Office for National Statistics

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Consistency of the methodology used to produce population statistics across the four countries of the United Kingdom

Background

Population statistics are a devolved matter and so each UK country has responsibility for the production of population statistics. For many population statistics ONS produces figures for Wales as well as England. Also, by agreement, ONS is commissioned by the National Statistician and the Registrars General of Scotland and Northern Ireland to carry out the National Population Projections for all 4 countries. The National Records of Scotland (NRS) has responsibility for population statistics in Scotland and the Northern Ireland Statistics and Research Agency (NISRA) for Northern Ireland. In addition ONS has responsibility for collating statistics on the UK. The table below summarises some of the differences between the population estimates produced by the different organisations and gives an indication of how material they are. The table covers population statistics published after the 2011 Census.

Categories used

For each of the key statistical outputs an assessment has been made separately on data inputs and methodology. The following different categories have been used:

1. The statistics are effectively the same.
2. There are some trivial differences which are unlikely to materially affect comparability (either because they only affect a small element of the population or the difference is unlikely to be noticeable overall).
3. There are important differences but they are inevitable and related to data availability (for example administrative data variation from devolved policy areas) and/or country-specific issues (for example Northern Ireland has a land border with a non-UK country).
4. There are important differences which could potentially be addressed. This includes where data are not available for one or more of the jurisdictions.

Anything in category 4, or cases where statistics are not produced, could require further work; these will be discussed at The UK Population Theme Working Group to consider plans for addressing the differences.

Outcome

ONS has produced this paper in conjunction with Welsh Government, NISRA and NRS, and all parties have agreed on the outcome of the assessment, shown in Table 1. Annex A contains more detailed information on methodology collected when this assessment was carried out, including links to further methodology documentation from individual countries' websites. Although not an output, the definition of the census base has been included because it is foundational for all demographic statistics. One common inconsistency between the 4 countries is the publication titles. Despite the fact that some of the statistics themselves are effectively the same, these discrepancies in the product names could cause unnecessary confusion and, therefore, may benefit from being harmonised. This will also be considered at The UK Population Theme Working Group.

The information in this document is correct as of January 2016.

Table 1 Assessment of consistency of population statistics across the four countries of the UK

Population output	Data/ methods	Category	High level summary
Census base definition	Data	3	In Scotland, the 2011 Census used an enumeration base of being in Scotland for at least 6 months. It was then assumed this equated to the usual residence definition for statistics, as analysis of available data suggested that the number of short-term migrants in Scotland was relatively small and there was no way to accurately identify them in the census data. England & Wales and Northern Ireland used a 3 months actual or intended stay enumeration base with a question that allowed short-term residents (3-12 months) and usual residents (12 months plus) to be identified. In Scotland user requirements for other topics took priority over intention to stay questions.
	Methods	3	For England & Wales and Northern Ireland those enumerated but who are resident, or intend to be resident, for less than 12 months need to be identified and excluded. Census design issues meant that the censuses were not able to identify UK born short-term residents (England & Wales) and non-Northern Ireland born short-term residents (Northern Ireland).
Mid-year Population Estimates – to local authority and equivalent level	Data	3	Different datasets used for determining and distributing international migration. For example, Northern Ireland uses other data than IPS to determine international migration as they have a land border with the Republic. Administrative data, such as patient registers, come from different organisations. Also minor differences in vital events and armed forces data.
	Methods	3	Northern Ireland uses a mixed method of cohort component and ratio change at local government district level. England & Wales and Scotland use a cohort component approach only. Some small differences over the inclusion/exclusion of vital events to non-residents and late registrations. Numbers are small. Different methods are used both between and within countries for distributing international migration flows. Some differences in treatments of special populations (for example, asylum seekers). Different lag periods are used in deriving internal migration from administrative data.

Population output	Data/ methods	Category	High level summary
Population Estimates of the Very Old	Data	2	There are some small differences in definitions around deaths. In addition, there will be small effects from differences in the mid-year estimates methodology.
	Methods	1	There are some small definitional differences but the approach is essentially the same.
Small Area (and other geography) population estimates	Data	2	Different data sources are used (for example, Scotland uses vital events to produce a partial cohort component approach). In addition, there will be small effects from differences in the mid-year estimates methodology.
	Methods	3	Different ways are used to define small areas in the different jurisdictions. Methods used to produce small area data are also different between the jurisdictions, with Scotland using a cohort component approach, England & Wales using a ratio change approach and Northern Ireland using a combination of both. There is also some different treatment of special populations.
National Population Projections	Data	2	All the differences at the national level in mid-year estimates will contribute but in the context of the uncertainty around projections they are not material.
	Methods	1	There will be minor differences between the countries in the setting of some of the assumptions related to data availability (for example parity data on births, length of data series for mortality rates). The calculation of the projections is the same.
Subnational Population Projections	Data	3	Differences in the mid-year estimates will also apply to projections as they are based on the components that also produce mid-year estimates.
	Methods	4	While approaches are similar, the Welsh projections are not constrained to the national projections and are published to a different timetable.
Legal Partnership Status Estimates	Data	1	Survey data are used for England & Wales. These data are also available for Scotland and Northern Ireland. Therefore the data are available but not used (see below).
	Methods	N/A	Results are only currently produced for England & Wales combined. There are no ‘methods’ applied in the other countries although it may be possible to produce Wales separately using the same data and methodology, and also Scotland and Northern Ireland data from survey data. However, for Northern Ireland, there is currently no user requirement for such a product. In Scotland, production of these estimates has been suspended following user consultation.

Annex A

Detailed information collected and collated in the assessment, as at January 2016.

Each table outlines the approaches, data sources, and methods used by each of the 4 countries, for each of the main outputs. The precise content of each output may vary by country. For further information, please see the population section of the NISRA, NRS, ONS and Welsh Government websites.

If printing, suggest printing in A3.

Contents

Mid-Year Population Estimates – Table 1

		England & Wales	Scotland	Northern Ireland	Differences Identified
Organisation		Office for National Statistics (ONS).	National Records of Scotland (NRS).	Northern Ireland Statistics & Research Agency (NISRA).	
Approach		Census-based cohort component method.	Census-based cohort component method.	Northern Ireland (National) Level Census-based cohort component method. This method is used to create Northern Ireland level statistics (Section A, Table 1). Areas within Northern Ireland (Subnational) Mixed method (Cohort component and Ratio Change) is used to produce Super Output Areas, from which Local Government Districts and other small area geographies (Table 3) are produced. Section B of Table 1 details the mixed approach.	Different approach taken – England & Wales and Scotland use cohort component only, Northern Ireland uses a mixed approach to get to LGD level.
Geography		Local Authority.	Council Area.	Local Government District (and down to Super Output Area level).	Different geographies.
Publication Title		ONS produces the statistics for England & Wales. ONS produces publication: Mid-Year Population Estimates for the UK. Welsh Government produces the publication for Wales: Mid-year Estimates of the Population.	Mid-year population estimates, Scotland.	Population and Migration Estimates Northern Ireland.	Published with different titles across UK.
Section A - Cohort Component Method					
Components					
Census base		The England & Wales Census captures the definition of 'usual residence' with the household question referring to 12 months or more (consistent with the UN Definition).	Scotland has an enumeration base of 6 months or more, and uses this as a proxy for 12 months in terms of the UN definition of 'usual residence'.	The Northern Ireland Census captures the definition of 'usual residence' with the household question referring to 12 months or more (consistent with the UN Definition).	Scotland's way of capturing the usually resident population is different.
Births	Data sources	**General Register Office (GRO)** Live births occurring between 1 July and 30 June by sex and area of usual residence of mother. Births to non-resident mothers are included as a proxy for the number of births to resident mothers of England & Wales who give birth abroad, who would otherwise be missed from the population estimates.	**National Records of Scotland (NRS)** Live births occurring between 1 July and 30 June by sex and area of usual residence of the mother. Births to non-resident mothers are included as a proxy for the number of births to resident mothers of Scotland who give birth abroad, who would otherwise be missed from the population estimates.	**General Register Office Northern Ireland (GRONI)** Live births occurring between 1 July and 30 June by sex and area of usual residence of mother. Births to non-resident mothers are not included. Looks at all births registered between 1 July and 31 December, and occurred between 1 July and 30 June, thus allowing 6 months for late registrations. Any registration later than that will be added in the next MYEs.	Northern Ireland – Births to non-resident mothers are not included.

		England & Wales	Scotland	Northern Ireland	Differences Identified
	Methods	The number of live births between 1 July of the previous year to 30 June of the reference year is added to the population estimates at age 0, according to the area of usual residence of mother. Babies born to non-resident mothers are allocated to local authorities proportionately using the distribution of births occurring to resident mothers in the year.	The number of live births between 1 July of the previous year to 30 June of the reference year is added to the population estimates at age 0, according to the area of usual residence of mother. Babies born to non-resident mothers are allocated to the council area of their place of birth.	The number of live births occurring between 1 July of the previous year to 30 June of the reference year is added to the population estimates at age 0, according to the area of usual residence of mother.	Northern Ireland – Births to non-resident mothers not included. Scotland – Council Area, England & Wales – LA. Scotland - non-resident mothers allocated differently to England & Wales.
Deaths	Data sources	**General Register Office (GRO)** Deaths occurring between 1 July and 30 June by sex, age at death and area of usual residence. An adjustment is made to account for late registrations occurring in the previous year in anticipation of a similar number in the current year. Deaths of non-residents are included, allocated proportionately to the location of whether other deaths occur. In all countries, place of non-resident deaths are included as a proxy for residents who die abroad.	**National Records of Scotland (NRS)** Deaths occurring between 1 July and 30 June by sex, age at 30 June and area of usual residence. No adjustments are made to account for late registrations occurring in the previous year in anticipation of a similar number in the current year. No adjustments are made for non-resident deaths, that is, deaths of non-residents are included, allocated to place of death. In all countries, place of non-resident deaths are included as a proxy for residents who die abroad.	**General Register Office Northern Ireland (GRONI)** Deaths occurring between 1 July and 30 June by sex, age on 30 June and area of usual residence. Looks at all deaths registered between 1 July and 31 December, and occurred between 1 July and 30 June, thus allowing 6 months for late registrations. Any registration later than that will be added in the next MYEs. Deaths of non-residents are included, allocated to the place of death. In all countries, place of non-resident deaths are included as a proxy for residents who die abroad.	In Scotland no adjustments are made to account for late registrations, but in England & Wales, and Northern Ireland adjustments are made. Non-resident deaths are allocated differently in England & Wales, versus Scotland and Northern Ireland.
	Methods	Deaths are subtracted from the mid-year population by age (calculated at mid-year) and sex at the area of usual residence of the deceased. Where local authority of residence is not recorded it is imputed using the local authority distribution of all other deaths by age and sex that have occurred during the year.	Deaths are subtracted from the mid-year population by age (calculated at mid-year) and sex at the area of usual residence of the deceased, or place of occurrence for non-resident deaths. Scotland uses postcode information which looks up to LA so there are no missing LA codes, (ie local authority of residence is always recorded).	Deaths are subtracted from the starting mid-year population by age on 30 June and sex at the area of usual residence of the deceased or place of death for non-resident deaths. Deaths without district information are distributed over local areas within the registration district of the deaths (based on observed deaths).	Northern Ireland – by age on 30th June, not by age calculated at mid-year. Scotland and Northern Ireland – deaths are recorded at place of occurrence for non-resident deaths.
Long Term International Migration (LTIM)	Data sources	**International Passenger Survey (IPS)** Estimates of the number of people intending to enter/leave England & Wales for a period of 12 months or more. **Labour Force Survey (LFS)** Estimates of international immigration to England & Wales that have already occurred, by region.	**International Passenger Survey (IPS)** Estimates of the number of people intending to enter/leave Scotland for a period of 12 months or more. **Labour Force Survey (LFS)** Estimates of international immigration to Scotland that has already occurred, by region.	**Medical Card Register** List of patients registered with a family doctor (for inflows and outflows). Provides information to separate flows to/from GB and Rest of World, which allows the same definition of international migration to be used for UK level estimates.	<u>Northern Ireland</u> - Sources either not used / not available in relation to LTIM: IPS, LFS, Migrant worker Scan, NHSCR, Further Education Learner Data, HESA, Confirmation of Acceptance to Study, Certificate of Sponsorship, and Leave to Remain for Study, CHI, Census 2011. - Different GP Patient Register to England & Wales.

		England & Wales	Scotland	Northern Ireland	Differences Identified
		Migrant Worker Scan Number of National Insurance number registrations by international migrants. **National Health Service Central Register (NHSCR)** **GP Patient Register Data System (PRDS)** Number of international migrants registering with a GP. **Further Education Learner data** Further education data on international students. **Student Record (Higher Education Statistics Agency)** Number of international students at HE establishments. **Confirmation of Acceptance to Study, Certificate of Sponsorship, and Leave to Remain for Study** Numbers of international students issued visas and sponsorships to study. **Census 2011** International migration inflows by sex, age citizenship and local authority from 2011 Census data.	**NHS Central Register (NHSCR)** Number of international migrant inflows and UK outflows by age, sex and Scottish NHS Board. **Community Health Index (CHI)** Number of international migrant inflows and UK outflows by age, sex and Scottish NHS Board.		Reason – Northern Ireland land border means IPS measures were not appropriate in the past for LTIM. Scotland - Sources either not used / not available in relation to LTIM: Migrant Worker Scan, Further Education Learner Data, HESA, Confirmation of Acceptance to Study, Certificate of Sponsorship, and Leave to Remain for Study, Census 2011. - Different NHSCR to England & Wales. England & Wales - Sources either not used / not available in relation to LTIM: CHI. - Different GP patient register to Northern Ireland. - Different NHSCR to Scotland.
	Methods	National and regional level The IPS provides an estimate of international (between England & Wales and non-UK countries) migrant inflows and outflows by age and sex. An adjustment is made to the IPS estimates of long-term international migration to account for people who change their intended length of stay within the country or away from the country (these people are known as visitor and migrant switchers). Immigration estimates also use LFS data on moves that have already occurred to improve estimates at regional level. Local area level Administrative data sources are used to distribute the England & Wales immigration	National level The IPS provides an estimate of international (between Scotland and non-UK countries) migrant inflows and outflows. An adjustment is made to the IPS estimates of long-term international migration to account for people who change their intended length of stay within the country or away from the country (these people are known as visitor and migrant switchers). Allocation of immigration flows to Scotland from the UK-level IPS immigration estimates use the LFS while emigration flows from Scotland use just the IPS. Local area level International migration inflows at Scottish NHS Board level are allocated by using	National and subnational level The number of people who join or rejoin the list of patients registered with a family doctor within a one-year period provides an estimate of international migration inflows by age at 30 June, sex and local area. The number of people who de-register from the patient list provides an estimate of international migration outflows by age, sex and local area. There is no information on the destination of de-registrations. The number of de-registrations is scaled up by an additional 67 per cent as the medical card system is known to not capture all international migration outflows. The up-scale factor was derived from the rebasing exercise following the 2011 Census results. The age distribution of young adult males is	Different approaches are driven by the different data sources. Scotland doesn't use IPS migrant inflows and outflows by age and sex. There is a difference in how national migration is allocated to local level driven by differences in the different data sources. There is little material difference in the end result, demonstrated by the reconciliation work conducted after the 2011 Census. This work showed that, at the total population level, all 3 countries had a difference between the rolled-forward mid-year estimates and the rebased population estimates within 0.4-0.9% of the 2011 Census estimate.

