

Understanding mid-year admin-based population estimates for local authorities in England and Wales

This methodology brings together important information about our mid-year admin-based population estimates (ABPEs) for England and Wales.

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1 . Status of mid-year admin-based population estimates

We are developing population statistics that make greater use of administrative data. Our mid-year admin-based population estimates (ABPEs) for England and Wales are [official statistics in development](#) while we refine our methods and the data sources used to estimate the usual resident population. ABPEs do not currently replace official mid-year population estimates or international migration estimates, and should not be used for policy or decision making.

We are aiming for our ABPEs to become the official mid-year population estimates in 2025. We will undertake engagement in autumn 2024 to gather feedback on the new approach, including with local authorities, so we can draw on local insight as we improve the estimates. This user feedback will be used as part of the criteria to support the decision on when the ABPEs will become the official mid-year population estimates. We have also requested [an assessment of our ABPEs](#) and are working to meet the standards expected of [Accredited official statistics](#) by summer 2025.

We published [provisional mid-2023 ABPEs for local authorities in England and Wales](#) in December 2023 and updated mid-2023 ABPEs in July 2024. Commentary for our July release is provided in our [Population estimates for England and Wales: mid-2023 bulletin](#) alongside the latest official estimates. This allows users to compare the ABPEs with official population estimates.

2 . Developing population statistics to make greater use of administrative data

We are working continuously to improve the statistics available to our users by providing more frequent population statistics of consistent quality every year. For over 200 years, the census has provided the basis of population statistics, offering a detailed understanding of society at a national and local level every ten years. However, census-based population estimates become less accurate as we move further from the census date, and local detail on important topics is not available between census years.

Policy users and decision makers have often reported that they would benefit from more frequent and timelier statistics. We are developing outputs that make greater use of administrative data to help us meet these needs. Using a range of sources from across government and the public sector, we can produce more frequent and timelier national and local statistics about the size and structure of the population.

Our [Transforming the way we produce statistics video on YouTube](#) provides more information about why we are developing the way we produce our statistics.

3 . Provisional and updated population estimates

We publish provisional and updated mid-year admin-based population estimates (ABPEs) which make the best use of all available information.

Provisional estimates make use of incomplete data alongside some assumptions about migration. Updated estimates include additional data that have become available.

Provisional mid-year ABPEs provide an early indication of the size of the population for local authorities in England and Wales. Provisional ABPEs are usually published around six months after the reference period. Improved updated estimates are usually provided around 12 months after the reference period. Traditionally, there has been a 12-month lag between the reference period and the publication of official mid-year population estimates.

4 . Counting people where they usually live

Like our official mid-year population estimates, our admin-based population estimates (ABPEs) are consistent with the standard [UN population definitions](#). This is based on the concept of "usual residence" and includes people who reside, or intend to reside, in the country for at least 12 months, whatever their nationality. Visitors and short-term migrants (who enter or leave the UK for less than 12 months) are not included. Students are taken to be resident at their term-time address.

Members of His Majesty's Armed Forces stationed in England and Wales are included at their place of residence but those stationed outside England and Wales are excluded. Members of the US armed forces and their dependants stationed in England and Wales are included.

The usually resident population does not always coincide with the number of persons to be found in an area at a particular time of day or year. The daytime populations of cities and the summertime populations of holiday resorts, for example, will normally be larger than their usual resident populations.

Our [Population and migration estimates - exploring alternative definitions: May 2023 article](#) considers new ways of estimating the population to enhance our existing statistics.

5 . Population stocks and flows

Mid-year admin-based population estimates (ABPEs) are produced by balancing data on population stocks and flows.

Population stocks are estimates of the population at specific points in time; we use population stocks relating to mid-year (30 June).

Flows estimate changes to the population stock over time, using data on births, deaths, international migration, internal migration and cross-border moves. Cross-border moves are where people move, in either direction, between England and Wales (combined), Scotland and Northern Ireland. The flow estimates we use cover the 12-month period to mid-year (30 June).

6 . Uncertainty around the population estimates

Measures of statistical uncertainty provide users with information about the quality of population estimates. Mid-year admin-based population estimates (ABPEs) are subject to uncertainty related to the measurement of population stocks at specific points in time and the components of population change over time.

