

Article

# Research report on population estimates by ethnic group and religion

Office for National Statistics research work on a simple method for producing population estimates by ethnic group and religion.

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## Correction

**4 December 2019 10:35**

A correction has been made to figure 4 of this release. This was due to a small error during the publishing process. You can see the original content in the superseded version. We apologise for any inconvenience.

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# 1 . Summary

This article presents research into a method for producing population estimates by ethnic group and by religion, combining Annual Population Survey (APS) and census data. It builds on [previous research into this method](#) published in 2017.

The illustrative estimates discussed here and presented in the accompanying dataset are for England and Wales and lower-level areas within them for 2016. They are based upon a three-year APS pooled dataset covering 2014 to 2016. Using pooled APS data is a development of the previous method, and the new illustrative estimates for population by ethnic group published here are compared with those produced using the previous iteration of the method. This is the first time illustrative estimates of population by religion have been produced using this method.

This research update is being published to engage users with the research we are currently undertaking and sets out the evidence used to assess new methods. We are publishing this update to invite your views on the method and on the usefulness of the data.

## 2 . Background

### Previous work

The Office for National Statistics (ONS) published a [Research report on population estimates by characteristics](#) in August 2017. This research used a “simple method” with a view to better meeting the interest in more up-to-date estimates of the population by ethnic group as the 2011 Census became less current. This method adjusted the Annual Population Survey (APS) estimates by ethnic group, country of birth and nationality so they cover the entire population and are consistent with the standard mid-year population estimates (MYEs).

One of the main findings of that work, reinforced by subsequent feedback, was that a large number of local and unitary authorities (LAs and UAs) did not have a sufficient number of APS survey contacts to produce robust estimates for all ethnic groups and therefore, the method would require further development to address user needs.

### Population estimates by religion

The ONS recognises data on religion are not routinely collected on surveys or reported on. We have committed to work cross-governmentally to explore how the data needs of religious communities could be better met. This work is being led by the [Centre for Equalities and Inclusion](#) (The Centre), a multidisciplinary convening centre based at the ONS.

The Centre carried out an initial review of existing published statistics on religion and equalities, covering the eight religious groups defined by the [Government Statistical Service's \(GSS's\) harmonised principle on religion](#) for England and Wales.<sup>1</sup> This review focused on outcomes across the six domains from the [Equality and Human Rights Commission's \(EHRC's\) measurement framework](#): education; work; living standards; health; justice and personal security; and participation.

This review highlighted a number of potential gaps in the existing evidence base, including in the availability of up-to-date estimates of the size of the different religious populations. The most recent official estimates come from the 2011 Census. [A comparison of the 2001 Census with the 2011 Census](#) showed that the number of people identifying with the different religious groups changed considerably over this period, so there is a need to consider how populations may change between censuses.

The Centre has been working with a task and finish group consisting of relevant experts from across government, to take forward work to explore religion in England and Wales and develop plans to address gaps in the evidence base. The group will report in 2020.

## Updates in this report

Research presented here addresses both feedback on the initial illustrative estimates by ethnic group published in 2017 and the requirement for more up-to-date estimates of the population by religion. We have refined the initial method, using three-year pooled APS data, to produce new illustrative estimates by ethnic group for England and Wales and our first estimates covering the whole population (including communal establishments) by religion for England and Wales since the 2011 Census.

These illustrative estimates are not official statistics. The most up-to-date official estimates of the [population by ethnic group and religion](#) are from the 2011 Census. This article therefore presents percentages of the population. Estimates of the population numbers and measures of completeness are presented in the datasets.

## Transformation of population statistics

It is our mission to provide the best insights on population using a range of new and existing data sources to meet the needs of our users. Our first work on this for [ethnicity estimates using the Generalised Structure Preserving Estimator \(GSPREE\)](#) was published alongside the August 2017 report.

The method used within this report is an interim approach while research work is undertaken to utilise a wider range of sources and develop appropriate methods for providing population estimates by different characteristics.

We have set ambitious targets to put administrative data at the core of our evidence on international migration and population by 2020, and we will deliver a predominantly online census in 2021. The ambition is to deliver a fully transformed system for producing population and migration statistics by 2023.

We will iteratively develop our transformed population and migration statistics system, taking on board feedback from users and making the best use of new data and new methods as they become available. We will rigorously quality assure new methods and share the impact of any changes made, demonstrating the benefits and improvements before implementing them.

Work will be ongoing to develop new methods of estimating populations, using administrative data, and this extends to population characteristics, such as those presented in this report. The [Transformation of the population and migration statistics system: overview](#) gives more information on this work.

## User need

The ONS' previous work and feedback from engagement with stakeholders has shown there is a user need for up-to-date population estimates by both ethnic group and religion. For ethnic group, the Race Disparity Unit have a requirement for more up-to-date and regular estimates at the LA and UA level. This research report looks at whether this need can be met using the APS combined with 2011 Census and MYEs data.

Our broad conclusion is that this method cannot fully meet user needs for LA- or UA-level data. However, at the national, regional and county level, it represents an improvement on the previously published ethnic group estimates (based on single-year APS) and provides a first indication of the completeness of religion estimates compared to the 2011 Census benchmark. Transformation work is continuing across the ONS to meet this user need.

## Notes for: Background

1. The Government Statistical Service's (GSS's) harmonised principle on religion defines eight groupings recommended as the standard for data collection in England and Wales: no religion; Christian; Buddhist; Hindu; Jewish; Muslim; Sikh; and any other religion (described by respondent).

## 3 . Data

This article builds on the previously published method, documented in our [2017 report](#), and uses the same data sources.

In summary, this article uses data from the Annual Population Survey (APS), the 2011 Census and the mid-year population estimates (MYEs).

