

Article

Transforming population statistics, comparing 2021 population estimates in England and Wales

Evaluating progress towards a transformed population statistics system, using comparisons between census-based and admin-based population estimates and Census 2021.

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Release date:
28 February 2023

Next release:
To be announced

Table of contents

1. [Overview of transforming population statistics in England and Wales](#)
2. [Census-based and admin-based population estimates](#)
3. [Evaluating the quality of census-based and admin-based population estimates](#)
4. [Definitional differences and quality considerations](#)
5. [Future developments](#)
6. [Related links](#)
7. [Cite this article](#)

1 . Overview of transforming population statistics in England and Wales

- As outlined in our blog post [Revolutionising administrative data: a look into the future of population and migration statistics](#), we have published a range of estimates and analysis on the size and structure of the usual resident population of England and Wales in 2021; these estimates include our official population estimates and those produced as part of our research towards transforming our population and migration statistics system.
- This article compares these different estimates, explaining differences in quality and providing links to the more detailed articles that underpin these findings.
- Overall, our admin-based population estimates (derived from our dynamic population model) show promise, producing estimates within 0.6% of our Census 2021-based mid-year estimates; this gives users an indication of the level of quality they can expect from our transformed estimates in the future.
- We have also demonstrated the need to put in place a robust estimation method to adjust for coverage error to support delivering estimates to a quality that meets user needs.

Some statistics in this report are not official statistics (admin-based population estimates and Statistical Population Datasets) and should not be used for decision-making. They are estimates based on new methodologies that are different from those currently used to produce official population and migration statistics. The information and research in this article should be read alongside the estimates to avoid misinterpretation. These outputs must not be reproduced without this warning.

2 . Census-based and admin-based population estimates

In June 2022, we published our first results from Census 2021, providing our best estimate of the usual resident population of England and Wales for 2021. Since then, we have published a range of additional estimates on the size and structure of the usual resident population of England and Wales in 2021, which were produced using different methods and data sources.

The statistics published represent our best understanding of the usual resident population in England and Wales and can be categorised in the following two ways.

Census-based estimates

These are our official estimates that rely on the census base along with other sources to capture population change. These estimates are accredited as National Statistics and should be used for decision-making. We will refer to these as census-based estimates throughout this article. There are three different census-based estimates that we refer to in this article, they are the:

- Census 2021 estimates that refer to a reference date of 21 March 2021
- Census 2021-based mid-year estimates (MYE) that refer to a reference date of 30 June 2021 (mid-year) and were produced by rolling forward from the Census 2021 by adding births and people arriving in the country, and removing deaths and people leaving the country; MYE at local authority (LA) level are also adjusted according to moves into and out of each LA
- 2021 rolled-forward MYE that refer to a reference date of 30 June 2021 and were produced by rolling forward yearly from Census 2011; this estimate is indicative of the quality that our current official estimates would be if we were no longer able to benchmark to a census every 10 years, more information can be found in [Reconciliation of mid-year population estimates with Census 2021, England and Wales](#).

Admin-based estimates

These transformation research outputs are predominantly based on administrative sources, supported by other sources. While these are not official statistics and should not be used in decision-making, they do represent our progress towards improving our population statistics and achieving National Statistics accreditation in the future. We will refer to these as admin-based estimates throughout this article. We refer to four different admin-based estimates in this article, all of which refer to a reference date of 30 June 2021, they are the:

- admin-based population estimates (ABPE) best estimate; this represents our best estimate derived from our new [dynamic population model \(DPM\)](#) and uses the best available data, including Census 2021, and a statistical modelling approach to estimate population and population change in a timely way to better respond to user needs
- ABPE future estimate that is indicative of what users might expect from our transformed population estimates derived from the DPM in the future, assuming that there is no longer a census; this estimate includes a proxy for a coverage adjustment method to adjust for bias in our Statistical Population Dataset (SPD) and does not directly include the Census 2021 estimate
- ABPE basic estimate that is included to show the quality of estimates we can derive from a basic DPM that does not include Census 2021 or a robust coverage adjustment method; more information about these versions of our ABPEs can be found in [Dynamic population model, improvements to data sources and methodology for local authorities, England and Wales: 2011 to 2022](#).
- unadjusted SPD that shows the quality of our SPD (in this case, SPD version 4.0), before it is included in the DPM model, and without a coverage adjustment method; more information on the methods and data sources used in the SPD and how it feeds into the DPM can be found in [Developing Statistical Population Datasets, England and Wales: 2021](#).

