
Mid-Year Population Estimates for Scotland: Methodology Guide 2016

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1. An introduction to population estimates

This paper describes in detail the current methodology used by NRS to produce the annual mid-year population estimates, with reference to the mid-2016 population estimates based on the 2011 Census.

The most authoritative population estimates come from the census, which takes place every 10 years, the most recent being held in March 2011. Population estimates from the census are updated each year with elements of population change in the previous 12 months to produce the annual mid-year estimates. These are considered the official estimates of the Scottish population

Coverage and availability of population estimates

Coverage

The latest [Population Estimates](#) can be found on the NRS website.

The available estimates are split under three sections:

Mid-year population estimates

The latest annual mid-year population estimates for Scotland and its constituent NHS Board and council areas. This section also includes historical data back to 1982 and a time series dataset back to 1855.

Special area population estimates

This section contains the Small Area Population Estimates and estimates for Settlements and Localities. Population estimates for Scottish Parliamentary Constituencies, Westminster Parliamentary Constituencies, Nomenclature of Units for Territorial Statistics (NUTS), Scottish Index of Multiple Deprivation deciles (SIMD) and Urban/Rural classification categories can also be found here.

Estimates of special populations

Estimates of the population split by country of birth, nationality and estimates of the very old (including centenarians) are available here.

Following consultation with users, estimates of population by marital status are no longer produced.

Availability

Population estimates for Scotland, council and NHS Board areas for a particular mid-year (30 June) normally become available around 10 months after the reference date.

These estimates are followed by:

- Mid-2016 Small Area Population Estimates (SAPE) at 2011 data zone level along with Urban/Rural population estimates.
- Estimates of Special Populations: Centenarians.
- Estimates of Special Populations: Country of Birth and Nationality (these are published using different methods and are based on the Annual Population Survey/Labour Force Survey).
- Population for Special Areas: the population of Settlements and Localities.

Published estimates split by sex for all ages are rounded to the nearest 10 at council area level to avoid implying spurious accuracy and for ease of aggregation.

Data sets may be downloaded free of charge in Portable Document Format (PDF), Excel or Comma Separated Value (CSV) format. Other data not published on the web are available on request, for example historic estimates¹.

Uses of population estimates

Mid-year population estimates currently have a wide variety of uses within central government, as well as being used by local authorities and health bodies, other public bodies, commercial companies and individuals in the private and academic sector.

These uses can be categorised into two broad groups:

- where the absolute numbers are of key importance. This may be in terms of allocating financial resources from central government, planning services or grossing up survey results. Some of the main central government uses are concerned with resource allocation, and
- where the population figures are compared with other figures such as the numbers of births or deaths in the calculation of rates and ratios.

Definition of the population

The population estimates for mid-2002 onwards are based on the 2011 Census and relate to the usually resident population. In simple terms, this means that population estimates are estimates of people where they usually live. The usually resident population does not always coincide with the number of persons to be found in an area at a particular time of the day or year. The daytime populations of cities and the summertime populations of holiday resorts will normally be larger than their usually resident populations.

The population base from the 2011 Census underpins the mid-year population estimates resident base and is defined as follows:

The 2011 Census has been conducted on a resident basis. This means the statistics relate to where people usually live, as opposed to where they are on census night. Students and schoolchildren studying away from home are counted as resident at their term-time address. If a member of the armed forces did not have a permanent or family address at which they are usually resident, they were recorded as usually resident at their base address. As in 1991 and 2001, residents absent from home on census night were required to be included on the census form at their usual/resident address. Wholly absent households were legally required to complete a census form on their return. No information is provided on people present but not usually resident.

For most people, defining where they 'usually' live for the purposes of the census is quite straightforward. However for a minority of people the concept of 'usual residence' is more difficult and it may be difficult to apply a general rule to assign people to where they are 'usually' living. Groups included in this category are:

- students;

Footnote

1) Contact details can be found in [Section 5](#) of this publication.

- armed forces;
- prisoners;
- seasonal workers;
- contract workers and others who frequently move with their job;
- some people living in communal establishments;
- people sleeping rough;
- foreign students and au pairs;
- people with frequently used second homes in the UK or abroad;
- people who live and work away from a family home for part of the week;
- children who regularly move between a mother and father's home;
- adults who live with a partner for part of the time but maintain a separate residence; and
- any other groups of people with more than one residence.