### Annual Population Survey (APS)

The APS is a continuous household survey, comprising the Labour Force Survey (LFS) supplemented by sample boosts in England, Wales and Scotland to ensure small areas are sufficiently sampled. The APS is a survey of households in the UK, so it does not include most people living in communal establishments (such as care homes or prisons), though information on some students living in halls of residence is collected where the students' parents live in a sampled household.

These estimates have been produced using a three-year APS pooled dataset, which covers the period from January 2014 to December 2016.

The single-year APS is constructed by combining data collected from waves 1 and 5 of the quarterly LFS plus annual Local Labour Force Survey (LLFS) "boosts" for England, Wales and Scotland. The single-year APS is published quarterly for overlapping annual periods.

The design of the three-year pooled APS dataset means that no person appears more than once, and the cases included are spread approximately equally across the three years.

The three-year pooled dataset is constructed using:

- wave 5 LFS for year 1
- wave 1 and 5 LFS for year 2
- wave 1 LFS for year 3
- wave 1 and 4 APS "boost" for all years

The use of the pooled datasets is not recommended for any time series analysis. This is because of the fact consecutive pooled datasets will contain two overlapping years of data (for example, January 14 to December 16 estimates and January 15 to December 17 will both contain 2015 and 2016). Therefore, any estimates of change will effectively be between 2014 and 2017, which is hard to interpret.

## 2011 Census

The 2011 Census provides estimates of the resident population in households and communal establishments for the UK (England, Wales, Scotland and Northern Ireland).

### Mid-year population estimates (MYEs)

MYEs are based on census data and are updated annually to account for estimates of population change from 1 July to 30 June. The two main contributors to population change are natural change (births minus deaths) and net migration (the difference between long-term moves into and out of the UK or local areas). The estimates cover the entire usually resident population, whether resident in households or communal establishments.

## 4 . Methods

The estimates produced here use a three-year Annual Population Survey (APS) pooled dataset in contrast to those produced in 2017 using a single-year APS dataset. Aside from the use of the pooled dataset and expanding the method to measuring religions in addition to ethnic group, the method is unchanged.

As was true for the August 2017 estimates, the proposed method is based on the assumptions that:

- the proportion of the total population living in households remains constant at the level measured in the 2011 Census
- the communal establishment population will have different characteristics to the household population, but these characteristics will have changed since the 2011 Census in a similar way to those of the household population

These assumptions have a potential impact on the utility of the estimates, particularly for areas with rapid change since 2011, but are a necessary assumption to enable calculation of estimates using this method. Further work is ongoing on alternative methods that do not rely on these assumptions and make more use of available administrative data.

A detailed explanation and worked example of the method used to produce the estimates can be found in our [previous report](#).

As a result of the APS sample sizes at lower geographies, there is a smaller number of ethnic group and religion categories used in this research than available in 2011 Census outputs. There are, for example, only six ethnic groups compared to 18 for the 2011 Census' key statistics tables for England and Wales. The six ethnic group categories include: White British; All Other White; Mixed / Multiple ethnic groups; Asian / Asian British; Black / African / Caribbean / Black British; and Other ethnic group. These categories are derived from the [harmonised classification of ethnic groups \(PDF, 505KB\)](#).

### “Not available” and zero estimates

In this report, we assess the completeness of the data produced by our method by measuring how many ethnic groups and religions we have an estimate for. If no APS contacts for a specific group occurred, then an estimate will be zero, and if fewer than three contacts occurred, we have suppressed the estimate (displayed as “NA”, standing for “not available”, in tables) in line with the Office for National Statistics' (ONS) standard policy on the use of the APS.

While it is possible for an estimate of zero to be correct, if there were no people of a specific ethnic group or religion in an area, our research on 2011 Census results suggests this is highly unlikely for any local or unitary authority (LA or UA) geographies in England and Wales (there were no LAs or UAs with zero or NA results in 2011 Census results for any of the ethnic groups or religions). Therefore, any zero estimates are likely to be indicative of lack of data owing to sample size (having zero APS contacts) rather than a genuine estimate that there are no people of a specific ethnic group or religion in an area. For this reason, we have combined the presence of zero and NA estimates together and describe them as areas or estimates with “low contact numbers” as an indicator for data completeness.

The full distribution of zero and NA estimates is included in Table C of the accompanying dataset.

## Previous comparisons to the census

This is a research report concerned with looking at the method. Estimates are provided for illustrative purposes only. One way to conceptualise this is to compare the estimates to the 2011 Census results, to assess their plausibility. This comparison is not without flaws as some deviation from census results would be expected even with perfect estimates, but it does provide a check of how reasonable the estimates may be.

High-level comparisons between 2011 Census and 2011 APS estimates of population by [ethnic group](#) and [religion](#) have been made in the past, and there are various considerations to bear in mind when comparing the two, including:

- APS sample sizes can be smaller at lower geographies such as LA
- the APS does not include communal establishments
- mode effect resulting from the different collection modes between the census and APS
- mode effect resulting from the voluntary nature of the religion question in the 2011 Census

Therefore, while comparisons with the 2011 Census are useful, they must be conducted carefully. We do this later in the report, after assessing the completeness of the data.

## 5 . Population estimates by ethnic group

New population estimates by ethnic group for 2016 have been produced using a three-year Annual Population Survey (APS) pooled dataset, which covers the period from January 2014 to December 2016. These estimates can be found in Table A of the dataset.

Comparing these revised estimates to the 2016 estimates produced using single-year APS data, previously published in the [2017 report](#), is useful in assessing improvements in completeness of the estimates as an indicator of quality. However, these findings should be regarded as indicative of what is possible at this stage rather than as precise estimates.

