Office for National Statistics

Article

Admin-based population estimates: local authority case studies, England and Wales, mid-2023

Case studies to analyse differences between the admin-based population estimates and the official mid-year population estimates

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1 . Main points

- Our intention is for admin-based population estimates (ABPEs) to become official mid-year population estimates in 2025, subject to meeting acceptance criteria which we plan to share in January.
- It is important to understand differences between the current official mid-year population estimates (MYEs) and our ABPEs; we continue to engage with users, including local authorities as we refine the ABPEs.
- The ABPEs use a wider range of data sources than the MYEs and innovative methods, which account for quality limitations in the data.
- At the local authority level, total ABPEs for 2011 to 2023 are very similar to official MYEs.
- For some local authorities, the population estimates differ for particular groups; in Cardiff and Rutland, there are small differences in the estimates for young men because of large student and armed forces populations, respectively.
- In Barking and Dagenham, and Westminster, there are small differences between the estimates for young women because of challenges associated with measuring migration flows.

Admin-based population estimates are official statistics in development while we refine methods and data sources. They do not replace our official mid-year population estimates and should not be used for decision making. These statistics should not be used without this warning.

2 . Building confidence in our new approach for estimating the population

The census and our census-based mid-year estimates have provided the best understanding of the population at a moment in time for many years. However, a more flexible and responsive approach is required. Our new admin-based approach for measuring the size of the population allows us to maximise the use of administrative data and increase efficiency by making the best use of data already available.

Our aim is to ensure users understand and have confidence in our new approach. User feedback and local insight plays an essential part in our ability to improve our population statistics. We welcome insights from users of our statistics. Please email any feedback on the quality of our admin-based population estimates (ABPEs) or evidence in relation to any differences between our current population estimates and the ABPEs to pop.info@ons.gov.uk.

Differences between the ABPEs and the official mid-year population estimates (MYEs) are small for most areas. Out of 318 local authorities, only 14 areas have at least one year between 2011 and 2023 where the MYE lies outside the ABPE credible interval. The majority of these are London boroughs, including Westminster.

It is important for our users to understand what is causing these more notable differences, so that they can have confidence in our new approach. In this article, we have selected four local authorities as case studies to analyse differences in the population estimates for particular age groups. These are:

- Cardiff, which has a large student population
- Barking and Dagenham, which is ethnically diverse, has a fast-growing population and a high percentage of young children
- Westminster, which is ethnically diverse and densely populated, with a high percentage of social and private renting
- Rutland, which is a small local authority, with a high percentage of residents living in communal establishments

These examples represent some important population features seen in some local areas. The analysis in this article and our engagement with selected local authorities has improved our understanding of why differences exist, a useful step in building confidence in the new approach being developed for population and migration statistics. Through our ongoing engagement with users, including local authorities, we continue to improve our understanding of the strengths and limitations of the ABPEs and work together to understand how we can address any challenges. Potential local data sources that could improve our estimates will also be considered and we welcome our users' expert opinions on these where this could be the case.

Our ABPE engagement plan explains how we will continue to engage with users through a variety of existing and new forums to better understand their needs and listen to feedback ahead of transitioning to the new methods.

Our intention is for ABPEs to become official mid-year population estimates in 2025, subject to meeting acceptance criteria which we plan to share in January. The criteria for transition will include statistical quality, operational readiness, assurance processes, planned evaluation and contingency plans.

Acknowledgements

The Office for National Statistics (ONS) has been supported in this research by the University of Southampton. We would like to thank those involved for their guidance and support.

We would also like to thank the four local authorities explored in this article for their feedback and insight.

3 . Overview of admin-based population estimates

Our admin-based population estimates (ABPEs) are official statistics in development which is explained on the Office for Statistics Regulation (OSR) website. They are produced using methods that build on the traditional cohort component method, which has been used to produce official mid-year population estimates (MYEs) for many years.

Importantly, both the ABPEs and MYEs use the same input data for the population flow components for births, deaths, and migration. The ABPEs also use a population stock derived independently for each year from a wide range of administrative data. In contrast, the MYEs use the estimated population flow components to roll forward census population stock estimates between censuses. A limitation of this approach is that the level of uncertainty in the MYEs increases as we move further away from a census.