The usual residence for students and certain members of the armed forces is specifically referred to in the definition of resident population for the 2011 Census given above. For other groups, guidance was provided either on the census form or in the enumerators' instructions.

In general, the definitions used in the 2011 Census are carried through into the population estimates, mainly because the census is used as a base for the population estimates. However, although efforts are made to ensure comparability of definitions in intercensal data and sources used in the population estimates, sometimes it is not possible to obtain data using the same definition as used in the census.

For example, in the International Passenger Survey (IPS), used to estimate international migration, a person is defined as an in-migrant and therefore a resident if they are intending to stay in Scotland for at least 12 months. However in the census, NRS made no specific adjustment for the presence of 6-12 months migrants among the persons counted in the census.

More details on the scale of the difference in population count between the enumeration and main output base in Scotland is given in [Paper 9 11\(09\)](#) of the Population and Migration Statistics Committee (PAMS) meeting held on 21 January 2011 (more details available on the NRS website).

In practice, when compiling a population estimate, a number of data sources have to be used, each with its own definition of usual residence. These differences in definition are becoming increasingly important, and are the subject of current research within the National Records of Scotland (NRS) and the Office for National Statistics (ONS).

2021 Census

On 27 March 2014 the National Records of Scotland announced that it intends to focus on planning for a census in 2021, which will be primarily online, while offering alternative modes of completion where necessary. It also aims to make best use of technology and administrative data in its design, building on the online approach used successfully in the 2011 Census. This follows on from the aims of the Beyond 2011 programme, which closed following the recommendation. More details are available from the [2021 Census](#) section of the NRS website.

Other population products

National population projections

Office for National Statistics (ONS) produces national population projections for the UK and on behalf of its constituent countries. The projections by age and sex are normally produced every second year and the assumptions on which they are based are agreed in consultation with the statistical offices of England, Scotland, Wales and Northern Ireland. The primary purpose of the projections is to provide an indication of future population if current trends in fertility, mortality and migration continue into the future. They are used as a common framework for national planning in a number of different fields. Further information is available on the [Population Projections](#) section of the ONS website.

Sub-national population projections

Sub-national population projections for areas within Scotland are produced by National Records of Scotland (NRS) and give an indication of future trends in population by age and sex over the next 25 years. They are trend-based projections, which means assumptions for future levels of births, deaths and migration are based on observed levels over the previous five years. They show what the population will be if recent trends in these continue and also show variant projections based on a range of plausible scenarios for example high migration, low fertility. The projections do not take into account any future changes that may occur as a result of policy initiatives, social or economic change. They are constrained at a national level by the national projections produced by ONS. Further information and data on [sub-national projections](#) is available on the NRS website.

Migration statistics

National Records of Scotland produce mid-year to mid-year estimates of migration within Scotland, between Scotland and England, Wales and Northern Ireland and between Scotland and overseas. More information is available in the [Migration section](#) of the NRS website.

Household estimates and projections

National Records of Scotland produces estimates and projections of the numbers of households in Scotland. The household projections are based on the population projections and observed trends in household size. The latest household estimates and household projections can be found in the [Households section](#) of the NRS website.

Other outputs

National Records of Scotland also produces a range of other outputs and more information can be found in the [Statistics section](#) of the NRS website.

2. Methodology for producing population estimates

Introduction

Population estimates for Scotland and its council and NHS Board areas are made using the cohort component method. This is a standard demographic method and is used by several other national statistics institutions that also have access to high quality data sources for the components of population change.

For example, this method is used by the Office for National Statistics (ONS), Northern Ireland Statistics Agency (NISRA), the Australian Bureau of Statistics and by the US Bureau of the Census.

Mid-year population estimates are made for the population resident on 30 June of the reference year. The starting point for the estimates is the resident population on 30 June in the previous year.

This population, by single year of age, is then aged on by one year (for example all three-year-olds become four-year-olds one year later). Those who have been born during the 12 month period prior to the mid-year point are then added on to the population and all those who have died during the 12 month period are removed according to their age, sex, and their usual place of residence.

The other factor to be taken into account in estimating the national population is the movement of people in and out of Scotland from the rest of the UK and from overseas (international migration). Internal migration includes both cross-border moves between the four constituent countries of the UK, which affect the total Scottish Population, and moves between local areas within Scotland. Movements of people within Scotland, including changes in special populations (such as the Armed Forces and Prison Population) contribute to population change at council and NHS Board area level.