		England & Wales	Scotland	Northern Ireland	Differences Identified
		totals from the IPS directly to local authorities. IPS data are split into different streams for international migrant inflows, mainly by 'reason for migration' (worker, student, other). Other splits are made for age group and citizenship (British, EEA27 and non-EEA). Citizenship data are used in order to align with the method for estimating visitor switchers. Streams are mapped to relevant administrative sources which are then used to distribute immigrants to each local authority. International migrant outflows are obtained by apportioning higher level estimates down to local authority level, using a model-based distribution. The outflow distribution is based upon estimates from a regression model using weighted IPS estimates of migration and a range of predictor covariates. These covariates are assessed periodically to ensure continued relevance. The international outflow estimates are then constrained to match the IPS national and regional estimates. Local authority population estimates are adjusted for net international migration by single year of age and sex using these estimates.	overseas inflows recorded on the NHSCR. International migration outflows at Scottish NHS Board level are allocated using proportions based on international inflows, outflows to the rest of the UK and the population size of each NHS Board. Age and sex distributions of international in-migrants are based on those of international inflows to that NHS Board area on the NHSCR. The age/sex distribution of international out-migrants is based on the distribution of out-migrants to the rest of the UK, and in-migrants from overseas as recorded by the NHSCR. An adjustment is made to increase sex ratios based on data from the IPS. International migration inflows at Council area level are based on records from the Community Health Index (CHI), which are made consistent with the NHSCR geographic and age / sex distributions. International migration outflows at Council area level are allocated using a combination of in-migrants to Scotland from overseas and migrants leaving Scotland for the rest of the UK. Council area population estimates are adjusted for net international migration by single year of age and sex using these estimates.	adjusted to match the young adult female age distribution to account for the fact that administrative data (medical cards) are known to be deficient in recording young adult males. Local government district population estimates are adjusted for net international migration by single year of age and sex using these estimates.	
Asylum Seekers	Data sources	**Immigration and Nationality Directorate, Home Office** Number of asylum seekers who remain in England & Wales for more than 12 months and their dependants. **National Asylum Support Service (NASS)** Number of asylum seekers receiving financial support and/or accommodation by local authority.	**Immigration and Nationality Directorate, Home Office** Number of asylum seekers who remain in Scotland for more than 12 months and their dependants. **National Asylum Support Service (NASS)** Number of asylum seekers receiving financial support and/or accommodation by local authority.	Very small numbers. Not considered as a separate component of the population estimates for Northern Ireland.	Northern Ireland – not included.

		England & Wales	Scotland	Northern Ireland	Differences Identified
	Methods	Applications for asylum provide the basis for estimated inflows of asylum seekers, and adjustments are made to exclude those removed from the UK within one year and a small number of asylum seekers captured by the IPS. Data collated by NASS are used to determine the subnational distribution of asylum seekers – these data are net, stock figures. Regional estimates of asylum seekers and their dependants are broken down to local authority level using information on the location of asylum seekers receiving financial support and/or accommodation.	Applications for asylum provide the basis for estimated inflows of asylum seekers, and adjustments are made to exclude those removed from the UK within one year and a small number of asylum seekers captured by the IPS. All NASS asylum seekers are allocated to Glasgow City as it is the only Council with the facilities in place to accommodate supported asylum seekers. Non-NASS asylum seekers are very small numbers and not treated as a separate component. The age/sex distribution is based on current asylum seeker stocks in Glasgow, and their estimated age at arrival and household characteristics. UK level age/sex distribution is used for out-migrants.	N/A	Scotland – Asylum seekers are allocated to Glasgow City and distributed based on current stocks and estimated age at arrival and household characteristics. UK level distribution age/sex used for out-migrants. England & Wales – Asylum seekers are distributed regionally using information about asylum seekers receiving financial support. England & Wales – have a net figure for asylum seekers. Northern Ireland – not included.
Internal Migration. This covers both internal (within-country) and cross-border (between-country) migration.	Data sources	**National Health Service Central Register (NHSCR)** **GP Patient Register Data System (PRDS)** Mid-year extracts of register by age, sex and postcode for 2 consecutive years. **Higher Education Statistics Agency (HESA)** Information on domicile and term-time address of students at start and end of study period.	**National Health Service Central Register (NHSCR)** Monthly counts of moves created from mid-2015 from monthly extracts of register by age, sex and postcode. **Community Health Index (CHI)** Mid-year extracts of index by age, sex and postcode for 2 consecutive years.	**Medical Card Register** Data on transfers of medical cards to/from Great Britain (within-UK migration), address changes within Northern Ireland (within-Northern Ireland migration). **Higher Education Statistics Agency (HESA)** Information on domicile and term-time address of students at start and end of study period is only used for within- Northern Ireland migration.	Scotland + England & Wales – CHI vs. GP Patient Register. Northern Ireland – Medical Card Register – different to England & Wales. Scotland – No HESA. Northern Ireland – use HESA for within-Northern Ireland migration and not between-UK migration.

		England & Wales	Scotland	Northern Ireland	Differences Identified
	Methods	2 consecutive annual mid-year extracts of the PRDS estimates of the number of people whose postcode differs between the 2 consecutive years are compared. The reference month is July, assuming a 1 month lag. PRDS counts are constrained to NHSCR former health authority level data to produce the final internal migration estimates. An adjustment is also made to better account for moves made when students begin their studies and moves made at the end of studies. The adjustments are based upon comparisons between moves identified in HESA data and those identified in the Patient Register data.	Patient records from 2 extracts of the CHI, taken one year apart, are matched to determine the number of internal migration moves by identifying postcode changes. The reference date for the CHI is 30 September, assuming a 3 month lag. The CHI-based counts are constrained to NHSCR Board data to ensure they are consistent with the NHSCR data for moves across an NHS Board boundary by origin, destination, age and sex.	The total number of medical card transfers between the UK countries is agreed at the national level. The reference date for the medical card registrations is a quarter ahead of the mid-year point, assuming a 3 month lag. Information on address changes within Northern Ireland for registrations is used for within Northern Ireland migration. Record-level information on age at 30 June, sex and origin/destination of medical card transfers is used to distribute the agreed total. The age distribution of young adult males is adjusted to match the young adult female age distribution to account for the fact that administrative data (medical cards) are known to be deficient in recording young adult males.	Most differences are attributable to the different data sources used. Scotland – No HESA/student/young adult adjustment. There are different lag assumptions for NHSCR between the different countries – England & Wales have a one month lag, and Scotland and Northern Ireland have a 3 month lag.
Special populations – components					
Home Armed Forces	Data sources	**Ministry of Defence (MOD)** Number of UK armed forces stationed in England & Wales by age, sex, service and local authority of base as at 1 July. **British Forces Germany** Numbers of UK armed forces' dependants for accompanied postings by sex and age on an annual basis. **Census 2011** UK armed forces by area of base and area of usual residence from the 2011 Census. Dependants of UK armed forces by area of permanent residence from the 2011 Census. In England & Wales, armed forces personnel are enumerated at their usual family residence. Information from the census about armed forces members who are enumerated at home but live on base was then used to adjust the census base to create both the correct usual residence base for the mid-year estimates and an accurate	**Ministry of Defence (MOD)** Number of UK armed forces stationed in Scotland by age, sex and council area annually, as at 1 July. The services data for Scotland are combined (land/air/sea). **NRS Stations Commanders' return** Number of home armed forces personnel usually resident in each council area by sex. **Census 2011** Number, age, sex and distribution of armed forces personnel in 2011 Census. Dependants are enumerated where they live in the census then treated as per the rest of the population and NHSCR armed forces flows are used. Census figures are adjusted to move some armed forces back to bases**.**	**Ministry of Defence (MOD)** Number of forces stationed in Northern Ireland by age, sex and area on an annual basis as at 1 July. The services data for Northern Ireland are combined (land/air/sea). Dependants are excluded.	<u>Northern Ireland</u> - sources either not used / not available in relation to armed forces: NRS Stations Commanders' return, NRS, British Forces Germany, and 2011 Census. - dependants are excluded. - services data are combined <u>Scotland</u> - sources either not used / not available in relation to armed forces: British Forces Germany, 2011 Census. - services data are combined, as for Northern Ireland too. Scotland - number of home armed forces personnel usually resident in each council area by age, sex, not service and local authority. Northern Ireland – just by age, sex and area – not by service, services are combined. England & Wales – by age, sex, service and local authority as at 1 July.

		England & Wales	Scotland	Northern Ireland	Differences Identified
		base to residence matrix. There will be some armed forces members who do, in fact, live at their family residence, so the matrix is important to distribute the correct proportions of armed forces who live on base versus at their family address. That matrix is then applied each year to the base figures provided by MOD.			
	Methods	<u>National</u> To account for the change in the population of armed forces stationed in England & 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. <u>Subnational</u> UK armed forces are removed from the population before other processes take place (eg ageing on), before the new stock figure is added back in. UK armed forces 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 personnel from local authority of base to local authority of residence. To calculate the change in the overseas dependant population, the current year's estimated overseas dependant population who are usually resident in England & Wales is subtracted from the previous year's overseas dependant 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 the home armed forces living with a partner.	Administrative data on personnel residing in barracks / ships are used to adjust local area distributions of armed forces recorded on the 2011 Census to better reflect 'usual residence'. Information from the Stations Commanders' return is used to determine whether there has been a change in the number of home armed forces in each area. Any changes are applied to the previous year's population to get total by council and NHS Board area. 2011 Census age and sex distributions will be updated with DASA data for base areas in future years. Postcode of the base is provided by the census and data collection, so imputing local authority of the base is not needed.	Previous year's armed forces based in Northern Ireland are removed from the previous year's population estimate. Once the civilian population has been aged on, the armed forces of the current year are added back into the population.	England & Wales and Scotland – use admin data to adjust for change. Northern Ireland – take out armed forces, and then add back in. England & Wales – imputing local authority of residence. Ultimately, although these methods differ, there is little material difference in the end result. (Note this is different to the treatment of Home Armed Forces in the Small Area Population Estimates).
Foreign Armed Forces	Data sources	**US Air Force** Number of US Air Force resident in England & Wales, by base of residence, age and sex. **Census 2011** US armed forces by area of base and area of usual residence from the 2011 Census.	There are no foreign armed forces stationed in Scotland.	There are no foreign armed forces stationed in Northern Ireland.	Northern Ireland & Scotland – No foreign armed forces stationed here.

		England & Wales	Scotland	Northern Ireland	Differences Identified
	Methods	Local authority of usual residence is imputed using data derived from the 2011 Census. An adjustment is made for the local authorities of Harrogate and North Kesteven for other US service arms to account for pockets of foreign forces. The change in the foreign armed forces population between the 2 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. Non-US foreign armed forces are not accounted for in the method as there are no data currently available. However, these are considered very small in number.	N/A	N/A	Northern Ireland & Scotland – No foreign armed forces stationed here.
Prisoners (sub national level estimates only)	Data sources	**Ministry of Justice (MoJ)** Number of prisoners usually resident in each prison, by age and sex, as at 30 June. A person is regarded as usually resident in a prison if they have been sentenced to 6 months or more.	**Scottish Prisons Service (SPS)** Number of prisoners usually resident in each prison, by age and sex, as at 30 June. A person is regarded as usually resident in a prison if they have been sentenced to 6 months or more.	Prisoners are not treated as a separate component of the population estimates for Northern Ireland; they are included in the medical card system.	Northern Ireland – Prisoners not treated as separate component.
	Methods	Prisoners are allocated to a local area based on the postcode of the prison in which they reside. The numbers of prisoners are aggregated to obtain estimates at local area level. Change in the prisoner population between the 2 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 due to operational needs.	Prisoners are allocated to a local area based on the postcode of the prison in which they reside. The numbers of prisoners are aggregated to obtain estimates at local area level. The prison population is removed from the base population for the previous year. After the base population has been aged on, the prison population for the current year, by age, sex and local area is added back in. An adjustment is made for changes in the size/make-up of the prison population each year to prevent double counting.	N/A	England & Wales – Change in prisoner population is used. Scotland – Prison population is removed, and then re-added after base is aged on. An adjustment is then made. Northern Ireland - doesn't treat prison population differently.
Section B - Mixed Method (Ratio Change and Cohort Component)					
		N/A No mixed approach used.	N/A No mixed approach used.	Section A of this table details the cohort component methodology used at Northern Ireland level. To produce the Super Output Area (SOA) level geography population estimates, a	Northern Ireland takes a mixed approach to calculating the SOA level estimates, which are the basis for producing the local government district estimates published.