The ABPE methods balance the population stocks and flows over time, taking account of the uncertainty associated with them. Our ABPEs therefore provide improved population estimates which better account for quality limitations in the data, including challenges associated with measuring migration flows.

Differences between the ABPEs and MYEs arise from methodological differences and the additional data used to derive the ABPEs. The two estimates tend to be most similar in the census years, 2011 and 2021. This is where census-based mid-year population estimates, which have relatively low levels of uncertainty, are used as the population stock for the ABPEs.

Our Population estimates for England and Wales: mid-2023 statistical bulletin includes an interactive population pyramid in Figure 9 which compares the ABPEs and MYEs by age and sex for all local authorities for mid-2021 to mid-2023. Information on the data sources used to produce these ABPEs is detailed in our ABPEs for local authorities dataset published in July 2024. The internal migration estimates for the year ending mid-2023 used as input data for both the ABPEs and MYEs, were produced using the approach used for provisional ABPEs. More information is provided in Section 11. Data sources and quality.

4 . How we produce admin-based population estimates

The admin-based population estimates (ABPEs) are produced using population stocks which are derived independently for each year from a wide range of administrative data, including health, education, tax, and benefits data. Both the ABPEs and the official mid-year population estimates (MYEs) use the same input data for the population flow components for births, deaths, and migration.

The population stocks are adjusted to correct for coverage errors. Census data are currently used to estimate coverage levels, while we explore methods using administrative data. More information on coverage adjustment is available in Section 3 of our Dynamic population model, improvements to data sources and methodology: local authorities in England and Wales, mid-2011 to mid-2023 article.

Statistical modelling takes account of underlying demographic trends and allows for differing levels of coverage and uncertainty associated with the input data. The ABPE process currently treats the numbers of births and deaths as exact counts, as these come from administrative registers and are considered reliable.

Migration is modelled as combined immigration (in-flows) and combined emigration (out-flows) for each local authority in England and Wales. Combined migration flows cover internal migration, cross-border moves and international migration. These combined flows are allowed to vary so that all the available information on population stocks and flows can be balanced. In this article, all references to modelled migration estimates refer to the estimates produced by the ABPE method.

In local authorities with high levels of population churn, it can be particularly challenging to accurately capture all movements into and out of the area. For example, internal migration flow estimates rely heavily on health data sources and people do not always update their GP registration information in a timely manner when they move between local authority areas.

There are also challenges in accurately measuring population change in local authorities that contain communal establishments such as student halls of residence, boarding schools, military bases, care homes and prisons. Population groups that live in communal establishments are often mobile and have unique interactions with administrative data, which can make it difficult to identify and place these residents in the population estimates. Examples include:

- student health records associated with a parental address rather than a term-time address
- UK armed forces personnel who may not be on GP registers

Statistical modelling balances the input data for 2011 onwards for each cohort in each local authority. This allows greater weight to be given to more reliable data. A coherent set of estimates are generated for the population and components of population change across the full time series. These estimates form a balanced demographic account, where the change in population between two time periods equals the net population flows.

The uncertainty around the ABPEs and the modelled migration estimates is illustrated by credible intervals, as explained in Section 10: Glossary. The probability that the true value lies in the credible interval is 95%.

5 . Comparing estimates for Cardiff

Population characteristics

Cardiff, the capital city of Wales, is the most densely populated local authority in Wales. With several higher education institutions, including universities, it has a large student population which includes international students. There is a high degree of population churn, with people moving into and out of the city. This is particularly the case for student age groups but also for children and younger, working-age people.

Census 2021 data show that Cardiff was in the highest 6% of all local authority areas in England and Wales for the percentage of usual residents who lived in communal establishments (4.3%). The coronavirus pandemic may have affected some people's choice of usual residence on Census Day in 2021, particularly students. Census 2021 counted students at their term-time address rather than where they happened to be on Census Day. Read more about how we ensured an accurate estimate of students in our Maximising the quality of Census 2021 population estimates methodology.

Total population

For Cardiff, total admin-based population estimates (ABPEs) for 2011 to 2023 are similar to the official mid-year population estimates (MYEs); the MYEs lie within the ABPE credible intervals throughout the period. After 2021, the census year, the estimates begin to diverge slightly; a likely consequence of the MYEs drifting between censuses. For mid-2023, the total ABPE is 1.7% lower than the MYE.

