

Mid-year population estimates QMI

Quality and methodology information for mid-year population estimates in the UK, detailing the strengths and limitations of the data, methods used, and data uses and users.

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1 . Output information

- Statistical designation: accredited official statistics
- Data collection: based on third-party data
- Frequency: annual
- How compiled: based on third-party data
- Geographic coverage: United Kingdom
- Related publication: Population estimates for the UK, England, Wales, Scotland and Northern Ireland: mid-2023
- Last revised: 8 October 2024

2 . About this Quality and Methodology Information report

This Quality and Methodology Information report contains information on the quality characteristics of the data (including the European Statistical System's five dimensions of quality) as well as the methods used to create it.

The information in this report will help you to:

- understand the strengths and limitations of the data
- learn about existing uses and users of the data
- understand the methods used to create the data
- help you to decide suitable uses for the data
- reduce the risk of misusing data

3 . Important points

- On 8 October 2024, population estimates for mid-2023 for the UK and constituent countries were published; this brought together estimates for England and Wales (published 15 July 2024), for Northern Ireland (published 19 September 2024) and for Scotland (published 8 October 2024).
- On 15 July 2024 population estimates for mid-2023 for England and Wales were published; these estimates were accompanied by revised mid-2022 population estimates for England and Wales, that incorporated updated subnational disaggregation of international migration.
- On 9 July 2024 National Records of Scotland published a back series of estimates for mid-2012 to mid-2021, consistent with the results of Census 2022 in Scotland; these have been incorporated into a set of UK population estimates for 2011 to 2022, that were published on 15 July 2024.
- On 23 November 2023, a revised set of population estimates for mid-2012 to mid-2021 for England and Wales was published.

4 . Quality summary

Information on the methods used to produce the latest components of population can be found in the methods guides produced by each national statistics institute:

- The [Population estimates for England and Wales, mid-2023: methods guide](#)
- The [Northern Ireland methodology report \(PDF, 257KB\)](#)
- The [mid-year population estimates Scotland: methodology Guide \(PDF, 40KB\)](#)

UK mid-year population estimates for 2023

Mid-2023 population estimates for the United Kingdom and constituent countries were published on 8 October 2024. This release brings together estimates for England and Wales published by us at the Office for National Statistics (ONS), for Scotland by National Records of Scotland and for Northern Ireland by the Northern Ireland Statistics and Research Agency. This release only provided estimates at country level because estimates at local authority level were not available for all four countries.

The mid-2023 international migration components for England and Wales, Scotland and Northern Ireland do not sum to the updated UK-level international migration estimates for mid-2023, published in May 2024. International migration estimates continue to be improved and updated and the population estimates for mid-2023 will be regularly revised to use the most up to date estimates of international migration.

England and Wales mid-year population estimates for 2023

Mid-2023 population estimates for England and Wales were published on 15 July 2024. As part of this release, revised mid-2022 population estimates for local authorities in England and Wales were published. These revisions use updated international migration estimates. Further information can be found in "Revisions" in Section 5: Quality characteristics of mid-year population estimates data.

Alongside the mid-year population estimates for mid-2023 we published admin-based population estimates for mid-2023, produced using the Dynamic Population Model (DPM). Admin-based population estimates are designated [official statistics in development](#), while methods and data sources continue to be refined. They do not replace the official mid-year population estimates and should not be used for decision making. Further information on these estimates can be found in our [Mid-year admin-based population estimates in England and Wales Quality and Methodology Information](#).

UK mid-year population estimates for 2011 to 2022

On 15 July 2024 a set of population estimates for the UK covering 2011 to 2022 were published. These provided estimates for the whole of the UK that were rebased to the 2021 and 2022 censuses across the UK. These estimates replace UK estimates for 2011 to 2022 published prior to 15 July 2024.

UK mid-year population estimates for 2022

Population estimates for the UK for mid-2022 were first published on 26 March 2024, and included mid-2022 population estimates for Scotland following their 2022 census. Mid-2022 population estimates for England, Northern Ireland and Wales were published in November 2023 and remain unchanged in this release.

Estimates for mid-2022 for Scotland are rolled forward from their 2022 census (28 February 2022), so they do not include a full year of change. Therefore, there are no components of change included in this release. Scotland estimates are released by National Records of Scotland (NRS) and more information can be found on the [NRS website](#). Estimates for Northern Ireland are published by Northern Ireland Statistics and Research Agency (NISRA) and can be found on the [NISRA website](#).

