

National population projections, fertility assumptions: 2020-based interim

The data sources and methodology used to produce fertility assumptions in the 2020-based interim national population projections.

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1 . Main points

- The long-term assumption for completed family size for the UK will be 1.59 children per woman by mid-2045; this is lower than the principal assumption for the 2018-based projections (1.78 children per woman).
- For the 2020-based projections, the long-term fertility assumptions are lower for each country of the UK in comparison with the 2018-based projections.
- In the long-term, age specific fertility rates (ASFRs) are projected to decline for women aged under 30 years, but increase for those aged 35 years and over.
- For this national population projections (NPP) release, only a principal projection has been produced; there are no variant projections.
- This set of NPPs have been developed to meet core user needs, and variant projections are not available as part of the release because of both uncertainty in our mid-year population estimates (the basis of our projections) and uncertainty in setting long-term demographic assumptions following the coronavirus (COVID-19) pandemic.

2 . Introduction

This article details the fertility assumptions used in the 2020-based interim national population projections (NPPs).

It includes the rationale behind the assumptions-setting process, a summary of recent fertility trends in the UK, and details input from the devolved administrations and the expert advisory panel we convened.

Fertility rates are presented in this article on a calendar-year basis unless otherwise stated. The fertility assumptions underlying the population projections (presented in Table 1) are on a mid-year basis. Therefore, there may be small differences between the figures presented in this article and the national population projections published [datasets](#).

Table 1 shows the fertility assumptions used in the 2020-based interim national population projections (NPPs).

Table 1: Short and long-term assumptions for total fertility rate

2020-based fertility assumptions, UK and constituent countries, 2020 and years ending mid-2025 and mid-2045

	2020 Assumption	Mid-2025 Assumption	Mid-2045 Assumption
England	1.59	1.56	1.62
Wales	1.47	1.44	1.47
Scotland	1.29	1.26	1.30
Northern Ireland	1.71	1.68	1.74
United Kingdom	1.56	1.53	1.59

Source: Office for National Statistics, National Records of Scotland, and Northern Ireland Statistics and Research Agency - 2020 births data; Office for National Statistics - National population projections

Notes

1. The figures for 2020 are based on final published fertility rates for each country. Provisional births figures were used for England, Wales and NI when setting the assumptions so data underlying the charts in this report might differ slightly to rates in this table.
2. The latest birth registration data for Northern Ireland show that there may have been a pandemic-related impact on the timing of birth registration. As a result there is additional uncertainty in the fertility assumptions for Northern Ireland.

3 . Methodological approach

The fertility assumptions are set as long-term and short-term age specific fertility rates (ASFRs) for each country of the UK. The long-term fertility rate is reached after 25 years, which for the 2020-based interim national population projections (NPPs), will be mid-2045.

The approach involved many stages, outlined as follows.

Historical fertility rate datasets for the UK and constituent countries were updated with the latest birth registrations and mid-year population estimates. For Northern Ireland, provisional 2020 birth registrations data were used. England and Wales rates for 2020 were calculated using birth notifications data, as registrations data were not available.

A panel of fertility experts provided their views on likely future trends in fertility using a questionnaire and through discussion at the fertility expert panel meeting in May 2021. A list of expected future fertility outcomes to aim for when setting the assumptions was compiled from the information provided. These are listed in [section 5](#) below.

A range of different ways of projecting forward the trends in fertility by age group were investigated at the UK level. These used past trends, expected future fertility based on experts' input, and additional research and advice. The recommended approach for the UK was the most plausible scenario, which was also supported by evidence.

The UK scenario was applied to data for the four countries of the UK. The long-term assumptions for each country were assessed against the expert advice given, and the past trends.

National Records of Scotland (NRS), Northern Ireland Statistics and Research Agency (NISRA) and the Welsh Government reviewed and provided feedback on the assumptions for their respective country.

Changes were made for individual countries where evidence supported this. For 2020-based projections, a change was made to the assumptions for 20- to 24-year-olds in Wales so that the rate of change differed to that applied to the rest of the UK.