Following Census 2021, MYEs for the intercensal period (2012 to 2020) were rebased. Total MYEs for Cardiff decreased and became more closely aligned to the ABPEs. Our Transforming population statistics, comparing 2021 population estimates in England and Wales article shows that ABPEs are more robust between censuses compared with the MYEs.

Comparing estimates for young men

We now focus on the mid-2023 population estimates for young men in Cardiff, where differences exist between the ABPEs and MYEs. Similar differences also exist for young women.

For males in Cardiff, mid-2023 ABPEs and MYEs are very similar, except for young men aged 18 to 33 years. Differences are most notable for men aged 21 to 24 years. For this group, the ABPEs are between 9% and 11% lower than the MYEs and the MYEs lie slightly above the upper bound of the ABPE credible interval.

Figure 1: Differences between the ABPEs and MYEs are greatest for men in their early-20s

Admin-based population estimates (ABPEs) and mid-year estimates (MYEs) for males by age, Cardiff, mid-2023

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These differences primarily come from the population stock, which estimates a lower number of young men compared with the MYEs. The lower population stock used as an input for the ABPEs leads to modelled estimates of combined emigration being higher than the flow input data used for both the ABPEs and the MYEs. Using an independent population stock alongside statistical modelling, to balance this stock with the population flows, generates improved population estimates; particularly in cases when young adults do not update their health records in a timely manner, when moving local authorities to start or leave higher education.

Figure 2: For men in their early-20s, modelled estimates of combined emigration are higher than the estimates used for the MYEs

Estimated combined migration in the admin-based population estimates (ABPEs) and the mid-year estimates (MYEs) for males by age, Cardiff, mid-2023

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Internal migration estimates used as input data for the MYEs and ABPEs include an adjustment that attempts to capture missing departures in the health data. The Higher Education Leavers Methodology (HELM) distributes higher education leavers whose addresses have not been updated on their health record, using the observed movement patterns of students who have previously left higher education. Additionally, the ABPE estimation process balances population stock and flow data from 2011 onwards. This takes account of the uncertainty in the estimates of internal migration and leads to improved estimates of combined migration and the population.

More information on HELM is available in Section 5 of our Mid-2023 population estimates methods guide.

6 . Comparing estimates for Barking and Dagenham

Population characteristics

The outer London borough of Barking and Dagenham is in the top 6% of most-densely populated local authorities in England and Wales. Between Census 2011 and Census 2021 the borough's population increased by 18%, the third-largest percentage increase of all local authorities in England and Wales. More generally, the population of London increased by 7.7%, while the population of England rose by 6.6%.

Barking and Dagenham has a high percentage of children aged under 5 years. Official mid-2023 estimates show that 7.8% of the population were aged under 5 years, the highest percentage out of all local authorities in England and Wales. Census 2021 shows a similar distribution. Many of the outer London boroughs and their surrounding areas also have a higher percentage of young children in the population.

Barking and Dagenham is ethnically diverse. Out of all local authorities, it had the tenth lowest percentage of usual residents who identified as part of the "White" ethnic group (45%) in Census 2021. Over a quarter (26%) identified as "Asian or Asian British", 21% identified as "Black, Black British, Caribbean or African" and the remaining 8% identified as either "Mixed or Multiple" or "Other ethnic group".

There is substantial population churn from both internal and international migration, with people moving into and out of the borough. For young adults aged 18 to 20 years, combined net migration shows more people leaving the local authority than moving into the area. For people in their 20s and early-30s, combined net migration generally shows more people moving to the area than leaving it. Young adults leaving to study and then returning, and others arriving for employment reasons also contribute to this trend.

Total Population

For Barking and Dagenham, total mid-year estimates (MYEs) lie within the admin-based population estimate (ABPE) credible intervals throughout the period 2011 to 2023. Total ABPEs for mid-2012 to mid-2020 are lower than the MYEs. Towards the end of the decade, the MYE lies close to the upper bound of the ABPE credible interval.

