

Article

Subnational population projections, research report on variant projections: 2014-based projections

This article outlines the research carried out on variant subnational population projections. It reports on the experimental work that has produced a number of variants as a “proof of concept”, and seeks feedback to inform future development.

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Table of contents

1. [Summary](#)
2. [Background](#)
3. [Selection of variants](#)
4. [Findings](#)
5. [Issues](#)
6. [How to provide feedback](#)
7. [Quality and methodology](#)
8. [Background information](#)

1 . Summary

This article reports on the research carried out on variant subnational population projections as a result of the recent [consultation on the 2014-based subnational population projections](#). It discusses some initial options for producing variant subnational population projections and reports on the experimental work that has produced a number of variants as a “proof of concept”. We would like to hear your thoughts on the usefulness of the variants presented and on what other variants might be useful to you. This will help us to consider whether variant subnational population projections should be included as a standard part of the subnational population projections release in future years. Your input will also help us to redevelop a production system for subnational population projections that will meet your needs.

2 . Background

We produce subnational population projections every 2 years. They provide an estimate of the future population size and age structure of local authorities in England. They need to meet user needs but also be produced in a consistent way across all areas. This means that they can be used as a common framework for informing local planning. Their uses include:

- informing local planning of healthcare, education and other service provisions
- forming the basis for other products such as household projections
- providing a basis for researchers and other organisations that also produce their own projections
- allocating funding to local authorities as part of the local government settlement calculations

Over the past few years, users have requested variant subnational population projections. This was particularly evident during the subnational population projections consultation meetings held in February 2016.

As a result, we agreed that we would investigate the potential for producing variant subnational population projections for future releases. We have therefore carried out initial investigations and produced a number of variant subnational population projections. It is important to note, however, that these variants have been produced as a ‘proof of concept’ and are not fully developed statistics.

We are now inviting users to review and provide feedback on the principle of producing variant subnational population projections. In particular, we would like to know:

- are the variants described in this paper useful to you?
- what other variants would you find useful?
- what challenges do you think subnational variants might raise?

Your feedback will help us to consider whether variant subnational population projections should be included as part of the subnational population projections release in future years. It will also provide useful input into the redevelopment of the subnational population projections production system which will soon be undertaken.

Although this work is about a “proof of concept”, it provides an opportunity to consider how variant subnational population projections could be used. Initial work has identified 3 main uses of variant subnational population projections. These are to:

- help explain the possible variability that may occur in a set of projections
- provide an indication of what the projected population may be under alternative scenarios
- help us to understand the impact of any proposed changes to the projections methodology

The work described here is the first step in the development and publication of “for use” variant subnational population projections for England. Such variants would be expected to have a large impact as they would meet identified user requirements and would be likely to feed into issues such as planning policy decisions at a local level.

3 . Selection of variants

The process of selecting variant subnational population projections involved considering a range of possible options and narrowing these down to the following 3 broad categories:

- using a different national constraint – this variant would follow standard subnational projection methodology but would constrain the subnational population projections to one of the national variant population projections
- using different methods for estimating subnational trends – this may be using a different time period for the trend data for a component or removing the requirement to constrain subnational components to their equivalent national component
- making adjustments to specific components, which would affect specific local authorities

Given the limited timescale for this research work, 3 variants were identified and selected to be produced as a “proof of concept”. The selected variants, are not necessarily the most useful, but they illustrate what types of variant subnational population projections could potentially be produced.

The 3 variants produced for this research were:

- high fertility
- zero net migration
- prisoners as a special population

In addition to these 3 variants, we are aware of user interest in variant subnational projections based on different trend estimation periods. Interest in this type of variant was shown at both this year’s and previous consultations. It would use a smaller or larger number of trend data years instead of the average of 5 or 6 years that is currently used. We plan to redevelop the subnational projections production system before the next release and intend to produce a more flexible system able to produce this type of variant. More information on this can be found in Issues (section 5).

The input data for each of the variants produced were gathered and prepared for processing in the subnational population projections system. The methodology and production system used to produce these variant projections are the same as those used in the production of the published subnational population projections. Each variant is considered in more detail below.

High fertility

This variant shows what a subnational population projection would look like using higher rates of fertility. It uses the standard subnational population projections methodology and data but uses the high-fertility national population projection variant as its constraint. It is produced by replacing all the component and population data from the principal national population projection, needed for the constraining process, with the equivalent data from the high-fertility national population projection variant. This approach shows how a variant subnational population projection can be produced that is consistent with an equivalent national population projection variant.

High fertility variant projections are available to download [from our website](#).

Zero net migration

This variant shows what a subnational population projection would look like if there was zero net migration and changes in population were only due to births and deaths. It uses the standard subnational population projections methodology and data. It is produced by replacing all the component and population data from the principal national population projection, needed for the constraining process, with the equivalent data from the zero net migration national population projection variant. This assumes zero net migration from international and cross-border flows. Probabilities of migrating out of an area are set to zero in the subnational component data, setting net internal migration to zero. This approach shows how a variant subnational population projection can be produced that makes specific adjustments to individual components.

Zero net migration variant projections are available to download [from our website](#).

Prisoners as a special population

This variant shows what a subnational population projection would look like if prisoners were treated as a “special population” (that is, assumed to have a static size and age-sex distribution). The variant was produced by using data on prisoners and combining it with data on home armed forces, so that prisoners are treated as a special population group. This approach may be of interest to local authorities with other potentially special populations. The addition of prisoners as a special population directly affects the subnational projections methodology and therefore, the results from this variant will be useful in assessing the impact of a change to the methodology.