### “Not available” and zero estimates

[Previous research](#) identified completeness of the estimates as a methodological weakness, an issue reflected in stakeholder feedback. At national and regional levels, APS sample sizes for single-year data were sufficient to produce estimates for all ethnic groups. However, at local and unitary authority (LA and UA) level, the low numbers of survey contacts caused substantial numbers of “not available” (NA) and zero estimates, with considerable variation in the number of NA and zero estimates across ethnic groups.

Overall, the use of pooled APS data in the production of new estimates has improved the completeness of estimates at LA level. There is a 7 percentage point decrease in the total number of NA and zero estimates (dropping to 21% from 28% of the single-year APS estimates). The distribution of low survey contact numbers and the NA and zero estimates they produce can be seen in Table C of the dataset.

## “Not available” and zero estimates by ethnic group

Despite the overall improvement in completeness at LA and UA level, there remains substantial variation between ethnic groups. Only 1% of estimates in the “White British” group are NA or zero; this is a result of the very small survey sample for the Isles of Scilly and City of London, which cannot be used to produce estimates for any ethnic group. In contrast, 44% of estimates in the “Black / African / Caribbean / Black British” group and 41% of the “Other ethnic group” category are NA or zero.

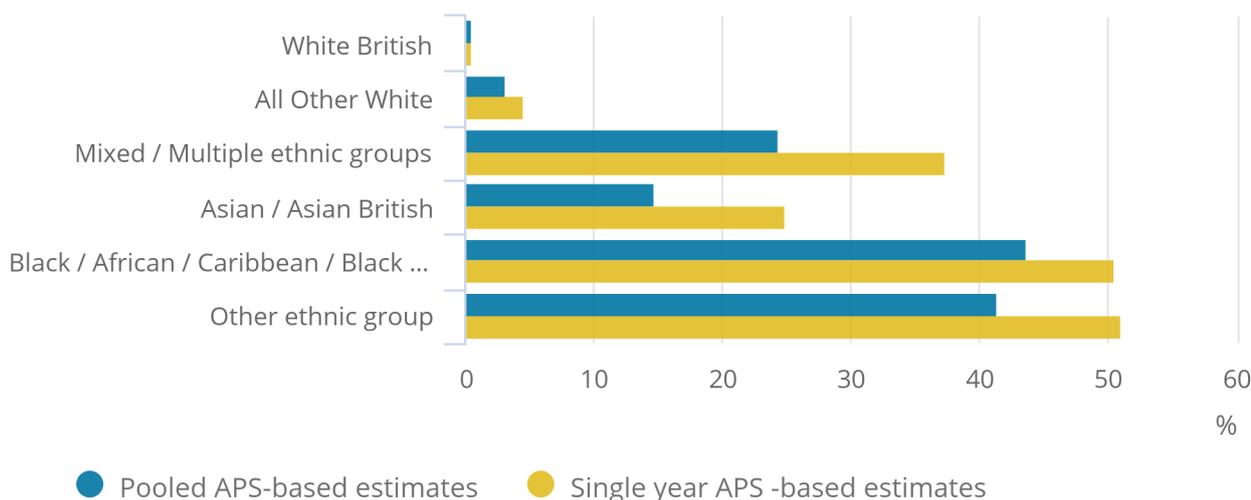
These figures represent an improvement in completeness from the single-year APS estimates for both these ethnic groups. There is a 7 percentage point improvement for the “Black / African / Caribbean / Black British” group and a 10 percentage point improvement for the “Other ethnic group” category. There are also notable improvements of 13 percentage points for the “Mixed / Multiple ethnic groups” and 10 percentage points for the “Asian / Asian British” groups. However, the 43 percentage point difference between the most and least complete groups (“White British” and “Black / African / Caribbean / Black British” respectively) is substantial (Figure 1).

### Figure 1: The proportion of not available and zero estimates varies considerably by ethnic group

Proportion of not available and zero estimates by ethnic group, local authorities in England and Wales, 2014 to 2016

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Proportion of not available and zero estimates by ethnic group, local authorities in England and Wales, 2014 to 2016



Source: Office for National Statistics – Research report on population estimates by ethnic group and religion

## Geographies with three or more “not available” and zero estimates

It is possible to provide complete estimates at the national, regional and county levels, but this is much less consistent at a LA and UA level (as shown in Table D of the dataset).

In order to consider the utility of these estimates at LA and UA level, we have used a threshold of three or more NA or zero estimates per LA or UA. This represents completeness of 50% or less of ethnic group estimates. There is a substantial improvement in the number of LAs and UAs that fall below this threshold in the pooled APS-based estimates. Among LAs and UAs, 12% fall below this threshold (Table D in the dataset), a decrease of 20 percentage points from the single-year APS estimates (where 32% of LAs and UAs had three or more NA or zero estimates).

When the numbers of NA and zero estimates in the single-year and pooled APS data are compared for each LA and UA, it is apparent that though the overall number of LAs and UAs that fall below the 50% threshold has improved, some have less rather than more completeness (see Figure 2). For example, Northumberland has only one NA estimate in the single-year APS estimates but has two in the pooled APS-based estimates. This is the result of the “smoothing” of spikes or anomalous survey contact counts that occurs in the pooled APS data. The use of pooled data reduces the number of zero or very low survey counts, but it also removes the anomalously high counts, which has the effect of improving completeness of estimates overall but increases missingness for a small number of LAs and UAs.