England and Wales mid-year population estimates for 2022

In November 2023 a set of mid-year population estimates covering England and Wales was published. Publishing a full set of UK estimates was not possible as mid-year estimates data for Scotland were not available. This is because Scotland had its census a year after the rest of the UK.

5 . Quality characteristics of mid-year population estimates data

This section provides a range of information that describes the quality and characteristics of the data and identifies issues that should be noted when using the data.

Relevance

This product is the official set of population estimates for the UK and constituent countries. However, in July 2024 data for England and Wales were published for mid-2023 alongside a back series of estimates for the UK for mid-2011 to 2022.

The [standard tables](#) include formatted tables designed to be a readable reference tool, and unformatted detailed time series which provide the greatest possible level of detail in a machine-readable format. The detailed time series data provide data from mid-2001 to the most recently published year. Estimates for 2001 to 2011 are provided for 2021 local authorities, while estimates for 2011 onwards use the local authority boundaries in place at the time of publication.

The way tables are provided allows users to look at populations split by components of population change, age and sex, for years back to mid-2001, for any local authority area. Median ages for local authority areas and population densities are also provided. Finally, additional "supporting information" tables provide national and regional level estimates as far back as possible, in some cases back to 1838. In this way we republish each year the largest amount of data possible, but in multiple formats to meet different needs.

Population estimates are also provided through [NOMIS](#) and our [Customise My Data](#) tool, to allow users to create bespoke tables covering the specific age-groups, sexes, areas and time-periods they require.

The way in which the UK is subdivided into local areas is subject to change. For this reason the time series of population estimates by current local authorities is only available from 1981 onwards (this is best accessed through [NOMIS](#)). Mid-1971 to mid-1980 population estimates by quinary age bands for local authorities within England and Wales are also [available](#). Section 13 of the Methodology guide sets out the specific changes to area codes and boundaries that have occurred in the last year.

For geographical levels that are smaller than local authority district, estimates are published as a separate output and have their own specific quality information found in our [Population estimates by output areas, electoral, health and other geographies QMI](#). For estimates of the population at the current time, [population projections](#) are available.

Accuracy and reliability

Population estimates are produced using a well-established demographic approach called the cohort component method (refer to the "How we process the data" section). The data sources are the best available that are nationally consistent down to local authority level, but the estimates are subject to the coverage and error associated with these sources. Information from administrative registers such as the numbers of births and deaths are considered reliable. However, sometimes separate data sources are combined to estimate the number of people in a component, their location and their age and sex.

Sampling error and statistical uncertainty

Mid-year population estimates are subject to statistical uncertainty related to the measurement of the census base they are rolled forward from, and from the measurement of each component of population change. Statistical uncertainty is lowest immediately following a census, and greatest immediately before the next census, as error accumulates over time.

Measuring the statistical uncertainty associated with each component is complex and new methods for measuring uncertainty must be developed each time mid-year estimate methods change. New estimates of statistical uncertainty around the mid-year estimates, that will reflect changes to international and internal migration estimates, are in development.

Other measures of accuracy

Several other products providing information on the likely accuracy of the estimates are available:

- a set of [quality indicators](#) provide high-level indications of the reliability of the estimates for each local authority and are published alongside each release (2013 onwards)
- statistical measures of the reliability of the Census 2021 estimates, on which the population estimates are based, are published in our [Measures showing the quality of Census 2021 estimates](#)

Main determinants of the accuracy of population estimates

The use of a cohort component method rolled forward from a census year means that the quality of the population estimates varies over time; specifically, the accuracy of the estimates tends to decline as we move further away from the census base.

For England, Wales and Northern Ireland, mid-year population estimates for 2021 were largely based on Census 2021, and were adjusted for the population change between Census Day and mid-year.

For Scotland, mid-year population estimates for 2022 were largely based on Census 2022, and were adjusted for the population change between Census Day and mid-year. Estimates for subsequent years account for each year's births, deaths, internal migration and international migration. For some areas, our estimates will move away from the true population in an area with each release of population estimates.