Final fertility assumptions for the UK and constituent countries were presented to, and signed off by, the NPP committee in September 2021.

4 . 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 particular year, 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 contrasts with 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.

The UK TFR has been declining year-on-year since 2012 when it was at 1.92, down to 1.56 in 2020.

Fertility rates up to 2020 were used in the assumptions-setting process so were largely unaffected by the coronavirus (COVID-19) pandemic.

Recent trends in TFRs and ASFRs can be seen in charts, alongside projected fertility based on final assumptions, in [section 6](#).

Completed family size

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

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

For the national population projections (NPPs), the upper age boundary for women to complete childbearing has been traditionally set at the age of 46 years. This cohort analysis includes data up to 2020. Therefore, it considers women born in 1974 as the most recent cohort to complete childbearing, as they will have reached 46 years by 2020.

The achieved family size by age has decreased across cohorts since the mid-1930s. For women who have completed childbearing, this has decreased from 2.22 children per woman for the 1945 cohort to 1.91 for the 1970 cohort.

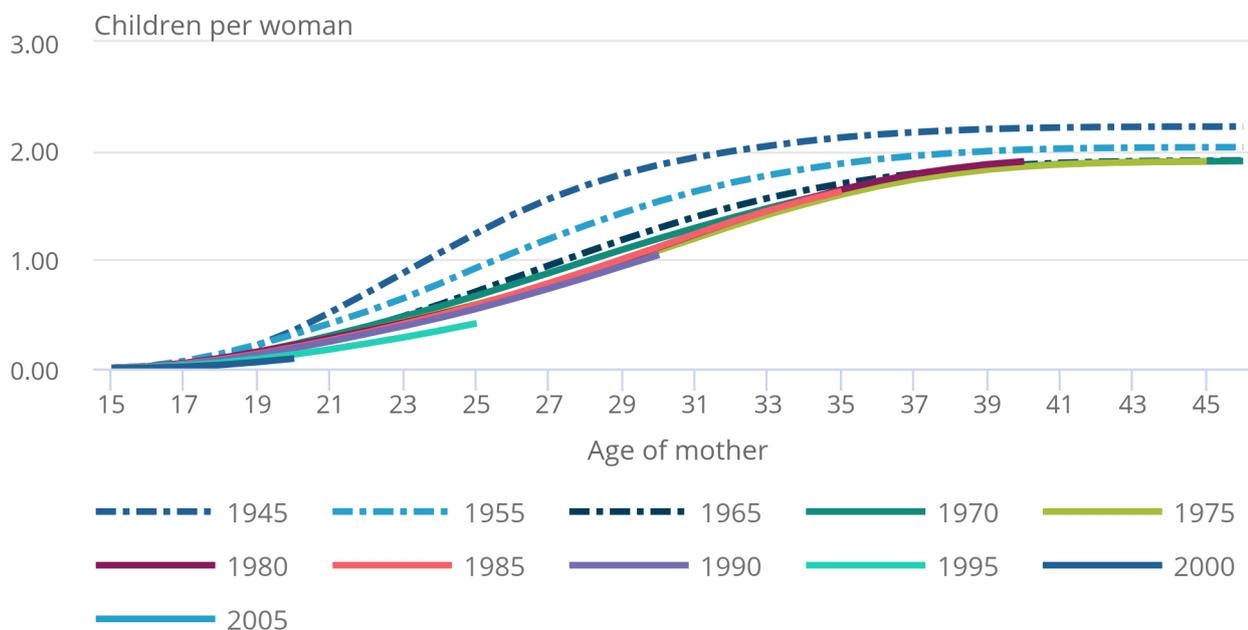
Within the cohorts of women who have not yet completed their childbearing years, those born in 1975 onwards have had fewer children in their 20s, compared with previous cohorts. The cohorts of women born in 1990 and 1995 have also started showing a decrease in the number of children born, compared with previous cohorts of women in their 20s. However, these women are still at the beginning of their childbearing years.