		England & Wales	Scotland	Northern Ireland	Differences Identified
				mixed approach is taken. It is from these SOA level estimates that the local government district (LGD) estimates are produced by aggregating up from the SOAs. <u>Mixed approach</u> Population estimates by Super Output Areas, sex and 5-year age band are derived by separately estimating the population in the period of interest using both the cohort component and ratio change methods, before taking an average of the 2 estimates for each SOA, by sex and age group. These estimates are then subject to a process of quality assurance. On rare occasions, estimates from one or the other method are found to be outliers. The general solution to these cases is to rely solely on one method rather than the average. (Documentation does not give details.) SOA estimates are disaggregated from 5 year age-bands to single year of age to allow aggregation to larger geographies such as local government districts (and other geographies detailed in Table 3). Both sets of disaggregation are done based on a combination of the components of change estimates, and administrative data sources used in the ratio change method (although Child Benefit Data are not used for disaggregation). <u>Cohort component</u> The central feature of the cohort component method is that it seeks to estimate population change by taking account of the components of change from one time period to another (ie births, deaths and migration). See section A of the current table (Table 1) and Table 3 for details of the cohort component method. <u>Ratio Change</u> In the ratio change method, selected indicators of population change are used to update the population from some earlier or base period. The method assumes an unchanged	Contrary to this, neither England & Wales nor Scotland take this approach, and simply use a cohort component method for their mid-year Estimates.

		England & Wales	Scotland	Northern Ireland	Differences Identified
				relationship over time between the chosen indicator and the true population. For a more detailed description of the mixed method used, and details of the ratio change element, see Table 3 – this specifically details how the SOA level estimates are produced, and it is the SOA estimates which are used to generate the LGD estimates referred to in Table 1.	

Population Estimates of the Very Old – Table 2

		England & Wales	Scotland	Northern Ireland	Differences Identified
Organisation		Office for National Statistics (ONS)	National Records of Scotland (NRS)	Northern Ireland Statistics & Research Agency (NISRA)	
Approach		Kannisto-Thatcher	Kannisto-Thatcher	Kannisto-Thatcher	
Publication Title		Population Estimates of the Very Old (including Centenarians)	Centenarians in Scotland (Including mid-year population estimates for those aged 90 & over)	Estimates of the population aged 85 and over, Northern Ireland	Published with different titles across UK.
Components					
Deaths and Population Estimates	Data sources	<u>Population estimates:</u> **Mid-year Population estimates for the UK** <u>Deaths</u>***:*** **General Register Office (GRO)** Deaths data are taken on a calendar year basis by age and sex at death. Registration data are used for the current year data, and occurrence data are used for previous years' data (as this dataset is then complete). Deaths of non-residents are included.	<u>Population estimates:</u> **Mid-year estimates of the population** <u>Deaths</u>***:*** **National Records of Scotland (NRS)** Deaths occurring between 1 July and 30 June by sex, age at 30 June and area of usual residence. No adjustments are made to account for late registrations occurring in the previous year in anticipation of a similar number in the current year. No adjustments are made for non-resident deaths, that is, deaths of non-residents are included. In all countries, place of non-resident deaths, allocated to place of death, are included as a proxy for residents who die abroad.	<u>Population estimates:</u> **Population and Migration estimates, Northern Ireland** <u>Deaths</u>***:*** **General Register Office Northern Ireland (GRONI)** Deaths occurring on a mid-year to mid-year basis by age at the start of the mid-year to mid-year period, at the total Northern Ireland level. Deaths of non-residents are included. **Mid-year population estimates** – used for constraining.	Population estimates differences – see Table 1. Any differences in population estimates will be inherent in the Estimates of very old. England & Wales – use registration data for current year, and occurrence for years prior to that, as the process is repeated, once occurrence data are available, the registration data are then replaced with the corresponding occurrence data). England & Wales – deaths are at calendar year vs. Scotland + Northern Ireland – mid-year. For differences in the mid-year population estimates, see Table 1. Any differences in these estimates will be inherent in the estimates of the very old, as they are constrained.
	Methods	The population at a given age is estimated by looking at the ratio of the number of survivors of a cohort still alive to the number of that cohort who died in the last few years. By making an assumption about the highest age at which everyone in a given cohort will have died, it is then possible to produce an algorithm using these survival ratios that will give estimates of the numbers of people alive at earlier ages for each cohort. That is, the KT method uses age-at-death data to build up distribution profiles of the numbers of elderly people in previous years. By collating age-at-death data for a series of years, it becomes possible to make an estimate of the number of people of a given age alive in any particular year and so create	The population at a given age is estimated by looking at the ratio of the number of survivors of a cohort still alive to the number of that cohort who died in the last few years. By making an assumption about the highest age at which everyone in a given cohort will have died, it is then possible to produce an algorithm using these survival ratios that will give estimates of the numbers of people alive at earlier ages for each cohort. That is, the KT method uses age-at-death data to build up distribution profiles of the numbers of elderly people in previous years. By collating age-at-death data for a series of years, it becomes possible to make an estimate of the number of people of a given age alive in any particular year and so create	The population at a given age is estimated by looking at the ratio of the number of survivors of a cohort still alive to the number of that cohort who died in the last few years. By making an assumption about the highest age at which everyone in a given cohort will have died, it is then possible to produce an algorithm using these survival ratios that will give estimates of the numbers of people alive at earlier ages for each cohort. That is, the KT method uses age-at-death data to build up distribution profiles of the numbers of elderly people in previous years. By collating age-at-death data for a series of years, it becomes possible to make an estimate of the number of people of a given age alive in any particular year and so create	Scotland + Northern Ireland - deaths data are mid-year to mid-year by age at start of the mid-year period. England & Wales – deaths data are on calendar year by age at death. It would be possible for ONS to reallocate deaths to a mid-year by mid-year basis for years after 1993 but prior to this date data are not available meaning there would be some small discontinuities in historical datasets. ONS are currently conducting a review of the methodology to produce 90 and over estimates by single year of age. The review will consider the impact of moving from using

		England & Wales	Scotland	Northern Ireland	Differences Identified
		age distribution profiles, assuming that migration at these oldest ages is minimal. To make estimates for the current year, it is not possible to use death data, as we are interested in the population who are currently or very recently alive. So the KT method uses an average of the last 5 years of age-at-death information to produce an estimate of the number of survivors for the most current year. The estimates for the current year and the recalculated back years are constrained to sum to the 90 and over totals in the Mid-Year Estimates (MYE) for males and females separately for the current year and the previous years. This provides users with a set of estimates by single year of age up to age 105 and over consistent with the published aggregate 90 and over population estimates. The input deaths data are in a calendar year basis by age at death. This is because historically this is the way in which deaths data for England & Wales were produced. Also, the estimates were initially calculated as input data for life tables which traditionally use calendar year deaths. Round their estimates of the population aged 90 and over by single year of age to the nearest 10, reflecting the quality of data and methodology.	age distribution profiles, assuming that migration at these oldest ages is minimal. To make estimates for the current year, it is not possible to use death data, as we are interested in the population who are currently or very recently alive. So the KT method uses an average of the last 5 years of age-at-death information to produce an estimate of the number of survivors for the most current year. The estimates for the current year and the recalculated back years are constrained to sum to the 90 and over totals in the Mid-Year Estimates (MYE) for males and females separately for the current year and the previous years. This provides users with a set of estimates by single year of age up to age 105 and over consistent with the published aggregate 90 and over population estimates. The input deaths data are on a mid-year to mid-year basis by age at the start of the mid-year to mid-year period. Applying the KT method to data in this format allows population estimates by age at a mid-year to be derived directly from the input data. Round their estimates of the population aged 90 and over by single year of age to the nearest 10, reflecting the quality of data and methodology.	age distribution profiles, assuming that migration at these oldest ages is minimal. To make estimates for the current year, it is not possible to use death data, as we are interested in the population who are currently or very recently alive. So the KT method uses an average of the last 5 years of age-at-death information to produce an estimate of the number of survivors for the most current year. The estimates for the current year and the recalculated back years are constrained to sum to the 90 and over totals in the Mid-Year Estimates (MYE) for males and females separately for the current year and the previous years. This provides users with a set of estimates by single year of age up to age 105 and over consistent with the published aggregate 90 and over population estimates. The input deaths data are on a mid-year to mid-year basis by age at the start of the mid-year to mid-year period. Applying the KT method to data in this format allows population estimates by age at a mid-year to be derived directly from the input data. Given the small population of Northern Ireland, NISRA publishes estimates to the nearest person.	deaths on a calendar year basis to deaths on a mid-year basis. England & Wales + Scotland – round to nearest 10. Northern Ireland – Round to nearest person.

Small Area Population Estimates – Table 3

		England & Wales	Scotland	Northern Ireland	Differences Identified
Organisation		Office for National Statistics (ONS)	National Records of Scotland (NRS)	Northern Ireland Statistics & Research Agency (NISRA)	
Approach		Ratio change This method uses the change in populations recorded on administrative sources as an indicator of change in the true population. A 'change ratio' is calculated from the administrative sources for each small area and applied to the previous year's population estimate to obtain an updated estimate. The method relies on the assumption that the relationship between the indicator of population and the true population has remained the same for the small area since the base year or latest estimated year.	Cohort component It uses the following steps from the starting population: •Remove armed forces and prisoner populations; •Age on the resultant population; •Add on births; •Subtract deaths; •Adjust for migration; •Add in asylum seekers; •Add in new armed forces and prisoner populations; •Make consistent with the mid-year estimate for council areas.	Population estimates for Super Output Areas in Northern Ireland are created from an average of the ratio change and cohort component methods. The 2 methods approach the measurement of population change from 2 separate but complementary perspectives (stocks versus flows). This provides a strong rationale for a combined approach that draws on the strengths of both methods. Furthermore, the complementarities between the 2 methods mean that the mixed approach makes maximum use of the available information.	Different approaches taken by each.
Publication title		Small Area Population Estimates.	Population estimates below council area level are published in 2 publication documents. One for 2011 Data Zones and non-standard geographies (Small Area Population Estimates Scotland) and another separate publication for settlements and localities (Settlement and Locality Population Estimates).	Population estimates for Northern Ireland and all geographies within Northern Ireland are published in one publication, except for Census Small Areas and Neighbourhood Renewal Areas, which are released together at a later date (for quality assurance purposes).	Different titles across the UK for the publications. Only England & Wales publish population estimates below local authority (or equivalent geography) within one single publication.
Geography level		Super Output Area (Lower-layer Super Output Area (LSOA) and Middle-layer Super Output Area (MSOA)).	Data Zones.	Super Output Area (SOA).	Population sizes for small areas vary. Average population size in 2011: Scotland Data Zones: 670 England & Wales MSOA: 7800 England & Wales LSOA: 1600 Northern Ireland SOA: 2000
Components					
Base population		**Initial methods and data sources used to create the Small Area Population Estimates for Census year.** This bridges the gap between census day and the mid-year point, creating the base population of the time series from which all intercensal Small Area Population Estimates are produced.			
	Data Sources	**2011 Census:** Unadjusted 2011 Census LSOA population estimates by single year of age and sex for the usually resident population. Births: **General Register Office (GRO)** Deaths: **General Register Office (GRO)**	**2011 Census:** 2011 Census population estimates by single year of age and sex for the usually resident population built up from census output areas Births **National Records of Scotland (NRS)** Deaths: **National Records of Scotland (NRS)**	**2011 Census:** 2011 Census SOA population estimates by single year of age and sex for the usually resident population Births: **General Register Office Northern Ireland (GRONI)** Deaths: **General Register Office (GRO)**	England & Wales – MYE Population estimates differences – see Table 1. Any differences in population estimates will be inherent in the Small Area Population Estimates.

		England & Wales	Scotland	Northern Ireland	Differences Identified
		MYE (used for constraining) See Table 1 above.	Migration: To estimate migration, a combination of data sources are used, including the: - **National Health Service Central Register,** - **Community Health Index,** - **International Passenger Survey**.	Migration **Medical Card Register** **MYE (NI Level used for constraining)**	
	Method	Unadjusted 2011 Census LSOA population estimates by single year of age and sex for The usually resident population were aged forward from 27 March 2011 (Census Day) to 30 June 2011. These aged forward estimates were adjusted to account for differences in armed forces usual residence definitions between census and mid-year estimates. Births occurring from 28 March 2011 to 30 June 2011 were added. Deaths occurring from 28 March 2011 to 30 June 2011 were subtracted. The LSOA estimates by single year of age and sex were constrained to the mid-2011 local authority (LA) mid-year estimates. This constraining is required because the mid-2011 LA estimates include adjustments for internal and international migration. These LSOA estimates by sex and single year of age were then aggregated to produce MSOA estimates and estimates for both LSOA and MSOA by quinary age group.	In order to carry out the cohort component method to produce the Data Zone SAPEs it was first necessary to create a 2011 Data Zone SAPE. In order to do this, births, deaths and migration data for the period between the 2011 Census and 30 June 2011 were obtained at postcode level and the corresponding Data Zone code for the postcode matched on. The 2011 Census Population was then adjusted by: Adding on the births, - Live births occurring between census and 30 June by sex and area of usual residence of the mother. - The number of live births between census and 30 June were added to the population estimates at age 0, according to the area of usual residence of mother. - For a few Data Zones that border England some births and deaths were distributed elsewhere in the council area so as not to distort the population of the small area. Subtracting the deaths - Deaths occurring between census and 30 June by sex, age at 30 June and area of usual residence. - No adjustments were made for non-resident deaths, that is, deaths of non-residents were included. - Deaths were subtracted from the mid-year population by age (calculated at mid-year) and sex at the area of usual residence of the deceased, or place of occurrence for non-resident deaths.	2011 Census SOA population estimates by single year of age and sex for the usually resident population were aged forward from 27 March 2011 (Census Day) to 30 June 2011. Births occurring from 28 March 2011 to 30 June 2011 were added. Deaths occurring from 28 March 2011 to 30 June 2011 were subtracted. Migration was calculated at small area level for the period between the 2011 Census in March to mid-year in June using changes in the medical card register. The SOA estimates by single year of age and sex were constrained to the mid-2011 Northern Ireland mid-year estimates. These SOA estimates by sex and single year of age were then aggregated to produce estimates for administrative areas within NI.	General approach is similar between the countries.