Migration is the most difficult part of the population estimate process to estimate precisely, as migratory moves are not registered in the UK, either at the national or local level. The best proxy data available on a nationally consistent basis are used to estimate migration. National Records of Scotland (NRS), with Office for National Statistics (ONS), is continually researching ways of ensuring and improving the quality of the population estimates. This research includes analysis of possible new data sources that may become available.

Summary of recent improvements

The table below provides a summary of recent method improvements that have been made to the method for producing the mid-year population estimates. More details are provided on each improvement in the relevant section after the table.

Year change was implemented	Details
Mid-2016	Refugees included in the migration estimates for the first time.
Mid-2016	The lag assumed for registering with a GP for estimating migration using the Community Health Index (CHI) was made consistent with the two month lag assumed using the National Health Service Central

	Register (NHSCR). Previously a three month lag was assumed using the CHI.
Mid-2015	An improvement was made to the estimates for internal migration within the UK. This change in method affected internal migration within Scotland and flows between Scotland and the rest of the UK.
Mid-2011	A sex-ratio adjustment has been introduced since 2011 which increases the number of male migrants at young adult ages where there is a large majority of women seen in the NHSCR data.

Summary of the cohort component method

The cohort component method can be summarised as follows:

- Take the previous mid-year resident population and age-on by one year.
- Then estimate the population change between 1 July and 30 June by:
 - adding births occurring during the year;
 - removing deaths occurring during the year;
 - allowing for migration to and from the area.

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

Rounding

At the end of the process for producing the estimates, the total number of people are rounded to the nearest 100 at Scotland level. The council level estimates are then rounded to the nearest 10.

During the process, the international migration estimates that are received from ONS and are rounded to the nearest 100 for both in and out flows. Asylum seekers are also rounded separately from other international migrants to the nearest 100 for each flow.

Quality assuring the data

When the Population and Migration Statistics team within NRS receives data for the various components, checks are carried out and comparisons made with previous years' data to gauge consistency and completeness of coverage. The data are then processed electronically to produce the mid-year estimates. Quality assurance takes place at each stage of this process. This may include calculation of demographic rates and ratios to help check the plausibility of the data. NRS also have processes in place to check the suitability of the administrative sources used in producing population

estimates. More information can be found in the following paper [‘Information about quality assurance arrangements for administrative data’](#) on the NRS website

The order of production

Population estimates for Scotland, council and NHS Board areas are produced first. Estimates for small areas (2011 Data Zones) are produced in the same way and constrained to the council area estimates (following the 2011 Census the data zone boundaries have been redrawn following user consultation. Both 2001 and 2011 Data Zones were designed to nest into council areas although for the 2001 Data Zones small boundary changes since 2001 mean their borders may no longer align precisely). Since August 2015 the 2011 Data Zone population estimates are aggregated to various geographies, for example urban and rural populations, or feed into the calculation of settlement and locality population estimates on a ‘best-fit’ basis. Prior to this date the various geographies were aggregated from 2001 Data Zones.

Information on how data zone population estimates are produced can be found in [Small Area Population Estimates](#) - Background and Methodology on the NRS website.

Information on populations calculated by aggregated 2001 and 2011 Data Zones to various geographies on a ‘best fit’ basis can be found in the [Evaluation of Non Standard Geography Population Estimates](#) section of the NRS website.

Overview of the method

The following figure shows how the population estimates for Scotland and its council and NHS Board areas are produced. All these processes are carried out by single year of age and sex up to age 89. Those aged 90 and over are processed as a single group.

The first main stage is the ageing on by one year of the previous year’s resident population. Before ageing on can be carried out however, all armed forces stationed in Scotland and detained prisoners in the previous year are removed from the resident population

Following ageing on, the main components of change – births, deaths and net migration are applied. Both migration to and from England & Wales, Northern Ireland and migration to and from the rest of the world must be taken into account. The Prison and Armed Forces populations for the new reference date are then added and a small adjustment is made for changes in the prison population and moves to and from the armed forces. Having applied these components, and rounded the resulting estimates, the final result is the population for Scotland, its council areas and NHS Board areas split by sex and single year of age to 89 then the 90+.

