Office for National Statistics

Population estimates for England and Wales, mid-2024: methods guide

National and subnational mid-year population estimates for England and Wales, broken down by administrative area, age, sex and components of population change.

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1 . Introduction to population estimates

Population estimates for England and Wales

We aim to produce annual estimates of the resident population of England and Wales 12 months after the date they refer to, usually around 30 June every year. Estimates for mid-2024 were accompanied by revised mid-2022 and mid-2023 population estimates for England and Wales that incorporated updated internal and international migration.

Alongside the mid-year population estimates for mid-2024, we have published admin-based population estimates (ABPE) for mid-2024. These are produced using the Dynamic Population Model. 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.

We are aiming for our ABPEs to become the official mid-year population estimates in 2026. Both sets of numbers use common data on components of population change for internal and international migration. Details of the methodology can be found in our Mid-year admin-based population estimates in England and Wales Quality and Methodology Information.

Current population estimates come from the census, which takes place every 10 years. The most recent censuses were held on 21 March 2021 in England, Wales, and Northern Ireland and on 20 March 2022 in Scotland. Population estimates from a census are updated each year to produce population mid-year estimates (MYEs), which are broken down by local authority, sex, and age.

Population estimates for the UK

We produce population estimates for England and Wales. We also collate estimates from Scotland and Northern Ireland to produce UK totals. Estimates for Scotland are produced by National Records of Scotland (NRS), while the Northern Ireland Statistics and Research Agency (NISRA) produces the estimates for Northern Ireland.

Estimates for each of the UK constituent countries are compiled using a common methodological approach and aim to be as consistent as possible. Details of the specific data sources and methods used across the UK are summarised in our UK comparisons methodological note.

In July 2025, we published mid-2024 population estimates for England and Wales rather than the UK. This was because of different processing schedules in Scotland and Northern Ireland that prevented UK-wide estimates being published. This article relates to the estimates for England and Wales only.

On 9 July 2024, NRS published a back series of estimates for mid-2012 to mid-2021, consistent with the results of the 2022 census in Scotland. These were incorporated into a set of UK population estimates for 2011 to 2022 that were published on 15 July 2024. NRS revised these estimates in January 2025, and we will incorporate these into the mid-2024 UK release currently planned for publication in Summer/Autumn 2025.

The NRS has published a Guide to the methodology used to produce MYEs for Scotland on their website (PDF 298KB). Details on the methodology used to create the Northern Ireland population estimates are available on the NISRA website (PDF 232KB).

Usually-resident population

These population estimates refer to the usually-resident population. It includes only people who reside in a country for 12 months or more, making them usually resident in that country. Visitors and short-term migrants are excluded. This can mean that estimates of population do not necessarily coincide with the number of people to be found in an area at a particular time.

For most people, defining where they usually live – for the purposes of the census, for example – is straightforward. For a minority of people, the concept of usual residence is more difficult to define. Examples include students, members of the armed forces, prisoners, and international migrants.

Specific rules are used for these groups:

- higher education students and schoolchildren studying away from home are considered usually resident at their term-time address
- members of the armed forces are usually resident at the address where they spend most of their time
- prisoners are usually resident in the prison estate if they have a sentence of twelve months or more
- international migrants are usually resident if they intend to stay in England and Wales for more than 12 months

Protection against disclosure

The estimates are produced using a variety of data sources and statistical models, including some statistical disclosure control methods. Small estimates should not be taken to refer to particular individuals.

Quality assurance

We consistently monitor the quality of the MYEs. This includes quality assurance of the administrative and survey data sources that are used to calculate the estimates, the statistical methods applied to produce the estimates, and the tables of data published on our website.

Further details are available in our MYEs Quality and Methodology Information (QMI) and in the quality assurance of administrative data (QAAD) reports listed in Section 11: Quality assurance of administrative data reports.

2 . Cohort component method

Rolled-forward estimates

Population estimates are produced using a cohort component method. This is a standard demographic method that uses high quality data sources to inform components of population change. The three major components of population change are natural change, migration, and special populations.

Natural change (births, deaths, and ageing)

The starting point for producing the estimates is the resident population from 30 June of the previous year. This population is aged on by one year. Births during the 12-month period are added to the population, while deaths during this period are removed according to recorded age, sex, and usual area of residence.

Migration

Movement of people into and out of the UK (international migration) and movements between different areas of the UK (internal migration) are also accounted for in the population estimates. Internal migration includes both cross-border moves between the countries of the UK and moves between local areas within each country of the UK. Migration is the most difficult part of the estimation process to measure accurately because the UK has no comprehensive or mandatory population registration. Rather, we use the best data available on a nationally consistent basis to estimate migration.

