Office for National Statistics

Article

Admin-based population estimates: local authorities in England and Wales, mid-2021 to mid-2023

Updated admin-based population estimates for all local authorities in England and Wales, mid-2021 to mid-2022 and provisional estimates for mid-2023.

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1 . Main points

- These admin-based population estimates (ABPEs) are official statistics in development that demonstrate our ability to produce provisional population estimates for mid-2023 six months earlier than would be possible using current methods.
- The ABPEs do not replace official mid-year population estimates and international migration statistics released on 23 November 2023 and should not be used for decision or policy making.
- We have produced provisional ABPEs for mid-2023 for all 318 local authorities in England and Wales using the dynamic population model (DPM) .
- Provisional mid-2023 ABPEs for England and Wales give a population of 60.8 million; a 1.1% (651,000) increase on the updated mid-2022 ABPE.
- The increase in population between the updated mid-2022 ABPEs and provisional mid-2023 ABPEs was comprised of 597,000 births, 564,000 deaths and net migration of 619,000, which includes international migration and migration between England and Wales and other parts of the UK.
- For England, the total provisional ABPE for mid-2023 was 57.7 million people (1.1% increase from mid-2022); for Wales it was 3.2 million people (1.1% increase from mid-2022).
- We have also produced updated ABPEs for mid-2021 and mid-2022; for England and Wales, these estimates are less than 0.1% lower than the ABPEs published in June 2023.
- We have further developed our methods and updated our input data since our previous publication in June 2023, so that the ABPEs reflect the latest available estimates of internal, cross- border and international migration for England and Wales.
- These official statistics in development are part of our population and migration statistics transformation programme; this work is ongoing and will be informed by feedback we have received in our recent consultation on the future of population and migration statistics.

These are official statistics in development because we continue to refine our methods. They do not replace official mid-year population and international migration estimates and should not be used for decision making. These outputs must not be reproduced without this warning.

2 . Overview of admin-based population estimates using the dynamic population model

Transforming population statistics

The census has evolved over time, providing a snapshot every 10 years into who we are and how we live. Our census-based mid-year estimates (MYE) have provided the best picture of population at a moment in time for many years. They are accredited as National Statistics, meaning that they meet the standards of trustworthiness, quality, and value, set out in the Code of Practice for Statistics. Official mid-year estimates (MYEs) for 2022 were published on 23 November 2023, following a delay due to quality issues in some of the data used for the internal migration component of the estimates, which required further research and development to address. The flexibility of the DPM enabled 2022 ABPEs to be updated in June 2023 accounting for these quality issues within the credible intervals. There is typically a 12-month lag between the reference period of the MYE and their publication. The coronavirus (COVID-19) pandemic underlined the need for more timely population estimates. We are researching new ways to produce population and social statistics with improved efficiency and timeliness by making the best use of administrative data already available.

In July 2022 we introduced the dynamic population model (DPM) as our future proposal for producing timely, coherent population statistics. Like the current mid-year estimates, the DPM uses the cohort component method, but makes use of a wider range of data sources.

The DPM balances the available information on the usual resident population at specific points in time (stocks) with information about changes in population over time (flows) to produce a coherent set of estimates. The admin-based population estimates (ABPEs) produced by the DPM and the data sources used as inputs refer to mid-year (30 June) for the reference year.

A significant advantage of the DPM is its flexibility. While it uses administrative data sources as stock datasets each year, it can incorporate other data sources as and when they become available. This could include sources relating to local areas or specific population groups, or sources that represent the total population. The model can also adapt to quality issues in our underlying data sources, by drawing strength across sources and balancing information from population stocks and flows depending on their levels of uncertainty. With these results, we demonstrate our ability to produce provisional estimates for mid-2023 for all local authorities in England and Wales, six months earlier than would be possible using the current MYE methods.

In this article the ABPEs are defined as official statistics in development because we continue to refine our methods for producing them and these are still subject to further evaluation. Therefore, these statistics should not be used for decision-making. However, the ABPEs demonstrate the potential to produce more timely and coherent estimates of the population compared with our current approaches. The Office for National Statistics (ONS) will seek National Statistics status once we have developed the methods for producing the ABPEs to an appropriate standard, and after further consultation with users. A companion article sets out the details of the developments in data sources and methodology.