Figure 1: More recent birth cohorts have lower fertility in their 20s

Average achieved family size by age, UK, 1945 to 2005 birth cohorts

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Average achieved family size by age, UK, 1945 to 2005 birth cohorts



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

In the assumption setting process, we have taken into account that the completed family size (CFS) for the 1980 and 1985 cohorts are expected to exceed the levels of the 1965, 1970 and 1975 cohorts.

5 . Expert views on future fertility

A panel of experts in UK fertility was formed to discuss their views and predictions on future fertility rates. Experts were provided with information on recent trends in fertility and responded to a questionnaire to gather their views on short-term and long-term fertility in the UK. Experts were asked to:

- provide the most likely projected total fertility rate (TFR) for the UK in both 2024 and 2044
- describe the expected rate of change between the short and long-term TFRs given
- describe the patterns expected for each age group
- provide opinions on how the TFRs for each country of the UK are expected to differ from the UK level
- comment on underlying factors that may influence future fertility

In May 2021, the national population projections (NPPs) expert advisory panel meeting was held virtually with experts and representatives from each of the devolved administrations. In the meeting, the panel discussed the methods used in setting the assumptions, recent fertility trends, the experts' questionnaire results, and expectations on future fertility rates. For more information on the expert advisory panel, please see [Background, methodology and assumption setting for the National population projections](#).

Expected future fertility

The expert assessment of UK fertility in both the short and long term resulted in the expected future fertility outcomes used in assessing different projection scenarios. The expected outcomes from the expert advisory panel were:

- at the UK level, aim for averages of 1.53 total fertility rate (TFR) in the short-term (2024) and 1.59 TFR in the long-term (2044)
- fertility might fall in the next two to three years then show signs of recovery rising in the long-term
- completed family sizes (CFSs) for the 1980 and 1985 cohorts will exceed levels achieved by the 1965, 1970 and 1975 cohorts
- age specific fertility rates (ASFRs) for age groups under 30 years will continue to decrease
- ASFRs for women aged 40 years and over to continue to rise

There was less consistency in experts' expectations of future fertility for women in their 30s. Questionnaire responses suggested fertility might remain at a fairly stable level for those aged 30 to 34 years, whereas fertility for those aged 35 to 39 years might increase.

We were able to cross-reference our assumptions against the following:

- experts expected differences in the TFR of each country against the UK TFR for 2024 and 2044
- other research such as the Centre for Population Change's working paper on [Recent trends in UK fertility and potential impacts of COVID-19 \(PDF, 3.78MB\)](#) for the UK and constituent countries over the next three years
- experts' own estimated ASFRs, which we could compare our scenarios against

Underlying factors that may influence future fertility

Experts provided their thoughts on the impacts of the coronavirus (COVID-19) pandemic on period fertility levels and completed family size (CFS) in the UK. Most experts suggested that there will be a decline in the short term followed by a small increase later, on account of postponing childbirth and economic uncertainty. It was also suggested that there may be some factors that result in an increase in fertility, such as changes to work patterns and increased importance of family. It was recognised that the coronavirus pandemic has affected people differently, which may lead to differing fertility outcomes. There was a suggestion that CFS was unlikely to be affected, or that there would only be a small negative impact on those in their 30s because of failure to achieve their fertility intentions.

Experts also gave their opinions on the impact of the UK leaving the European Union. They suggested that this would have little impact on fertility rates and less of an impact than the coronavirus pandemic. Most experts agreed that the UK leaving the European Union would have very little direct impact on the CFS in the UK, but that factors such as possible economic hardship may have an effect.

Other factors noted were suggested to lead to a decline in fertility or a delay in childbearing.

6 . Fertility assumptions

Following recent trends and expert opinions, the 2020-based fertility assumption is lower than the 2018-based assumption. This continues the downward trend for each round of assumptions since 2014.