Special populations

Adjustments to the population estimates are made for some special population groups that are not captured by the usual internal or international migration estimates: members of the armed forces and prisoners. These populations have specific age structures, which remain fairly constant over time so are not aged-on with the rest of the population. Such populations are referred to as static populations.

The cohort component method has six stages:

- stage one: take the resident population of the previous year on 30 June and age-on by one year
- stage two: add children born between 1 July and 30 June as the population aged zero
- stage three: subtract from the population the number of deaths between 1 July and 30 June
- stage four: add or remove people who have entered or left England and Wales from outside the UK between 1 July and 30 June
- stage five: adjust areas' populations to account for those that have moved within the UK between 1 July and 30 June
- stage six: 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

Census basing

This section describes how mid-year estimates (MYEs) are calculated for years when there is no census. For years in which there is a census, the MYEs are based on the census estimates and a slightly different approach is necessary. Rather than ageing-on the population by one year, the population is only aged-on by the period of time between the census and 30 June. Similarly, the components only need to account for change during this period rather than a whole year.

The census regards armed forces personnel as usually resident at their permanent or family home, even if most of their time is spent at their armed forces base address. In contrast, MYEs regard armed forces personnel as usually resident at their base addresses, so an adjustment to census data is made to reflect this.

Research and development

We continue to research ways to ensure and improve the quality of the population estimates, including analysis of new data sources that become available.

Uncertainty estimates are being created to give users additional information on the quality of these estimates. Measures of statistical uncertainty for mid-2021 to mid-2024 are published alongside the mid-2024 release.

In-depth methodology

The following sections describe in more detail how we estimate the components of population change in the MYEs produced for England and Wales.

3 . Births

Change in population resulting from births

Births in England and Wales occurring between 1 July of the previous year and 30 June of the current year are added to the population at age zero, by sex, and allocated to the local authority of usual residence of the mother.

Births data

Data on live births by sex are obtained from the Civil Registration System administered by the Office for National Statistics (ONS) and are based on births occurring (and then registered) in England and Wales. As registration of births may legally take place up to 42 days after a birth, the data received refer to the date of birth rather than the date of registration.

Births to usual residents of England and Wales occurring outside England and Wales

The Civil Registration System captures information on all births in England and Wales. This includes births to mothers who are usually resident elsewhere, but not necessarily those births to mothers who are usually resident in England and Wales that take place elsewhere.

We assume that the number of births for the two groups are similar in number and, on average, balance each other out. In this way, births to non-usually resident mothers are added to the population estimates as a proxy for those births elsewhere to usually resident mothers. We impute local authorities of residence for these births using the distribution of births we know about during the year.

4 . Deaths

Change in population resulting from deaths

Deaths that are registered in England and Wales between 1 July of the previous year and 30 June of the current year are subtracted from the population by sex, age, and local authority of usual residence.

Deaths data

Deaths data are obtained from the Civil Registration System administered by the Office for National Statistics (ONS). The data are supplied by sex, age, and local authority of usual residence in England and Wales. To be consistent with the mid-year reference date, we adjust age at death to age on 30 June.

Deaths to usual residents of England and Wales occurring outside England and Wales

The Civil Registration System captures information on all deaths in England and Wales. This includes deaths of people usually resident outside England and Wales. In the calculation of subnational population estimates, these people are allocated to a local authority, imputed using the distribution of deaths by age and sex we know about during the year.

The Civil Registration System does not record deaths of usual residents of England and Wales that have occurred abroad and that are not registered in England and Wales. These deaths are excluded from the deaths data and do not feature in the calculation of the mid-year population estimate (MYE).

We assume that the number of deaths for these two groups are similar in number and on average balance each other out. In this way, deaths among non-usually resident people are added to the population estimates as a proxy for the deaths of usually resident people that occurred outside England and Wales.

Unknown local authority of residence

Local authority of residence is not recorded for a small number of deaths. For these, a local authority is imputed using the distribution of deaths by age and sex we know about during the year.

Late registrations

We make a small adjustment for anticipated late registrations to allow for deaths that were not yet registered at the time the data were extracted. Prior to mid-2022, the number of late registrations in the previous year was used as a proxy for late registrations in the current year, on the assumption that the number of late registrations does not significantly vary year-to-year.

However, our analytical article regarding the Reconciliation work for mid-year population estimates highlighted that our late registration adjustment method omitted around 30,000 late registered deaths over the decade between 2011 and 2021. We have corrected this for years 2011 to 2021, and we have implemented a better approach for MYE 2022 onward. We now allow for a much longer registration delay, which results in more late registrations being included in our late registrations adjustment.