The degree of drift relates to the amount of population "churn" (the total number of moves into and out of an area) that occur. More rural areas tend to be more accurate than urban areas as the populations experience much lower levels of churn. The impacts of different components on each local authority are illustrated in the [Quality Indicators tool](#).

Estimates for large population aggregations (for example, the total UK population) are more accurate (proportionally) than those for small aggregations (such as population of 25-year-old men in a single local authority district). Larger aggregations are more accurate because less processing and manipulation is involved in their calculation. For instance, internal migration equals zero for the total UK population. At the local authority level, counts and age and sex distribution of international emigrants and immigrants are essential for estimating at lower aggregations.

Since the mid-year estimates are a product of a number of individual components, the impact of different errors, bias and sampling variability can be exacerbated or mitigated by errors, bias and sampling variability in other components of the process. A more detailed discussion of this, for the decade to 2011, is provided in [Further understanding of the causes of discrepancies between rolled forward and census based local authority mid-year population estimates for 2011 \(PDF, 1.570KB\)](#).

Long-term international migration

The quality of long-term international migration (LTIM) estimates is discussed in our [Admin-based long-term international migration estimates QMI](#).

International migration estimates for mid-2023

The mid-2023 international migration components for England and Wales, Scotland and Northern Ireland do not sum to the updated UK-level [international migration estimates for mid-2023](#), published in May 2024. If the latest LTIM estimate was incorporated into the UK population estimates the population would be 68.3 million (68,328,000), 63,000 (0.1%) higher than the published UK estimates of 68.3 million (68,265,200).

The population estimates for mid-2023 will be revised in 2025 once updated estimates of international migration are available.

International migration estimates for mid-2022

While no revisions were made to the headline long-term international migration estimates for mid-2022, between November 2023 and July 2024, the disaggregation of international migration estimates for mid-2022, to local authority level by age and sex, have been revised. Alongside the release of mid-year estimates for England and Wales for 2023, we revised the mid-2022 estimates to use the revised disaggregated estimates.

Internal migration and accuracy

Internal migration flows are primarily based on changes in record-level patient registrations with GP surgeries. To account for migration of people within the UK, data are obtained for flows of migrants between each pair of local authorities in England and Wales as well as for flows of migrants between England and Wales and the rest of the UK (cross-border flows).

From mid-2021, the patient register was discontinued, so we have used the Personal Demographics Service (PDS) annual extract instead. Information on the methods to produce internal migration estimates for mid-2022 are given in our [mid-2022 methods guide](#).

There is inevitably a delay (lag) between people moving and the updating of GP patient registrations. Consequently, we use the change in patient registrations in the year to 31 July each year rather than 30 June to allow for delays in registrations. For higher education students, we know this approach is insufficient and additionally make use of data from the [Higher Education Statistics Agency](#) (HESA) to move students to study areas.

For graduates who have not updated their GP registration after leaving, an improved method was introduced from mid-2017 to move them out of their student areas and distribute them to areas based on previous cohorts of university leavers and in a more timely manner. The impact of using this newer approach is presented in section 12 of our [Population estimates for the UK, mid-2021: methods guide](#).

Evidence from several sources suggests that some population groups - in particular students - made internal migration moves in March and April 2020 in response to the coronavirus pandemic and the closure of university halls of residence. The evidence is not easily quantifiable but one example, from the National Union of Students [Coronavirus and Students Survey](#) from April 2020 suggests that pre-pandemic, around 24% of students lived with parents or guardians but this increased to 54% during the early part of the pandemic.

However, our internal migration estimates do not reflect moves of this scale. If students could not or did not update their GP registration after returning home or moving elsewhere because of the impact of the pandemic, then their moves would not be captured.

However, by isolating moves made by students who did update their GP registration after 23 March 2020, we found that particularly for 20- and 21-year-olds, there were more moves than for the equivalent period in 2019. So, this combined with students moving to university pre-pandemic has led to lower decreases in internal migration in mid-2020 (from mid-2019) for 19- to 23-year-olds compared with other ages.

The extent to which internal migration affects each local authority area's population estimates is indicated in our [Quality Indicators](#) tool and in the [uncertainty measures](#).

Internal migration in mid-2023

For mid-2023 we have been unable to obtain all data necessary to run our internal migration estimates in full. Issues with late availability, changes in variables and incomplete coverage of data on those in higher education meant we could not link together health data and higher education data for 2023.