		England & Wales	Scotland	Northern Ireland	Differences Identified
			Adjusting for the migration. - Migration dataset produced by the mid-year estimates process is at a postcode level and so these postcodes are used to match on the corresponding Data Zone. The data are then summarised by in-migrants and out-migrants and the net migration calculated. It is this net migration which is used to make the Data Zone migration adjustment. - The migration adjustment: Net migration is added to the population by single year of age and sex for each Data Zone - To account for international migration, IPS data provided by ONS are used for the period between census day and mid-year.		
All intercensal small area population estimates produced from the above.					
	Data sources	**National Health Service Central Register (NHSCR)** **GP Patient Register Data System (PRDS)** Patient Register data are used for ratio change.	<u>Births</u> **National Records of Scotland (NRS)** Live births occurring between census and 30 June by sex and area of usual residence of the mother. Births to non-resident mothers are included as a proxy for the number of births to resident mothers of Scotland who give birth abroad, who would otherwise be missed from the population estimates. The number of live births between census and 30 June are added to the population estimates at age 0, according to the area of usual residence of mother. Babies born to non-resident mothers are allocated to the council area of their place of birth. For a few Data Zones that border England some births and deaths are distributed elsewhere in the council area so as not to distort the population of the small area. <u>Deaths:</u> **National Records of Scotland (NRS)** Deaths occurring between census and 30	**<u>Ratio Change</u>** For the ratio change method, indicator datasets include: - **Medical Card Register** o List of all persons registered with a family doctor. - **Her Majesty's Revenue and Customs** -Child Benefit. o Child benefit statistics on the number of children for which Child benefit is claimed. o Near universal coverage of under-6s. Partial coverage of 16-18 year olds. (Not available for 2008 so 2007 data are aged on.) - **Department of social development** - **Older Persons' database** o Information on the number of claimants of State Pension and other related benefits (disability benefits, pension credit). - **Department for Education: School Census** (which was not used for England & Wales). o Annual count of the number of children resident in Northern Ireland attending primary, post primary and special education establishments.	Different data sources are used given the different approaches taken. England & Wales simply use Patient Register data for the ratio change method along with previous estimates, special population data sources, detailed later in the table, and mid-year estimates for constraining – again detailed later in the table. Scotland and Northern Ireland – use vital events for their cohort component approaches, and migration data (Northern Ireland use Medical Card Register, Scotland use CHI, NHSCR &IPS). Northern Ireland use Medical Card Register, HMRC, DSD and DFE data for their ratio change indicators – different from England. Northern Ireland – Ratio change indicators used are dependent on what data sources are available at SOA level by age and sex.

		England & Wales	Scotland	Northern Ireland	Differences Identified
			June by sex, age at 30 June and area of usual residence. No adjustments are made for non-resident deaths, that is, deaths of non-residents are included. Deaths are subtracted from the mid-year population by age (calculated at mid-year) and sex at the area of usual residence of the deceased, or place of occurrence for non-resident deaths. <u>Migration:</u> To estimate migration, a combination of data sources are used, including the: - **National Health Service Central Register,** - **Community Health Index,** - **International Passenger Survey.** Migration dataset produced by the mid-year estimates process is at a postcode level and so these postcodes are used to match on the corresponding Data Zone. The data are then summarised by in-migrants and out-migrants and the net migration calculated. It is this net migration which is used to make the Data Zone migration adjustment. The migration adjustment: Net migration is added to the population by single year of age and sex for each Data Zone	<u>**Cohort component**</u> For the cohort component method: <u>Births</u> **General Registry Office in Northern Ireland** Individual records, geocoded and allocated to census output areas based on usual address of the mother, or if not available, place of birth. <u>Deaths</u> **General Registry Office in Northern Ireland** Individual records, geocoded and allocated to COAs based on usual residence of deceased, or if not available, place of death. <u>Migration</u> **Medical Card Register** Database of all persons registered with a GP. Maintained by Health and Social Care Business Services Organisation. Internal flows measured by changes of address when people change their GP registration from one location in Northern Ireland to another. External flows measured by new registrations of people moving into Northern Ireland and de-registrations by people moving away from Northern Ireland. Not all outflows are measured fully by the medical card register, therefore disaggregations are scaled up (and young adult males are adjusted to be similar to young adult females). Additional data sources are used to account for special populations such as armed forces and students (Higher Education Statistics Agency) (See below).	

		England & Wales	Scotland	Northern Ireland	Differences Identified

	Methods	The next year estimates are produced by applying the ratio change method to a LSOA estimate of the population base (the previous LSOA estimate) using Patient Register data ratio change between the same 2 years.
		
		Before applying these change ratios some population counts are subtracted (referred to as the special population) comprising UK armed forces, foreign armed forces and dependants, and prisoners, and added again after these counts are constrained to the local authority mid-year estimates minus the special population.
		
		The main assumption behind this ratio change method is that, for each area, the data should have a consistent relationship with the true population over time.
		
		Change ratios are calculated by quinary age group and sex for the Patient Register data. The change ratios are calculated by dividing for each dataset the current year count by quinary age and sex with the previous year count by quinary age and sex. This ratio is then applied to the previous year SAPE to give the current estimate.
		
		Estimates by single year of age and sex are produced by apportioning the quinary age counts to single year of age using current year local authority constrained Patient Register single year of age and sex counts.
			In Scotland, both 2001 and 2011 Data Zones use the Cohort Component methodology to create small area population estimates.
			
			It uses the following steps from the starting population:
			- Remove Armed Forces and Prisoner populations
			  ○ (see below for special populations);
			- Age on the resultant population;
			- Add on births;
			- Subtract deaths;
			- Adjust for migration;
			- Add in asylum seekers
			  ○ (see below for special populations);
			- Add in new armed forces and prisoner populations;
			  ○ (see below for special populations);
			- Make consistent with the mid-year estimates for council areas.
				Cohort component
				The central feature of the Cohort Component method is that it seeks to estimate population change by taking account of the components of change from one time period to another (ie births, deaths and migration).
				
				The starting point is the:
				- Ageing on of the population age structure from an earlier period to the period for which the estimates are required.
				- Births occurring between the 2 periods are added to the population.
				- Deaths are subtracted, by age group, from the initial population age structure.
				- The method also takes account of population gains due to in-migration, and losses due to out-migration, again by age group.
				
				Ratio Change
				In the ratio change method, selected indicators of population change are used to update the population from some earlier or base period.
				The method assumes an unchanged relationship over time between the chosen indicator and the true population.
				
				A particular advantage of the ratio change method is that it is straightforward to implement from the available datasets. For example, for adults aged 16-64, the ratio change estimate was produced by applying, for each SOA, the percentage increase in the number of persons listed as registered on the Medical Card Register to the mid-year estimate for that SOA. This was done for each of 10 age groups within that age range, separately for men and women.
				
				For the remaining age groups, the other datasets were combined to produce weighted average estimates of the change in the relevant population within each SOA.
					Overall methods are different – specific differences are difficult to ascertain in light of this.
					
					England – ratio change method is used.
					Scotland – cohort component method is used.
					
					Northern Ireland – a combination of ratio change and cohort component methods are used.

		England & Wales	Scotland	Northern Ireland	Differences Identified
				A mixed approach: **Mixed approach** Population estimates by Super Output Areas, sex and 5-year age band are derived by separately estimating the population in the period of interest using both the cohort component and ratio change methods, before taking an average of the 2 estimates for each SOA, for each of the age groups, both male and female. These estimates are then subject to a process of quality assurance. In rare occasions, it is found that estimates from one or the other method appear to be outliers. The general solution to these cases is to rely solely on one method rather than the average. Estimates are disaggregated from 5 year age-bands to single year of age to allow aggregation to other geographies Both sets of disaggregation are done based on a combination of the components of change estimates, and administrative data sources used in the ratio change method (although Child Benefit Data are not used for disaggregation). The Small Area Population Estimates methodology is a combination of the components of change and ratio change methods. The resultant population change cannot be perfectly explained by the components explained above. The remaining or unexplained difference is included in the 'Other Changes.' (No further information about the 'Other Changes' is available in the methodology document.)	
Special Populations					
Students	Data source	In England & Wales, students are not treated as a special population.	Student areas The population of 'student' Data Zones can fluctuate considerably from year to year because of the nature of the migration in these areas. In these areas, the 17-30 age group may be adjusted so that the age distribution is the same as the census. There may be times when a big change in the student population of a Data Zone is valid (eg opening/closure of a halls of residence), so this is checked.	In Northern Ireland, information from the **Higher Education Statistics Agency** is combined with that of the **Medical Card Register** to account for student flows. Therefore, student areas are not treated differently.	Only Scotland treats students as special population.

		England & Wales	Scotland	Northern Ireland	Differences Identified
			The areas that are checked are the Data Zones where students made up 20% or more of the population at the last census. This quality assurance uses information from the **NRS communal establishment data (HEP branch)**, and also **HESA** data.		
	Methods	N/A	In Scotland, a student area is identified as an area whose population during the 2011 Census was made up of 20% or more students. For these areas, separate quality assurance is carried out to compare the population count and the age-sex distribution with data from the 2011 Census and other information collected by National Records of Scotland. Adjustments may be required to these areas, with counteracting adjustments to other Data Zones within the same council area, sex and age group so that the aggregated Data Zones are consistent with the mid-year estimate council totals.	N/A	Only Scotland treats students as special population.
Prisoners	Data Source	**Ministry of Justice (MoJ)** Number of prisoners usually resident in each prison, by age and sex, as at 30 June A person is regarded as usually resident in a prison if they have been sentenced to 6 months or more. Prisoners are allocated to a local area based on the postcode of the prison in which they reside.	**Scottish Prisons Service (SPS)** Number of prisoners usually resident in each prison, by age and sex, as at 30 June. A person is regarded as usually resident in a prison if they have been sentenced to 6 months or more. Prisoners are allocated to a local area based on the postcode of the prison in which they reside.	In Northern Ireland, prisoners are not treated as a special population.	
	Methods	For England & Wales, prisoners are treated as a special population, similarly to the treatment of armed forces. Prisoners are allocated to a local area based on the postcode of the prison in which they reside. Change in the prisoner population between the 2 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 due to operational needs.	For Scotland, prisoners are treated as a special population, similarly to the treatment of armed forces.	N/A	England & Wales – change in the special population is applied. Scotland – stocks are removed and replaced Northern Ireland – not treated as a special population.

		England & Wales	Scotland	Northern Ireland	Differences Identified
Armed forces	Data sources	Home **Ministry of Defence (MOD)** Number of UK armed forces stationed in England & Wales by age, sex, service and local authority of base as at 1 July. **British Forces Germany** Numbers of UK armed forces' dependants, for accompanied postings, by sex and age, on an annual basis. **2011 Census for England & Wales** UK armed forces by area of base and area of usual residence from the 2011 Census. Dependants of UK armed forces by area of permanent residence from the 2011 Census foreign armed forces and dependants. **Foreign** **US Air Force** Number of US Air Force resident in England & Wales, by base of residence, age and sex. **2011 Census for England & Wales** US armed forces by area of base and area of usual residence from the 2011 Census.	**Ministry of Defence (MOD)** Number of UK armed forces stationed in Scotland by age, sex and council area annually, as at 1 July. The services data for Scotland are combined (land/air/sea). **NRS Stations Commanders' return** Number of home armed forces personnel usually resident in each council area by sex. **2011 Census for Scotland** Number, age, sex and distribution of armed forces personnel in 2011 Census.	**Ministry of Defence (MOD)** The Defence Analytical Services Agency of the Ministry of Defence provides details on the number of forces stationed in Northern Ireland by age, sex and area, as at 1 July. The services data for Northern Ireland are combined (land/air/sea).	Northern Ireland - Sources either not used / not available in relation to armed forces: NRS Stations Commanders' return, British Forces Germany, and 2011 Census. - Dependants excluded. - Services data are combined Scotland – Sources either not used / not available in relation to armed forces: British Forces Germany, 2011 Census. - Services data are combined, as for Northern Ireland. Scotland - number of home armed forces personnel usually resident in each council area by age, sex, not service and LA. Northern Ireland – just by age, sex and area – not by service, services are combined. England & Wales – by age, sex, service and LA as at 1 July.
	Methods	Home UK armed forces 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 personnel from local authority of base to local authority of residence. To calculate the change in the overseas dependant population, the current year's estimated overseas dependant population who are usually resident in England & Wales is subtracted from the previous year's overseas dependant 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 the home armed forces living with a partner.	In Scotland, armed forces are treated as a special population. Before the population is aged-on, the armed forces population for the previous year is removed. The updated armed forces population is added back in after other adjustments for births, deaths and migration have been made. The armed forces estimates at council area level are apportioned to Data Zones, based on the Data Zone distribution of the previous year. Aggregated Data Zones are made consistent with the age-sex distribution of armed forces at council area level. The census AF distributions are then constrained to the new AF estimates used in the MYEs. The 2011 Armed Forces population by Data Zone was created by using the 2011 Census AF population by postcode, adjusted to move some AF back to barracks to better reflect usual residence, and then matching on the corresponding Data Zone code using	In Northern Ireland, 9 SOAs were identified as containing army barracks. For these areas, the ratio change method is less reliable for younger ages as there is a weak relationship between population and indicator variables. As a result, the cohort component estimates are used, in which armed forces based in Northern Ireland are subtracted in the previous year's estimates before ageing on the civilian population and then adding in the armed forces after the ageing on is complete. Before they are added back in again, the armed forces counts at previous mid-year are removed, and counts for new mid-year are added. These will be different, resulting in a component of change (generally a reduction of HMF stationed in NI).	Scotland and Northern Ireland – no foreign armed forces. Ultimately, the principle difference is that for: England & Wales – change in the special population is applied. Scotland – stocks are removed and replaced Northern Ireland – stocks are removed and replaced. However, although these methods differ, there is little material difference in the end result.