In 2021, the difference between the estimates narrows. This is because Census 2021-based MYEs, which have relatively low levels of uncertainty, are used as the population stock for the ABPEs. After the census year, the two estimates begin to diverge again with the total ABPE higher than the MYE. In mid-2023, the total ABPE is 1.3% higher than the MYE.

Comparing estimates for young women

The rest of this case study focuses on the estimates for young women in Barking and Dagenham, where differences between the mid-2023 ABPEs and MYEs are at their greatest.

The ABPEs and MYEs for females in Barking and Dagenham in mid-2023 are very similar at most ages except young women, particularly those aged between 26 and 33 years. At each of these ages, the ABPEs are more than 6% higher than the MYEs, and the MYEs lie consistently below the lower bound of the ABPE credible interval. The MYEs also lie below the lower bound of the credible interval for young women aged 24, 35 and 36 years.

For young women, a similar pattern is also present in mid-2022; however, the MYEs lie outside the ABPE credible intervals less often. Estimates for 2021 are more closely aligned because it is a census year.

Figure 3: For women in their late-20s and early-30s, ABPEs are higher than the MYEs

Admin-based population estimates (ABPEs) and mid-year estimates (MYEs) for females by age, Barking and Dagenham, mid-2023

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Modelled estimates of combined net migration for this group of women are higher than the input data used for the MYEs and the ABPEs. This results from higher modelled combined immigration, and lower modelled combined emigration in the ABPEs.

Figure 4: For women in their late-20s and early-30s, modelled estimates of combined net migration are higher than the estimates used for the MYEs

Estimated combined migration in the admin-based population estimates (ABPEs) and the mid-year estimates (MYEs) for females by age, Barking and Dagenham, mid-2023

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The ABPEs use a population stock derived independently for each year from a wide range of administrative data. For Barking and Dagenham, the population stock for this group of women in mid-2023 is higher than the MYEs. The ABPE estimation process then balances this population stock and population flow data over time, using the uncertainty associated with these estimates. Our ABPE methods provide improved estimates which better account for challenges associated with accurately estimating population flows into and out of the borough.

7 . Comparing estimates for Westminster

Population characteristics

Westminster, an inner London borough, is the tenth most densely populated local authority in England and Wales. Only other London boroughs are more densely populated.

The borough has several universities, military bases and boarding schools. Despite this, it is not considered to have a large communal establishment population compared with other local authorities. However, these establishments contribute to the borough's high level of population churn from both internal and international migration.

Westminster was one of only three London boroughs to see its population decline between the last two censuses in 2011 and 2021, decreasing by 6.9%. Overall, the population of London increased over the decade by 7.7%. For Census 2021, the coronavirus (Covid-19) pandemic may have affected where people were usually resident. Since 2021, official population estimates for Westminster show the population to be increasing.

In Census 2021, Westminster was the local authority with the third-highest percentage of households living in social or private rented properties (72%). Only Tower Hamlets and Hackney had slightly higher percentages. Many of the rental properties in Westminster are considered short-term rentals and this further contributes to population churn.

Total population

The total admin-based population estimates (ABPEs) for Westminster for mid-2011 to mid-2023 are lower than the official mid-year estimates (MYEs). The MYEs lie above the upper bound of the ABPE credible interval between 2016 and 2018. In mid-2023, the total ABPE is 2.4% lower than the MYE.

Figure 5: Total ABPEs are lower than the MYEs

Admin-based population estimates (ABPEs) and mid-year estimates (MYEs), Westminster, mid-2011 to mid-2023

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Between 2011 and 2017, the two population estimates diverge slightly, with the ABPEs becoming increasingly lower than the MYEs. In this period, modelled net combined migration for Westminster is lower than the estimates used for the MYEs. The lower modelled net combined migration is mainly a result of higher modelled emigration.

Differences between the ABPEs and MYEs narrow in 2021, when Census 2021-based MYEs provide the estimated population stock for the ABPEs. There is a greater level of uncertainty around Census 2021-based MYEs for Westminster, compared with other local authorities because of a comparatively low census response rate. This is reflected by the wider confidence intervals around the 2021 MYE. Further information on the quality of Census 2021 data is available in our Measures showing the quality of Census 2021 estimates methodology.