The deaths data used for the revised back series of population estimates for 2012 to 2021 was extracted in early 2023. This data provides a more complete picture of the number of deaths that occurred over the period and does not include a late registration adjustment.

5 . Internal migration

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 people between England and Wales and the rest of the UK (cross-border flows). Our internal migration estimates target definition is all changes of address (moves) occurring within the reference year.

Internal migration data

Internal migration estimates are primarily based on data that flag up when people change their address with their doctor. Since most people change their address with their doctor soon after moving, these data are considered to provide a good proxy indicator of migration.

Estimates for 2017 onwards are based on the PDS stock files, Higher Education Statistics Agency (HESA) data and PDS weekly updates.

More details about these internal migration data sources are provided below.

Personal Demographics Service data

Each year, we receive a snapshot of data extracted from the PDS as of 31 July, known as the PDS stock file. This reference date is based on the assumption that it takes about a month to register with a GP and appear on the PDS after moving to a new area. This enables migration estimates to be produced for the year ending 30 June.

The records from the current year are compared with those from the previous year to identify people who have changed their address during the period. We define a person who changes their local authority of residence within England and Wales between one year and the next as an internal migrant. This is known as a transition, as it does not cover within-year moves.

Personal Demographics Service data for within-year moves and cross border flows

The PDS records within-year moves of patients and is combined with PDS and HESA stock files to produce estimates of migration between local authorities.

The counts of cross-border flows between England and Wales and Scotland and Northern Ireland are also obtained using the PDS weekly updates file. The total flows to and from constituent countries of the UK are agreed between the Office for National Statistics (ONS), National Records of Scotland (NRS) and Northern Ireland Statistics and Research Agency (NISRA), based on records of in-migration to the relevant country.

NHS Central Register data until February 2016

The NHS Central Register (NHSCR) recorded the movements of patients between health authority areas (HAs) and was combined with Patient Register (PR) data held by individual HAs, to produce estimates of migration between local authorities. Similar data sources were used to obtain estimates of cross-border flows to and from Scotland and Northern Ireland.

The NHSCR data source was discontinued in February 2016. Consequently, England and Wales internal migration estimates for mid-2016 were calculated by combining the 2016 PR data with the 2015 NHSCR data. For mid-2017, we moved to using the PDS weekly updates file.

Higher Education Statistics Agency data and Higher Education Leavers Methodology

The fundamental approach to estimating internal migration within England and Wales is to compare people's area of residence on the PDS in the current year with that in the previous year. Weaknesses with this approach include that people moving to or leaving higher education might be slow to update their health registration (with a GP). This would mean we would not identify all the moves into student areas or into areas where graduates tended to move to after completing their studies. We have used several methods to try to account for these moves.

The HESA data showed where students were registered by their university as living, and this allowed us to make more accurate estimates of people moving to study in each area.

Our estimates for 2012 onwards use the Higher Education Leavers Methodology (HELM). This method distributes those higher education leavers whose addresses have not been updated on their PDS (Patient Register (PR) for estimates pre-2017) after leaving higher education using the observed movement patterns of students who have previously left higher education.

The method can be summarised as follows:

- stage one: identify people who need their area of residence imputed; this will be from their PDS (formally PR) records (not updated during the year) previously linked to HESA data but no longer with a HESA record as the person has left higher education

- stage two: identify similar people (those who left higher education but took more than a year to update their health registration) from three years previously and use their PDS records to estimate the distribution of destinations; three years is judged to be the best balance of recent and older data to both reflect current patterns and maximise the proportion of updated registrations

- stage three: apply the estimated distribution from stage two to people who need their area of residence imputed; the random imputation avoids systematic bias in destinations chosen, but the final distribution will be close to the initially estimated distribution

We expect that the estimates produced using HELM are more accurate than those produced using the previous method. Recognising that higher education leavers might disperse to any of the local authorities in England and Wales will mean the internal migration estimates should better reflect the real patterns of moves that occur.

By not simply keeping the higher education leavers at their HESA address or returning them to their PDS address, we expect the methodology to better reflect the number of post-student-aged individuals remaining in "student" local authorities and the number of post-student-aged individuals moving to popular graduate destinations (often large metropolitan areas).

It is important to note that some people remain in their local authority of study following higher education. HELM recognises this, as the destination distributions still reflect individuals staying in their local authority of study.

