

National population projections, variant projections: 2018-based

The variant projections, a range of scenarios with alternative demographic assumptions, used in the 2018-based national population projections.

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Table of contents

1. [Purpose of variant projections](#)
2. [Range of variants](#)
3. [Summary of variant projections](#)
4. [Quality and methodology](#)

1 . Purpose of variant projections

We produce population projections to understand possible changes in the structure of the population. They are based on assumptions considered to best reflect demographic patterns at the time they are adopted. However, because of the inherent uncertainty of demographic behaviour, any projection will inevitably differ to a greater or lesser extent from actual future population change.

Because of the uncertainty surrounding our main principal projections, we offer a set of alternative scenarios according to higher or lower assumptions about the trajectories of fertility, mortality and migration. We determine our set of variants through consultation with government users. These variants provide an indication of uncertainty and sensitivity to alternative assumptions, but they should not be interpreted as upper or lower limits of future demographic behaviour.

2 . Range of variants

We have published 17 variant projections alongside the principal projections. Some of these are single-component variants, which show the effect of varying one assumption while keeping other assumptions in line with the principal projection; others are combination variants, which look at the effect of varying two or more assumptions.

Table 1 lists the variants published in the 2018-based national population projections (NPPs) and the assumptions underlying each variant. Most of the variants use the principal, high and low assumptions for fertility, mortality and migration; these are summarised numerically in Table 2. Some variants use “special case” assumptions, which are described in greater detail in the Variants that use special case assumptions subsection.

Table 1: List of variants available for the 2018-based national population projections, UK

Variant name	Geography	Fertility assumption	Life expectancy assumption	Migration assumption
Principal	UK; GB; E and W; E, W, S, NI	Principal	Principal	Principal
High fertility	UK; E, W, S, NI	High	Principal	Principal
Low fertility	UK; E, W, S, NI	Low	Principal	Principal
High life expectancy	UK; E, W, S, NI	Principal	High	Principal
Low life expectancy	UK; E, W, S, NI	Principal	Low	Principal
High migration	UK; GB; E, W, S, NI	Principal	Principal	High
Low migration	UK; GB; E, W, S, NI	Principal	Principal	Low
High population	UK; E, W, S, NI	High	High	High
Low population	UK; E, W, S, NI	Low	Low	Low
Zero net migration	UK; GB; E, W, S, NI	Principal	Principal	Zero
Young age structure	UK; E, W, S, NI	High	Low	High
Old age structure	UK; E, W, S, NI	Low	High	Low
Replacement fertility	UK; E, W, S, NI	Replacement	Principal	Principal
Constant fertility	UK; E, W, S, NI	Constant	Principal	Principal
No mortality improvement	UK; E, W, S, NI	Principal	No improvement	Principal
Constant fertility and no mortality improvement	UK; E, W, S, NI	Constant	No improvement	Principal
Not National Statistics: 0% future EU migration	UK; GB; E, W, S, NI	Principal	Principal	0% future EU migration from year ending mid-2021 onwards
Not National Statistics: 50% future EU migration	UK; GB; E, W, S, NI	Principal	Principal	50% future EU migration from year ending mid-2021 onwards

Source: Office for National Statistics – National population projections

Notes

1. E refers to England. [Back to table](#)
2. W refers to Wales. [Back to table](#)
3. S refers to Scotland. [Back to table](#)
4. NI refers to Northern Ireland. [Back to table](#)

Table 2: Long-term assumptions for the 2018-based national population projections, UK

	Low	Principal	High
Fertility (Total fertility rate by mid-2043)	1.58	1.78	1.88
Mortality (improvement rate by 2043)	0.0%	1.2%	1.9%
Migration (year ending mid-2025 onwards)	+90,000	+190,000	+290,000

Source: Office for National Statistics – National population projections

Notes

1. The total fertility rate increases to closer to 1.79 later in the projection. [Back to table](#)

Variants that use special case assumptions

Replacement fertility

Replacement fertility is the level of fertility required for the population to replace itself in size in the long term, given constant mortality rates and in the absence of migration. The replacement level is around 2.075 in the UK, meaning women would need to have, on average, 2.075 children each to ensure the long-term “natural” replacement of the population. The replacement fertility projection combines assumed replacement-level fertility with the principal assumptions of mortality and migration.

Constant fertility

This projection assumes that age-specific fertility rates (ASFRs) will remain constant at the values assumed for the first year of the principal projection, for each constituent country of the UK. It should be noted that for the UK as a whole, the assumption underlying this variant changes slightly through the projection period; this is because the UK assumption is influenced by the way the respective population of each country changes over time. The assumed rates for the first year of the projection are consistent with provisional estimates of total births for the year. The constant fertility projection combines assumed constant fertility with the principal assumptions of mortality and migration.

No mortality improvement

This projection assumes that the combined age- and sex-specific mortality rates remain constant at the values assumed for the first year of the principal projection. It differs from the low mortality assumption in that no mortality improvement assumes an improvement rate of 0.0% from the base year, whereas the low mortality assumption converges to an improvement rate of 0.0% by 2043. The assumed rates are consistent with provisional estimates of total deaths for the year. This projection combines an assumption of no mortality improvement with the principal assumptions of fertility and migration.