In 2022 and 2023, modelled net migration falls slightly below the estimates used for the MYEs, and the ABPEs show a slightly lower level of population growth than the MYEs.

Comparing estimates for women in their 20s and mid-50s

We now focus on women in Westminster in their 20s and mid-50s to show how the ABPE methods account for unexpected findings present in one data source but not others.

For Westminster, mid-2023 ABPEs for women aged 25 to 29 years are notably lower than the MYEs. For women aged 26 and 27 years, the MYEs lie above the upper bound of the ABPE credible interval. The ABPEs are also notably lower than the MYEs for women aged 54 to 56 years where again, the MYEs lie above the upper bound of the ABPE credible interval.

Figure 6: For women in their late-20s and mid-50s, ABPEs are notably lower than the MYEs

Admin-based population estimates (ABPEs) and mid-year estimates (MYEs) for females by age, Westminster, mid-2023

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For women in their late-20s, modelled combined emigration is higher than the estimates used as an input for the MYEs and the ABPEs. This leads to lower modelled net migration. This is consistent with the issue of health records missing the departure of some of the highly mobile population groups found in Westminster. The ABPE estimation process balances population stocks for each year, and population flow data over time, using the uncertainty associated with these estimates. These methods provide improved estimates, which better account for challenges associated with accurately estimating population flows into and out of the borough.

In mid-2023, the MYEs show a peak in the population of women aged between 54 and 56 years. For women in their 50s, migration levels are low and net migration is close to zero in both the modelled ABPEs and the MYEs. The peak in the MYEs arises from women aged 52 to 54 years ageing on from Census 2021-based estimates. However, it is not clear why we would expect a peak in population for women born in the late 1960s. This peak is not present in regional-level estimates, or for men in Westminster. Westminster had a relatively low response rate to Census 2021. As a result, relatively large amounts of adjustment and imputation were required to derive the population estimates. The uncertainty around the census-based population estimates for Westminster is therefore greater than for many other local authorities.

Figure 7: For women in their late-20s, modelled estimates of combined emigration are higher than the estimates used for the MYEs

Estimated combined migration in the admin-based population estimates (ABPEs) and the mid-year estimates (MYEs) for females by age, Westminster, mid-2023

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The population stock estimate used to produce the ABPEs does not have a peak for women in their 50s. Balancing this stock with the population flow data over time, takes account of the uncertainty associated with these estimates. The ABPE method therefore allows for issues with any single data source and means that problems in one year are less likely to be carried forward into the next.

8 . Comparing estimates for Rutland

Population characteristics

Rutland, in the East Midlands, is a predominantly rural area. It is the third least populated local authority in England and Wales, only the Isles of Scilly and City of London have smaller populations. For population density, Rutland was in the lowest 8% of local authorities in England and Wales in mid-2023.

Despite its small overall population, Rutland has a high representation of several population groups including boarding school students, armed forces, and prisoners. Consequently, Rutland had the third highest proportion of residents living in communal establishments in Census 2021 (8.8%), behind Cambridge (13.2%) and Oxford (13.1%).

The high representation of boarding school students, armed forces, and prisoners in Rutland contributes to population churn. Much of this is internal migration, although some international immigration takes place among school-age children. Outside of these groups, population churn is low and most migration is internal to other local authorities within England and Wales.

Members of UK and foreign armed forces, and prisoners are treated as special populations in the MYEs. Their movements are assumed not to be captured by the data sources used to estimate international and internal migration. The methods and data sources used to estimate these special populations are detailed in our mid-2023 population estimates methods guide. These methods are subject to assumptions and caveats and provide the net change for a local authority for each age and sex. These net-moves feed into the estimate of combined migration used to derive the ABPEs. Positive net changes are added to combined immigration, while negative net changes are included with combined emigration.

Total population

Total admin-based population estimates (ABPEs) are broadly similar to the official mid-year population estimates (MYEs) for the years 2011 to 2023. The MYEs all lie well within the ABPE credible intervals. In 2021, the difference between the estimates is very small (53 people). This reflects the low levels of uncertainty in this year because of the census.

The two estimates diverge slightly after 2021, with the ABPE higher than the MYE. In mid-2023, the total ABPE for Rutland is 1.1% higher than the MYE.