The dynamic population model (DPM) which produces the ABPEs, generates a sample from the distribution of population and migration counts, which represents a set of plausible values, given the uncertainty of the inputs.

Our ABPEs are the average (mean) value from the distribution. The uncertainty around the ABPEs is illustrated by [credible intervals \(Git Hub\)](#) which are generated from the distribution. Credible intervals are published alongside the ABPEs and show the range of possible estimates. The probability that the true value lies in the credible interval is 95%.

Credible intervals are provided for each age and sex within each local authority. They cannot be aggregated to provide credible intervals across combined groups. We are investigating how we can provide estimates of uncertainty at all levels of aggregation. Estimates of uncertainty at the aggregate local authority level are available in our [ABPEs for local authorities in England and Wales dataset published in July 2024](#).

Further information on our ABPEs and their quality assurance, appropriate uses and strengths and limitations, is available in our [Mid-year admin-based population estimates in England and Wales Quality and Methodology Information \(QMI\)](#) report.

7 . Revisions

To meet user requirements for timely estimates using administrative data sources, we initially produce provisional estimates, we then revise these as more data become available. Revisions are a standard part of producing timely estimates.

In statistical outputs, we refer to the planned updates resulting from improvements to data or methods as revisions. Our transition to a new population and migration statistics system means that how we think about revisions is changing. Our article [The future of population and migration: a statistical design](#) provides more information on the principles that will guide our approach.

8 . How we estimate the population using administrative data

Our mid-year admin-based population estimates (ABPEs) are produced using the dynamic population model (DPM).

The DPM builds on the cohort component method that has been used to produce our official mid-year population estimates (MYEs) for many years. It extends our existing MYE methods, incorporating statistical modelling to take account of underlying demographic trends and to allow for differing levels of coverage and uncertainty associated with input data. The DPM supports the use of an increasing range of data sources, enabling our ambition to maximise and optimise the use of administrative data.

The DPM estimates the size of the population each year for all local authorities by single year of age and sex, using independently estimated population stocks, flows and demographic trends. Using independent population stocks each year helps to reduce the uncertainty that, in the current system, increases as we move further away from a census. This is a known limitation of the current mid-year population estimate methodology, which rolls forward our census-based population estimates.

The DPM can take account of any quality limitations in the underlying data sources and draws strength across the wide range of data sources being used. It balances input data on population (stocks) at specific points in time, with the components of population change (flows of births, deaths, and migrants) over time. This results in a distribution of potential population and migration counts.

Our ABPEs are the average (mean) value from the distribution. The uncertainty around the ABPEs is illustrated by credible intervals, which show the range of possible estimates.

The DPM has been developed using a [software environment for statistical computing, known as "R"](#). We plan to make the code available in an open source format in the future, as part of our commitment to continuous improvement and transparency.

Published in February 2023, the [Design and implementation of the dynamic population model technical paper \(PDF, 1.343KB\)](#) provides more detail on:

- the Bayesian demographic accounting framework used in the DPM
- how system models summarise underlying demographic trends
- how data models summarise the quality of the data sources
- how we estimate the parameters which feed into the system models for births, deaths, in-migration, and out-migration
- the data models used for population stocks

We plan to publish a methods guide in summer 2025 which provides a detailed explanation of how our ABPEs are produced.

Our official census-based population estimate methodology is detailed in our [Population estimates for England and Wales, mid-2023: methods guide](#).

9 . Data sources used

The data sources used to produce the mid-year admin-based population estimates (ABPEs) can vary based on availability. The specific datasets used to create each set of ABPEs are detailed within our [ABPEs for local authorities in England and Wales datasets](#).

The Statistical Population Datasets (SPDs) which provide the independent population stock for each year are created by combining a variety of data sources including:

- tax and benefits datasets
- health datasets
- education datasets covering schools, further education and higher education
- prisoners data
- birth and death registrations

The [Statistical population dataset version 4: research to date and future developments paper \(PDF, 474KB\)](#), published in May 2023, provides more detail on the SPDs.

If an SPD is not available for a particular year, it is possible to use other data such as [Personal Demographics Service \(PDS\) data from the NHS](#) on their own, as the population stock.

Our methods for producing the ABPEs are not reliant on census data as they can use administrative sources to measure population stocks. However, existing census data do feed into the estimation process. Census-based mid-year population estimates for 2011 and 2021 are used as population stocks as they represent the best available population stock data for these years.