Unlike the previous methodology, which distributed students over time, HELM distributes all higher education leavers to their imputed destination in the first year after they finished higher education. There is some inaccuracy because some of the moves informing the destination distributions took place in the second or third year after leaving higher education. This is offset by the fact that some recorded moves may have been "lagged", occurring in the first year but recorded in the second or third year after leaving higher education. There is a further offsetting effect in that the destination distributions assume that any individuals who did not change address in any of the three years after leaving higher education remained in their local authority of study while some of these may have moved later or simply not updated their health registration.

Imputing place of residence for individual records has substantial advantages over making aggregate adjustments, as any incorrect imputation would be automatically corrected when that person updates their health registration. The impact of using HELM, as opposed to the previous method of estimating graduate migration patterns for mid-2017, is presented in Section 12: Understanding the impact of changes to internal migration methods of our mid-2021 methodology.

Estimating within-year moves - reconciling Personal Demographics Service stock files with weekly updates

The majority of internal migration moves reflect someone living in one area of England and Wales at the start of the year and another area at the end of the year. We call this type of move a "transition", but not all moves are of this type. For example, if people move multiple times in a year, babies move within the year they are born, or if people die or emigrate before the end of a year; these are collectively called "within-year moves". The PDS stock files cannot capture the migration of those who move during the year but who were not registered with a GP at one of the two mid-year time points. However, the PDS weekly updates files (and formerly, the NHSCR) pick up these types of moves. Scaling factors derived from the relationship between moves based on PDS weekly updates and transitions based on PDS stock are used to scale our initial transitions to better account for all moves with the reference period.

As part of the rebasing of the mid-2011 to mid-2021 population estimates following the 2021 Census we revised our population estimates for the decade. A linear regression was applied to the scaling factors for 2012 to 2016, created using the NHSCR to ensure the scaling factors were consistent across the decade.

Internal migration and special populations

Movements of members of the armed forces are not included in the internal migration estimates. While the PDS records movements of people into and out of the armed forces, movements of serving members are not fully recorded. Similarly, movements of prisoners are also not included in the internal migration estimates. The population of armed forces and prisoners are estimated separately and discussed in 7: Home armed forces, Section 8: Foreign armed forces, and Section 9: Prisoners.

6 . International migration

An international migrant is defined as a person who changes their country of usual residence for a period of at least a year. Our latest estimates, published in our Long-term international migration (LTIM) bulletin, are produced using methods that are based predominantly on administrative data. Previously, the international migration component of the mid-year estimate was produced using a complex set of methods using a variety of administrative and survey data sources. These methods were designed to complement international migration estimates from the International Passenger Survey (IPS). A detailed description of the methods used to produce international migration estimates prior to mid-2021 is available in Section 12: Summary of historical methods.

International migration at age, sex, local authority

With our move to a more-administrative based system for measuring international migration, we have developed a new experimental method to produce international migration estimates by age and sex at a local level. This uses data from:

- 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)
- Longitudinal Personal Demographics Service (LPDS)
- Home Office Asylum and Resettlement Data
- Census 2021

These data sources combined allow us to break down the total net migration estimate by age, sex, and local authority.

Guided by data availability, different methods are used to estimate age, sex, and local authority migration for EU, non-EU, and British nationals. The EU, non-EU and British flows are then brought together to provide an overall estimate of migration by age, sex, and local authority.

EU nationals

To estimate the age, sex, and location immigration patterns of EU nationals, we use a combination of LPDS (for those immigrating under the age of 18) and RAPID data. The RAPID data is adjusted for undercoverage using HESA data for students (aged 18 and over) who are not in employment. This adjustment is tailored for each local authority to account for those areas which may not have a higher education institution. For emigration, the PDS data does not produce sensible distributions for child migration at local authority level, so we make a ratio adjustment based on the number of adults migrating for this group to obtain estimates of child emigrants by age, sex, and local authority. We describe the ratio adjustment in more detail in our Dynamic population model, improvements to data sources and methodology. These data are used together to create a proportion of total immigration and emigration, which is then applied to the headline estimate, published in our most recent Long-Term International Migration (LTIM) estimate for year ending June 2024 to give the age, sex, and local authority distribution for EU nationals.

Non-EU nationals

Data for non-EU nationals at the UK level are comprised from Home Office Borders and Immigration Data (HOBID). Data are available by age and sex for this data. The same method for EU nationals (described above) are applied for non-EU nationals to provide geographical distributions at Local Authority level. However, the age and sex distribution and non-EU total from RAPID, HESA, and PDS are then re-constrained to the age and sex totals from HOBID data to ensure consistency between the two estimates. Asylum data is then added after constraining.

British nationals

For British nationals, we use the distributions from Census 2021 to measure the local authority distribution of those migrating. The age and sex distribution continues to use a mix of International Passenger Survey (IPS) data and Census 2021.