Internal migration data based on health data would underplay the movements of young adults to and from higher education. To mitigate against this risk, the internal migration estimates for mid-2023 are based on moves observed in health data (Personal Demographics Service updates) scaled up by the ratio between official internal migration estimates for mid-2022, and PDS based moves for mid-2022. This same approach is used for the production of ABPEs for mid-2023.

We will conduct further work to understand the effect of this once complete data are available.

Internal migration in mid-2022

During quality assurance of the input data for 2022 internal migration processing, substantial issues were found with the PDS data, which had been supplied using individuals' most recent addresses (including temporary addresses) rather than their current usual address. Working with the data supplier we developed a dataset that met our needs by combining several extracts of PDS data.

When the PDS data was resupplied, a subsequent run of internal migration was carried out to look at the impact. This resulted in more than 66,000 extra moves but these were generally spread evenly, with 95 per cent of flows (by local authority, single year of age and sex) within ± 1 moves of the original run and 99 percent within ± 3 . Aggregating flows to local authority level shows bigger differences but 95 percent of local authority flows still fell within ± 5 moves.

In the initial estimates, we identified unusual migration flows for Portsmouth. This is because there is an unusually large number of students at the University of Portsmouth whose addresses, recorded on the Higher Education Statistics Agency (HESA) data, are outside of Portsmouth. Following additional analysis, we made the decision to revert students continuing their studies at the University of Portsmouth, but with addresses for 2022 outside of Portsmouth, to their previous year's HESA address. This resulted in migration for 2022 that was more consistent with previous years.

Coherence and comparability

The 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 [National Records of Scotland](#) and estimates for Northern Ireland produced by the [Northern Ireland Statistics and Research Agency](#).

Population estimates for each of the UK constituent countries are compiled using a common methodological approach and aim to be as consistent as possible. More information on comparisons between UK constituent countries can be found in [Consistency of methods used for population statistics across UK countries](#).

Where substantial changes in methods are implemented, we seek to publish a consistent back series of estimates to the year of the previous census. So, the rebasing of estimates to the results of Census 2021 has been accompanied by the publication of [a full set of comparable population estimates for England and Wales back to 2012](#).

Estimates of births and deaths used to calculate the population estimates are based on births and deaths that occur during the year to the mid-year reference point, irrespective of when registered. This definition is different to that used in other ONS outputs on births and deaths that use alternative reporting periods (for example, calendar year) and measure birth and death registrations rather than occurrences. Figures quoted from the components of change in the population estimates will therefore be slightly different from the standard ONS outputs related to these events.

The revised mid-year estimates for 2012 to 2021 and the mid-2022 estimates for England and Wales, published on 23 November 2023, use long-term international migration estimates that are fully coherent with the international migration estimates published on the same day.

The mid-year population estimates are used both within and outside government as the definitive set of population figures for the UK, constituent countries and subnational geographies to local authority level. They are used for calculating other official population statistics such as population projections, small area population estimates, population estimates by marital status and estimates of the very old population. These outputs are consistent with the current series of mid-year population estimates, though there is inevitably a lag between population estimates for a particular year being published and this being reflected in the derived products.

Users often compare population estimates for individual local authorities with other data sources, for example, administrative records or anecdotal evidence. Comparisons between datasets should be treated with caution, as there are always definitional differences in the data collected (for example, whether the data differentiate between long-term or short-term migration, or whether they account for individuals who have left the country or authority). Also, other data sources may cover only a subset of the population.

Admin-based population estimates (ABPE)

In July 2022 we introduced the [dynamic population model \(DPM\)](#), as explained in our [DPM article](#), as our future proposal for producing timely, coherent population statistics. The updated ABPEs, published in July 2023, are defined as official statistics in development because we are continuing to refine our methods for producing ABPEs 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.

On the 15 July 2024 ABPEs for mid-2023 were published alongside the mid-year population estimates for 2023. Both sets of numbers use common data on components of population change for internal and international migration.

Accessibility and clarity

Our recommended format for accessible content is a combination of HTML web pages for narrative, charts and graphs, with data being provided in usable formats such as CSV and Excel. Our website also offers users the option to download the narrative in PDF format. In some instances, other software may be used, or may be available on request. Available formats for content published on our website but not produced by the Office for National Statistics (ONS), or referenced on our website but stored elsewhere, may vary. For further information, please refer to the contact details at the beginning of this report.