Improvements since June 2023

In this article we provide an update to our provisional ABPEs for mid-2021 to mid-2022, as well as provisional estimates for mid-2023. Since our last publication in June 2023, we have incorporated the following improvements to our ABPE method:

- updated the input data, including the rebasing of internal, cross border and international migration estimates following Census 2021 and the latest available estimates of long-term international migration, which incorporate improved methods
- updated the estimation method to use a Laplace approximation method rather than a particle filtering approach
- included population stock data for 2022 from the Statistical Population Dataset (SPD) version 4.1
- included population stock data for 2022 and 2023 from the Personal Demographic Service (PDS)

We also provide comparisons of the updated ABPEs for mid-2021 to mid-2022 with their respective official MYEs.

We will further update these APBEs as we continue to develop the methodology and as updated input data sources become available. These improvements and plans for further development are described in more detail in a companion article.

Our Population statistics and sources guide helps users find the right population statistics for them.

3 . Admin-based population estimates for mid-2023

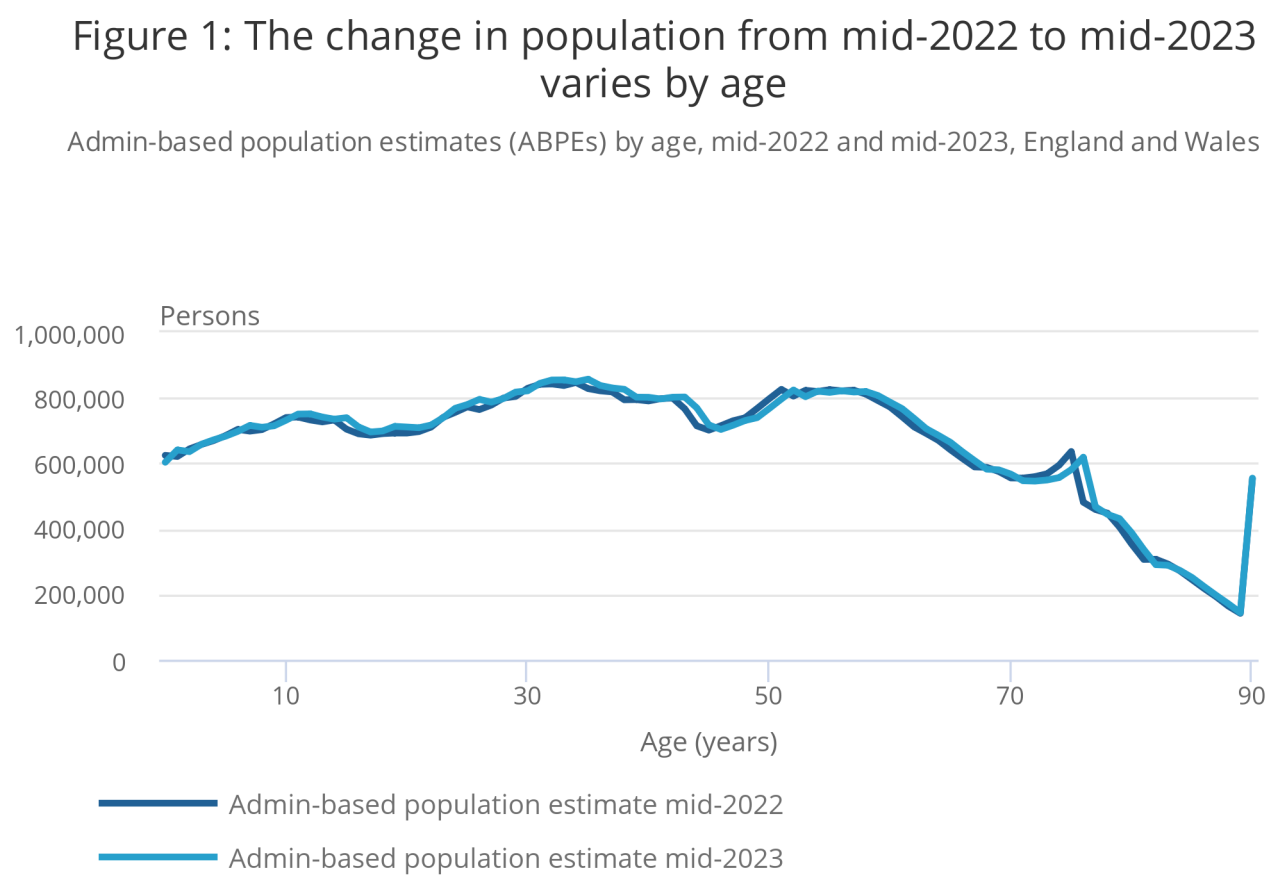
This article presents findings from our admin-based population estimates (ABPEs) from the dynamic population model (DPM). These ABPEs incorporate official Census 2021-based mid-year estimates (MYEs) as our population stock in June 2021, including uncertainty measures derived from Census 2021. The DPM uses this information along with admin-based population stocks, birth and death counts and statistical models for inflows and outflows, as well as birth, death, and migration rates, to produce ABPEs for mid-2023.