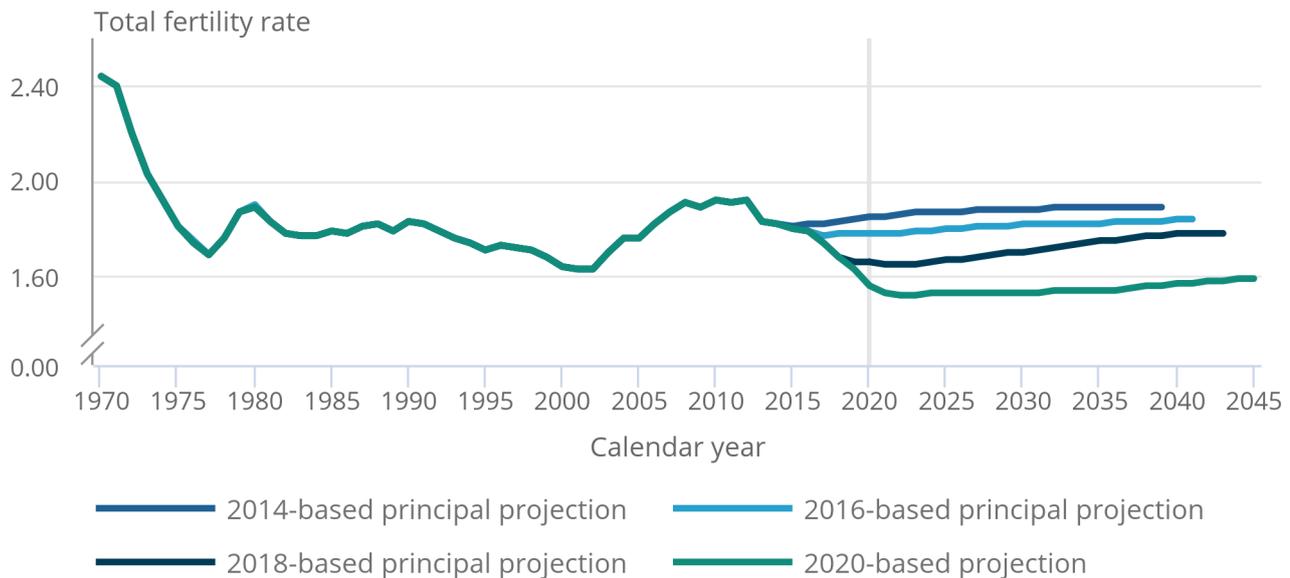
Figure 2 shows the past and projected total fertility rates (TFRs) for the UK. The TFR has been projected to decline over the next two years, show some recovery for the subsequent two years, before rising in the long-term. The 2020-based projected TFRs are much lower than those used in the 2018-based projections or previous rounds of projections.

Figure 2: The UK total fertility rate has been declining year on year since 2012, when it was at 1.92, down to 1.56 in 2020

Past and projected total fertility rate, UK, 1970 to 2045

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Past and projected total fertility rate, UK, 1970 to 2045



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 – 2020 birth notifications data (for 2020-based)

Northern Ireland has consistently had the highest TFR (1.71 in 2020), and Scotland has had the lowest (1.29 in 2020). In recent years, the difference between the countries of the UK has narrowed. Wales had a higher fertility rate than England until 2002, but this has reversed with England experiencing higher rates since 2002. In 2020, England had a TFR of 1.59 and Wales experienced a lower fertility rate by 0.12 (at 1.47). All four countries have experienced a similar trajectory over time, showing a general decline in TFR since 2012. As the same trends have been applied to each country's data (with the small exception for Wales detailed below), the relative position of each country to the rest of the UK has been retained in the long-term. The differences between the four countries of the UK are projected to persist.