3 . Evaluating the quality of census-based and admin-based population estimates

Table 1 provides a summary of each of the 2021 population estimates described in [Section 2](#). For each estimate, the table includes the total population estimates for England and Wales, the percentage difference from the Census 2021-based mid-year estimates (MYE), and the percentage of local authorities that meet our maximum quality standard (within plus or minus 3.8% of the Census 2021-based MYE). We are looking for 97% of all LAs to meet this quality standard. For the total England and Wales population we are looking to be within 0.15% of the Census 2021-based MYE. (Read our [Beyond 2011 Options Report 2 for more information](#))

Table 1: Census-based and admin-based population estimates for England and Wales, 2021

Population estimate	Total population England and Wales	Percentage difference to Census 2021-based MYE	Percentage of LAs meeting P1 quality standard
Census 2021	59,597,300	-	-
Census 2021-based MYE	59,641,800	-	-
2021 rolled-forward MYE	59,910,300	0.5%	83.4%
ABPE best estimate	59,648,400	0.0%	100.0%
ABPE future estimate	60,015,600	0.6%	99.7%
ABPE basic estimate	60,331,000	1.2%	91.5%
Unadjusted SPD	58,935,000	-1.2%	64.4%

Source: Mid-year estimates, admin-based population estimates and Statistical Population Datasets from the Office for National Statistics

Notes

1. P1 quality standard is the maximum quality standard set out in evaluation criteria of the Beyond 2011 programme. At the LA level the P1 quality standard was to be within positive or negative 3.8% of the 2011 Census estimate. We are planning to publish updates to the quality standards using Census 2021 later this year.

The results in Table 1 highlight the following four important findings:

- our admin-based population estimates (ABPE) best estimates are of similar quality to the Census 2021-based MYE, this is not surprising given that the ABPEs use the Census 2021-based MYE as an input; the ABPE best estimate comfortably meets both the national and sub-national quality standards
- while lower quality than the Census 2021-based MYE or ABPE best estimate, our ABPE future estimate still provides a high-quality population estimate; this gives us confidence that once we have a robust estimation method to adjust for coverage error in place, we will be able to produce population estimates that meet our quality standards each year, even without a census every 10 years
- the 2021 rolled-forward MYE and ABPE basic estimate provides an indication of how our official and transformed population estimates, respectively, would perform without a census or coverage adjustment; neither estimate meets our quality standards, which suggests that without a census there would be a need for some type of coverage adjustment. See [Reconciliation of mid-year population estimates with Census 2021, England and Wales](#) for more information on what is causing the differences between MYE estimates
- the low percentage of LAs falling within quality standards for the unadjusted Statistical Population Dataset (SPD) population count provides further evidence that we need to adjust for coverage errors in the SPD to produce ABPEs that meet the required quality standards

Figure 1: Coverage adjustment of the Statistical Population Dataset is needed to produce high-quality admin-based population estimates

Total percentage difference by local authority for 2021 population estimates compared with Census 2021-based mid-year estimates, England and Wales

Notes:

1. Data points may not appear in the exact expected position because of chart design and many LAs having similar percentage differences to Census 2021-based MYE, particularly for ABPE best estimate when many LAs have 0% difference to Census 2021-based MYE. Exact percentage differences can be seen by hovering over specific data points.
2. Dashed lines represent the P1 quality standard, indicating LAs that fall within plus or minus 3.8% of Census 2021-based MYE.