Our updated ABPEs for mid-2021 and mid-2022 and provisional ABPEs for mid-2023 are not directly comparable with the ABPE best estimates time series for mid-2011 to mid-2020 published in February 2023, as they now incorporate rebased official international and internal migration flows using Census 2021 results.

Our provisional ABPE for mid-2023 for England and Wales was 60.8 million people, a 1.1% increase on the mid-2022 ABPE. For England the estimate for mid-2023 was 57.7 million people (1.1% increase) and for Wales the estimate was 3.2 million people (1.1% increase).

Figure 1: The change in population from mid-2022 to mid-2023 varies by age

Admin-based population estimates (ABPEs) by age, mid-2022 and mid-2023, England and Wales



Source: Admin-based population estimates (ABPEs) from the Office for National Statistics

Notes:

1. Population at age 90 years refers to all age 90 years and over.

2. Admin-based population estimates for mid-2023 are provisional.

The change in population between two consecutive years for a given age is determined by ageing of the relevant birth cohorts and by components of change (births, deaths and migration). Between mid-2022 and mid-2023, there have been increases in the population of older children and young adults mainly because of migration (this includes migration between England and Wales and other parts of the UK, as well as international migration). The population aged 70 years and over has also increased as people are living longer and reaching older ages. Changes around ages 71 to 77 years reflect rapid changes in birth cohort sizes immediately after World War 2.

In 93% of local authorities, the population increased between mid-2022 and mid-2023. Changes in the size of local authority populations during this period may have been influenced by changes in migration following the coronavirus (COVID-19) pandemic, such as increased flows to urban areas, rather than to rural and coastal locations.

Excluding City of London as an outlier due to its very small population, the largest percentage increases in population between mid-2022 and mid-2023 were in Coventry (3.9%), Tower Hamlets (3.8%), Camden (3.6%) and Manchester (3.3%).

Out of all 318 local authorities, 22 (7%) show a decrease in population between mid-2022 and mid-2023, with the largest percentage decreases in Rutland (1.0% lower), Haringey (0.9% lower) and St Albans (0.6% lower).

Figure 2: Cities and London boroughs show the largest increases in population

Percentage change in population, mid-2022 to mid-2023, local authorities in England and Wales

Notes:

1. Measures for local authorities with small populations may be less robust than larger local authorities.
2. Isles of Scilly and City of London have very small populations which can often lead to outlying results. City of London (12.2% increase) has not been included in this chart for this reason.

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The interactive population pyramid in Figure 4 shows how the age and sex structure of our provisional mid-2023 ABPEs varies by local authority.

4 . Comparing admin-based population estimates with official mid-year estimates

Official mid-year population estimates (MYEs) for 2022 were published in November 2023 alongside rebased MYEs for the period 2012 to 2020 to align with Census 2021 results.

Updated admin-based population estimates (ABPEs) are very similar to official MYEs; our total ABPEs for England and Wales for mid-2021 and mid-2022 are both 0.1% lower than the corresponding MYEs.

ABPEs are produced using statistical modelling techniques and the cohort component method. As our official MYEs are produced using different data sources and methods centred around the same cohort component approach, the ABPEs and MYEs are not expected to match exactly.