Coverage adjustment of the population stocks is required to allow for coverage errors. These occur when a member of the population:

- is not counted (undercoverage)
- is counted more than once (overcoverage)
- is counted in the wrong location

Our current proxy coverage adjustment method for population stocks uses census data. We are currently exploring methods using administrative data sources for coverage adjustment.

Data estimating population flows also feed into the estimation process and include:

- counts of live births and death registrations recorded by the [General Register Office](#)
- our estimates of [internal migration and cross-border flows](#): these are primarily based on PDS data, which flags when people change their address with their doctor
- our estimates of [long-term international migration](#): these are based on different data sources and methods for each nationality grouping

The methods and all the data sources used in our estimates of internal migration and cross-border flows are described in our [Population estimates methods guide](#). Methods and data sources used in our estimates of long-term international migration are described in our [Methods to produce provisional long-term international migration estimates methodology](#).

Our [Data source overviews](#) provide more information on the administrative data sources used to estimate the population stocks and flows. They explain why the data sources are important, their coverage of the population, and the quality of the data.

The data sources used are not designed to be tools for creating population statistics. To show how we ensure they remain fit for purpose, we publish [quality assurance of administrative data \(QAAD\) reports](#) detailing how the data are collected, their quality, strengths, and limitations. Additional QAADs are being developed to ensure all data sources that are used to produce the ABPEs are covered.

10 . How we quality assure our methods

Our methods and the data sources used to produce the mid-year admin-based population estimates (ABPEs) are continually developed and enhanced as we seek to improve the quality of our outputs in line with our [quality strategy](#).

All our methodological work for the ABPEs has been presented to our independent [Methodological Assurance Review Panel \(MARP\)](#), chaired by Sir Bernard Silverman and consisting of a panel of recognised experts. All papers presented to the panel are available in the [papers section of the UK Statistics Authority website](#).

A subgroup of MARP, consisting of Bayesian statisticians, is being set up to provide advice on the methods developed for and used in the dynamic population model (DPM). The methods have also been presented and discussed at a cross-government Demographic Methods Expert group.

11 . Ensuring coherence across the population statistics system

Our admin-based population estimates (ABPEs) are [official statistics in development](#). Currently, our mid-year population estimates are [Accredited official statistics](#). These are used:

- as a base for other population statistics, such as [population projections](#), and [population estimates for the very old](#)
- to produce population estimates for lower geographical levels and alternative geographies
- for weighting surveys such as the Labour Force Survey (LFS) and other social surveys, to ensure they are representative of the total population (and adjusted to remove persons living in communal establishments where necessary)
- as a denominator for various rates and ratios relating to population, health, crime and the economy

We are working towards our ABPEs becoming our accredited official population estimates. We will ensure coherence across the population statistics system, as we make this transition.

12 . Estimates for higher level geographies and subgroups of the population

Our [Admin-based population estimates \(ABPEs\) for local authorities in England and Wales dataset](#) provides estimates of the population and components of population change for all local authorities by single year of age and sex. These are summed to give higher level estimates such as total population within a local authority, region, country, or age group.

Credible intervals are published alongside the ABPEs and show the range of possible estimates. Credible intervals are provided for each age and sex within each local authority. The probability that the true value lies in the credible interval is 95%.

Credible intervals cannot be aggregated to show the range of possible estimates for combined groups. We continue to conduct research to enable estimates of uncertainty to be provided at all levels of aggregation. Our [ABPE dataset](#) includes estimates of uncertainty at the aggregate local authority level for 2011 to 2023.

13 . UK estimates

The Office for National Statistics (ONS) compiles and publishes population estimates for the UK, using estimates for England and Wales (also produced by the ONS); estimates for Scotland, produced by the [National Records of Scotland \(NRS\)](#); and estimates for Northern Ireland produced by the [Northern Ireland Statistics and Research Agency \(NISRA\)](#).

Admin-based population estimates (ABPEs) for the UK are not yet available. Methods for producing UK estimates in the future are being considered in collaboration with NRS, and NISRA. We are working with the devolved administrations, to ensure population and migration estimates remain coherent across the UK.