An adjustment to the back-series of international migration estimates used in the mid-year estimates for 2012 to 2021 was implemented. This adjustment increased the flow of British nationals emigrating over the decade in response to research that showed IPS-based estimates overestimated net migration for British nationals when comparing the UK-born population change between 2011 Census and Census 2021. This adjustment was not implemented in estimates for mid-2022 and mid-2023. Further information on this can be found in our Revised UK international migration statistics: 2012 to 2021.

These estimates are likely to be revised as we continue to develop methods to provide the most accurate picture of international migration. This includes both the overall estimate of international migration and estimates at more granular levels, where the methods are less developed. For more information on the potential revisions, please see our Population and International Migration Statistics Revisions Policy.

7 . Home armed forces

Who is included

The population estimates include all members of the UK armed forces (UKAF) stationed in England and Wales. Members of UKAF deployed on operations and temporary assignments overseas are also included in the population estimates where their last permanent station is in England and Wales. Personnel who are serving on overseas postings are removed from the population estimates, but we account for their flows and those of their accompanying dependants into and out of England and Wales.

Special population

UKAF are treated as a special population as the movements of military personnel are not captured by the data sources used to estimate international and internal migration.

We assume that UKAF personnel and their dependants travel by military flights into and out of England and Wales when serving in posts overseas. Therefore, they are not counted in the international migration estimates. These are routes that are not covered by the International Passenger Survey (IPS), which was still used to measure the migration flows of UK nationals for the year to mid-2024. We also assume that UKAF personnel are not on GP registers. Therefore, they are not counted in the internal migration estimates. However, it is assumed that dependants are on GP registers, so movements of dependants within England and Wales are not part of the special population.

Home armed forces data

We receive aggregated UKAF data from the Ministry of Defence (MoD). These data include military personnel counts by age, sex, and local authority of base. We also receive aggregate data from British Forces Germany (BFG) by sex and age, of dependants (partners and children) who accompany members of UKAF stationed in Germany.

Census data for the home armed forces are also used to inform distributions for local authority of usual residence.

Change in UK armed forces stationed in England and Wales

Data are obtained from the MoD for UKAF by sex, age, and local authority of base, stationed in England and Wales. To fit in with the population estimates' usual residence definition, the UKAF population is estimated at the residence at which they spend most of their time. A base-to-residence distribution based on census data is used to adjust UKAF from their local authority of base to their local authority of residence.

Change in civilian population

Any change in the population of UKAF from one year to the next will be reflected in the civilian populations of England and Wales; those joining and leaving UKAF will create a resulting inflow and outflow between UKAF and the civilian population.

This flow between the UKAF population and the civilian population must also account for UKAF serving overseas if they are usually resident in England and Wales. Prior to mid-2022, this flow had been calculating using a distribution of serving UKAF. However, this meant population estimates for local authorities with large UKAF populations were operating as a closed system. UKAF joiners came from local authorities with large UKAF populations and UKAF leavers returned to local authorities with large UKAF populations.

From mid-2022, UKAF joiners and leavers are assigned to a local authority based on the distribution of veterans from Census 2021. As a result, the tendency of armed forces personnel to stay near their former bases remains but is less extreme than was previously the case.

A reduction factor is applied to all members of UKAF (including those stationed overseas) to estimate those who would be usually resident in England and Wales, as opposed to other parts of the UK. The proportion of UKAF stationed in England and Wales is used as a proxy for calculating this reduction factor.

To account for the change in the population of UKAF stationed in England and Wales, the previous year's estimated population is subtracted from the current year's estimated population, by sex, age, and local authority of usual residence.

A local authority of residence is imputed for each net flow using a local authority distribution derived from the census for the permanent home of members of UKAF.

Change in overseas dependants

We assume that dependants (partners and children) of members of UKAF who are serving overseas are not picked up by international migration estimates (which for UK nationals, are still based on the IPS). Therefore, they are treated as part of the home armed forces special population.

BFG data on dependants accompanying UKAF stationed in Germany are used to provide a ratio (number of dependants per UKAF member) and sex and age distribution that can be applied to UKAF serving overseas to estimate the overseas dependant population.

A reduction factor is also applied to the estimated overseas dependant population to estimate those who are usually resident in England and Wales. The reduction factor is calculated using the same proportion as previously, so that only the overseas dependants who are usually resident in England and Wales are estimated.

To account for the change in the overseas dependant population, the current year's estimated population who are usually resident in England and Wales is subtracted from the previous year's population, by sex and age.