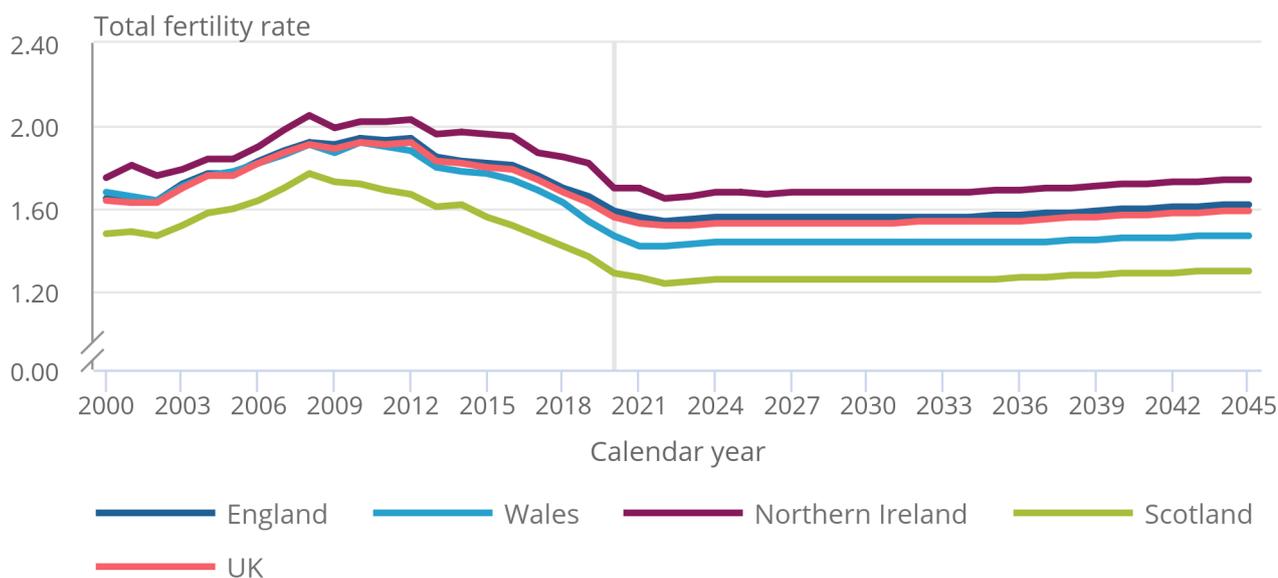
Projected fertility rates are based on trends in birth registration data. The latest birth registration data show that there may have been a coronavirus pandemic-related impact on the timing of this data for Northern Ireland. As there was insufficient time to include this data in the assumption setting process, there is additional uncertainty in the fertility assumptions for Northern Ireland. It is planned that a more robust set of 2021-based national population projections (NPPs) will be published after the release of Census 2021 results.

Figure 3: Northern Ireland has consistently had the highest total fertility rate

Past and projected TFR, UK constituent countries, 2000 to 2045

Figure 3: Northern Ireland has consistently had the highest total fertility rate

Past and projected TFR, UK constituent countries, 2000 to 2045



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 – 2020 birth notifications data (for 2020-based)

Age Specific Fertility Rates for Wales

Application of the initial proposed UK scenario resulted in:

- a projected increase in the divergence between the England and Wales total fertility rate (TFR) over time
- the projected TFR for Wales in 2044 being lower than in 2020
- the 2044 proposed assumption for Wales being lower than the experts' suggested deviation from the UK average

The trends for Wales occur because women in Wales tend to have babies at younger ages than in England. The proposed scenario projected rises in fertility for women aged 35 years and over and decreases (or stability) for women aged under 35 years.

Further analysis was carried out to compare the five-year average percentage change for Wales (based on data for 2015 to 2019) with that of the UK. For the 20- to 24-year-old age group, Wales had experienced less of a decline than for the UK as a whole. Therefore, for Wales only, the decline for the 20- to 24-year-old age group has been reduced. This brings the TFR for Wales in 2044 (1.47) in line with the 2020 figure.