3 . Summary of variant projections

In this section, we present a general overview of the different variants and compare them with the principal projection. In particular, we compare projected population sizes for mid-2043 and growth rates over the period from mid-2018 to mid-2043.

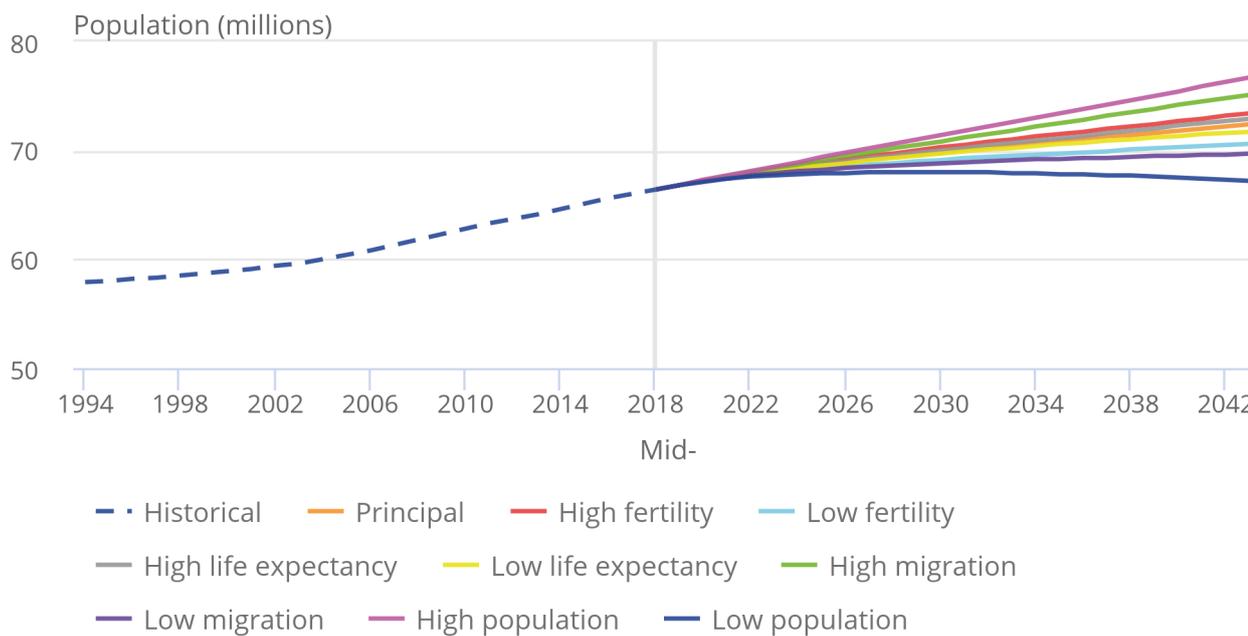
Figure 1 and Table 3 show the differences in projected population size for the UK for the principal projection and under the variant scenarios. The 0% future EU migration and 50% future EU migration variants are not included as they are not [National Statistics](#).

Figure 1: The variant population projections offer a range of future demographic scenarios

Estimated and projected total population for selected variants, UK, mid-1994 to mid-2043

Figure 1: The variant population projections offer a range of future demographic scenarios

Estimated and projected total population for selected variants, UK, mid-1994 to mid-2043



Source: Office for National Statistics – National population projections

Table 3: Projected population increase, UK, mid-2018 to mid-2043

	Mid-2043 population (millions)	Population change (millions)	Percentage change
Principal	72.4	6.0	9.0
High population	76.7	10.3	15.4
Replacement fertility	76.4	9.9	15.0
Young age structure	75.5	9.0	13.6
High migration	75.1	8.7	13.1
High fertility	73.4	7.0	10.5
High life expectancy	72.9	6.5	9.8
Constant fertility	71.8	5.3	8.0
Low life expectancy	71.7	5.3	8.0
No mortality improvement	71.4	4.9	7.4
Constant fertility and no mortality improvement	70.7	4.3	6.5
Low fertility	70.6	4.2	6.3
Low migration	69.7	3.3	4.9
Old age structure	68.5	2.0	3.0
Low population	67.2	0.8	1.2
Zero net migration	66.3	-0.2	-0.3

Source: Office for National Statistics – National population projections

4 . Quality and methodology

The National population projections Quality and Methodology Information (QMI) report contains information on the quality characteristics of the projections as well as the methods used to create the data. We have also published information on the decision-making process in [National population projections, how the assumptions are set: 2018-based](#) and [National population projections, background and methodology: 2018-based](#), which contain more background detail on each of the fertility, mortality and migration assumptions.

We have produced the 0% and 50% future EU migration variant projections in response to user needs following consultation. These are user-requested statistics first produced for the 2016-based national population projections (NPPs), and we have produced them again for the 2018-based projections. These statistics remain as user-led variant projections produced to meet specific stakeholder requirements, and they are not classed as [National Statistics](#) because they have not been created using a standard method.

The EU variant assumptions are produced by applying percentage changes by single year of age and sex to the principal international migration assumption. The percentage changes are calculated based on the proportion of all migration that was to and from the rest of the EU during the last three years of long-term international migration estimates. These changes take effect from the year ending mid-2021 onwards.