### Figure 2: Completeness improves for the majority of local authorities

Maps showing number of not available or zero estimates for each local authority for the single-year and pooled APS-based estimates

**Source: Office for National Statistics – Research report on population estimates by ethnic group and religion**

[Download the data](#)

## Local authority “not available” and zero estimates by census area classification

A useful approach to understanding the impact of using the three-year APS pooled datasets on completeness at LA and UA level is to group similar areas together. One of the most relevant groupings for these data is the [2011 Census area classification](#). This is a hierarchical classification consisting of three tiers of supergroups, groups and subgroups. The labels for the groupings are intended to reflect each area’s characteristics in terms of demographic structure, household composition, housing, socio-economic characteristics and employment patterns. [Pen portraits](#), which provide an informal view of the characteristics of each area, are available.

The following analysis makes use of the top tier of the 2011 Census area classification hierarchy: supergroups. The supergroup classifications of individual LAs and UAs are included in Table A of the dataset and are visible on Figure 2 when you hover over each geography.

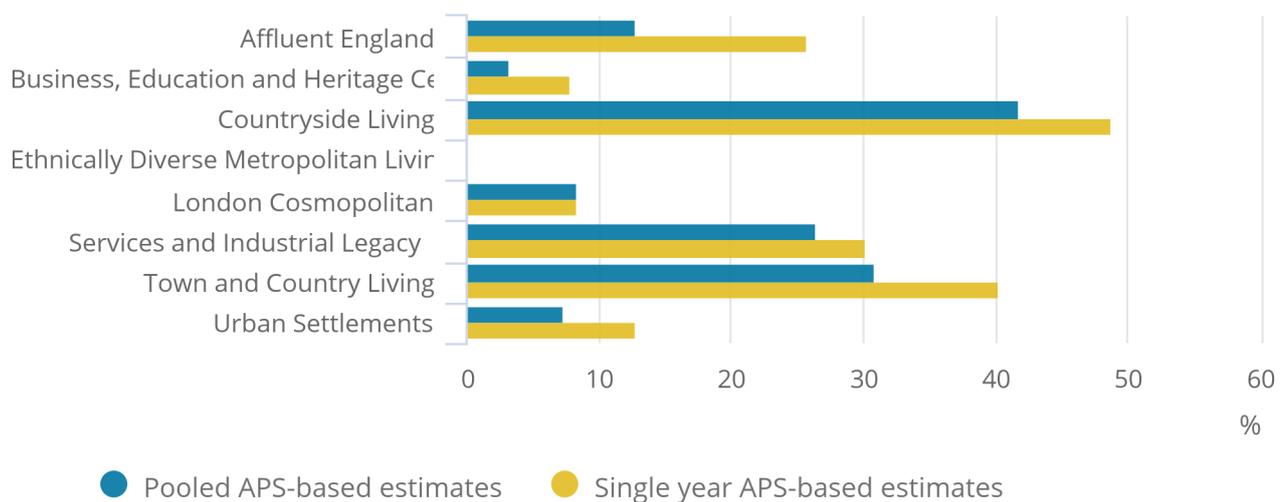
The most complete LA and UA estimates are for the Ethnically Diverse Metropolitan Living group, which has no NA or zero estimates (Table E). Similarly, the London Cosmopolitan group has 8% NA or zero estimates. All of these are the result of the very small survey sample for the City of London, which cannot be used reliably to produce estimates for any ethnic group. In contrast, despite the overall improvement in completeness, the more rural LAs and UAs have more NA and zero estimates. For the Countryside Living group, 42% of possible estimates are NA or zero, and the Town and Country Living group has 31% NA or zero estimates (Figure 3).

**Figure 3: Countryside Living and Town and Country Living areas have the largest proportions of not available and zero estimates using both single-year and pooled APS datasets**

Percentage of not available and zero estimates by 2011 Census area classification supergroups

**Figure 3: Countryside Living and Town and Country Living areas have the largest proportions of not available and zero estimates using both single-year and pooled APS datasets**

Percentage of not available and zero estimates by 2011 Census area classification supergroups



Source: Office for National Statistics – Research report on population estimates by ethnic group and religion

There is a general trend towards more complete estimates in urban areas and less complete estimates in rural areas, where you might expect a less ethnically diverse population and therefore smaller APS survey contact counts.

### Comparability of the pooled APS-based estimates

A useful way to address the quality of estimates produced using this method is to compare the percentage of the overall population in each ethnic group to the 2011 Census results. Some difference to census is to be expected in the estimates, and this analysis focuses on the plausibility or reasonableness of that difference.

### National level comparisons

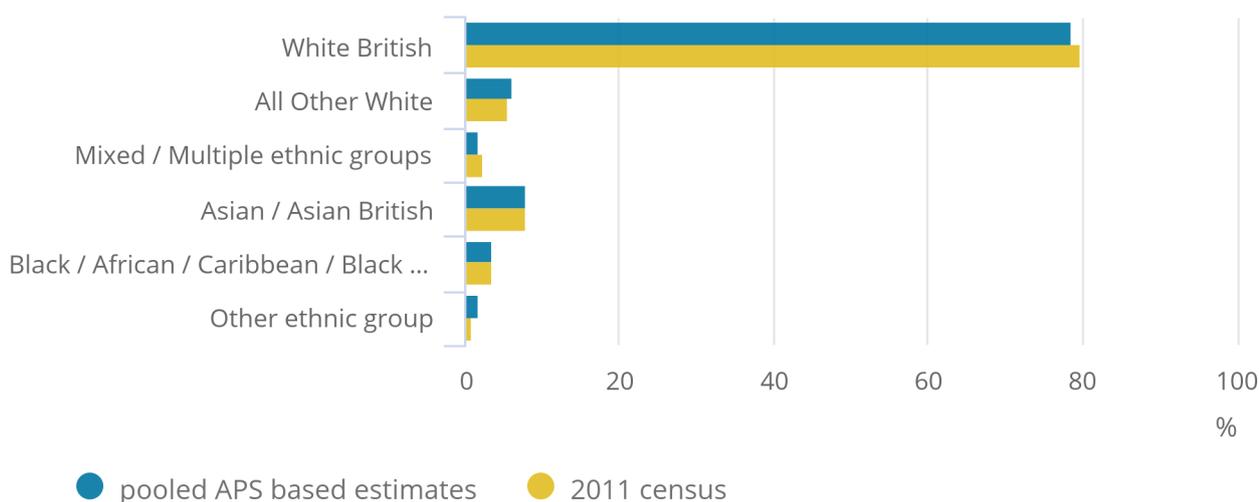
At the national level, the census and pooled APS-based estimates are very similar. For England, there is a decline of one percentage point for the “White British” group and just under one percentage point for the “Mixed / Multiple ethnic groups” category (Figure 4). This is offset by small increases of less than one percentage point in the estimates for “All Other White”, “Asian / Asian British” and “Other ethnic group” categories. While we are not able to measure the quality of these estimates directly, the scale of the difference between census and the pooled APS-based estimates at the national level seems reasonable. However, since the scale of these differences is small, they fall within the confidence intervals of the pooled APS input data (Table G in the supporting dataset).