$$\begin{array}{c}
\textbf{The previous year's population} \\
- \\
\text{The previous year's armed forces stationed in Scotland} \\
- \\
\text{The previous year's prison population} \\
\longrightarrow \\
\textbf{Age-on the population by one year} \\
+ \\
\textbf{Births} \\
- \\
\textbf{Deaths} \\
+ \\
\textbf{Net migration*} \\
+/- \\
\text{Net moves into and out of the Armed Forces**} \\
+ \\
\text{The current year's armed forces stationed in Scotland} \\
+ \\
\text{The current year's prison population} \\
+/- \\
\text{An adjustment for changes in prison population} \\
= \\
\textbf{Estimated population for current year}
\end{array}$$

* Net migration includes in-migrants and out-migrants from England & Wales, Northern Ireland and overseas, including estimates of asylum seekers. For Council and NHS Board areas this also includes moves within Scotland.

**Movements to and from the armed forces (including dependents) are processed with, and previously were included under, net migration.

Births

Data on births are obtained from the compulsory civil registration system administered by National Records of Scotland and the Local Registration Offices. The Population and Migration Statistics team is supplied with data on live births by sex for the period from 1 July of the previous year to 30 June of the current year. Because registration of a birth may legally take place up to 21 days after the birth, the data received refer to the date of birth rather than the date of registration. Births are added to the population at age zero and are allocated to the area of usual residence of the mother.

Deaths

As for births, data for deaths are obtained from the compulsory civil registration system. The Population and Migration Statistics team is supplied with data on deaths by age and sex for the period from 1 July of the previous year to 30 June of the current year. Data refer to the date of death rather than the date that the death was registered. Deaths are subtracted from the mid-year population by age and sex at the area of usual residence of the deceased. In order for this to work correctly, the age at death is calculated to be the age that the deceased person would have been on 30 June. (This age calculation is carried out by the NRS Vital Events team.) No adjustments are made for non-resident deaths.

Migration

Migration is the most difficult component of population change to estimate, as there is no comprehensive system which registers migration in the UK, either moves to or from the rest of the world, or moves within the UK. Estimates of migration have therefore to be based on survey data and the best proxy data that exist.

Migration estimates are derived from three key sources of data:

- National Health Service Central Register (NHSCR);
- Community Health Index (CHI); and
- International Passenger Survey (IPS).

The NHSCR is used to calculate moves between NHS Board areas within the UK, with migration at council area and below estimated using anonymised data from the CHI. The IPS provides information on overseas moves into and out of Scotland, and on asylum seekers. These three main sources are described in more detail in the remainder of this section.

Armed forces

The Armed Forces population used in the mid-year estimates is based on armed forces personnel recorded in the census, which captures a larger armed forces population than administrative sources.

Census estimates for local areas were adjusted to take into account differences in where armed forces personnel were instructed to complete their census forms and our standard definition of 'usual residence'.

To update the population each year, Station Commanders' Returns are sent to military bases throughout Scotland asking how many armed forces personnel live in barracks, married quarters and private accommodation as at 30 June. These are used to estimate numbers residing in each council and NHS Board area.

Changes in the armed forces populations from the previous year's returns are applied to the previous year's population. The changes are applied rather than using the new Stations Commanders' estimates directly due to the differences between the armed forces captured by the census and administrative estimates.

In mid-2016 the age-sex distribution has been based on data from the 2011 Census.

Information on the armed forces population has in the past been constructed using information from the Defence Analytical Services Agency's (DASA) [TSP10](#) and [TSP8](#) publications which were published on their website. These figures were used together with information on the change in the armed forces from the National Records of Scotland Station Commanders' return.

DASA no longer publish TSP8 and NRS are continuing to explore whether this information can be sourced directly from DASA. This is expected to be the source of information on the age and sex structure of the armed forces population in future years.

Prisoners

Information on those sentenced to six months or more at 30 June by age, sex and establishment is obtained from the Scottish Government prison statistics. This group of prisoners are considered to be 'usually resident' in the area where the prison is located. Prisoners with shorter sentences are assumed to be 'usually resident' at their home address.

At the beginning of the mid-year processing the prison population of the previous year is removed from the previous year's population. After ageing on the general population and adjusting for births, deaths and migration the prison population for the current year is added to the population.

Following this, an adjustment has been introduced from 2011 to account for any changes in the prison population. The rebased mid-year population estimates from 2002 to 2010 also contain this adjustment. For example, if the prison population increased by 200 people in the year, the national population would be adjusted downwards by the same amount. This prevents double counting of prisoners and prevents an increase in the national population, which would otherwise result from any increase in the prison population.