		England & Wales	Scotland	Northern Ireland	Differences Identified
		Foreign Local authority of usual residence is imputed using data derived from the 2011 Census. An adjustment is made for the local authorities of Harrogate and North Kesteven for other US service arms to account for pockets of foreign forces. The change in the foreign armed forces population between the 2 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. Non-US foreign armed forces are not accounted for in the method as there are no data currently available. However, these are considered very small in number.	the Scottish Neighbourhood Statistics postcode-data zone geography lookup. The population was then summarised by single year of age, sex and Data Zone.		
Asylum seekers	Data sources	In England & Wales, asylum seekers are not treated as a special population.	**Immigration and Nationality Directorate, Home Office** Number of asylum seekers who remain in Scotland for more than 12 months and their dependants. **National Asylum Support Service (NASS)** Number of asylum seekers receiving financial support and/or accommodation by local authority.	There are very small numbers of asylum seekers in Northern Ireland; there is no special treatment for this population.	Scotland – Only Scotland treat asylum seekers as a special population.
	Methods	N/A	In Scotland, in 2012 the Home Office provided National Records of Scotland with the postcodes for the head of households for asylum seekers within Scotland. Using the Council area estimates, the data are then apportioned to Data Zone level, according to head of household postcode. All asylum seekers are contained within Glasgow City. For later years, asylum seeker estimates are apportioned to Data Zones in Glasgow City, based on the Data Zone distribution of the previous year. Aggregated Data Zones are made consistent with the age-sex distribution of asylum seekers.	N/A	Scotland – Only Scotland treat asylum seekers as a special population.

	England & Wales	Scotland	Northern Ireland	Differences Identified
Constrained to mid-year estimates:				
Data sources	Population estimates: **Mid-year Population estimates for the UK** This means that: • Usual residents away from home temporarily are included • visitors are excluded, • Students are counted at their term-time address. • Members of Her Majesty's (HM) and non-UK Armed Forces stationed in the UK are included; • HM forces stationed outside the UK are excluded.	Population estimates: **Mid-year estimates of the population** This means that: • Usual residents away from home temporarily are included • visitors are excluded, • Students are counted at their term-time address. • Members of Her Majesty's (HM) and non-UK armed forces stationed in the UK are included; • HM forces stationed outside the UK are excluded.	Population estimates: **Population and Migration estimates, Northern Ireland** This means that: • Usual residents away from home temporarily are included • visitors are excluded, • Students are counted at their term-time address. • Members of Her Majesty's (HM) and non-UK armed forces stationed in the UK are included; • HM forces stationed outside the UK are excluded.	Population estimates differences – see Table 1. Any differences in population estimates will be inherent in the subnational population estimates.
Published statistics	Single year of age and sex.	2001: 5 year age bands, except 10-15 and 16-19 which have 6 and 4 age groups in the bands, respectively. (This was to create a child population 0-15 years). 2011: SYOA.	Super Output Area by broad age bands (0-15, 16-39, 40-64, 65+) and sex.	England & Wales and Scotland – SYOA. Northern Ireland –Broad age bands and sex for SOAs.
Other small area and non-standard geographies.				
Geographies	• Clinical Commissioning Groups. • Output Areas. • Parliamentary constituencies. • Electoral wards. • National parks.	Produced from Data Zone estimates above: Settlements and localities. Non-standard geographies National parks. Community Health Partnerships. UK parliamentary constituencies. Scottish parliamentary constituencies. Multi-member wards. Nomenclature of Units for Territorial Statistics (NUTS).	Aggregated from Super Output Area estimates above: • NUTSIII • Health and Social Care Trusts • Education and Library Boards • Parliamentary constituencies • Local government districts (published by SYOA, produced in mid-year estimates detailed in Table 1) • Electoral wards Disaggregated from Super Output Area estimates above: • Census Small Areas (population totals published only) Aggregated from Census Small Areas • Neighbourhood Renewal Areas	Other small area geographies for which estimates are produced differ across the UK.
Methods	CCGs (Clinical Commissioning Groups) CCGs are aggregated from current year's LSOA mid-year estimates using an official ONS Geography LSOA to CCG lookup.	Non-standard geography small area population estimates are produced using a best fit method from the Data Zones produced. Allocation is based on population	Population estimates for areas within Northern Ireland are created by Super Output Areas (SOAs). These SOAs become the building blocks to create population	In general the approach is to produce non-standard geographies using the small area data (SOAs/DZs) as building blocks.

	England & Wales	Scotland	Northern Ireland	Differences Identified
	Data sources: • **Mid-year Estimates (see Table 1 for information).** • **Official LSOA – CCG lookup file.** <u>OA, Wards and parliamentary constituencies (PCs)</u> OAs, wards and PCs are produced using an apportionment method based on Patient Register administrative data. This is the same administrative dataset that is used in the ratio change method to produce LSOA and MSOA estimates. 1. Obtain current year's LSOA mid-year estimates 2. Remove special populations: prisoners and armed forces (using Ministry of Justice data on prisoners and Defence Statistics/2011 Census information on numbers and location). 3. Distribute non-special LSOA population between all OAs in the LSOA using a distribution ratio obtained from Patient Register administrative data This is using a 'stock' (as opposed to a 'change') approach, ie taking the stock in the Patient Register and using this to apportion the LSOA level data. 4. Distribute special population between OAs in the LSOA (using Ministry of Justice data on prisoners and Defence Statistics/2011 Census information on numbers and location of armed forces) 5. Aggregate non-special and special OA population estimates to create total OA population estimates 6. Round estimates to produce final current year's OA mid-year estimates 7. Aggregate current year's OA mid-year estimates to wards and PCs using official ONS Geography OA to ward/PC best-fit lookups. *Data sources:* • **Patient Register.** • **Ministry of Justice (prisoners).** • **Ministry of Defence (armed forces).**	the weighted centroid of the Data Zone to the higher area. Settlement and Locality population estimates are produced using a different method: 1. Data Zone population estimates are disaggregated to postcode level using address point information. 2. Postcode are then classified as high or low density 3. High density postcodes are then grouped together to form settlements if their population rounds to 500 or more 4. Localities are created by splitting the larger settlements into smaller areas based on historical areas and feedback from local councils.	estimates for other geographies, including Wards, LGDs and other geographies above the SOA level (however 6 SOAs consist of 2 Wards each). For 2011 Census Small Areas, the apportionment method is used to disaggregate the Super Output Area-level estimates into Census Small Areas based on a combination of the cohort-component results and administrative data sources. Only NRAs are added up from Census Small Areas (and Regional Development Offices are added up from NRAs). All population estimates for areas within Northern Ireland are constrained to Northern Ireland level population, which is produced first.	There are some differences in the construction of the smallest building blocks (from the SOAs/DZs) between the 3 devolved administrations.

	England & Wales	Scotland	Northern Ireland	Differences Identified
	National Parks Mid-year population estimates for national parks are based on a combination of the OA population estimates described above (to provide up-to-date annual estimates of the population of the wider area surrounding the national park) and 2011 Census population estimates for the exact national park area. 1. Identify all OAs that fall either wholly or partially within a national park area 2. Calculate the proportional change in the population of these OAs between the previous and current year for the total population and by age and sex 3. Apply these proportions to the previous year's national park population estimate to obtain figures for current year (for mid-2011 estimates the 2011 Census estimates were used as the 'previous year' figure) 4. Constrain estimates by age and sex to match total population figure 5. Round estimates to produce final current year's national park mid-year estimates (including further constraining if necessary to ensure population totals are maintained) *Data sources:* • **Use OA estimates as above.** • **Uses previous year's national park estimates.** • **Uses census estimates (see Table 1 for info).**			

National Population Projections – Table 4

		England & Wales	Scotland	Northern Ireland	Differences Identified
Organisation		Produced by the Office for National Statistics (ONS) on behalf of the National Statistician and the Registrars General of Scotland and Northern Ireland. The underlying assumptions were agreed in liaison with the devolved administrations – Welsh Government, National Records of Scotland (NRS) and Northern Ireland Statistics and Research Agency (NISRA).	Produced by the Office for National Statistics (ONS) on behalf of the National Statistician and the Registrars General of Scotland and Northern Ireland. The underlying assumptions were agreed in liaison with the devolved administrations – Welsh Government, National Records of Scotland (NRS) and Northern Ireland Statistics and Research Agency (NISRA).	Produced by the Office for National Statistics (ONS) on behalf of the National Statistician and the Registrars General of Scotland and Northern Ireland. The underlying assumptions were agreed in liaison with the devolved administrations – Welsh Government, National Records of Scotland (NRS) and Northern Ireland Statistics and Research Agency (NISRA).	
Approach		Cohort component.	Cohort component.	Cohort component.	
Publication Title		National Population Projections, UK	Projected Population of Scotland	Northern Ireland Population Projections	Published with different titles across UK.
Components					
Base population	Data sources	Population estimates: **Mid-year population estimates for the UK** The projections for England & Wales are based on the mid-2014 population estimates that we published on 25 June 2015. The projections for Scotland are based on the mid-2014 population estimates published by NRS on 30h April 2015 and likewise the projections for Northern Ireland are based on the mid-2014 estimates published by NISRA on 4 June 2015. These estimates are based on the results from the 2011 Census. Very old: **Population estimates of the very old (including centenarians)** Official mid-year population estimates produced by ONS, NRS and NISRA are prepared by individual age to the age of 89, with an upper age band for all those aged 90 and over. Estimates of the population aged 90 to 104 by single year of age and for the 105 and over age group are prepared using the Kannisto-Thatcher survivor ratio method, with the results controlled to agree with the official estimates of all those aged 90 and over.	Population estimates: **Mid-year estimates of the population** The projections for England & Wales are based on the mid-2014 population estimates that we published on 25 June 2015. The projections for Scotland are based on the mid-2014 population estimates published by NRS on 30 April 2015 and likewise the projections for Northern Ireland are based on the mid-2014 estimates published by NISRA on 4 June 2015. These estimates are based on the results from the 2011 Census. Very old: **Centenarians in Scotland** Official mid-year population estimates produced by ONS, NRS and NISRA are prepared by individual age to the age of 89, with an upper age band for all those aged 90 and over. Estimates of the population aged 90 to 104 by single year of age and for the 105 and over age group are prepared using the Kannisto Thatcher survivor ratio method, with the results controlled to agree with the official estimates of all those aged 90 and over.	Population estimates: **Population and migration estimates, Northern Ireland** The projections for England & Wales are based on the mid-2014 population estimates that we published on 25 June 2015. The projections for Scotland are based on the mid-2014 population estimates published by NRS on 30 April 2015 and likewise the projections for Northern Ireland are based on the mid-2014 estimates published by NISRA on 4 June 2015. These estimates are based on the results from the 2011 Census. Very old: **Estimates of the population aged 85 and over** Official mid-year population estimates produced by ONS, NRS and NISRA are prepared by individual age to the age of 89, with an upper age band for all those aged 90 and over. Estimates of the population aged 90 to 104 by single year of age and for the 105 and over age group are prepared using the Kannisto-Thatcher survivor ratio method, with the results controlled to agree with the official estimates of all those aged 90 and over.	Population estimates differences – see Table 1. Any differences in population estimates will be inherent in the National Population Projections. Population estimates of the very old differences – see Table 2. Any differences in population estimates of the very old will be inherent in the National Population Projections for these age groups.

		England & Wales	Scotland	Northern Ireland	Differences Identified
	Methods	The projections are made for successive years running from one mid-year to the next. For each age the starting population, taking into account net migration less the number of deaths, produces the number in the population, one year older, at the end of the year. To this has to be added survivors of those born during the year. Age is defined as completed years at the last birthday.	The projections are made for successive years running from one mid-year to the next. For each age the starting population, taking into account net migration less the number of deaths, produces the number in the population, one year older, at the end of the year. To this has to be added survivors of those born during the year. Age is defined as completed years at the last birthday.	The projections are made for successive years running from one mid-year to the next. For each age the starting population, taking into account net migration less the number of deaths, produces the number in the population, one year older, at the end of the year. To this has to be added survivors of those born during the year. Age is defined as completed years at the last birthday.	No methodological differences.
Births and Deaths Controls	Data sources	Births **General Register Office (GRO)** Total live births occurring between 1 July and 30 June. Deaths **General Register Office (GRO)** Total deaths occurring between 1 July and 30 June by sex.	Births **National Records of Scotland (NRS)** Total live births occurring between 1 July and 30 June. Deaths **National Records of Scotland (NRS)** Total deaths occurring between 1 July and 30 June by sex.	Births **General Register Office Northern Ireland (GRONI)** Total live births occurring between 1 July and 30 June. Deaths **General Register Office Northern Ireland (GRONI)** Total deaths occurring between 1 July and 30 June by sex.	No differences.
	Methods	Birth and death control totals for first year of projections. Births – total. Deaths – totals by sex. The fertility and mortality assumptions are then applied to these totals.	Birth and death control totals for first year of projections. Births – total. Deaths – totals by sex. The fertility and mortality assumptions are then applied to these totals.	Birth and death control totals for first year of projections. Births – total. Deaths – totals by sex. The fertility and mortality assumptions are then applied to these totals.	No methodological differences.
Fertility	Data sources	Projected fertility rates, by Single Year of Age, provided by **Demographic Analysis Unit, ONS.**	Projected fertility rates, by Single Year of Age, provided by **Demographic Analysis Unit, ONS.**	Projected fertility rates, by Single Year of Age, provided by **Demographic Analysis Unit, ONS.**	No differences.
	Methods	The number of births in the year is calculated by multiplying the average number of women at each single year of age during the year (taken as the mean of the populations at that age at the beginning and end of the year) by the fertility rate applicable to them during that year. The total number of births in a year is assumed to be divided between the sexes in the ratio of 105 males to 100 females, in line with recent experience. The number of infants aged 0 at the end of the year is calculated by taking the projected number of births, deducting the number of deaths found by applying the infant mortality rate and adding half the number of net migrants aged 0 last birthday.	The number of births in the year is calculated by multiplying the average number of women at each single year of age during the year (taken as the mean of the populations at that age at the beginning and end of the year) by the fertility rate applicable to them during that year. The total number of births in a year is assumed to be divided between the sexes in the ratio of 105 males to 100 females, in line with recent experience. The number of infants aged 0 at the end of the year is calculated by taking the projected number of births, deducting the number of deaths found by applying the infant mortality rate and adding half the number of net migrants aged 0 last birthday.	The number of births in the year is calculated by multiplying the average number of women at each single year of age during the year (taken as the mean of the populations at that age at the beginning and end of the year) by the fertility rate applicable to them during that year. The total number of births in a year is assumed to be divided between the sexes in the ratio of 105 males to 100 females, in line with recent experience. The number of infants aged 0 at the end of the year is calculated by taking the projected number of births, deducting the number of deaths found by applying the infant mortality rate and adding half the number of net migrants aged 0 last birthday.	No methodological differences.
Mortality	Data sources	Projected mortality rates, by Single Year of Age and sex, provided by **Demographic Analysis Unit, ONS.**	Projected mortality rates, by Single Year of Age and sex, provided by **Demographic Analysis Unit, ONS**	Projected mortality rates, by Single Year of Age and sex, provided by **Demographic Analysis Unit, ONS.**	Scotland has an adjusted lower mortality rate.