**Figure 4: There is less difference between the distribution of the population by ethnic group at the 2011 Census and pooled APS-based estimates at the national level**

Percentage of population by ethnic group for England

Figure 4: There is less difference between the distribution of the population by ethnic group at the 2011 Census and pooled APS-based estimates at the national level

Percentage of population by ethnic group for England



Source: Office for National Statistics research work on a simple method for producing population estimates by ethnic group and religion

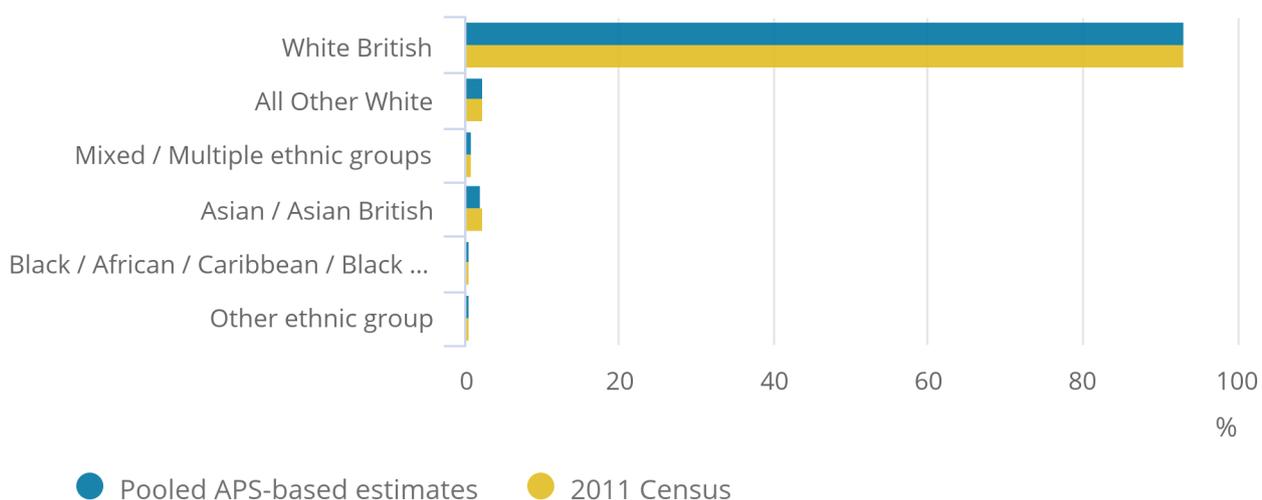
For Wales, the difference between the census and pooled APS-based estimates is even smaller (Figure 5). This likely reflects the fact that those areas where we would expect to see less difference, or “churn”, are less ethnically diverse. However, it is possible that the pattern of differences between the census and pooled APS-based estimates for specific groups does not represent change in populations but results from our method, since the scale of these differences falls within the confidence intervals of the pooled APS data used to generate the estimates (Table G of the supporting dataset).

**Figure 5: There is very little difference between the 2011 Census and pooled APS-based estimates in Wales, where the population is less ethnically diverse**

Percentage of population by ethnic group for Wales

Figure 5: There is very little difference between the 2011 Census and pooled APS-based estimates in Wales, where the population is less ethnically diverse

Percentage of population by ethnic group for Wales



Source: Office for National Statistics research work on a simple method for producing population estimates by ethnic group and religion

## 6 . Population estimates by religion

The method described previously has also been used to produce estimates of the population by religion for the first time. These estimates are published for the first time in this release. These three-year pooled Annual Population Survey (APS) based estimates can be assessed to understand the utility of the method for estimating populations by religion.

### Treatment of “not stated” in religion estimates

There is a clear mode effect observable in the modelled estimates when compared with the 2011 Census data. Owing to the voluntary nature of the religion question in the census, a proportion of responses (about 7% at the England and Wales level) were “not stated”. While this is a possible response in the APS, it is only available if a spontaneous refusal is given by the respondent, which means it is present for a much smaller proportion of those surveyed (around 0.25% at the England and Wales level). It is also important to note that the APS is a voluntary survey, so there may be differential response rates.

Owing to this mode effect and the treatment of small numbers of contacts, we believe that combining the “Not stated” and “No religion” groups is sensible, to create a “No religion / Not stated” group. This reduces the number of area or group combinations with low contact numbers in the data, and it makes the estimates produced easier to compare to 2011 Census estimates on a consistent basis.