For information regarding conditions of access to data, please refer to our links:

- our [terms and conditions](#) (for data on the website)
- the [copyright and reuse of published data](#)
- our [accessibility statement](#)

The population estimates release consists of a combination of HTML web pages for narrative, charts and graphs (brought together in a statistical bulletin), with data being provided in usable formats such as CSV and Excel. The [Population estimates for the UK bulletin](#) can also be downloaded in PDF format.

As statistical disclosure control methods are applied to each component of the estimates, the standard outputs now include the most detailed (single year of age and sex) estimates at the local authority level and there is no requirement for data access agreements to use the estimates at any level of detail. Alternative presentations of the data, in response to an [ad hoc query](#) or a [Freedom of Information request](#), are made available simultaneously with provision to the requester under the principle of equal access.

In addition to a summary table, providing the main results on one page, detailed unformatted tables can be downloaded free of charge in Microsoft Excel format. These provide unrounded data that are published to promote further analysis for users. A note provided with these detailed tables states that the estimates should not be taken to be accurate to the level of detail provided. Our [Analysis of population estimates tool](#) (in Excel) is also published to help users easily manipulate the data.

Any additional enquiries regarding the mid-year population estimates can be made by emailing pop.info@ons.gov.uk or by telephone on +44 1329 444661.

Advance notice of any forthcoming major changes in methodology will be announced.

Timeliness and punctuality

Population estimates for the UK and for England and Wales are normally published annually in June.

In a typical year, population estimates are available about 12 months after the reference date. This time lag reflects the availability of the data sources that measure the components of population change over the year preceding the estimate and the time required to process the data and calculate the estimates. Where substantial changes occur later to either the data or the methodology used in producing population estimates, a back-series of revised estimates is made available to create a continuous time series between censuses.

Mid-year estimates for 2021, for England and Wales, were published six months later than usual. The delay to this publication reflects the additional time required to incorporate the Census 2021 into the mid-year estimates and developments to internal and international migration. This had a follow-on impact to the timetable for the mid-2022 estimates, which were published five months later than usual on 23 November 2023.

Mid-year population estimates for 2023 (for England and Wales) were published on 15 July 2024. Mid-year population estimates for the UK (for mid-2023) were published on 8 October 2024 following publication of estimates for Northern Ireland (19 September 2024) and alongside publication of estimates for Scotland (8 October 2024).

In general, the publication of mid-year population estimates would be later than the planned date only if essential data used to calculate the estimates were not available. For example, if estimates of internal migration were not received or delays were encountered in the supply of administrative data from third parties.

For more details on related releases, the [GOV.UK release calendar](#) provides 12 months' advance notice of release dates. In the unlikely event of a change to the pre-announced release schedule, public attention will be drawn to the change and the reasons for the change will be explained fully at the same time, as set out in the [Code of Practice for Statistics](#).

Concepts and definitions, including list of changes to definitions

Although the population estimates are not explicitly required by law, their production is consistent with our duty under Section 5 of the [Census Act 1920](#) to collect and publish "any available statistical information" with respect to the number and condition of the population between censuses.

A [conceptual framework for population and migration statistics](#) (including the population estimates) is available.

The mid-year population estimates are consistent with the standard UN definition for population estimates, which is based upon 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.

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.

Students are taken to be resident at their term-time address.

Prior to 2021, prisoners had been regarded as usually resident at an institution if they had been sentenced to serve six months or more. For 2021 onwards the definition has been updated to be consistent with that used in Census 2021. That is prisoners:

- serving 12 months or more
- on convicted unsentenced remand
- with indeterminate sentences
- who are non-criminals, on recall and those with sentence length not recorded

The figures for the UK do not include the population of the Channel Islands or the Isle of Man, which are Crown Dependencies rather than part of the UK.

For some people, the concept of usual residence is more complicated. People with no usual residence are counted in the census as being usually resident in the area in which they were staying on census day.

Although usual residence is the recognised definition for population estimates, use of a single definitional base does not meet the needs of all users. 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 usually resident populations.

Geography, including list of changes to boundaries

The mid-year estimates for England and Wales are published annually on the local authority boundaries in place at time of publication and usually on the local authority boundaries in place at the data reference point. A list of changes to local authority changes for the most recent year is available in the current edition of the [Mid-year estimates methodology](#).