14 . Estimates below local authority level

We are exploring possible approaches for producing Admin-based population estimates (ABPEs) for geographical breakdowns below local authority level. Possible approaches are explored in our [Small Area Population Estimates in the transformed population estimation system: methods development](#).

15 . Disaggregated migration: international, internal, and cross-border flows

The dynamic population model (DPM) estimates the population and population change.

The DPM models migration as combined in-flows and combined out-flows for each local authority in England and Wales. To better understand changes in the size of local authority populations, these combined flows then need to be disaggregated to provide estimates of international, internal, and cross-border flows. Disaggregated migration flows data will be published once we have had more time to develop and quality assure our methods and estimates.

In the future, disaggregated migration flows will allow a measure of net international migration. It is not advisable to calculate an inferred net international migration and cross-border flow for England and Wales by summing combined immigration and combined emigration for each local authority and then subtracting emigration from immigration. We would not expect this figure to be the same as the mid-year population estimates components of change, because of the different methods used.

16 . Mid-year admin-based population estimates for 2011 onwards

Our [mid-year admin-based population estimates \(ABPEs\)](#) published in July 2024 provide a fully comparable time series for 2011 to 2023. This takes account of methodological improvements and new and updated data sources, including new estimates for migration. This time series supersedes, and is not comparable with, previous time series.

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

The different methods used to produce the mid-year admin-based population estimates (ABPEs) and the official mid-year population estimates (MYEs) mean that we do not expect these two sets of estimates to match exactly. ABPEs are produced using independent population stocks for each year, which reduces the increase in uncertainty as we move further away from a census. This is a known limitation of the current mid-year population estimate methodology which rolls forward our census-based population estimates.

Updated mid-2023 ABPEs published in July 2024 are very similar to the accredited official MYEs; the total ABPE for England and Wales is 0.2% lower than the official MYE and is 0.1% lower than the provisional ABPE.

Our [Population estimates for England and Wales: mid-2023 bulletin](#) provides more detail on how the two sets of estimates compare.

18 . How we engage with users

The Office for National Statistics (ONS) engages with users in a variety of ways, to understand how we can develop our statistics to best fit user needs. This includes:

- sharing progress and seeking feedback through user groups such as the [Central and Local Information Partnership](#); the UK Population Theme Advisory Board (chaired by ONS and including representatives from academia, the [Welsh Government](#), the National Records of Scotland (NRS) and the Northern Ireland Statistics and Research Agency (NISRA)); and the [British Society for Population Studies \(BSPS\)](#).
- engaging with users at events such as forums, webinars and conferences
- engaging with local authorities to assess quality and impact, as well as asking for local insights and sources to help us improve our methods
- asking for feedback through consultations, mailing lists, social media, and in all our publications
- handling queries via our email address: pop.info@ons.gov.uk

Our consultation on the [Future of population and migration statistics \(FPMS\) for England and Wales](#), which took place between 29 June and 26 October 2023, has captured user feedback on our proposals for the development of our population and migration statistics. Our [consultation update \(PDF, 163KB\)](#) details the number of consultation responses by sector, and outlines how we engaged with users both before and during the consultation. It also explains how we have carried out our analysis of the responses. Our formal response will be published later in 2024.

This valuable feedback received through a range of engagement activities continues to guide our work. We continue to explore and build on further opportunities for user feedback to understand how to best meet user needs.

19 . Further information on population statistics

User feedback plays an essential part in our ability to improve our statistics. Please email any questions or feedback to pop.info@ons.gov.uk.

Updates on publications and events can be found in [our monthly newsletter](#), including our planned new programme of webinars on population and migration statistics.

For further information on how our mid-year admin-based population estimates (ABPEs) are created, their quality assurance, appropriate usage, and strengths and limitations, see our [Mid-year admin-based population estimates in England and Wales Quality and Methodology Information \(QMI\)](#).

Information relating to admin-based population estimates (ABPEs), the dynamic population model (DPM) and transforming population statistics are available in:

- our [Admin-based population estimates articles series](#)
- our [Mid-year admin-based population estimates QMI](#)
- our [The future of population and migration: a statistical design methodology](#)
- our [How our population and migration estimates are evolving article](#)
- our [Consultation on the future of population and migration statistics in England and Wales](#)

Information relating to mid-year population estimates (MYE) is available in our [MYE QMI](#).

20 . Cite this methodology

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