A local authority of residence is imputed for each net flow using a local authority distribution derived from the census for members of UKAF living with a partner.

Compilation

To calculate the total change of UKAF, we calculate by sex, age, and local authority: net change in UKAF stationed in England and Wales, plus net change in the civilian population, plus net change in overseas dependants.

8 . Foreign armed forces

Special population

Foreign armed forces based in England and Wales are treated as a special population in the population estimates, as we assume they are not captured by the methods used to estimate internal and international migration.

We assume that foreign armed forces personnel travel by military flights into and out of England and Wales, and are, therefore, not counted in the international migration estimates. We also assume that foreign armed forces personnel are not on GP registers. Therefore, they are not counted in the internal migration estimates.

Who is included

All foreign armed forces personnel and their dependants (partners and children) usually resident in England and Wales should be included in the population estimates. The US Air Force (USAF) makes up the majority of foreign armed forces; however, there are a number of military personnel from other US service arms (US Army, Navy and Marine Corps) who are also based in England and Wales. Up until 2022, we only received data on USAF, but we now receive data on all United States Military.

Foreign armed forces who are not from the US are not accounted for as part of the special population, as there are no data currently available. However, these are considered very small in number.

Foreign armed forces are excluded from our non-EU migration estimates, as we excluded anyone who was exempt from immigration control.

Imputation of missing sex and age

For 2024, we received data for adult dependents that had an age distribution inconsistent with previous years. A resupply of data from USAF was not possible. Therefore, we used the age distribution from 2023 to inform the age distribution for 2024.

For 2019 and 2020, we received data on the ages of children, but USAF were unable to supply data on the sex of children. We imputed the sex of children using the sex distribution of children in 2018. Spouses' data were supplied by proportions in age bands by sex. We imputed the missing single year of age data using the proportions supplied by USAF by assuming that each age within each age band accounted for an equal share of the total. For example, for the age band 20 to 24 years, we assumed that one-fifth were aged 20 years, one-fifth aged 21 years and so on.

US military data

Data for US military based in England and Wales are supplied to us annually on or around the reference date of 30 June for the number of personnel and their dependants, by sex, age and base in England and Wales.

Base to local authority of residence

The population of England and Wales is estimated at the local authority of usual residence. US military data are only provided by base. Therefore, local authority of usual residence is imputed using data derived from Census 2021. For any bases in the US military data where there is no base to residence information available in the census, residence is assumed to be at the local authority of the base. This is a valid assumption, as the majority of the US armed forces live on base.

Change in foreign armed forces population

The change in the foreign armed forces population between the two mid-year points is estimated by subtracting the previous year's estimated foreign armed forces population from the current year's estimated foreign armed forces population, by local authority of residence, sex, and age.

The exception to this approach is the method for estimating zero-year-olds. At the beginning of the process of calculating the MYEs, all zero-year-olds of the previous year's special population must be subtracted. This is to avoid ageing-on any zero-year-olds that will be accounted for at the end of the MYE calculation process through addition of the current year's special population one-year-olds.

However, when the current year special population is added at the end of the MYE calculation process, none of the zero-year-olds should be added. The zero-year-olds in the current year special population will already have been counted into the population because they were born in the UK and are part of the births data that are added to the MYEs.

Some additional special population zero-year-olds will have been born outside the UK and migrated in within the last year and will not be counted. These would be broadly balanced by those zero-year-olds born to the special population in the last year who then migrate out of the country, assuming a broadly similar resident special population over the year. There may be larger variations in this fraction if bases increase or decrease their personnel significantly.

Assumptions not stated elsewhere

A further assumption is made in how we estimate the foreign armed forces special population. It is assumed that joiners and leavers of the foreign armed forces population are not taken from or put back into the general England and Wales population.

9 . Prisoners

Special population

Prisoners are treated as a special population in the population estimates, as it is assumed that movements of people into and out of prisons are not picked up by GP registers used to estimate internal migration. The population resident in prisons for mid-2024 uses the Census 2021 definition of prisoners. This includes all prisoners in England and Wales with a sentence of 12 months or more.

Prisoner data

Usually, the Ministry of Justice (MoJ) supplies data on the number of people resident in prisons in England and Wales on 30 June of the reference year, by prison location, sex, and age. For mid-2021 and mid-2022, MoJ did not provide this data on the required breakdown. However, they did supply data for quality assurance purposes as part of Census Day 2021 estimates. We used this data to distribute published totals (on the same definition) to estimate mid-2021 and mid-2022. For mid-2023 onwards, we acquired record-level data with the variables required to update this to a more effective method.