Revisions

England and Wales mid-2022

Alongside the release of mid-year estimates for England and Wales for 2023 we revised the mid-2022 estimates to use an updated disaggregation of long-term international migration estimates. No revisions were made to the headline long-term international migration estimates.

UK 2011 to mid-2022

On 15 July 2024 a set of population estimates for the UK covering 2011 to 2022 were published. These estimates have been rebased to the 2021 and 2022 censuses across the UK. Estimates for England and Wales were previously published in November 2023, for Northern Ireland in June 2023, and for Scotland on 9 July 2024.

England and Wales 2012 to mid-2020

The population estimates for mid-2012 to mid-2020, for England and Wales, were revised in November 2023 as part of the [reconciliation and rebasing project](#) following Census 2021. Reconciliation and rebasing is a regular decennial project that ensures mid-year population estimates rolled forward from the previous census are consistent with estimates based on the most recent census.

The mid-2021 population estimates, rolled forward from Census 2021 were revised in November 2023 to be consistent with the latest estimates of long-term international migration. An article discussing future revisions to population and migration statistics was published on the 17 November 2023.

Output quality

To maintain the timeliness of the population estimates publications, the data sources used are the best available at the time of production. However, these may not be final or published sources. Death registrations data are constantly updated and while many late death registrations are incorporated, it is possible for some to be too late to be used, particularly if they occur towards the end of the mid-year period. Estimates are adjusted to account for late death registrations but rely on them evening out over time.

Why you can trust our data

To produce these population estimates, we use the best data sources available and methods that are rigorously scrutinized by experts (both within and outside of the ONS) and that are consistently applied across England and Wales.

Methods are regularly reviewed and improvements made where possible. For example, methods for international and internal migration have evolved through the use of additional data sources and new methods to produce more robust estimates of population change.

Some sampling and methodological error is inevitable in any estimates but, even when errors have accumulated over 10 years, the mid-year population estimates are useful for robust population figures. The mid-year population estimates for 2021 rolled forward from 2011 closely matched Census 2021 based mid-year estimates, with 89% of local authorities having a difference of less than 5%, as shown in our [Reconciliation of mid-year population estimates with Census 2021 at local authority level article](#).

Collaboration

We collaborate with National Records of Scotland (NRS) and the Northern Ireland Statistics and Research Agency (NISRA), producing some statistics for them but mainly using their outputs to compile population statistics for the whole of the UK.

Data suppliers are contacted when unusual patterns are found in the data and a comprehensive set of processing checks are followed in the production of each component of the population estimates. The processing checks applied by both data suppliers and the ONS are set out in a set of Quality Assurance of Administrative Data reports. Processing is carried out in SAS and python using programs that ensure that consistent processes are followed year to year.

Staff are encouraged to apply "curiosity" to each component of population change. The result is that each element of the population estimates gets rigorously checked by multiple people to ensure that changes over time are plausible. The few external data sources that are available before the estimates are published are used to quality assure the estimates; these include administrative data on GP patient registrations, State Pension recipients and changes in dwelling stock. In addition, we work throughout the year to look at wider changes in local authority areas and understand how this affects the plausibility of the population estimates over time.

6 . Methods used to produce mid-year population estimates data

How we collect the data and main data sources

Data are obtained from a variety of organisations to create the mid-year population estimates. The quality of data acquired from external sources are assured through memoranda of understanding. Different mechanisms are in place for internal data sources that allow concerns to be raised and data quality to be maintained.

In addition to Census data, the main data sources used in the compilation of the mid-year population estimates are:

- birth and death registrations from the [General Register Office \(GRO\)](#)
- a wide range of data sources are used to estimate international migration moves including Home Office Borders and Immigration Data (HOBID), Registration and Population Interaction Database (RAPID) from the Department for Work and Pensions, Higher Education Statistics Agency (HESA), NHS Personal Demographics Service (PDS), 2021 Census and the International Passenger Survey (IPS)
- internal migration moves are estimated using the [Personal Demographic Service \(PDS\)](#) and [Higher Education Statistics Agency \(HESA\)](#) data
- changes in the population of home and foreign armed forces in the UK are estimated using [Ministry of Defence](#) and [United States Air Force \(USAF\)](#) data
- the number of prisoners is estimated using [Ministry of Justice](#) data