Prisoners as a special population variant projections are available to download [from our website](#).

4 . Findings

As part of the quality assurance process, the variant subnational population projections were compared to the published [2014-based subnational population projections](#). The following summarises what these comparisons show. Detailed data analysis has not been included in this report because this analysis was carried out to sense check the variant projections which were produced as a "proof of concept", rather than to draw any conclusions on what they showed. However, the variant projections have been published alongside this report to help users understand them and provide informed feedback. Further information can be found in section 7.

High fertility

The high-fertility variant increases the projected population aged 0 to 25 leading to an overall increase in the projected population for England of 1.2 million by 2039. The local authorities most affected by the high fertility variant are ones that have a higher birth rate in the principal projections. The higher fertility rate also means that some areas further increase their child population by 2039 as additional babies born in the early years of the projection enter their childbearing years. In addition, the migration trends are those that were used in the 2014-based subnational population projections, so the additional population resulting from a higher fertility rate will increase the number of internal migrants where probabilities for moving out of an area are applied.

Zero net migration

This variant shows what the population would look like in the absence of any migration. As expected, the population for England is projected to increase at a slower rate. By 2039, the variant projected population for England is almost 6 million lower than the principal projection. In those areas with the highest percentage population growth in the principal projection, the variant shows an increase in projected population at the end of the projection period but at a lower level than the principal projection. In those areas with the highest percentage population decline in the principal projection, the variant pattern is less consistent. In areas that experience a peak in projected population in the student ages, the variant shows this peak aged 25 years older at the end of the projection period.

Prisoners as a special population

Treating prisoners as a special population does not change the projected population for England. Additional data on prisoners has been added to the projected population, the projections are still constrained to the principal national projection. At the local level, the results show that treating prisoners as a special population increases the projected population by 2039 in areas with large prison populations. The population in these areas is projected to increase across a number of ages, particularly the young to middle age groups when compared with the principal subnational projections. The population in large, urban areas is more likely to see a decrease over the period of the projection.

5 . Issues

Value to users

The principal national population projections are supported by variant projections which provide an indication of uncertainty and sensitivity to alternative assumptions of fertility, mortality and migration. We have produced variant subnational population projections as a "proof of concept" as a result of requests from users. We would like to hear your views on their value and, in particular, on the following:

- would these "proof of concept" variants be useful?
- what other variants would you find useful?
- what challenges do you think they might raise?

Challenges with the current production system

The current subnational projections methodology uses the previous 5 years of data to calculate trends for components such as births, deaths and internal migration, and 6 years of data to calculate trends for international migration. Different approaches to estimating subnational trends were investigated as part of this research. Although the production system is not currently able to produce a projection using an alternative number of trend years, work is planned to redevelop the production system before the 2016-based subnational population projections are released (provisionally planned for 2018). One of the main aims of that work is to produce a more flexible production system that will allow for such adjustments.

Comparisons with the published subnational population projections

For this research work the subnational variant projections are compared with the published [2014-based subnational population projections](#), referred to in this article as the principal projections. Since this research is about a "proof of concept", the comparisons are made to ensure that the production system produces credible variant subnational population projections and to assess how the variant projections compare with the equivalent principal subnational population projections.

Use and interpretation

The variant subnational population projections chosen and produced as a "proof of concept" have been published to support the contents of this report. Further information can be found in section 7. They show how variant subnational population projections may be produced and are being made available to help users understand the value of the variants. They are not National Statistics and users should use the [2014-based subnational population projections](#), published in May 2016, where projections at a subnational level are required.

6 . How to provide feedback

We would like you to review and provide feedback on the concept of producing variant subnational population projections. In particular, whether the variants described in this paper would be useful to you, what other variants you may find useful and what challenges you think they might raise. Your feedback will provide useful input to the future redevelopment project of the subnational projections production system, which is due to be undertaken.

Please send your comments to projections@ons.gsi.gov.uk.

7 . Quality and methodology

The [Subnational Population Projections Quality and Methodology Information document](#) contains important information on:

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

The methodology has been designed with the intention of best meeting your requirements and we welcome any comments or suggestions.

There has been a change to the methodology used to produce the 2014-based national population projections so that migration rates are now used for the intra-UK cross-border flows rather than constant assumed flows. This means that the national population projections are no longer affected by a constant number of intra-UK migrants being applied to population structures which may change over time. The subnational population projections are constrained to the national population projections, so this improvement is reflected in the 2014-based subnational population projections at local authority level.

8. Background information

1. The variant subnational population projections produced as a "proof of concept" and published to support the contents of this report are high fertility, zero net migration and prisoners as a special population.
2. The subnational population projections [methodology report](#) provides background information on the methodology and data sources that are used to produce the subnational population projections.
3. The subnational population projections are produced on a consistent basis across all local authorities in England. The [2014-based subnational population projections](#) for England published in May 2016 are based on the [mid-2014 population estimates](#) published in June 2015 and are consistent at a national level with the [2014-based national population projections](#) for England published in October 2015.
4. A new set of projections is normally made every second year. Full details of the [2012-based subnational population projections](#) are available on the National Statistics website. The [2010-based subnational population projections](#) were published in March 2012. An interim set of [2011-based subnational population projections](#) were produced in September 2012 to take account of the results of the 2011 Census.
5. Assumptions made about future fertility, mortality and migration at local authority level in the 2014-based subnational population projections are based upon recent observed trends from the components of change which are published with the latest mid-year population estimates. The assumptions do not take account of future policy changes nor local development policies that have not yet occurred.
6. The 2014-based subnational population projections are produced on local authority boundaries in place at mid-2014.