This means comparisons of the “No religion” group should be undertaken with care, using this combined group. It is important to note that while this group combines the two responses, we do not make the assumption that “Not stated” in 2011 Census data means the same as “No religion”, as we have no evidence to support this. We welcome user feedback on whether combining these groups is acceptable and whether it has any impact on users’ proposed uses of the data.

## **“Not available” and zero estimates**

This research has shown substantial variation in the completeness of the outputs. All findings are therefore indicative of what is currently possible rather than precise estimates. The relatively small size of some religions leads to a much higher proportion of estimates not available for these religions than for “Christian” and “No religion” (the two largest groups overall). The distribution of estimates with low contact numbers can be seen in Figure 6 (and Table C of the supporting dataset, which shows the high proportion of “Not stated” estimates that would affect overall quality if this group were not combined with the “No religion” group). It is clear that for the majority of local or unitary authorities (LAs or UAs), we are not able to produce robust estimates of religion, outside of the larger groups.

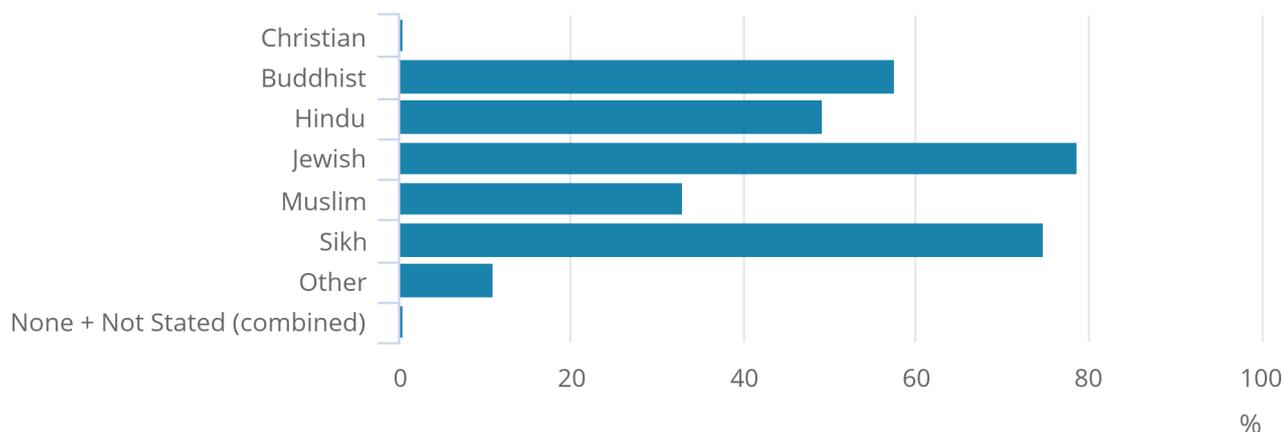
Table D of the supporting dataset gives an overview of the number of groups for whom it was not possible to make an estimate at different geographies (after combining the “None” and “Not stated” groups). At the country and regional level, we were able to generate estimates for all groups. These could be useful to users, providing a more up-to-date estimate than the 2011 Census results. Estimates simply being present does not address their quality, just the completeness of the data.

## Figure 6: The proportion of not available and zero estimates varies considerably by religion

Proportion of not available and zero estimates by religion, local authorities in England and Wales, 2014 to 2016

### Figure 6: The proportion of not available and zero estimates varies considerably by religion

Proportion of not available and zero estimates by religion, local authorities in England and Wales, 2014 to 2016



Source: Office for National Statistics – Research report on population estimates by ethnic group and religion

## Geographies with three or more “not available” and zero estimates

For the religion estimates in this report, we have set a completeness threshold. If three or more estimates within an area are affected by low contact numbers (shown as “0” or “NA”) estimates, we are considering this an unacceptable level of incomplete data. This threshold has been selected for consistency with ethnic group. The data are still presented in the accompanying dataset, but we advise caution when drawing conclusions from it.

We welcome user feedback on this threshold and whether estimates for areas with low contact numbers are still useful for users, for those groups that are present.

Table D also shows that for geographies below regional or county level, there are an unacceptably high number of areas with low contact numbers, rendering analysis of the data at this level unwise for most LAs and UAs. More detail on which areas do not have estimates for each religion can be found in Table B of the data that accompany this research report.

## Figure 7: Missingness is more prevalent than for ethnicity and tends to affect rural local authorities more than urban authorities

Maps showing number of not available and zero estimates for each local authority for religions in pooled APS-based estimates

## Source: Office for National Statistics – Research report on population estimates by ethnic group and religion

[Download the data](#)

The completeness at LA and UA level is not uniform, as shown in this interactive map, with some areas showing far more low contact estimates than others. When compared to the maps for ethnic group, it is clear there are more areas with low contact numbers.

### Local authority “not available” and zero estimates by census area classification

Census supergroups have again been used to provide more insight into completeness. The religion profile of an LA is more closely aligned with these groups than their regional location. These groups and the completeness of the data we can provide for them are summarised in Table C of the supporting dataset. Regional estimates have also been produced and can be found in Table B of the accompanying dataset.

In common with the ethnic group analysis, we make use of the top tier of the 2011 Census area classification hierarchy: supergroups. The supergroup classifications of individual LAs and UAs are included in Table B of the dataset and are visible on Map 2 when you hover over each geography.