The administrative sources used to process the England and Wales estimates are not designed to be tools for population statistics. To show how we ensure they remain fit for purpose, quality assurance of administrative data (QAAD) reports are published detailing how the data are collected, their quality, strengths, and limitations:

- [Births](#)
- [Deaths](#)
- [UK Armed Forces](#)
- [US Armed Forces](#)
- [Higher Education Statistics Agency](#)
- [Prisoners](#)
- [Northern Ireland internal migration](#)
- [International migration data for Scotland](#)
- [International migration data for Northern Ireland](#)
- [University of Warwick halls of residence data](#)

For more information on administrative sources of data that the Office for National Statistics (ONS) uses to produce statistics (including a list of administrative sources), or that are available for use in the production of statistics in the future, and information on statistical techniques for using administrative data, please see the [Statement of Administrative Sources](#).

How we process the data

The quality assurance of administrative data reports listed in the previous section provide details of how each individual source is quality assured. In some cases, data sources cover the necessary: location, age and sex; in most cases, however, some of these data are missing and need to be imputed; or one property is taken from one source, and another from a second. These methods are set out in the population estimates methods guides listed in [Section 4: Quality summary](#).

The mid-year population estimates use the cohort component method. This is a standard demographic method that estimates the size of the population using the components of population change to update a population base such as the census estimate.

The resident population of the previous year is aged on; those who were born are added, those who have died removed; similarly, those who have immigrated into the country are added and those who have emigrated removed. To accurately estimate the population of areas within the UK movement of people into and out of those areas is also accounted for through internal migration. This can occur between constituent countries and at the lower local authority level. Special populations are exempted from this process with old figures being removed at the start and updated figures replacing them at the end. This is because their movements are not accounted for within the standard internal and international migration datasets.

The stages of this process will be:

Stage 1

Take the resident population of the previous year on 30 June and age on by one year.

Stage 2

Add children born between 1 July and 30 June as the population aged zero.

Stage 3

Subtract from the population the number of deaths between 1 July and 30 June.

Stage 4

Add or remove people who have entered or left England and Wales from outside the UK between 1 July and 30 June.

Stage 5

Adjust areas' populations to account for those that have moved within the UK between 1 July and 30 June.

Stage 6

Update the population for changes in special populations (prisoners and armed forces), and account for people entering and leaving them from areas of the UK; this produces the resident population of the current year on 30 June.

The subnational mid-year population estimates for England and Wales are calculated first. The national estimates are produced by aggregating the subnational estimates. A different method is used to produce population estimates for smaller areas, for example, National Parks and wards. Details of the [methods used to produce population estimates by Output Areas, electoral, health and other geographies are available](#).

Many data sources are used within population estimates including some that use statistical disclosure control methods. Several components of population change take location from one source and age and sex from another, thus ensuring that the resulting population estimates do not refer to specific individuals. Additionally, we ensure, where possible, that definitions between data sources remain consistent. For instance, to ensure consistency between the 2011 Census and the subsequent population estimates, the definition of a prisoner was adapted to refer to those sentenced to serve six months or more.

For census years the population is aged by the period of time between the census and 30 June (in both 2011 and 2021 this was around 15 weeks). Similarly, the components only need to account for change during this period. For each component, this is established by the availability of data for the period between census day and 30 June and the amount of change expected. Further details of how this was done in 2001 can be found in [Population Trends 109](#). Details of the methods used in 2011 can be found in [Methods guide for census-based mid-2011 population estimates](#) and the methods used in 2021 can be found in our [Population estimates for the UK, mid-2021: methods guide](#).

After the results of a new census are known, the population estimates over the previous decade are subsequently revised to ensure a consistent time series. In light of the 2021 Census results, the mid-2012 to mid-2020 population estimates were revised at [national](#) and [subnational](#) level. The methodology for revising the population estimates involved identifying parts of the population estimates that were under-or-over-estimated between 2012 and 2020, using 2021 Census data and other sources. Further details of the methods used to revise the back-series can be found in [Rebasing of mid-year population estimates following Census 2021, England and Wales](#)

For 2011, the differences between the original population estimates and the revised ones is analysed in detail in [Further understanding of the causes of discrepancies between rolled forward and census-based local authority mid-year population estimates for 2011](#) (PDF, 1,570KB).