Procedures during census years

The method above describes how mid-year population estimates are calculated for years when there is no census. For census years such as 2011, a slightly different approach is necessary. The starting point for the base population is that estimated by the census. In 2011 this was as at 27 March. Rather than ageing on the population by one year, the population only needed to be aged on by the period of time between the census and 30 June (three months in 2011) which is calculated using dates of birth provided on the census. Similarly, the components only needed to account for change during this period rather than a whole year.

In 2011 an adjustment was made to the initial census base population used for the mid-year estimates. This was to account for differences in where armed forces personnel were instructed to complete their census forms and our standard definition of 'usual residence'. The adjustment largely increased numbers in areas with barracks and correspondingly decreased numbers elsewhere in the country compared with the census population. The mid-2011 population assumed no changes in the total number of personnel between 27 March and 30 June.

Further details of the process used in 2001 can be found in the [2001 Population Report](#) available in the 2001 Population section of the NRS website.

3. Detail on the methodology for estimating migration

Internal migration within the UK

The NHSCR system records the movements of patients between NHS Board areas in the UK. Each time a patient transfers to a new NHS doctor in a different NHS Board area, the NHSCR is notified and then the patient is considered to have made a migrant move. Counts of these re-registrations are used as a proxy indicator for moves between Scotland and the rest of the UK.

The CHI holds records of people registered with an NHS doctor in Scotland. Unlike the NHSCR, these records contain the postcode of the patient's address. Postcode data is shared by NHS National Services Scotland (NSS) with NRS NHSCR. Under the agreement NHSCR staff hold copies of the CHI Postcode alongside the actual NHSCR which they may use in a limited way, for example to help trace patients for NHS Health Board postings. Counts of new postcode records from the anonymised NHSCR and linked CHI postcode extract are used as a proxy indicator for moves within Scotland at NHS Board area level.

Further to this, NRS also receive a separate annual snapshot of CHI data including postcode as well as other data not linked to NHSCR directly from NHS NSS, which enables migration to be estimated for council areas, and for smaller areas. The approach used for estimating council area migration involves matching CHI patient records extracted from a database which reflects the 'live' CHI system on two occasions one year apart.

Previously, the two extracts from the 'live' CHI system that were used to estimate migration were at 30 September each year (for example the mid-2015 estimate CHI extracts from 30 September 2014 and 30 September 2015 were used). However, for the mid-2016 population estimates onwards the method has been improved by using CHI extracts at 31 August (31 August 2015 and 31 August 2016).

Using the September CHI extracts, the lag that was assumed for a person registering with a General Practitioner (GP) following a move was three months. People who registered with a GP up to 30 September were counted as moving in the year to 30 June. For example, council area migration for the mid-2015 estimate was based on GP registrations that occurred from 1 August 2014 to 30 September 2015. However, the lag has now been changed to two months with the change to August CHI extracts and is now consistent with the lag that is assumed for the NHSCR for health board level moves.

If 30 September CHI extracts had been used rather than 31 August CHI extracts for the mid-year estimates for 2016, there would have been no difference for the total population of Scotland. The change also had no effect on the population at NHS Health Board level as the council area level moves from the CHI are controlled to the health board level moves from the NHSCR. For most council areas the differences that this change made were relatively small. The biggest changes in migration due to the improvement were in City of Edinburgh which had 925 (2.9 per cent) more in-migrants and 484 (2.0 per cent) more out-migrants using the two month rather than three month lag. Currently, NRS migration data derived from the NHSCR is considered to be the most reliable data available at NHS Board area level, so estimates from the CHI are controlled to ensure that they are consistent with the NHSCR data for moves across NHS Board area boundaries by origin, destination, age and sex.

Due to an improvement in data sources, the accuracy of cross border migration data between Scotland and Northern Ireland was improved in 2009. More information on the nature of the improvements is contained in the papers from the May 2010 meeting of the [Population and Migration Statistics Committee \(PAMS\)](#), available on the NRS website. We are continuing to review the process for estimating internal migration, including investigating the use of patients' postcode information held on the NHSCR. More information on the progress of this work can be found in papers of the [Population and Migration Statistics Committee \(PAMS\)](#).