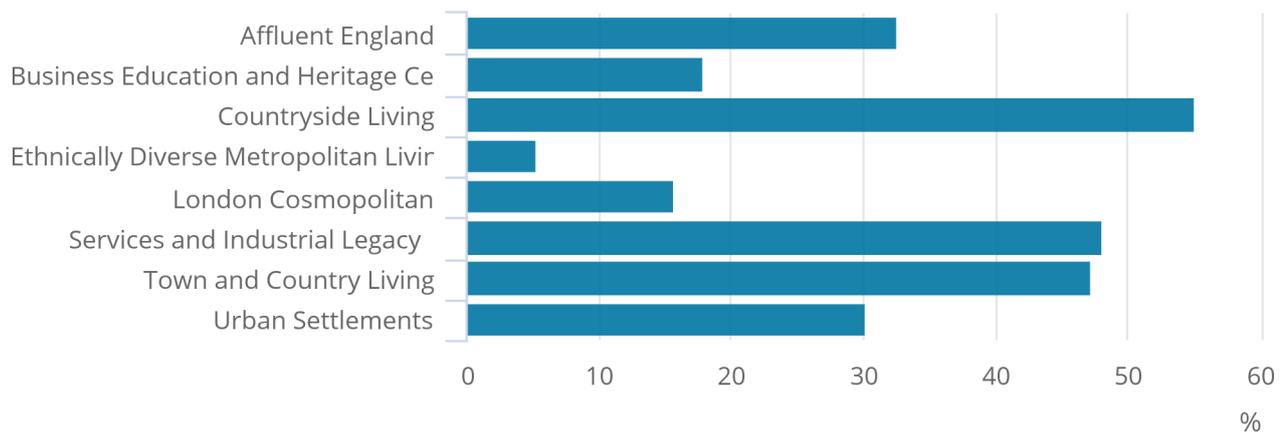
The most complete LA and UA estimates are still for the Ethnically Diverse Metropolitan Living group, which has only eight NA or zero estimates (Table E). Similarly, the London Cosmopolitan group has very few, again as a result of the City of London. While the patterns are similar to those of ethnic groups shown in Figure 3, it is clear that the data for religion are sparser.

**Figure 8: Countryside Living has the largest proportion of not available and zero estimates for religion, in common with ethnic group**

Percentage of not available and zero estimates by 2011 Census area classification supergroups

**Figure 8: Countryside Living has the largest proportion of not available and zero estimates for religion, in common with ethnic group**

Percentage of not available and zero estimates by 2011 Census area classification supergroups



Source: Office for National Statistics – Research report on population estimates by ethnic group and religion

We have combined the “Not stated” and “No religion” categories for both the census and pooled APS-based estimates when making comparisons between the two, to counteract the mode effect.

### Comparability of the pooled APS-based estimates

We have compared all summary supergroup estimates to comparable ones from the 2011 Census. Distributions at the summary level are comparable, with different patterns seen by supergroup, as shown in Table F.

### National level comparisons

While we are not able to measure the quality directly, at the national level it is reasonable to assume some insight can be found in comparing the 2011 Census results for England and Wales to those produced by our new method using pooled APS data. For England, we can see that in comparing 2011 and pooled APS data, there is a decline for the “Christian” group, though it remains the largest group in England. The lower proportion of the population in the “Christian” group is counteracted by higher proportions for all the other groups, with the largest increases seen for the “Muslim”, “None + Not stated” and “Other” groups. Without a breakdown by any other characteristic (for example, by age or sex), we cannot draw any conclusions about what causes these differences.

These estimates are derived from a combination of sources, which will all contain uncertainty. We are unable at present to produce confidence intervals directly from this method, but we can look at the confidence intervals for the input APS data to provide an indication of the level of uncertainty caused by the sample survey component.

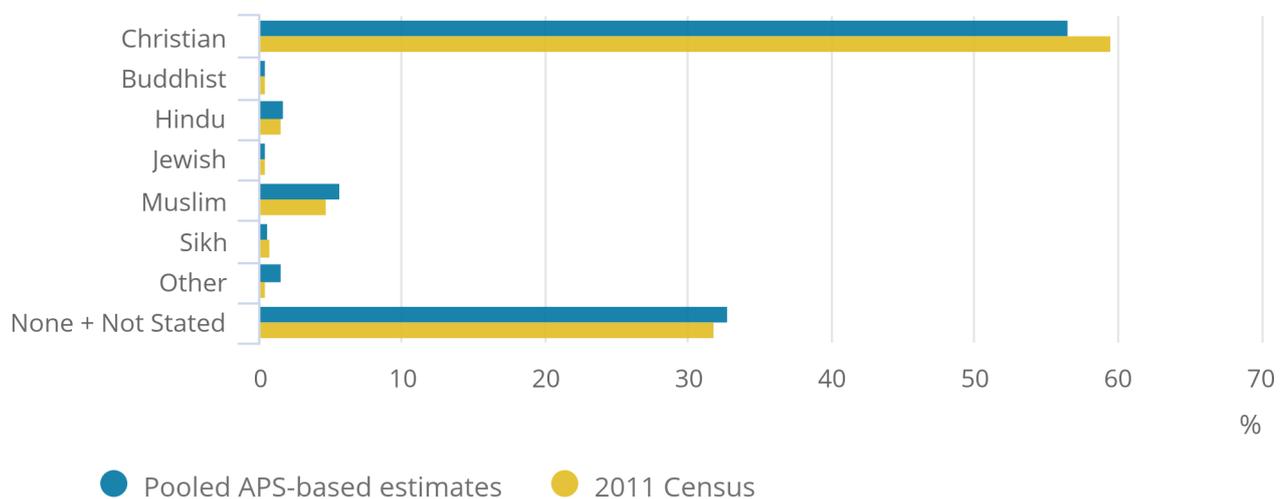
These confidence intervals are shown in Table G of the accompanying dataset and show that where small positive or negative differences are apparent, associated APS confidence intervals would allow for the direction of change to be reversed.