How we analyse the data

Once the data are processed using the methods outlined previously, no further analysis is required in terms of seasonal adjustment, weighting or indexing. Data are analysed extensively, however, as part of the quality assurance processes outlined in the next section, and to provide users with meaningful context in the bulletin that accompanies the population estimates.

The analysis covers the following lines of enquiry:

- How is the UK population changing in the short and long-term?
- How are the main trends in international migration, births and deaths affecting the population estimates?
- What are the ageing patterns of the population, over time and by area?
- How is population change distributed across the countries of the UK, and its local authority areas?
- Which components of population estimates drive local population change?

How we quality assure and validate the data

The population estimates are primarily quality assured in four separate stages:

1. on receipt of source data, as described in "How we collect the data and main data sources"
2. as each data source is processed and turned into a component of population change (see 'How we process the data')
3. once the data are compiled, looking at how changes in components relate to one another, and the overall population change
4. as other data sources and feedback from users become available throughout the year

How we disseminate the data

To accompany publication of population estimates data, a [bulletin](#) is produced, which provides a narrative to help users understand patterns and changes in the data. The data itself are visible in the interactives within the bulletin as well as accompanying [publication tables and a detailed time series](#). Beyond the bulletin and data tables, greater customisability of analysis is facilitated to fulfil user need through the [Analysis of Population Estimates Tool](#), [Customise my Data](#), and [Nomis](#).

Definitive series of population estimates

The full series of population estimates for the UK runs from 1838 to 2023. The level of detail (by geographic area, age, sex and components of change) is greater for the most recent estimates. For mid-2001 to mid-2023, population estimates and components of population change for England and Wales are available at local authority level by single year of age and sex. For mid-2001 to mid-2023, population estimate data for Scotland and Northern Ireland are available by single year of age and sex and with aggregate components of population change (no age or sex).

For 1991 to 2000, population estimates by single year of age and sex at the local authority level are available from [nomis](#).

For 1981 to 1990, population estimates by quinary age and sex at local authority level are available from [nomis](#).

For 1971 to 1980, population estimates on pre-1974 local authorities are available from the ONS web archive. Estimates on standard statistical regions are available from our regional population estimates timeseries.

For estimates prior to 1971 we have a set of population estimates for each country of the UK. These series provide data for UK from 1838, for Great Britain from 1937, for England and Wales combined from 1838, for England and Wales separately from 1971, for Scotland from 1872 and for Northern Ireland from 1912.

How we review and maintain the data processes

Each round of population estimates is reviewed before publication. This is carried out by colleagues from other teams within Demography at ONS who apply different statistical tests to those already applied to look at the plausibility of changes over time and detect outliers. For the mid-2020 estimates, given the unusual circumstances of the reference period (the first three months of the pandemic), we convened a meeting of experts from within Demography to discuss the estimates.

The main review mechanism is through peer review via the ONS's Research Review Group. This brings together experts from Population Statistics, Migration Statistics and Methodology divisions to provide expert views on issues and decisions. Where alternative methods have to be applied, for example, in the use of the three-year average immigration distributions detailed in the 'Quality' section, both the decision to proceed and the final impact are taken to that panel for scrutiny.

This also ensures that population and migration statistics remain coherent. For example, when methods were improved for the 2018 back-series (covering mid-2012 to mid-2016), the Research Review Group helped ensure the methodology kept the population estimates compatible with population projections.

7 . Other information

Other useful links

Other information related to the topic of population statistics is available:

- [Consistency of methods used for population statistics across UK countries](#)
- [Estimates of the very old \(including centenarians\), UK](#)
- [Population and migration statistics system transformation](#)
- [Internal migration estimates QMI](#)
- [Local area migration indicators](#)
- [Measures of statistical uncertainty](#)
- [Mid-year population estimates methods guide](#)
- [National population projections](#)
- [National Records of Scotland](#)
- [Northern Ireland Statistics and Research Agency](#)
- [Overview of the UK population](#)
- [Nomis](#)
- [ONS's Customise My Data](#)
- [ONS Geoportal](#)
- [Population estimates by marital status](#)
- [2011 Census](#)
- [Population estimates quality tools](#)

8 . Cite this methodology

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