From mid-2015 onwards an improved method for estimating internal migration within the UK has been introduced. A direct extract of anonymised records from the NHS Central Register (NHSCR) to calculate the migration at a health board level is now used. This improvement, the first stage of further planned improvements, has been accelerated due to the implementation of the April 2014 NHS Board area boundary changes on the NHSCR system. Internal migration information for the 2014 mid-year population estimates was not affected by changes in Board area boundaries and the methodology used for mid-2014 and years prior to mid-2014 is detailed in the [Mid-Year Population Estimates for Scotland: Methodology Guide 2014](#) on the NRS website. Information about the impact of the boundary changes compared with our previous migration data source is contained in Annex A of Paper 4 PAMS (14) 16 from the November 2014 meeting of the [Population and Migration Statistics Committee \(PAMS\)](#). The improvements made to the methodology, the data source from NHSCR and the impacts of these changes are detailed in Paper 10 PAMS (15) 10 from the May 2015 meeting of the [Population and Migration Statistics Committee \(PAMS\)](#), available on the NRS website.

International migration

An international migrant is defined by the United Nations as someone who changes country of residence for 12 months or more. There is no single, all inclusive system in place to measure all movements of people into and out of the UK or to determine if they meet the definition of a long-term migrant. Therefore, it is necessary to use a combination of data from different sources that have different characteristics and attributes in order to produce estimates of international migration. While offering the best data currently available, none of the data sources used are specifically designed to capture information solely on international migration.

National Records of Scotland currently use the Long-Term International Migration (LTIM) estimates (previously referred to as Total International Migration (TIM)) produced by the Office for National Statistics (ONS) for the national estimates of international migration to and from Scotland. These are the best estimates of the moves to and from the UK that meet the definition of long term migration.

Three sources of data are used by ONS to compile the LTIM estimates:

- International Passenger Survey (IPS);
- Information held by the Home Office; and
- Labour Force Survey (LFS).

The IPS is a continuous sample survey conducted by the Office for National Statistics (ONS) at the principal air, sea and Channel Tunnel routes between the UK and countries outside the British Isles. It is the prime source of migration data to and from the UK, providing estimates of both inflows and outflows, but does not cover all

migration types. The Home Office provides data on asylum seekers and their dependants, and the LFS, collects information on where international migrants live based on their recorded work address.

Fundamental changes were introduced to the IPS sample design at the beginning of 2009 to make the survey more focused on identifying migrants. These changes included a re-organisation of the times and frequency of sampling of travellers, sampling at additional locations including Aberdeen and improvements to the IPS weighting methodology.

Given that the IPS collects information on the intentions of potential migrants, which may or may not be realised, an adjustment is made to the IPS data for visitor switchers (people who say they are staying for less than 12 months but in fact stay more) and migrant switchers (people who say they are staying for longer than 12 months but in fact stay for less).

The IPS provides an estimate of international migrants into the United Kingdom. The allocation of these migrants to Scotland is based on the LFS. The LFS provides more reliable data on the geographical distribution of immigrants than the destination provided in the IPS as it is based on where migrants actually live rather than on their initial intentions. The outflow of international migrants from Scotland is based directly on the IPS data.

More information on the Long-Term International Migration (LTIM) method including the quality of the IPS can be found in the [International Migration](#) Methodology section of the ONS website.

Distribution of international migrants to Scotland

International migration flows between Scotland and overseas are allocated to each NHS Board area and given an assumed age and sex distribution using proportions recorded on the NHS Central Register (NHSCR). These proportions are applied to the total Long-Term International Migration (LTIM) flows for Scotland.

For inflows the recorded moves from overseas to Scottish NHS Board areas on the NHSCR are used to estimate the proportion of migrants entering each area.

NHSCR records hold limited data on international outflows from NHS Board areas to overseas, as patients do not reliably de-register with their doctor when moving overseas. As a result of this various methods have been used to approximate the geographic distribution of out-migrants since 2001. International outflows are now allocated to NHS Board areas based on:

- international inflows from two years prior to the reference date;
- outflows to the rest of the UK; and
- the population share of each NHS Board area.

These proportions are averaged but with international inflows weighted twice. The international inflows stand as a proxy for non-British out-migrants (for example 'returning home') while the moves to the rest of the UK and population share stand as a proxy for British out-migrants.

Age and sex distributions of international migrants are obtained from the NHSCR in a similar way, and calculated separately for each NHS Board area.