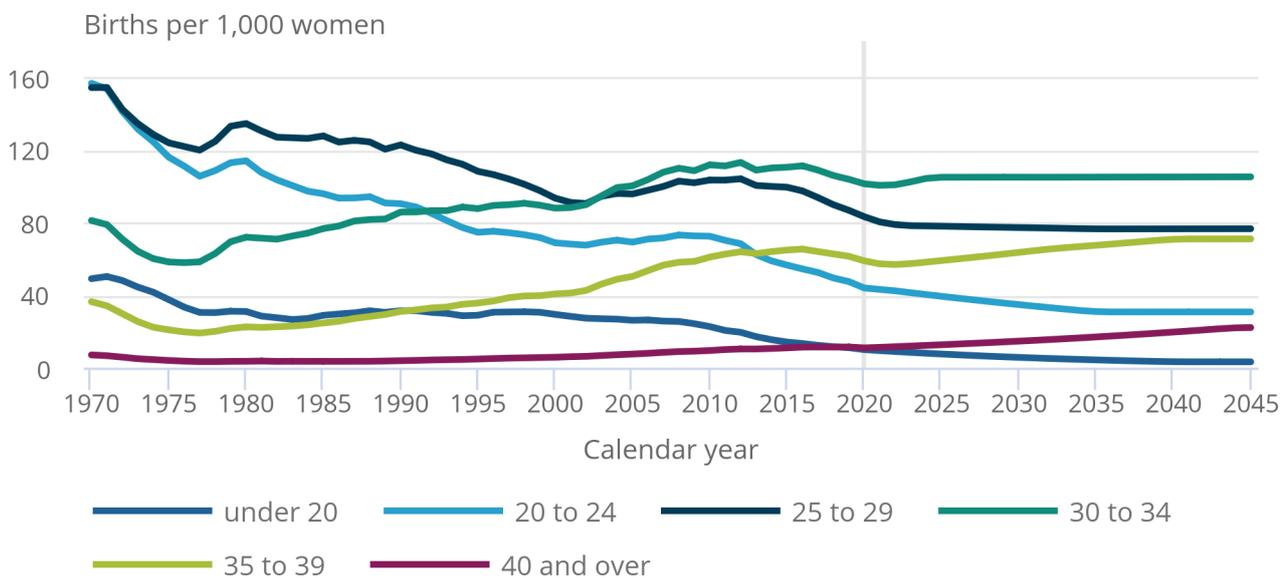
Figure 4 shows that the age specific fertility rates (ASFRs) for women aged over 40 years has increased in recent years. This had led to a widening of the ASFRs experienced by the oldest and youngest groups, which is projected to continue.

Figure 4: All age groups of women aged under 40 years show a decline from 2016 to 2020, continuing the trends previously seen in most age groups

Past and projected age-specific fertility rates, UK, 1970 to 2045

Figure 4: All age groups of women aged under 40 years show a decline from 2016 to 2020, continuing the trends previously seen in most age groups

Past and projected age-specific fertility rates, UK, 1970 to 2045



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 – 2020 birth notifications data (for 2020-based)

7 . Related links

[Births in England and Wales: summary tables](#)

Dataset | Released 14 October 2021

Annual summary statistics on live births and stillbirths, by sex, age of mother, whether inside marriage or civil partnership, percentage of non-UK-born mothers, birth rates and births by mothers' area of usual residence.

[Provisional births in England and Wales: 2020 and Quarter 1 \(Jan to Mar\) 2021](#)

Statistical bulletin | Released 24 June 2021

Provisional analysis of births occurring between January 2020 and March 2021 in England and Wales using NHS birth notifications to explore possible effects of the coronavirus (COVID-19) pandemic on live births and stillbirths.

[User guide to birth statistics](#)

Article | Released 14 October 2021

Supporting information for birth statistics, which present figures on births that occur and are then registered in England and Wales. Figures are based on information collected at birth registration.

[Births in Scotland](#)

Webpage | Updated as new data become available

National Records of Scotland's (NRS's) statistics on births.

[Births in Northern Ireland](#)

Webpage | Updated as new data become available

Northern Ireland Statistics and Records Agency's (NISRA's) birth statistics from 1887 onwards.

[Births QMI](#)

Article | Released 14 October 2021

Quality and Methodology Information for live births occurring and registered in England and Wales, detailing the strengths and limitations of the data, methods used, and data uses and users.