UK for all women aged 20 years and over

Past and assumed age-specific fertility rates, UK, 1973 to 2043

Figure 8: The age-specific fertility rate is assumed to gradually increase throughout the UK for all women aged 20 years and over

Past and assumed age-specific fertility rates, UK, 1973 to 2043



Source: Office for National Statistics, National Records of Scotland, and Northern Ireland Statistics and Research Agency – Birth registration data and mid-year population estimates; Office for National Statistics – Population projections data

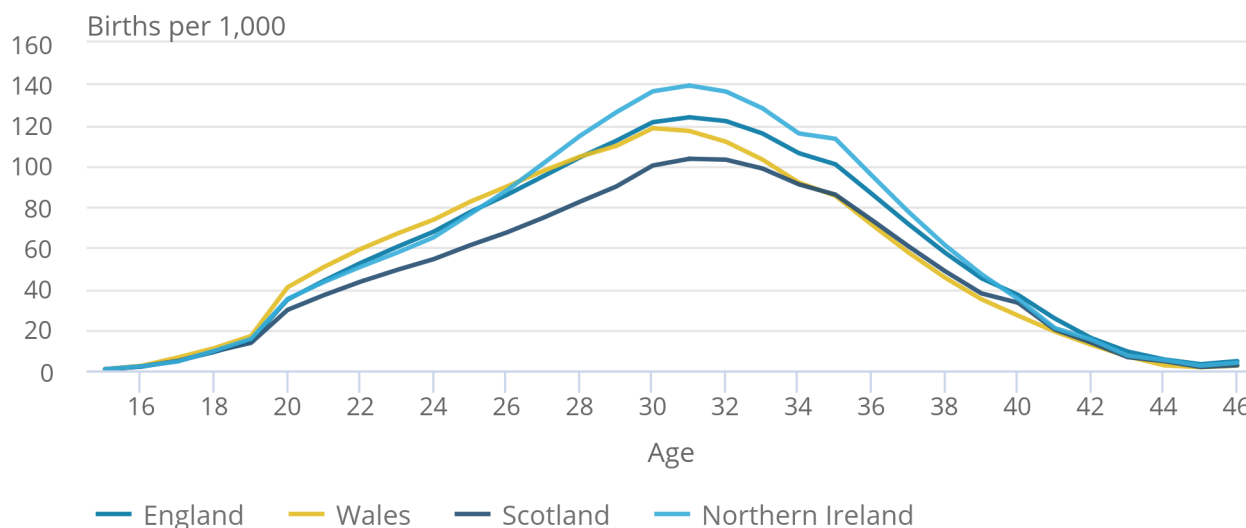
The long-term ASFRs for the countries of the UK are shown in Figure 9.

Figure 9: The long-term assumed age-specific fertility rate peaks in the early 30s throughout most of the UK but is slightly lower in Scotland

Long-term assumed age-specific fertility rates, UK constituent countries, 2018-based projections

Figure 9: The long-term assumed age-specific fertility rate peaks in the early 30s throughout most of the UK but is slightly lower in Scotland

Long-term assumed age-specific fertility rates, UK constituent countries, 2018-based projections



Source: Office for National Statistics – Population projections data

6 . Assumptions for fertility variants

The purpose of the fertility variants is to show the consequences of sustained levels of fertility above or below that assumed in the principal projection. The variants are designed to give plausible alternative scenarios, not upper or lower limits for future fertility.

It was agreed via the consultation exercise that for the 2018-based projections, asymmetric variants of +0.1 higher and -0.2 lower than the principal assumption should be used for each country of the UK. These are the same variant widths as the 2016-based projections.