Download the data

[.xlsx](#)

Important findings from Figure 1 show that:

- the spread of the distribution for LA population estimates are widest for the unadjusted SPD, and narrowest for the ABPE best estimate, when compared with the Census 2021-based MYE
- there are large outliers in the ABPE basic estimate that are likely to be driven by error in the unadjusted SPD, particularly in areas with high levels of movement into and out of these areas (migration)
- there are also some large outliers in the 2021 rolled-forward MYE; this shows how error has built up in certain areas between the 2011 Census and Census 2021, which can probably be attributed to international and internal migration over the decade
- the spread of the ABPE future estimate is narrow and all but one LA falls within the required quality standard

Further detail on these LA patterns for our admin-based estimates can be found in our [Developing Statistical Population Datasets, England and Wales: 2021](#) article, and our [Admin-based population estimates: provisional estimates for local authorities in England and Wales, 2011 to 2022](#) article.

4 . Definitional differences and quality considerations

When comparing population estimates for 2021, we need to consider the definitional differences between them and how these might contribute to our findings.

We have used the Census 2021-based MYE rather than the Census 2021 estimates referenced as at 21 March 2021 as a comparator for our admin-based estimates in this article, to ensure we are comparing estimates from the same reference period (mid-year).

Census-based estimates are produced from census responses and adjustments made for non-response. As the census took place during a period of lockdown, it is possible that the circumstances may have affected some people's place of usual residence, which may be different to the information captured in the administrative sources for the same period. This may result in differences when comparing the census-based and admin-based population estimates, particularly at local level. Further information on the quality of the Census 2021 can be found in our [Quality and Methodology Information \(QMI\) for Census 2021](#). This emphasises the importance of producing more timely estimates that reflect a rapidly changing population.

5 . Future developments

Our research next steps all include a focus on quality.

We have work underway to develop a robust coverage adjustment method using a coverage survey. This work focuses on putting in place an interim solution for our next publication this summer, as well as developing a long-term strategy as the admin-based population estimates (ABPE) transition towards becoming National Statistics in the future. Further information on our options for developing this method is available in the [SPD Estimation Options paper published on the UKSA website \(PDF, 1271KB\)](#).

We will develop quality measures for all important data sources that feed into the dynamic population model. This includes our coverage-adjusted Statistical Population Datasets (SPD), our international migration estimates and our internal migration estimates. It also includes having quality measures for individual data sources that are used.

We will also focus on understanding the quality of the ABPE for 2021 and 2022 in more detail, at more granular levels. This will be done through a mix of aggregate analysis and continuing to progress our linkage research between the Census 2021, Census Coverage Survey and SPD. This will allow us to understand where quality improvements are needed.

Alongside the estimates themselves, we have published further detail on the data sources and methods used to produce them, and more detailed analysis describing what we have learned about their quality using comparisons with Census 2021 and Census 2021-based MYE. These articles include further information on our next steps and are available in [Section 6: Related links](#).

6 . Related links

[Reconciliation of mid-year population estimates with Census 2021, England and Wales](#)

Article | Released 28 February 2023

Outlines reasons for differences between the Census 2021-based MYE and the 2021 MYEs rolled forward from 2011 Census.

[Dynamic population model, improvements to data sources and methodology for local authorities England and Wales: 2011 to 2022](#)

Methodology | Released 28 February 2023

Methodology paper focusing on improvements made to the data sources and methods used to produce the admin-based population estimates (ABPEs).

[Admin-based population estimates: provisional estimates for local authorities in England and Wales, 2011 to 2022](#)

Article | Released 28 February 2023

Admin-based population estimates for all local authorities in England and Wales from the dynamic population model.

[Developing Statistical Population Datasets, England and Wales, 2021](#)

Article | Released 28 February 2023

Includes analysis of the SPD compared with Census 2021.

[Understanding quality of the Statistical Population Dataset in England and Wales using the 2021 Census - Demographic Index linkage](#)

Article | Released 28 February 2023

Analysis of Statistical Population Dataset version 4.0 2021 using a linkage between Census 2021 and the Demographic Index.

[Understanding quality of linked administrative data sources in England and Wales, using the 2021 Census – Demographic Index linkage](#)

Article | Released 1 March 2023

Analysis of linkage between the Demographic Index and linked census and Census Coverage Survey to understand the quality of administrative data sources in England and Wales.

7 . Cite this article

Office for National Statistics (ONS), released 28 February 2023, ONS website, article, [Transforming population statistics, comparing 2021 population estimates in England and Wales](#)