For the purposes of the population estimates, a person is regarded as usually resident in a prison if they have been sentenced to serve 12 months or more.

Change in prisoner population

Change in the prisoner population between the two mid-year points is estimated by subtracting the previous year’ s estimated prisoner population from the current year’s estimated prisoner population, by local authority, sex, and age. This change can only be indicative, as the prison estate population can fluctuate widely between mid-year points because of operational needs.

Change in non-prisoner population

Any change in the estimated prisoner population from one year to the next will be reflected in the general population of England and Wales; those joining and leaving the prisoner population will create a resulting inflow and outflow between the general population.

To distribute inflows and outflows of prisoners to and from the general population of England and Wales, we use the local authority distribution of the previous year's population estimate and distribute flows to the local authorities with the highest populations.

Foreign national offenders and offenders from other parts of the UK

The prisoner component of the population estimates assumes that all prisoners in England and Wales remain in England and Wales following the completion of their sentence. Foreign national offenders who are deported following completion of their sentence, or ex-prisoners who move to other parts of the UK, are not accounted for in this method. Owing to difficulties in accurately estimating this population, we assume that the flow of ex-prisoners returning to England and Wales from elsewhere balances out these flows.

10 . Compilation

Subnational population estimates (for local authorities in England and Wales) from each component are compiled to produce national and subnational estimates.

The previous year's population estimate by sex, age and local authority of usual residence is aged-on by one year. The number of births between the two mid-year points is added into the population at age zero years. Deaths between the two mid-year points are removed from the population estimates.

Net flows of international and internal within-UK migration are then added into the population estimates. Changes resulting from special populations are also added into the population.

The resulting population estimate is the final population estimate for 30 June of the current year, by sex, age, and local authority.

11 . Quality assurance of administrative data reports

We quality assure the administrative data used in the estimation of the annual mid-year population estimate (MYE) to ensure that they are suitable. For further information regarding data quality issues and its impact on population statistics, please see our quality assurance of administrative data (QAAD) articles:

- 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 Migrant Worker Scan (MWS)
- for Asylum seeker data and non-asylum enforced removals
- for Home Office immigration
- for Asylum seekers support
- for University of Warwick halls of residence data

12 . Summary of historical methods

The mid-year estimates (MYE) release contains population estimates from 2001 to the present year. Some of the main differences between the methods outlined in this article and those used between 2001 and 2023 are discussed here.

Internal migration estimates (mid-2002 to mid-2011)

Internal migration estimates for mid-2002 to mid-2011 are based on Patient Register (PR) data (both the Patient Register Data Service (PRDS) and NHS Central Register (NHSCR)) enhanced using aggregate data from the Higher Education Statistics Agency (HESA) and 2001 Census data to better account for the movements of students. Further details on this method can be found in our archived methodology papers.

Internal migration estimates (mid-2012 to mid-2016)

For mid-2012 to mid-2016, the NHS Central Register (NHSCR) was used in combination with the PR and HESA data. However, the NHSCR data source was discontinued in February 2016. Consequently, England and Wales internal migration estimates for mid-2016 were calculated by combining the 2016 PR data with the 2015 NHSCR data. For mid-2017, we moved to using the Personal Demographics Service (PDS).

For the mid-2012 to mid-2016 internal migration estimates, we improved our methods by linking the PR data with data from the HESA. The HESA data showed where students were registered by their university as living, and this allowed us to make more accurate estimates of people moving to study in each area. However, it did not tell us where people (particularly those slow in updating their health registration) moved to after completing their studies. Rather than assuming those people stayed in the area where they studied (which would result in overestimating the population of that area), we used a model that assumed people completing their studies and not updating their health registration record would move back to their PR address over time.

Internal migration in mid-2021

For information about Census Day to mid-year 2021, please see our Population estimates for the UK, mid-2021: methods guide, published in 2022.

Internal migration in mid-2022

Prior to the original publication of the mid-2022 internal migration on 23 November 2023, substantial issues were found with the PDS data during quality assurance of the input data for 2022 internal migration processing. These data were 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 were 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% of flows (by local authority, single year of age and sex) within plus or minus 1 moves of the original run and 99% within plus or minus 3 moves. Aggregating flows to local authority level shows bigger differences, but 95% of local authority flows still fell within plus or minus 5 moves. Internal migration in mid-2022 has been revised with the correct resupplied data and published on 30 July 2025.

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 in the Higher Education Statistics Agency (HESA) data, are outside of Portsmouth. Following additional analysis, we reverted students continuing their studies at the University of Portsmouth, who had 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.