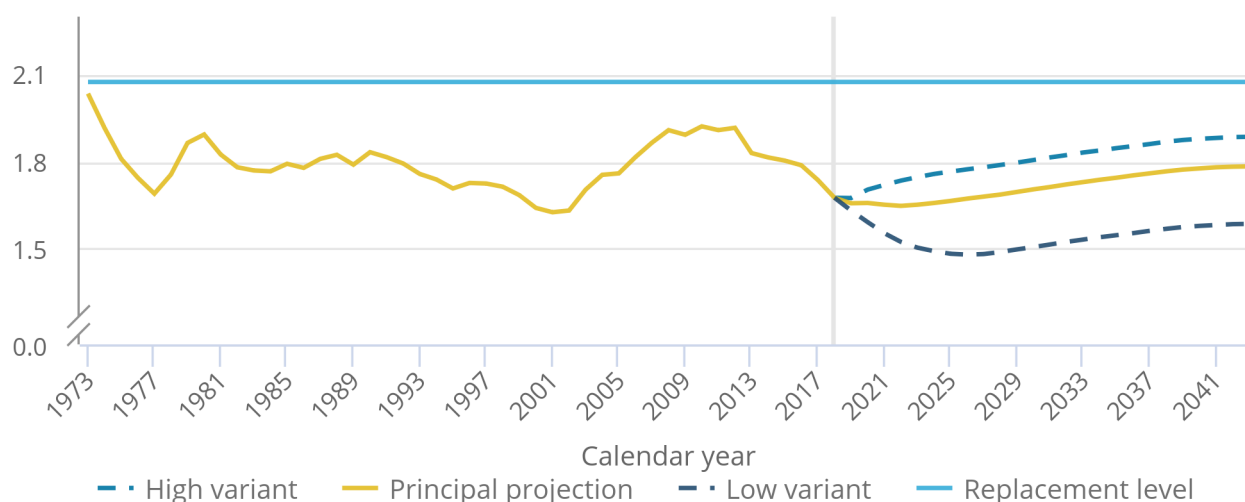
The long-term principal, high and low fertility assumptions for the UK and its constituent countries are shown in Figure 10.

Figure 10: High and low fertility variants are 0.1 children higher and 0.2 children lower per woman, respectively

Past and assumed principal, high and low total fertility rate, UK, 1973 to 2043

Figure 10: High and low fertility variants are 0.1 children higher and 0.2 children lower per woman, respectively

Past and assumed principal, high and low total fertility rate, UK, 1973 to 2043



Source: Office for National Statistics, National Records of Scotland, and Northern Ireland Statistics and Research Agency – Birth registration data and mid-year population estimates; Office for National Statistics – Population projections data

Notes:

1. Replacement fertility is the level of fertility required for the population to replace itself in size in the long term. In the UK, women would need to have, on average, 2.075 children to ensure long-term “natural” replacement of the population.

In addition to high and low fertility variants, the following projections are also available:

- constant fertility variants: these assume the current level of fertility remains constant into the future
- replacement fertility variants: these assume that fertility will be at a level for the population to replace itself in the absence of migration

7 . Methodological approach

The fertility assumptions are set as long-term completed family sizes (CFSs) for each country of the UK. For the 2018-based national population projections (NPPs), the long-term fertility rate will be reached 25 years into the projection in the year ending mid-2043.

The approach for producing the fertility assumptions can be broken down into the following stages:

- we updated the datasets for the UK and its four countries with the latest births registrations data (2017) and corresponding mid-year population estimates
- period and cohort fertility rates were calculated so that we had a time series of age-specific fertility rates (ASFRs) and CFSs over the last 50 years up to the latest year
- we extrapolated past trends into the future to look at future levels of fertility if past trends were to continue
- we explored different scenarios for the UK, informed by the goals outlined in [Section 5](#) and expert panel advice, by projecting forward trends in fertility by age group
- the most plausible scenario was selected as the recommended approach
- this scenario was then applied to each country's data to determine proposed long-term assumptions for the countries of the UK
- the devolved administrations and stakeholders participating in the NPPs consultation exercise provided feedback on the recommended long-term assumptions
- when the latest births and population data (2018) became available, we incorporated these figures and smoothed the historical ASFRs
- the scenario was applied to the latest data and adjustments were made to ensure the agreed long-term targets were reached
- at the UK level, we set the low and high fertility variants as -0.2 and +0.1 around the agreed principal assumption, phasing in the change from the principal to the low (or high) variant to ensure no implausible change in rate from one year to the next
- we deflated or inflated the UK principal projected ASFRs to create UK low and high variants by age
- for each year of the projection and for each country of the UK, we applied the UK proportions of low to principal and high to principal rates to derive low and high fertility variants at the country level
- National Records of Scotland (NRS), the Northern Ireland Statistics and Research Agency (NISRA) and the Welsh Government quality assured the assumptions for their own country
- final fertility assumptions were signed-off by the NPP committee
- fertility assumptions files for each country of the UK were provided as inputs to the NPPs model.

Overall, the projections process:

- converted the data to be on a period rather than a cohort basis
- adjusted the fertility assumptions from calendar year to mid-year figures
- adjusted the projected ASFRs for the first year of the projection (year ending mid-2019) to ensure the derived projected total births for that year were in line with provisional estimates for each country
- used the 2018 mid-year population estimates and adjusted fertility, mortality and migration assumptions to calculate future estimates of the UK population and projected numbers of births, deaths and migrants