**Figure 9: The distribution of religions at the national level for England looks similar to the 2011 Census**

Percentage distribution for 2011 Census and pooled APS-based estimates for England

Figure 9: The distribution of religions at the national level for England looks similar to the 2011 Census

Percentage distribution for 2011 Census and pooled APS-based estimates for England



Source: Office for National Statistics – Research report on population estimates by ethnic group and religion

In both the 2011 and 2016 estimates, Wales is less diverse than England with regard to religious group distribution to the minority religions but has a higher proportion of “None + Not stated”, at just under 40% compared with around 32% for England. Wales also showed a slightly lower estimate for the proportion of “Christians”, though it is of a lesser magnitude of difference than England. In contrast to the growth in England, the “Muslim” population in Wales remained similar. The changes for the other religions were very similar between England and Wales, though the minority religious populations comprise a smaller proportion of the population in Wales.

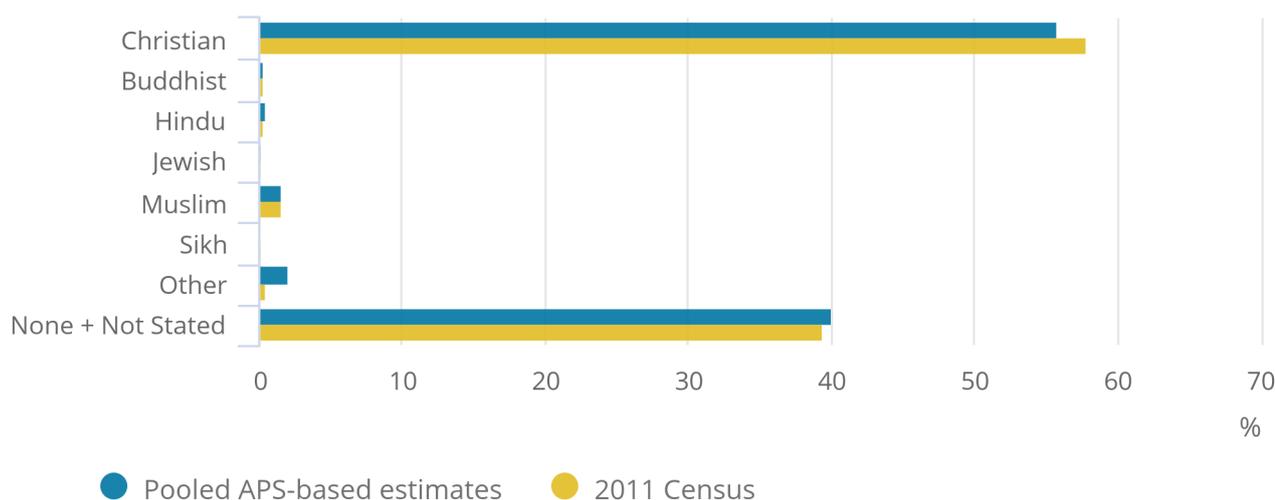
The same point holds true for Wales with regard to confidence intervals (in Table G of accompanying dataset). The small size of the majority of the differences seen between the 2011 Census and pooled APS-based estimates lies within the confidence interval from the APS source data.

**Figure 10: The distribution of religions at the national level for Wales is similar to the 2011 Census but less diverse when compared with England**

Percentage distribution for the 2011 Census and pooled APS-based estimates for Wales

Figure 10: The distribution of religions at the national level for Wales is similar to the 2011 Census but less diverse when compared with England

Percentage distribution for the 2011 Census and pooled APS-based estimates for Wales



Source: Office for National Statistics – Research report on population estimates by ethnic group and religion

## 7 . Conclusion and next steps

The conclusions drawn about the strengths and weaknesses of these methods are very similar to those found in the [previous report](#).

In summary, this research has shown that at the national, regional and county level, applying the method to pooled Annual Population Survey (APS) data provides comparable estimates of the whole (household + communal establishment) population for England and Wales to previous estimates at national, regional and county level for ethnic group. If estimates at these geographic levels would be useful for stakeholders, the Office for National Statistics (ONS) could produce these on an annual basis, using single-year APS data to allow for time series comparisons (assuming single-year religion data were found to be reasonable).

The quality of estimates produced by this method for local and unitary authorities (LAs and UAs) is less clear. The maps presented in this report show that at the LA and UA level, completeness of the data appears better for ethnic group than religion (though this might be a result of the greater number of religion than ethnic group categories at a high level). However, even with pooled APS data, the completeness at LA and UA level does not appear good enough for us to recommend its use, from either single-year or pooled APS data.

This research report is an interim measure, and we are seeking user feedback on the use of these statistics and whether there is value in making their production a regular (annual) occurrence.

If these data prove useful, further improvements to the method and presentation of these statistics could be undertaken. Some known areas for further examination include:

- investigating the production of confidence intervals
- taking on board any user feedback from this report
- creating a demographic breakdown by age or sex at the national or regional level (owing to sample size constraints)
- producing a coherent time series, to allow for analysis over time (for methodological reasons, the current pooled APS data method is not suitable for this)
- offering more analysis of the intersection of religion and other characteristics on population estimates

The ONS is committed to the further development of our population statistics, making the best use of new data and new methods as they become available. Further details of our plans for population characteristics work using these new sources will be published in due course.

## 8 . Providing feedback

You are invited to provide feedback on these research outputs. In particular, we are interested in your thoughts on:

- the change to the method we have used (use of pooled Annual Population Survey (APS) data)
- whether you would prefer point-in-time estimates (using pooled APS data) or a time series with less completeness (using single-year APS data)
- whether the quality measures (completeness and comparison to the census) we have used are appropriate or could be improved
- whether the use of 2011 Census supergroup area classifications adds value
- whether you find the illustrative estimates of the population by religion useful

Please provide your comments via email to [pop.info@ons.gov.uk](mailto:pop.info@ons.gov.uk).