Internal migration in mid-2023

Prior to the original publication of the mid-2023 internal migration on 15 July 2024, we were unable to obtain all the usual data necessary to run our mid-2023 internal migration estimates in full. In particular, issues with late availability, changes in variables, and incomplete coverage of data on those in higher education have meant we could not link health data and higher education data for 2023. Internal migration data based purely on health data would, in particular, underestimate the movements of young adults to and from higher education.

To mitigate against this risk, the internal migration estimates for mid-2023 were based on moves observed in health data (Personal Demographics Service (PDS) updates), scaled up by the ratio between official internal migration estimates for mid-2022 and PDS based moves for mid-2022. This is the same approach used for the production of ABPEs for mid-2023. Internal migration in mid-2023 has been revised following the supply of higher education data and published on 30 July 2025.

Internal migration estimates (mid-2017 to mid-2021)

From mid-2017, the PDS replaced the NHSCR in our methods. Like the NHSCR, the PDS weekly updates file records the movements of patients and is combined with PR data (and subsequently PDS stock data from 2021) to produce estimates of migration between local authorities. Scaling factors derived from PDS stocks and PDS updates were applied to the transitions to give moves. A linear regression was applied to the scaling factors for 2017 to 2021 to ensure the scaling factors were consistent with the earlier part of the decade when the NHSCR was used.

Further details can be found in the Population estimates for the UK, mid-2020: methods guide.

International immigration estimates (mid-2006 to mid-2020)

International immigration at the England and Wales level was distributed to local authorities by stream using administrative data. Further details on this method can be found in our Improved methodology for estimating immigration to local authorities in England and Wales. Also refer to our Population estimates for the UK, mid-2020: methods guide for more detail.

International immigration estimates (mid-2002 to mid-2006)

For mid-2002 to mid-2006, international immigration at the local authority level was calculated using a regression model, much like that currently used for international emigration, to distribute immigrants to local authorities. Further details can be found in Estimating international long-term immigration by local authority: update (PDF, 1.28MB).

International emigration estimates (mid-2002 to mid-2011)

For mid-2002 to mid-2011, international emigration at the local authority level was calculated using a regression model, much like that currently used, to distribute emigrants to local authorities. Further details can be found in Estimating international long-term immigration by local authority: update (PDF, 1.28MB).

International emigration estimates (mid-2012 to mid-2020)

For mid-2012 to mid-2020, international emigration at the local authority level was calculated using a different statistical model. This model was used to estimate the numbers of emigrants over the year using relationships established between the estimate of emigration from the IPS and estimates from other data sources (covariates).

Further details can be found in our Population estimates for the UK, mid-2020: methods guide.

Migration to and from Ireland (mid-2002 to 2007)

Historically, we used data from the Central Statistics Office (CSO) in Ireland to estimate migration flows between the UK and the Republic of Ireland. Their data were used because there were no routes between the two countries surveyed by the International Passenger Survey (IPS). From mid-2008, flows to and from Ireland were covered by the IPS. Further details can be found in Improving estimates of international migration in Northern Ireland, and between the UK and Republic of Ireland (PDF, 58KB). Additional changes, detailed in our Methods used to revise the subnational population estimates methodology (PDF, 640KB), were made post-census and as part of the revised back series of population estimates for mid-2001 to mid-2010.

13 . 2023 geography changes

Local government boundary names and area codes can change at any time. Since 2022, the changes listed below have occurred. In some cases, local authority names or area codes have changed with little effect on the population estimates. In other cases, local authorities have merged into new larger bodies. Boundary changes prior to 2022 can be found in the 2021 methods guide.

Boundary changes in 2023

- The local authority of Cumberland (E06000063) was formed by the merger of Allerdale (E07000026), Carlisle (E07000028) and Copeland (E07000029).
- The local authority of Westmorland and Furness (E06000064) was formed by the merger of Barrow-in-Furness (E07000027), Eden (E07000030) and South Lakeland (E07000031).
- The local authority of North Yorkshire (E06000065) was formed by the merger of Craven (E07000163), Hambleton (E07000164), Harrogate (E07000165), Richmondshire (E07000166), Ryedale (E07000167), Scarborough (E07000168) and Selby (E07000169).
- The local authority of Somerset (E06000066) was formed by the merger of Mendip (E07000187), Sedgemoor (E07000188), South Somerset (E07000189) and Somerset West and Taunton (E07000246).

Population estimates are published each year according to the local authorities in place at the time of publication. See our Open Geography Portal for more information on historical geography changes.

14 . Cite this methodology

Office for National Statistics (ONS), released 30 July 2025, ONS website, methodology, Population estimates for England and Wales, mid-2024: methods guide