Table 1: Updated admin-based population estimates and mid-year estimates, mid-2021 and mid-2022, England and Wales

Mid-year	Updated admin-based population estimate (ABPE)	Official mid-year estimate (MYE)	Percentage difference
2021	59,602,809	59,660,524	-0.1
2022	60,180,615	60,238,038	-0.1

Source: Admin-based population estimates (ABPEs) and mid-year estimates (MYEs) from the Office for National Statistics

Notes

1. ABPEs have been rounded to the nearest whole number; the percentage difference has been calculated using the unrounded ABPE.

Differences between the ABPEs and MYEs vary by local authority. Mid-2022 ABPEs were greater than official MYEs in 55% of all local authorities (176 out of 318). Of these, the percentage difference between the ABPE and MYE was greatest for Wyre (ABPE 0.6% higher), Shropshire (ABPE 0.6% higher), Tendring (ABPE 0.5% higher) and Stratford-on-Avon (ABPE 0.5% higher). In mid-2021, these areas also had some of the greatest percentage differences behind City of London (ABPE 2.0% higher) and alongside Bolsover (ABPE 0.5% higher in mid-2021 and 0.4% higher in mid-2022). City of London has a very small population which can often lead to outlying results.

Among the local authorities where the mid-2022 ABPE was lower than the official MYE, the percentage difference was most notable in Westminster (ABPE 1.3% lower), Burnley (ABPE 1.2% lower) and Kensington and Chelsea (ABPE 1.0% lower); these local authorities also had the greatest percentage differences between the mid-2021 ABPE and MYE.

It should be noted that there is uncertainty around population estimates produced using both the dynamic population model (DPM) and the MYE methodology. Credible intervals for the ABPEs by single year of age, sex and local authority are provided in the admin-based population estimates for local authorities in England and Wales dataset. MYEs at the total local authority population level lie within the ABPE credible intervals for all local authorities for mid-2022 and mid-2021 with the exception of City of London, Rother and Rochford where the mid-2021 MYE is marginally lower than the ABPE lower credible interval bound.

Figure 3: The differences between admin-based population estimates and mid-year estimates vary by local authority, with the largest differences generally found in cities and more urban local authorities

Total percentage difference between admin-based population estimates (ABPEs) and mid-year estimates (MYEs), mid-2021 and mid-2022, local authorities in England and Wales

Notes:

1. The percentage difference has been calculated using the unrounded ABPE.

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In England and Wales, the mid-2023 ABPEs showed a population of 29.9 million males and 31.0 million females. Figure 4 shows that differences between the ABPEs and MYEs vary by local authority, single year of age and sex.

Figure 4: At the local authority level, differences between annual ABPEs and MYEs vary by age and sex

Admin-based population estimates (ABPEs) and mid-year estimate (MYEs) by age and sex, mid-2021 to mid-2023, local authorities in England and Wales

Notes:

1. Mid-year estimates (MYEs) for 2023 are not yet available.
2. Credible intervals for the ABPEs by single year of age, sex and local authority are provided in the admin-based population estimates for local authorities in England and Wales dataset.

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5 . Case study: admin-based population estimates for Oxford

In our previous publications, we analysed population estimates for Oxford as a way of showing how changing methods and input data affect the admin-based population estimates (ABPEs). Our updated ABPEs for the male population in Oxford from mid-2021 and mid-2022 alongside provisional estimates for mid-2023 show a population age profile peaking sharply at age 19 years in mid-2021, shifting to age 20 years in mid-2022 and age 21 years in mid-2023 as the cohort ages. The same trend is seen for both males and females and is also present in the official mid-year estimates (MYEs) for mid-2021 and mid-2022, it contrasts with earlier years where MYEs consistently peak at age 20 to 21 years.