		England & Wales	Scotland	Northern Ireland	Differences Identified
			A further adjustment is made in setting the mortality rate for the base year in Scotland to account for their lower mortality. The assumptions, and how this is treated, is the same (just a lower rate to start with).		
	Methods	The number of deaths in a year is obtained by adding half of the net inward migrants at each age to the number in the population at the beginning of the year and applying the mortality rate qx. The mortality rates used in the projections represent the probabilities of death between one mid-year and the next, according to a person's age last birthday at the beginning of the period. The appropriate rate of "infant mortality", that is, the probability of a new-born child not surviving until the following mid-year is also given. This is about 85% of the full, first year of life infant mortality rate used in official statistics.	The number of deaths in a year is obtained by adding half of the net inward migrants at each age to the number in the population at the beginning of the year and applying the mortality rate qx. The mortality rates used in the projections represent the probabilities of death between one mid-year and the next, according to a person's age last birthday at the beginning of the period. The appropriate rate of "infant mortality", that is, the probability of a new-born child not surviving until the following mid-year is also given. This is about 85% of the full, first year of life infant mortality rate used in official statistics.	The number of deaths in a year is obtained by adding half of the net inward migrants at each age to the number in the population at the beginning of the year and applying the mortality rate qx. The mortality rates used in the projections represent the probabilities of death between one mid-year and the next, according to a person's age last birthday at the beginning of the period. The appropriate rate of "infant mortality", that is, the probability of a new-born child not surviving until the following mid-year is also given. This is about 85% of the full, first year of life infant mortality rate used in official statistics.	No methodological differences.
International Migration	Data source	A number of data sources are used to derive the migration assumptions. International migration flows are primarily sourced from the **International Passenger Survey (IPS)**. Armed forces and dependants from Germany data are provided by **Population Estimates Unit (ONS) and DASA.** Asylum seeker data **Immigration and Nationality Directorate, Home Office** Number of asylum seekers who remain in England & Wales for more than 12 months and their dependants.	A number of data sources are used to derive the migration assumptions. International migration flows are primarily sourced from the **International Passenger Survey (IPS)**. Armed forces and dependants from Germany – N/A. Asylum Seeker data **Immigration and Nationality Directorate, Home Office** Number of asylum seekers who remain in Scotland for more than 12 months and their dependants.	**Medical Card Register** List of patients registered with a family doctor (for inflows and outflows). Armed forces and dependants from Germany – N/A. Asylum seeker - N/A.	England – only use armed forces and dependants from Germany data. Northern Ireland - No IPS. England & Wales + Scotland – use asylum seeker data, Northern Ireland doesn't.
	Methods	Migration is assumed to occur evenly throughout the year. For computing purposes, this is equivalent to assuming that half the migrants in a given year at a given age migrate at the beginning of the year and half at the end of the year. The number of net migrants to be added to obtain the population aged x+1 at the end of the projection year therefore consists of half of those migrating during the year at age x and half of those migrating during the year at age x+1. A set of autoregressive integrated moving average (ARIMA) models is fitted to each	Migration is assumed to occur evenly throughout the year. For computing purposes, this is equivalent to assuming that half the migrants in a given year at a given age migrate at the beginning of the year and half at the end of the year. The number of net migrants to be added to obtain the population aged x+1 at the end of the projection year therefore consists of half of those migrating during the year at age x and half of those migrating during the year at age x+1. A set of autoregressive integrated moving average (ARIMA) models is fitted to each	Migration is assumed to occur evenly throughout the year. For computing purposes, this is equivalent to assuming that half the migrants in a given year at a given age migrate at the beginning of the year and half at the end of the year. The number of net migrants to be added to obtain the population aged x+1 at the end of the projection year therefore consists of half of those migrating during the year at age x and half of those migrating during the year at age x+1. A set of autoregressive integrated moving average (ARIMA) models is fitted to each	Northern Ireland –moving average 20 years, England & Wales, Scotland – 25 years. Armed forces and dependants from Germany are only included for England. No allowance made for Scotland, Wales or Northern Ireland. Asylum seekers – modelled separately for England & Wales, Scotland. Not separate for Northern Ireland.

		England & Wales	Scotland	Northern Ireland	Differences Identified
		flow, and the best model is selected based on goodness-of-fit statistics and consultation with the devolved administrations. For England & Wales, the international migration assumptions use a 25year moving average. As trends can be fairly volatile, a short-term assumption is implemented for the first few years of the projections, after which constant annual migration flows are adopted for the longer term. Projections include an estimate of the phased return of the armed forces and dependants from Germany, to England only. No equivalent allowance is made for Wales, Scotland and Northern Ireland. When modelling international migration flows, international and asylum seeker flows are modelled separately.	flow, and the best model is selected based on goodness-of-fit statistics and consultation with the devolved administrations. For Scotland, the international migration assumptions use a 25year moving average. As trends can be fairly volatile, a short-term assumption is implemented for the first few years of the projections, after which constant annual migration flows are adopted for the longer term. Projections include an estimate of the phased return of the armed forces and dependants from Germany, to England only. No equivalent allowance is made for Wales, Scotland and Northern Ireland. When modelling international migration flows, international and asylum seeker flows are modelled separately.	flow, and the best model is selected based on goodness-of-fit statistics and consultation with the devolved administrations. For Northern Ireland, the international migration assumptions use a 20year moving average (as data are not available for 25 years). As trends can be fairly volatile, a short-term assumption is implemented for the first few years of the projections, after which constant annual migration flows are adopted for the longer term. Projections include an estimate of the phased return of the armed forces and dependants from Germany, to England only. No equivalent allowance is made for Wales, Scotland and Northern Ireland. When modelling international migration flows, international and asylum seeker flows are modelled as one flow, as the asylum seeker data are incorporated in the Mid-year population estimates.	
Cross Border Migration	Data sources	Cross border (intra-UK) flows are obtained from the **National Health Service Central Register (NHSCR**). Data by age and sex to create cross border rates are provided from NHS registration information.	Cross border (intra-UK) flows are obtained from the **National Health Service Central Register (NHSCR**). Data by age and sex to create cross border rates are provided from NHS registration information.	Cross border (intra-UK) flows are obtained from the **National Health Service Central Register (NHSCR**). Data by age and sex to create cross border rates are provided from NHS registration information. This also includes **Medical Card Register** data for migration from Great Britain to Northern Ireland.	
	Methods	Total rates are taken from the NHS registration data. Rates between England & Wales and Wales and England include a student adjustment.	Total rates are taken from the NHS registration data. No student adjustment made.	Total rates are taken from the NHS registration data. No student adjustment made.	Student adjustment made for Wales→England and England→Wales, no adjustment made for Scotland and Northern Ireland.
Variant projections					
Data Sources and Methods		Variant projections are produced, using the same methodology and data sources as the above principle projections using combinations of the following different rates: Fertility • high, low, principle • These fertility rates are provided by **Demographic Analysis Unit, ONS**	Variant projections are produced, using the same methodology and data sources as the above principle projections using combinations of the following different rates: Fertility • high, low, principle • These fertility rates are provided by **Demographic Analysis Unit, ONS**	Variant projections are produced, using the same methodology and data sources as the above principle projections using combinations of the following different rates: Fertility • high, low, principle • These fertility rates are provided by **Demographic Analysis Unit, ONS**	No differences.

	England & Wales	Scotland	Northern Ireland	Differences Identified
	Mortality • high, low, principle • these mortality rates are provided by **Demographic Analysis Unit, ONS** International Migration • high, low, principle • these different international migration rates are provided by **Population Projections Unit, ONS**	Mortality • high, low, principle • these mortality rates are provided by **Demographic Analysis Unit, ONS** International Migration • high, low, principle • these international migration rates are provided by **Population Projections Unit, ONS**	Mortality • high, low, principle • these mortality rates are provided by **Demographic Analysis Unit, ONS** International Migration • high, low, principle • these international migration rates are provided by **Population Projections Unit, ONS**	

Subnational Population Projections – Table 5

		England	Wales	Scotland	Northern Ireland	Differences Identified
Organisation		ONS	Welsh Government	National Records of Scotland (NRS)	Northern Ireland Statistics and Research Agency (NISRA)	
Approach		Conceptual approach: as with the National Population Projections, the projections are produced using a 'cohort component method'.	Conceptual approach: as with the National Population Projections, the projections are produced using a 'cohort component method'.	Conceptual approach: as with the National Population Projections, the projections are produced using a 'cohort component method'.	Conceptual approach: as with the National Population Projections, the projections are produced using a 'cohort component method'.	
Publication Title		Subnational Population Projections for England	Local Authority Population Projections for Wales	Population Projections for Scottish Areas	Population Projections for areas within Northern Ireland	Published with different titles across UK.
Components						
Base population and control to National Population Projections	Data sources	Population estimates: **Mid-year Population estimates for the UK** This means that usual residents temporarily away from home are included, visitors are excluded and students are counted at their term-time address. Members of Her Majesty's (HM) and non-UK armed forces stationed in England are included; HM forces stationed outside England are excluded.	Population estimates: **Mid-year Population estimates for the UK** This means that usual residents temporarily away from home are included, visitors are excluded and students are counted at their term-time address. Members of Her Majesty's (HM) and non-UK armed forces stationed in Wales are included; HM forces stationed outside Wales are excluded.	Population estimates: **Mid-year estimates of the population** This means that usual residents temporarily away from home are included, visitors are excluded and students are counted at their term-time address. Members of Her Majesty's (HM) armed forces stationed in Scotland are included; HM forces stationed outside Scotland are excluded.	Population estimates: **Population and Migration estimates, Northern Ireland** This means that usual residents temporarily away from home are included, visitors are excluded and students are counted at their term-time address. Members of Her Majesty's (HM) and non-UK armed forces stationed in Northern Ireland are included; HM forces stationed outside Northern Ireland are excluded.	For differences in the population estimates, see Table 1. Any differences in these estimates will be inherent in the Subnational Population Projections. No non-UK Armed forces are included in the base population in Scotland.
	Methods	The starting point for this is an existing estimate of the population (by age and sex) in each area. The projection for the first year is produced by ageing on the estimated population by one year; adding births and subtracting deaths and adjusting for migration (either by adding on inflows and subtracting outflows or simply adding on a projected net flow). Averaging to reduce volatility Given the base population, the projections are determined by the assumptions on fertility, mortality and migration. These are primarily based on observed data. As these demographic rates can vary significantly from year to year, the subnational projections generally adopt some element of averaging	The starting point for this is an existing estimate of the population (by age and sex) in each area. The projection for the first year is produced by ageing on the estimated population by one year; adding births and subtracting deaths and adjusting for migration (either by adding on inflows and subtracting outflows or simply adding on a projected net flow). Averaging to reduce volatility Given the base population, the projections are determined by the assumptions on fertility, mortality and migration. These are primarily based on observed data. As these demographic rates can vary significantly from year to year, the subnational projections generally adopt some element of averaging	The starting point for this is an existing estimate of the population (by age and sex) in each area. The projection for the first year is produced by ageing on the estimated population by one year; adding births and subtracting deaths and adjusting for migration (either by adding on inflows and subtracting outflows or simply adding on a projected net flow). Averaging to reduce volatility Given the base population, the projections are determined by the assumptions on fertility, mortality and migration. These are primarily based on observed data. As these demographic rates can vary significantly from year to year, the subnational projections generally adopt some element of averaging	The starting point for this is an existing estimate of the population (by age and sex) in each area. The projection for the first year is produced by ageing on the estimated population by one year; adding births and subtracting deaths and adjusting for migration (either by adding on inflows and subtracting outflows or simply adding on a projected net flow). Averaging to reduce volatility Given the base population, the projections are determined by the assumptions on fertility, mortality and migration. These are primarily based on observed data. As these demographic rates can vary significantly from year to year, the subnational projections generally adopt some element of averaging	Wales do not constrain to the totals in the National Population Projections, Scotland, Northern Ireland and England do.