Comparing estimates for young men

We now look at the estimates for men in more detail, as the armed forces and prison populations in Rutland are predominantly men.

Mid-2023 ABPEs for men in Rutland are consistently slightly higher than the MYEs at most ages between 22 and 43 years. The MYEs lie just below the lower bound of the ABPE credible interval for men aged 24, 31 and 34 years.

Special population adjustments are relatively large for Rutland compared with other local authorities. In the year to mid-2023, total net out-migration for men aged 22 to 43 years was estimated to be 431, 65% of which was attributable to a net decline in special populations.

Figure 8: For men aged 22 to 43 years, ABPEs are mostly slightly higher than the MYEs

Admin-based population estimates (ABPEs) and mid-year estimates (MYEs) for males by age, Rutland, mid-2023

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The ABPEs use population stock datasets for each year, which are created using a wide range of administrative data including health, education, tax, benefit and prison population data from the Ministry of Justice (MoJ). Before coverage adjustment, there is notable under-coverage in the estimated population stocks for Rutland, particularly for men aged 22 to 42 years, a group often associated with special populations.

For men in their 20s, 30s and early-40s, modelled combined immigration is generally slightly higher than the estimates used for the MYEs; modelled combined emigration is generally slightly lower. This leads to slightly higher modelled net migration and a higher ABPE for these ages.

In Rutland, the greatest percentage differences between mid-2023 ABPEs and MYEs are for men aged 19 and 20 years. For those aged 19 years, the MYE lies just below the lower bound of the ABPE credible interval. In contrast, for those aged 20 years, the MYE lies above the upper bound of the ABPE credible interval. These differences primarily come from the population stock, which estimates a larger population aged 19 years and a smaller population aged 20 years, compared with the MYEs. Differences in modelled combined emigration for the ABPEs arise from the differences in the population stocks.

Figure 9: For men in their 20s and 30s, modelled estimates of combined net migration are higher than the estimates used for the MYEs

Estimated combined migration in the admin-based population estimates (ABPEs) and the mid-year estimates (MYEs) for males by age, Rutland, mid-2023

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The ABPE estimation process balances the population stock and population flow data over time, using the uncertainty associated with these estimates. This allows for coverage issues with the population stocks and the challenges associated with measuring population flows. The ABPE methods therefore lead to improved population estimates, particularly among groups where there is a high level of population churn.

9 . Data on admin-based population estimates: local authorities in England and Wales, mid-2011 to mid-2023

Admin-based population estimates for local authorities in England and Wales
Dataset | Released 15 July 2024
Admin-based population estimates for all local authorities in England and Wales from the dynamic population model.

10 . Glossary

Cohort

In this article, cohort refers to a group of people with the same year of birth, where "year" refers to the year to 30 June.

Coverage adjustment

Coverage adjustment of the population stocks is required to allow for coverage errors. These occur when a member of the population is not counted, is counted more than once or is counted in the wrong location. Our current proxy coverage adjustment method for population stocks uses census data. We are exploring methods using administrative data sources. Section 4 of our Future of population and migration: a statistical design methodology provides more information on this area of work.

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 for official mid-year population estimates 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. The probability that the true value lies in the credible interval is 95%. Credible interval bounds are not symmetrical around the admin-based population estimates (ABPEs); the distance of the lower and upper bound from the ABPE will differ.

Flows

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).

Modelled migration estimates

In this article, all references to modelled migration estimates refer to the migration estimates produced by the ABPE estimation method. These estimates differ from the migration estimates used in the official mid-year population estimates and as input data for the ABPEs. The ABPE process derives modelled estimates for combined immigration (inflows) and combined emigration (outflows). Combined migration flows include internal migration, international migration and cross-border moves. Modelled migration estimates are derived by balancing population stock and flow data over time, using the uncertainty associated with these estimates. Estimates of combined net migration are calculated by subtracting estimates for combined emigration from combined immigration.

Population stocks

Population stocks are estimates of the population at specific points in time. Population stocks used to estimate the ABPEs relate to mid-year (30 June) and are produced independently for each year. Coverage adjustment of the population stocks is required to account for coverage errors.