For in-migrants the age-sex distribution of moves from overseas to that NHS Board area on the NHSCR is used. For international out-migrants the age-sex distribution is based on:

- out-migrants to the rest of the UK leaving from that NHS Board area; and
- in-migrants from overseas two years prior to the reference date, aged on by two years.

At NHS Board area level the weighting of the two distributions depends on the level of in-migration from overseas that takes place in that area. Areas with a high level of in-migration from overseas are assumed to also have out-migrants who reflect the characteristics of this group (for example 'returning home').

It is acknowledged that NHSCR flows undercount the number of migratory moves for young men in particular, due to General Practitioner (GP) registration behaviour in different groups. Compared with LTIM estimates by sex there are fewer men in both the in and out-migrant groups recorded on the NHSCR. A sex-ratio adjustment has been introduced from 2011 which increases the number of male migrants at young adult ages where there is a large majority of women seen in the NHSCR data.

More information on how the methodology has been changed is available in the papers from the April 2013 meeting of the [Population and Migration Statistics Committee \(PAMS\)](#) on the NRS website.

The distribution of migrants to council areas is based on records from the Community Health Index (CHI), which are then made consistent with the NHSCR geographic and age/sex distributions at NHS Board area level. International in-migrants were allocated using records appearing on the CHI extract where the patient had arrived from overseas. Like the NHSCR, the CHI extract holds limited data on people leaving Scotland for overseas and so international out-migrants were allocated using a combination of in-migrants to Scotland from overseas and migrants leaving Scotland for the rest of the UK.

More information on how the CHI extract is used in the mid-year estimates process and more detail of the methodology is available in the meetings papers PAMS (03) 10 – Improving the GROS migration data for council areas – proposals for 2002 and Supplement to PAMS (03)10 – Validation of Proposed Methodology both of which can be found within the PAMS meeting [3 April 2003](#) which is available on the NRS website.

Work to improve the method used to allocate international out-migrants to NHS Board and council areas is continuing and further improvements will be considered for future publications.

Asylum seekers

Both inward and outward asylum seekers are included in the LTIM estimate (outward asylum seekers are people who arrive looking for asylum but for one reason or another don't stay). Most of these asylum seekers are assumed to be supported by the National Asylum Support Service (NASS). This means that they are entering the UK through a Home Office application and are provided with support such as subsistence costs or help with accommodation by NASS while their application is underway.

Currently the vast majority of NASS supported asylum seekers in Scotland are supported in Glasgow City Council and so it is assumed that the majority of asylum seekers entering Scotland migrate to Glasgow City Council. The NASS supported asylum seekers are not included in the control totals when distributing international migrants around Scotland.

A small number of non-NASS supported asylum seekers may be present elsewhere in Scotland. No specific adjustments are made for this group.

The age/sex distribution of in-migrating and out-migrating asylum seekers is derived from the UK level distribution provided by the Office for National Statistics and information from the Home Office.

Refugees

For the mid-2016 population estimates, refugees resettled under Home Office Resettlement Schemes are now included. The total number of refugees is added to the LTIM totals for Scotland. They are then accounted for in the NHSCR and CHI migration processing in the same way as other international migrants. As being registered for a doctor is part of the support package in place after arrival, it is assumed that all refugees are registered with a GP.

Compared to asylum seekers, refugees have been dispersed much more widely across council areas in Scotland. Therefore there are relatively small numbers of refugees in each council area (the highest number of refugee resettlements in the nine months that the Syrian Vulnerable Person's Resettlement Scheme was operating prior to mid-2016 was 83 in City of Edinburgh). This data is from the [Home Office website](#) in table as_20_q. Therefore, the age-sex distribution of refugees at Scotland level would have to be allocated to council areas randomly in the absence of more detailed geographic data on the age and sex of refugees if a similar method was used for refugees as asylum seekers. It was therefore decided to account for refugees using the same method as is used for other overseas in-migrants using the NHSCR and CHI.

Additional migration data

The NRS website includes a [Migration](#) section which provides additional tables showing migration estimates associated with mid-year population estimates as well as Local Area Migration Reports which draw together a range of sources of data on migration to enable analysis of migration at local area level.

Research into improving migration and population statistics

It is increasingly important to have high quality statistics on migration and the population, for policy development and for planning and providing public services. Achieving this aim is challenging in the context of increasingly complex lifestyles and changes in migration to and from the UK.