		England	Wales	Scotland	Northern Ireland	Differences Identified
		the observed figures over several years to provide a more reliable projected value. Consistency with other population figures: the projections use the standard definition of the resident population and (except for Wales, where this has not yet proved possible) are constrained to be consistent with the totals in the National Population Projections for that country.	the observed figures over several years to provide a more reliable projected value. Consistency with other population figures: the projections use the standard definition of the resident population and (except for Wales, where this has not yet proved possible) are constrained to be consistent with the totals in the National Population Projections for that country.	the observed figures over several years to provide a more reliable projected value. Consistency with other population figures: the projections use the standard definition of the resident population and (except for Wales, where this has not yet proved possible) are constrained to be consistent with the totals in the National Population Projections for that country.	the observed figures over several years to provide a more reliable projected value. Consistency with other population figures: the projections use the standard definition of the resident population and (except for Wales, where this has not yet proved possible) are constrained to be consistent with the totals in the National Population Projections for that country.	
Fertility	Data sources	<u>Births</u> Birth information comes from registered births collected by **the General Register Office** by local authority, age of mother (ages 15 to 44 inclusive) and sex of child. Age-specific fertility rates (ASFRs) are produced using data from **Population Estimates Unit data (ONS).**	<u>Births data for ASFR</u> **ONS Revised Mid-year estimates**	<u>Births</u> **National Records of Scotland (NRS)** Births information comes from registered births by local authority, age of mother and sex of child. ASFR are produced using data from the **NRS vital events team, NRS**.	<u>Births</u> **General Register Office Northern Ireland (GRONI)** Registered birth data, as with the **Mid-year estimates.**	MYE Population estimates differences – see Table 1. Any differences in population estimates will be inherent in the Subnational Population Projections.
	Methods	Long-term age-specific fertility assumptions for each local authority in England are produced by combining projected age-specific fertility rates from the National Population Projections with observed fertility trends for each local authority during the past 5 years. For each of the past 5 years, Age Specific Fertility Rates (ASFRs - the number of births to women of that age divided by the number of women of that age) are calculated for females aged 15 to 44 by single year of age for each local authority in England. These 5 years of local ASFRs are added together and divided by the sum of 5 years of the national ASFRs, to produce an estimated "fertility differential". This differential is then multiplied by the national	Long-term age-specific fertility assumptions for each local authority in Wales are produced by analysing age-specific fertility trends for each local authority during the most recent 5 years. For each of the 5 years, Age Specific Fertility Rates (ASFRs - the number of births to women of that age divided by the number of women of that age) are calculated for females aged 15 to 49 by single year of age for each local authority in Wales. In order to reduce data volatility, 5 year averaged ASFRs are calculated for each local authority then scaled to the fertility levels of the most recent year. This is done by using the most recent births	Long-term age-specific fertility assumptions for each local authority in Scotland are produced by combining projected age-specific fertility rates from the National Population Projections with observed fertility trends for each local authority during the most recent 5 years. Scotland level age-specific fertility rates for women aged 15 to 46 are applied to the population in each area in the base year to calculate expected births for each area of Scotland. Birth figures from a 5 year period preceding the projection are used to calculate an average. These averages are scaled to the Scotland projected births for the first year of the projection period. The scaled average is then divided	Long-term age-specific fertility assumptions for each area in Northern Ireland are produced by combining projected age-specific fertility rates from the National Population Projections with observed fertility trends for each local authority during the most recent 5 years. For the first year of the local area projections, the best estimate of births is used as this is available when the local area projections are compiled. For subsequent years, Northern Ireland level age-specific fertility rates are adjusted for local variations. Long-term age specific fertility assumptions for each local government district (LGD) are produced by analysing age-specific fertility trends for each area during	Northern Ireland's methodology is similar to that of the mortality assumptions, but uses the ratio of the differences in the TPFR and applies this to the ASFR. Northern Ireland's methodology for the first year is also different. Scotland's methodology is similar to their mortality methodology. Wales, again, is similar to their mortality methodology but using different ranges. England's methodology is similar to the death methodology. All countries use different ages (Scotland is the only country with the same ages as the National Population Projections).

		England	Wales	Scotland	Northern Ireland	Differences Identified
		projected ASFR for the first year of the projection to give the local ASFR. The projected number of births is then calculated by multiplying the local age-specific fertility rates by the number of women of that age in that local authority in the projected year. The total number of births is constrained to the figure in the National Population Projections. To allocate the projected births to each sex, a sex ratio (that is, the ratio of boys born to girls) of 105:100 is used. This is the same as the ratio used for the National Population Projections. Checks, and if necessary, adjustments are made to ensure that ASFRs for very small local authorities (Isles of Scilly and City of London) are appropriate.	data to calculate a ratio of the actual births over expected births for each local authority, and multiplying the averaged ASFRs by this ratio for each local authority. These scaled ASFRs form the assumed ASFRs for the projection period. Fertility differentials are also used to predict the pattern of fertility by age over the projection period. These fertility differentials are taken from the National Population Projections for Wales and therefore the differentials are the same for each local authority. The differentials are combined with the local authority specific 5-year average scaled ASFRs to form the final fertility assumptions. To allocate the projected births to each sex, a sex ratio (that is, the ratio of boys born to girls) of 105:100 is used. This is the same as the ratio used for the National Population Projections.	by the expected births figure mentioned above, and the result is the local fertility scaling factor for each area. This is applied to the population of women of childbearing age across each year of the projection period to calculate the number of births for each area. To allocate the projected births to each sex, a sex ratio (that is, the ratio of boys born to girls) of 105:100 is used. This is the same as the ratio used for the National Population Projections.	recent years. Total Period Fertility Rates (TPFRs) are calculated for females aged 15 to 44 for each LGD. The average TPFRs for each LGD are computed from the most recent 5 years and transformed into a LGD specific scaling factor by dividing it by the Northern Ireland TPFR. These LGD scaling factors are used to scale the Northern Ireland single year of age fertility rates used in the Northern Ireland-level population projections for each LGD. Thus across the projection period, all projected LGD TPFRs run in parallel with the projected Northern Ireland rate. The overall projected births are constrained to be consistent with the Northern Ireland level projected births. To allocate the projected births to each sex, a sex ratio (that is, the ratio of boys born to girls) of 105:100 is used. This is the same as the ratio used for the national population projection.	Wales and Scotland – don't constrain projected births.
Mortality	Data sources	<u>Deaths</u> Death information comes from registered deaths collected by the **General Register Office** by local authority, age and sex. ASMR are produced using data from **Population Estimates Unit data (ONS).** **National Population Projections** – used in scaling (See Table 4 for differences).	<u>Deaths data for ASMR</u> **ONS Revised Mid-year estimates** **National Population Projections** – used for mortality differentials (See Table 4 for differences).	<u>Deaths</u> **National Records of Scotland (NRS)** Deaths information comes from registered deaths by local authority, age and sex. ASMR are produced using data from the **NRS vital events team, NRS.** **National Population Projections** – used for scaling (See Table 4 for differences).	<u>Deaths</u> **General Register Office Northern Ireland (GRONI)** Registered deaths, as used for **Mid-year Population Estimates** **National Population Projections** – used for scaling mortality rates (See Table 4 for differences).	Mid-year Population Estimates differences – see Table 1. Any differences in population estimates will be inherent in the Subnational Population Projections.

		England	Wales	Scotland	Northern Ireland	Differences Identified
	Methods	Long-term age-specific mortality assumptions for each local authority in England are produced by combining projected age-specific mortality rates from the National Population Projections with observed mortality trends for each local authority during the past 5 years. Local mortality differentials are calculated in a similar way to the fertility assumptions. For each of the past 5 years, Age Specific Mortality Rates (ASMRs - the number of deaths to people of that age/sex divided by the number of people in that age/sex group) are calculated for males and females aged newborn to 90+ by single years of age for each local authority in England. These 5 years of local ASMRs are added together and divided by the sum of 5 years of the national ASMRs, to produce an estimated 'mortality differential'. This differential is then multiplied by the national projected ASMR to give the local ASMR. The projected number of deaths is then calculated for each year by multiplying the local ASMRs by the number of people of that age and sex in that local authority in the projected year, and then scaling the total deaths of that age-sex group (across all local authorities) to the number in the National Population Projections. Checks and, if necessary, adjustments are made to ensure that ASMRs for very small local authorities (Isles of Scilly and City of London) are appropriate.	Long-term age-specific mortality assumptions for each local authority in Wales are produced by analysing age-specific mortality trends for each local authority during the most recent 5 years. Age Specific Mortality Rates (ASMRs) are calculated for males and females aged newborn to 90+ by single years of age for each local authority in Wales. In order to reduce data volatility, 5 year averaged ASMRs are calculated for each local authority then scaled to the mortality levels of the most recent year. This is done by using the most recent deaths data to calculate a ratio of the actual deaths over expected deaths for each local authority, and multiplying the averaged ASMRs by this ratio for each local authority. These scaled ASMRs form the assumed ASMRs for the projection period. Mortality differentials are also used to project the pattern of mortality by age over the projection period. These differentials are calculated in a similar way to those used for the fertility assumptions. The mortality differentials are taken from the National Population Projections for Wales and therefore the differentials are the same for each local authority. The differentials are combined with the local authority specific 5 year average scaled ASMRs to form the final mortality assumptions.	Long-term age-specific mortality assumptions for each local authority in Scotland are produced by combining projected age-specific mortality rates from the National Population Projections with observed mortality trends for each local authority during the most recent 5 years. Mortality assumptions are calculated in a similar way to fertility assumptions. Expected deaths are calculated by applying the Scotland level age-specific mortality rates to the base population. An average deaths figure is calculated for each area using the observed deaths from the 5 years preceding the projection period, and these are scaled to the Scotland deaths figure from the first year of the national projections. The scaled averages are then divided by the number of expected deaths mentioned above and the result is the local mortality scaling factor. Separate scaling factors are calculated for: mortality of males aged 0-59, mortality of males aged 60-79, and mortality of males aged 80+, and the same 3 factors are calculated for females. However, for smaller areas it is not always appropriate to calculate separate mortality scaling factors for each age group and in these cases a single factor for males and a single factor for females are used. The decision around this is made by calculating confidence intervals around the scaling factors. In general, where a confidence interval is 0.15 or more a single scaling factor is used to cover all ages.	Long-term age-specific mortality assumptions for each local authority in Northern Ireland are produced by combining projected age-specific mortality rates from the National Population Projections with observed mortality trends for each local authority during the most recent 5 years. For the first year of the local area projections, the best estimate of deaths is used as this is available when the local area projections are compiled. For subsequent years, Northern Ireland level age-specific mortality rates are adjusted for local variations. For each area, mortality scaling factors are derived by dividing the observed number of deaths in a 5 year period by the expected number of deaths given the area's population and Northern Ireland level age-sex specific mortality rates. Separate scaling factors are calculated for mortality of males aged 0-64, 65-79 and 80+, whilst for females this was done for 0-74, 75-84 and 85+. These age bands were chosen as there are roughly equal numbers of deaths in each age group. These LGD scaling factors are used to scale the Northern Ireland mortality rates by single year of age (up to 90+) used in the Northern Ireland-level population projections.	Northern Ireland calculates the number of deaths they would expect, and identify the actual deaths that occur in the 5 years – then apply the ratio of this to scale the rates. Scotland's methodology is similar to that of Northern Ireland, but use different age groups to scale. Wales, again, is similar. England's methodology differs as it uses the ASMR and derives the rates directly from rates in the Local authority. The scaling factor ages differ between the countries.

		England	Wales	Scotland	Northern Ireland	Differences Identified
				The local mortality scaling factors are applied across the population for the projection period and the projected deaths are calculated for each area.		
Migration	Data sources	The migration data are those used in the **Mid-year population estimates.** See Table 1 above. Constraining: **National Population Projections**	The migration data are those used in the **Mid-year population estimates.** See Table 1 above. **National Population Projections** – used for migration trends (See Table 4 for differences).	The migration data are those used in the **Mid-year population estimates.** See Table 1 above. Constraining: **National Population Projections**	The migration data are those used in the **Mid-year population estimates.** See Table 1 above. Constraining: **National Population Projections**	Mid-year Population Estimates differences – see Table 1. Any differences in population estimates will be inherent in the Subnational Population Projections.
	Methods	Migration is treated as consisting of 3 components – international migration, cross border (within UK) migration and internal (within England) migration. Inflows and outflows for each component are estimated separately using trends over the past 5 or 6 years with projected totals constrained to the National Population Projections. International migration International migration is moves made by people between England and outside of the UK and includes adjustments for visitor and migrant switchers and asylum seekers. Long-term international migration assumptions are produced by analysing age and sex specific migration trends for each local authority during the most recent 6 years. The international migration component of the mid-year estimates is used for this purpose. The migration trends are estimated using the most recent 6 years of International Passenger Survey data on migration. Data on the most recent year for asylum seekers and their dependants are provided by the Home Office and the National Asylum Support Service. The average flows (by single year of age and sex) for each	Migration is treated as consisting of 2 components – international migration and within UK migration (including both migration within Wales and between Wales and other parts of the UK). International migration Long-term international migration assumptions for each local authority are produced by analysing age and sex specific migration trends for each local authority during the most recent 5 years. The international migration component of the mid-year estimates is used for this purpose. Due to the volatility relating to migration figures year on year, the long term international migration assumptions are based on an average of the most recent 5 years of data. 5-year averaged flows by quinary age and sex are set as a static migration assumption for each local authority for both in- and out-migration for each year of the projection period. Within UK migration Long-term within-UK migration assumptions for each local authority are produced by analysing age and sex specific migration trends for each local	While international, UK and internal migration data are used as separate inputs to the methodology; these data are combined for the Scottish Subnational Population Projections. A net migration assumption is calculated for each council and NHS board area. Average migration over a 5 year period is calculated for each council area for: •in-migration from outside Scotland (includes moves from overseas and from the rest of the UK) •out-migration to outside Scotland •in-migration from other councils within Scotland, and •Out-migration to other councils within Scotland. The migration data are those used in the mid-year estimates. The in and out migration averages for outside Scotland are scaled so that the total Scotland flows match the agreed long-term Scotland migration assumption in the national projections. However, the moves within Scotland are not scaled. The scaled out of Scotland and within Scotland averages are summed to get the net migration figures for each area. These are	Migration is treated as consisting of 2 components – international and cross-border (within UK) migration, and internal (within Northern Ireland) migration. For the first year of the local area projections the best estimate of migration flows is used as these data are available when the local area projections are compiled. To project local area gross migration flows, the average annual flow over the last 5 years are used. The aggregate average annual flow into and out of Northern Ireland is constrained to the national projected flows to and from the rest of the UK and outside the UK. The national level projections for Northern Ireland do not include migration related to people moving address within Northern Ireland (internal migration). However internal migration is required for the local area projections. Migration by age and sex often differs between areas – for example some areas attract more students than others. So, unlike fertility and mortality, the Northern Ireland age-specific migration rates are not applied to all areas.	England has 3 components of migration, the third being internal migration, whereas Wales and Northern Ireland just having 2 (although Scotland does include the 3 components as separate data inputs to the methodology, they are combined and not treated differently), so effectively calculate migration for 2 components. Wales – doesn't constrain to National Population Projections. The main differences are found in the number of flows that are being projected – England = 3, Scotland, Wales and Northern Ireland = 2.