Figure 5: Oxford male population age profile in admin-based population estimates

Updated admin-based population estimates (ABPEs) for males aged 40 years and under, mid-2021, mid-2022 and provisional mid-2023, Oxford local authority

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Our provisional mid-2022 ABPEs published in February 2023 showed a shift in age peak in the Oxford male population estimates, with a very sharp population peak for those aged 20 years for mid-year 2022. This sharp peak was reduced in our updated ABPEs for mid-2022 published in June 2023 bringing the age-profile more in line with the long-term trend. These estimates have been further updated in this release by including population stock datasets for 2022 and 2023 and are similar to the official MYEs. Credible intervals show the levels of uncertainty in the estimates; the credible intervals for the updated mid-2022 ABPEs are generally much narrower than those for the previous set of ABPEs published in June 2023. We expect to make further improvements, particularly for 2023, by inclusion of updated data and exploring developments to the coverage adjustment approach for administrative population stock datasets.

Figure 6: Oxford male population age profile in admin-based population estimates is similar to official mid-year estimates

Admin-based population estimates (ABPEs) and mid-year estimates (MYEs) for males aged 40 years and under, mid-2022, Oxford local authority

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6 . Admin-based population estimates: local authorities in England and Wales, mid-2021 to mid-2023 data

Admin-based population estimates for local authorities in England and Wales
Dataset | Released 18 December 2023
Admin-based population estimates for all local authorities in England and Wales from the dynamic population model.

7 . Glossary

Administrative data

Collections of data maintained for administrative reasons, for example, registrations, transactions, or record-keeping. They are used for operational purposes and their statistical use is secondary. These sources are typically managed by other government bodies.

Credible intervals

The range in which the true value of the quantity being estimated is likely to be contained. This is a similar concept to the confidence intervals published for the current MYE and Census estimates. We use 95% credible intervals in this article by taking 2.5th and 97.5th percentiles from the distributions of counts produced by our estimation process as the lower and upper bounds of our intervals respectively. In this case, we can say that the probability that the true value lies in the credible interval is 95%.

Dynamic population model

A dynamic population model (DPM) is a statistical modelling approach that uses a range of data to measure the population and population changes in a fully coherent way.

Official statistics in development

Official statistics that are in the testing phase and not yet fully developed. A more detailed explanation is available.

8 . Future developments

The dynamic population model (DPM) and resulting admin-based population estimates (ABPEs) are showing great potential for producing timely, coherent population statistics. We are aiming for the ABPEs to be our official population estimates. Our recent consultation on the future of population and migration statistics asked users to provide feedback about our research so far. This feedback will inform further research, publication cycles and our revisions policy. The National Statistician will make a recommendation on the future of population statistics in 2024.

9 . Provide feedback

We welcome your feedback on the dynamic population model (DPM), our transformation journey, and our latest progress and plans. If you would like to contact us, please email us at pop.info@ons.gov.uk.

We have launched our Local population statistics insight feedback framework, which enables users of population statistics to provide feedback at local authority level and suggest data sources for us to better understand the quality of our estimates.

You can also sign up to email alerts from the Office for National Statistics Population team for updates on our progress, and to hear about upcoming events and opportunities to share your views.

10 . Collaboration

The Office for National Statistics (ONS) has been supported in this research by the University of Southampton. Specifically, we would like to thank John Bryant, Peter Smith, Paul Smith, Jakub Bijak, Jason Hilton, Andrew Hind, Erengul Dodd and Joanne Ellison for their guidance and support.

11 . Related links

Dynamic population model, improvements to data sources and methodology: local authorities in England and Wales, updated mid-2021 and mid-2022 and provisional mid-2023
Methodology | Released 18 December 2023
Update on the data and methodology used by the dynamic population model (DPM) to produce admin-based population estimates (ABPEs). These are Official Statistics in development.

Admin-based population estimates: updated estimates for local authorities in England and Wales, 2021 to 2022
Article | Released 27 June 2023
Updated admin-based population estimates for all local authorities in England and Wales, 2021 to 2022.

Dynamic population model, improvements to data sources and methodology for local authorities, England and Wales: 2021 to 2022
Methodology | Released 27 June 2023
Update on the data and methodology used by the dynamic population model (DPM) to produce admin-based population estimates (ABPE). Experimental Statistics.

Population estimates for England and Wales: mid-2022
Statistical bulletin | Released 23 November 2023
National and subnational mid-year population estimates for England and Wales by administrative area, age and sex.

12 . Cite this article

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