Since the early 2000s, and especially since Eastern European countries joined the European Union (EU) in May 2004, migration has played a larger part in Scotland's demographic change than in previous decades.

It was in this context that the National Statistician set up the Inter-Departmental Task Force on Migration Statistics to make recommendations on timely improvements that could be made to estimates of migration and migrant populations in the UK, both nationally and at a local level. National Records of Scotland was part of an inter-departmental effort, led by the Office for National Statistics (ONS), to improve the estimates of migration and migrant populations in the UK, both nationally and at a local level.

The report of the Inter-Departmental Task Force on Migration Statistics was published on 15 December 2006 by the Office for National Statistics (ONS). National Records of Scotland (NRS) has been involved in a number of workstreams within this programme with the aim of incorporating the research into their outputs. More details can be found in the [Migration Statistics Improvements](#) section of the NRS website.

The ONS website has more information on the [Migration Statistics Improvement Programme](#) including the programme's final report.

4. Future developments

The methodology used in the mid-year estimates is ever-evolving and as more administrative data sources become available to NRS and as the accuracy of data increases, inevitably, changes to the methodology will result. This section outlines several new sources of data that NRS are pursuing access to and also highlights areas in the current methodology that NRS are working towards improving.

Changes to the methodology

Migration improvements

We are continuing to review the process for estimating within UK migration. This work includes continued investigation into the use of the direct extract of anonymised records from the NHS Central Register (NHSCR), which may allow more accurate information at council and small area level. Data from new sources (detailed below) are hoped to help us assess how well student migration is being captured by the NHSCR.

Work to improve the method used to allocate international migrants to NHS Board and council areas is also continuing and further improvements will be considered for future publications.

Single Year of Age Up To Age 99

The 2011 Census results were presented at single year of age up to age 99 and then collectively from age 100. Currently National Records of Scotland is considering whether Scottish mid-year estimates methodology can be extended to the same age range. We are not yet confident in the quality of available data for this group and developmental work in this area is on-going.

New sources of data

In addition to the administrative data provided by various sources both internal and external, National Records of Scotland is exploring avenues for sourcing new types of data.

Preparations for the 2021 Census involve data linkage and National Records of Scotland has been utilising this methodology to explore the possible gains from use of a variety of different administrative data sources.

NRS hopes to be able to use data on:

- people who pay council tax and have occupied exemptions, sourced from the 32 Scottish Local Authorities;
- people in Higher Education, sourced from the Higher Education Statistics Agency (HESA); and
- low level population data on Armed Forces personnel, sourced from the Defence Analytical Services Agency (DASA).

5. Contact us

This methodology guide is designed to provide the users of statistics with an introduction to the methods employed by National Records of Scotland (NRS) in the production of mid-year population estimates. NRS have also tried to provide background information on the data sources utilised.

This process is not exhaustive and so NRS have provided this section as a source of further information on UK population statistics.

The Scottish population

For more information on the population of Scotland please visit the following websites:

[Population Statistics](#) (NRS website):

[Census in Scotland](#) (Scotland's Census website).

Please contact our Statistics Customer Services if you need any further information.

E-mail: statisticscustomerservices@nrscotland.gov.uk.

The Northern Ireland population

Further information on Northern Ireland's population can be found within the population of Northern Ireland and Census in Northern Ireland sections of the Northern Ireland Research Agency (NISRA) website (www.nisra.gov.uk):

[Population of Northern Ireland](#) publications section; and

[Census in Northern Ireland](#).

or contact them by telephone:

General enquiries (028) 9034 8100

Census enquiries (028) 9034 8160

or email:

General enquiries info.nisra@dfpni.gov.uk

Census enquiries census.nisra@dfpni.gov.uk

The England & Wales population

For more information on the Office for National Statistics (ONS) and the population of England & Wales please visit the following pages on the ONS website:

[Population Projections](#); and

[Census of England & Wales](#).

or contact them by telephone:

General enquiries 0845 601 3034

Census enquiries in England & Wales 01329 444972

or email:

General enquiries info@ons.gsi.gov.uk

Census enquiries in England & Wales census.customerservices@ons.gsi.gov.uk

The UK population

Statistics regarding the UK population are compiled by ONS using the statistics produced by NRS and NISRA in conjunction with their own data on England & Wales.

For information on the population of the UK please use the details provided above with regards to England & Wales.