		England	Wales	Scotland	Northern Ireland	Differences Identified
		local authority are then scaled to equal the total inflow and outflow assumed in the National Population Projections. <u>Within UK (cross-border) migration</u> Cross-border migration is moves made by people between England and the rest of the UK. To calculate cross-border moves, an average of 5 years' cross-border estimates data is used to give an average count of moves between local authorities in England and the other countries of the UK (Wales, Scotland and Northern Ireland). Information on moves between England & Wales are captured in a similar way to internal migration flows and use a combination of 3 administrative sources: the Patient Register Data Service (PRDS), the National Health Service Central Register (NHSCR), and the Higher Education Statistics Agency (HESA) data. Information on moves in to, and out of, Scotland and Northern Ireland are based on data from National Records of Scotland and the Northern Ireland Statistics Research Agency. It is assumed that these average flows remain constant for the whole projection period. However, the cross-border migration is controlled to the National Population Projections, by age and sex for each year, so the local authority level figures may be scaled up or down according to the national projected cross-border flows. <u>Internal (within England) migration</u> Internal migration is moves made between local authorities within England. Internal migration assumptions for each local authority	authority during the most recent 5 years. Internal migration estimates are based on population components of change data for the years up to the census. 5-year averaged flows by quinary age and sex are set as a static migration assumption for each local authority for both in- and out-migration for each year of the projection period.	rounded to the nearest 50 to get the long-term migration figures for each area. Council and NHS board area specific age/sex distributions have been assumed for the in and out- migrant flows using information on movement of patients from the National Health Service Central Register (NHSCR) observed in the previous 3 years and the Community Health Index (CHI), again over the previous 3 years. These distributions have been made consistent with the age/sex distribution used for Scotland in the national projection.	Instead each area has its own individual age specific migration rates calculated using the last complete year's data and these are applied to the gross flows for that area.	

		England	Wales	Scotland	Northern Ireland	Differences Identified
		are produced by analysing age and sex specific migration trends for each local authority during the most recent 5 years. Internal migration estimates are based on PRDS, NHSCR and HESA data. The proportion of people moving from a local authority (known as the "Internal Migration Ratio") is calculated by dividing the number of people moving out of the area by the number of people living there. This is calculated separately for males and females by single year of age for each of the trend years and then a 5 year average is calculated to produce rates of out-migration by age and sex. By applying these proportions to the population figures, estimates of internal migration are created. By adding up the number of outflows from every authority into a particular authority, the inflows into that authority are calculated. In local authorities with small numbers of moves and/or populations, this method can lead to unrealistic results. To overcome this, adjustments are sometimes made to smooth the data.				
Special Populations	Data sources	As for **mid-year estimates** (see Table 1).	As for **mid-year estimates** (see Table 1).	As for **mid-year estimates** (see Table 1).	As for **mid-year estimates** (see Table 1).	As for mid-year estimates (see Table 1).
	Methods	The following are considered as Special Population groups in the local authority projections for England: • Home Armed Forces • Foreign Armed Forces The populations in these groups as at 30 June in the base year of the projections are assumed to be static throughout the projection period for each local authority.	The following are considered as Special Population groups in the Wales local authority population projections: • Home Armed Forces • Foreign Armed Forces • Prisoners The populations in these groups as at 30 June in the base year of the projections are assumed to be static throughout the projection period for each local authority.	The following are considered as Special Population groups in the Scotland subnational population projections: • Home Armed Forces o Dependants not included • Asylum seekers The population of the Home Armed Forces as at June 30th in the base year of the projections is assumed to be static throughout the projection period for each local authority.	Only Home Armed Forces are treated as a Special Population in the population projections for areas within Northern Ireland. The population in that group as at 30th June in the base year of the projections are assumed to be static throughout the projection period for each local authority. Planned closures of barracks and/or substantial withdrawal of HM forces are also taken into consideration.	Foreign armed forces – England & Wales. Asylum seekers – Scotland only. Prisoners – Wales only. Northern Ireland – plan for closure of barracks to be included.

		England	Wales	Scotland	Northern Ireland	Differences Identified
				The assumption for asylum seekers used in the National Population Projections is applied to the method to calculate the long-term net-migration assumption for Glasgow City council area. This is because Glasgow City is the only Scottish local authority to have participated in the dispersal of people making a claim for asylum in the UK by the Home Office. Private sector involvement for later years is also still in Glasgow City.		
Variant projections	Data sources	N/A	The high- and low fertility and mortality assumptions for Wales are taken from the **National Population Projections.**	Source for variant rates: **ONS variant projections**	N/A	Wales – data source uses National Population Projections – see Table 4. Any differences in population estimates will be inherent in the Subnational Population Projections.
	Methods	There are no variant population projections produced for areas within England. Research into the feasibility of producing variant projections, for example a variant based on longer local trends for internal migration, is under consideration.	A zero migration (natural change only) projection variant is produced for Wales, along with higher, lower and ten-year average migration variant projections. The higher variant is based on an assumption of high fertility and low mortality. The lower variant is based on an assumption of low fertility and high mortality. The ten-year average migration variant is based on average internal and international migration data over a10 year period up to the census.	High and low migration variant projections, consistent with the National Population Projections variants, have been produced for Scotland. These variant projections use the same fertility and mortality assumptions as the principal projection but assume higher or lower levels of net in-migration to Scotland. It should be noted that only moves to and from the rest of the UK and overseas are affected by this. 7 key variant projections (high migration, low migration, zero migration, high fertility, low fertility, high life expectancy, low life expectancy) are published on the NRS website, again for single year of age (up to 90+) and by sex for each council and NHS board area. Comparisons between each of the projections are also available.	There are currently no variant population projections produced for areas within Northern Ireland. They may be considered in the future subject to user needs.	Wales only do a high variant and low variant changing mortality and fertility – no migration variant included. Scotland produces 7 variants, with changing migration variants too.
Published statistics		Local authority population projections for England are available by sex and quinary age group (up to 90+) for regions, local authorities, counties and clinical commissioning groups.	Local authority population projections for Wales are available by single year of age (up to 90+) and by sex for each local authority. Projected figures are stored in unrounded format throughout the	Subnational Population Projections for Scotland are available by single year of age (up to 90+) and by sex for each council and NHS board area. Projected births, local fertility and	Population projections for areas within Northern Ireland are available by single year of age (up to 90+) and by sex for Local Government Districts. Additional tables provide projected	Available for different geographies. England, Northern Ireland, and Scotland provide components of change information. Wales don't. Differences in rounding.

	England	Wales	Scotland	Northern Ireland	Differences Identified
	Additional tables provide summary components of change for regions, counties and local authorities. The data in these tables are rounded to the nearest 100 people. Unrounded subnational population projection data by single year of age and components of change are also published.	production process except for when rounded to the nearest hundred during preparation of the statistical release. Due to the functionality of StatsWales they are stored in unrounded when uploaded to the site. However when downloaded from StatsWales the decimals will not appear – so in effect rounded to the nearest whole person.	mortality scaling factors, migration assumptions, projected percentage change in population of broad age groups, and comparisons with previous projections are published on the NRS website for each council and NHS board area. The assumed national age-specific fertility and mortality rates are also available. There is no rounding for the projections, except for National Protections and strategic development planning area projections.	components of change (births, deaths and migration) for each area, and are presented to the nearest person.	
Projection period	The local authority population projections are published for the 25 years that follow the base year.	The local authority population projections are published for the 25 years that follow the base year.	The subnational population projections are published for the 25 years that follow the base year.	Population projections for the new 11 Local Government Districts and larger geographies are published for the 25 years that follow the base year. For the former 26 local government districts, population projections are published for the 15 years that follow the base year.	Northern Ireland – published for the 15 years that follow base year (for the former 26 LGDs), 11 new LGDs 25 years – same as England, Wales, Scotland.
Geography	The latest 2012-based projections are published for the 326 local authority districts existing in England in 2012, together with corresponding counties and regions. In addition, the projections are published for clinical commissioning groups in England.	The projections are published for the 22 local authorities in Wales.	The projections are published for the 32 council and 14 NHS board areas in Scotland.	The projections are published for the former 26 local government districts in Northern Ireland. Population projections for 5 Health Trusts, 5 Education & Library Boards and 5 NUTS-III areas are created by aggregating the projected populations of combinations of these local government districts. In addition, projections are also published for the new 11 Local Government Districts, which replaced former 26 Districts in April 2015.	Geographies for which these products are created differ between the countries.
Other geographies		Projections have also been developed for national park areas. These are based on a similar methodology to that used in the local authority projections.	Projections have also been developed for national park and Strategic Development Planning Areas. These are produced as a separate publication later in the year. The migration assumptions for these projections are based on similar methodology used in the local		Not produced by Northern Ireland, as there are no national parks in Northern Ireland. Not produced in England. Scotland – produce for Development Planning areas and national parks, later in the year. Wales produce for national parks.

	England	Wales	Scotland	Northern Ireland	Differences Identified
			authority projections, but a different software package is used for part of the projection processing (POPGROUP).		Scotland – use different software package.
Frequency of Projections	Local authority population projections are currently published every 2 years, with a 2 year lag, to a broadly similar timetable to projections for other parts of the UK.	Local authority population projections are anticipated to be published around every 3 years, to a broadly similar timetable to projections for other parts of the UK.	Subnational population projections are published every 2 years, to a broadly similar timetable to projections for other parts of the UK.	Subnational population projections are published every 2 years, to a broadly similar timetable to projections for other parts of the UK.	No differences.

Population Estimates by Legal Partnership Status – Table 6

	England & Wales	Scotland	Northern Ireland	Differences Identified
Organisation	Office for National Statistics (ONS).	N/A no longer produced; produced until October 2009.	N/A – Not produced.	Northern Ireland – no user requirement for such a product. Scotland – Production of these estimates has been suspended following user consultation.
Approach	Cohort component.	N/A	N/A	N/A – only England & Wales Produce.
Publication Title	Population Estimates by Marital Status and Living Arrangement, England & Wales	Until October 2009: Mid-year Marital Status Population Estimates, Scotland	N/A	Published with different titles across UK in the past. Only England & Wales produce.
Data sources	**Labour Force Survey** **Mid-year population estimates**	N/A	N/A	N/A – only England & Wales produce.
Methods	The Population Estimates by Marital Status and Living Arrangements are calculated by taking the legal marital status and living arrangement distributions from the Labour Force Survey (LFS) and applying them to the mid-year population estimates (by age groups and sex) for England and Wales. Estimates from the LFS by age group and sex are calculated for each year and for each legal marital status or living arrangement. The estimates from the LFS are then converted into percentages for each age group by marital status. Mid-year population estimates for each year are then grouped into the corresponding age groups. Finally, the percentage of people in each age group by marital status or living arrangement is multiplied by the number of people in the mid-year population in the corresponding age group.	N/A	N/A	N/A – only England & Wales produce.

Information sources and reference links

Mid-Year Population Estimates – Table 1
http://www.nrscotland.gov.uk/files//statistics/population-estimates/midyear-2014/mye-methodology-guide-2014.pdf
http://www.ons.gov.uk/ons/guide-method/method-quality/specific/population-and-migration/pop-ests/population-estimates-for-las/population-estimates-uk-comparisons-paper.pdf
http://www.ons.gov.uk/ons/guide-method/method-quality/specific/population-and-migration/population-statistics-research-unit--psru-/difference-between-the-2011-census-estimates-and-the-rolled-forward-population-estimates.pdf
http://www.nrscotland.gov.uk/files/statistics/population-estimates/reconciliation-report/mye-reconciliation-report.pdf
http://www.nisra.gov.uk/archive/demography/population/midyear/Stat_Report_Rebased_NI_2001_2011.pdf
http://www.nisra.gov.uk/archive/demography/population/midyear/Methodology_2014.pdf

Population Estimates of the Very Old – Table 2
http://www.nrscotland.gov.uk/files//statistics/centenarians/centenarians-in-scotland-methodology-guide-2014.pdf
http://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/ageing/bulletins/estimatesoftheveryoldincludingcentenarians/2015-09-30
http://www.nisra.gov.uk/archive/demography/population/OldestOld/85AndOver-Bulletin.pdf

Small Area Population Estimates – Table 3
http://www.nisra.gov.uk/archive/demography/population/small_area/SAPE14-comparison.pdf
http://www.ons.gov.uk/ons/guide-method/method-quality/specific/population-and-migration/pop-ests/methodology-note-on-production-of-small-area-population-estimates-march-2014.pdf
http://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-estimates/special-area-population-estimates/small-area-population-estimates/2001-2004/methodology
http://www.nrscotland.gov.uk/files//statistics/population-estimates/special-area-2011-dz/sape/sape-methodology-paper.pdf
http://www.nisra.gov.uk/archive/demography/population/small_area/SAPEdocFinal.pdf
http://www.nisra.gov.uk/archive/demography/population/midyear/Methodology_2014.pdf
http://www.nrscotland.gov.uk/files/statistics/review-area-best-fit/special-area-review-best-fit.pdf
http://www.nisra.gov.uk/archive/demography/population/midyear/MYE14_Bulletin.pdf

National Population Projections – Table 4
http://www.ons.gov.uk/ons/guide-method/method-quality/quality/quality-information/population/quality-and-methodology-information-for-subnational-population-projections--snpp-.pdf
http://www.ons.gov.uk/ons/rel/npp/national-population-projections/2014-based-projections/rpt-1-background-and-methodology.html
http://www.ons.gov.uk/ons/guide-method/method-quality/specific/population-and-migration/population-projections/methodology---national-population-projections/index.html
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