11 . Data sources and quality

The data sources used to produce the admin-based population estimates (ABPEs) can vary based on availability. The specific data sources used to create each individual set of ABPEs are detailed in our accompanying datasets.

Statistical Population Datasets (SPDs), generally provide the population stock. They are produced independently for each year by linking records across multiple administrative data sources and applying a set of inclusion and distribution rules. The data sources used include:

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

It is possible to use more than one population stock for each year. Alternative population stocks include the Personal Demographics Service (PDS) or census. The PDS often becomes available before other data sources.

Our methods to produce the ABPEs are not reliant on census data. However, census data do currently 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 stock for these years. Census data for 2011 and 2021 are also used in our proxy coverage adjustment method for the population stocks, while we explore methods for coverage adjustment using administrative data sources. More detail on our proxy coverage adjustment method is available in Section 3 of our Dynamic population model, improvements to data sources and methodology article.

Data estimating population flows include:

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

The methods and data sources used in our estimates of internal migration and cross-border moves are described in Section 5 of our Population estimates methods guide. The methods and data sources used to produce our estimates of long-term 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 cover why the data sources are important, their coverage of the population, and their data quality.

The data sources used are not designed to be tools for creating 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. Reports are available:

- for Births
- for Deaths
- for UK Armed Forces
- for US Armed Forces
- for Patient Register (PR)
- for Higher Education Statistics Agency (HESA)
- for Prisoners
- for NHS Central Register (NHSCR)
- for long-term international migration

Additional QAADs are being developed to ensure all data sources used to produce the ABPEs are covered.

Our methodological work, published on the UK Statistics Authority website, has been presented to the independent Methodological Assurance Review Panel (MARP), 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. The methods have also been presented and discussed at a cross-government Demographic Methods Expert Group. A subgroup of MARP, consisting of Bayesian statisticians, is being set up to provide advice on the methods used to produce the ABPEs.

ABPEs are rigorously quality assured at all stages of production. Further information on this quality assurance, how the ABPEs are created, their appropriate usage, and strengths and limitations, is available in our Mid-year admin-based population estimates for England and Wales quality and methodology information (QMI).

For the mid-2023 ABPEs and mid-year estimates (MYEs), the internal migration estimate had to be produced using an alternative approach, after a change to the variables available in Higher Education Statistics Agency (HESA) data, which affected data linkage. The alternative approach involved scaling Personal Demographics Service data and is explained in more detail in our Dynamic population model, improvements to data sources and methodology: local authorities in England and Wales, mid-2011 to mid-2023 article. This approach is usually used for provisional ABPEs because HESA data are not available at the time of production. Consequently, mid-2023 internal migration estimates used to derive the ABPEs have a higher level of uncertainty than would be expected in future ABPE releases.

12 . Future developments

Admin-based population estimates (ABPEs) are derived by modelling 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 need to be disaggregated to provide estimates of international, internal, and cross-border flows. We aim to publish disaggregated migration flows in summer 2025, once we have refined methods and quality assured the resultant estimates.

The Office for Statistics Regulation (OSR) has assessed the ABPEs against the standards set out in the Code of Practice for Statistics. Our Action plan in response to OSR assessment of Office for National Statistics (ONS) ABPEs outlines how we plan to address the recommendations.

Our population and migration quarterly update article provides the latest information on plans and progress to help keep users informed.

13 . Feedback

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.

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.

14 . Related links

Mid-year admin-based population estimates for England and Wales QMI
Methodology | Released 15 July 2024
Quality and methodology information for mid-year admin-based population estimates (ABPEs) for England and Wales, detailing the strengths and limitations of the data, methods used, and data uses and users.

Understanding mid-year admin-based population estimates for local authorities in England and Wales
Article | Released 15 July 2024
Important information about our mid-year admin-based population estimates (ABPEs) for England and Wales.

Dynamic population model, improvements to data sources and methodology: local authorities in England and Wales, mid-2011 to mid-2023
Article | Released 15 July 2024
Update on the data used by the dynamic population model (DPM) to produce admin-based population estimates (ABPEs).

Population estimates for England and Wales: mid-2023
Bulletin | Released 15 July 2024
National and subnational mid-year population estimates for England and Wales by administrative area, age and sex.

15 . Cite this article

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