

Article

Reconciliation of mid-year population estimates with Census 2021, England and Wales

Analysis of differences between mid-year population estimates rolled forward from mid-2020 and official estimates rolled forward from Census 2021.



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1 . Main points

- The official mid-2021 population estimate for England - based on Census 2021 data - is 201,700 (0.36%) lower than the estimate rolled forward since the 2011 Census.
- The official mid-2021 population estimate for Wales - based on Census 2021 data - is 66,800 (2.11%) lower than the estimate rolled forward since the 2011 Census.
- For England, the difference is made up of 201,600 fewer females and 403,200 more males in the 2021 rolled-forward estimate.
- For Wales, the difference is made up of 22,500 more females and 44,300 more males in the 2021 rolled-forward estimate.
- The majority of these differences at the England and Wales levels are attributed to international migration flows over the decade.
- This article identifies potential sources of error in the mid-year population estimates and explores the reasons for them.
- It provides evidence towards the rebasing of historic mid-year population estimates and the consultation on the future of the population and social statistics system in June 2023.

Differences between population estimates based on Census 2021 data and annual mid-year population estimates are expected. The high response rate for Census 2021 combined with improved methods of estimating international migration, should ensure that this difference is kept to a minimum in the future.

2 . Overview

The purpose of reconciliation is to identify the difference in the 2021 rolled-forward mid-year estimates. We do this by comparing the differences between the official Census 2021-based mid-year estimates (based on Census 2021 and accounting for births, deaths and migration in the period to mid-year 2021) and the 2021 rolled-forward (based on the 2011 Census with a decade of mid-years estimates with births, deaths and migration incorporated) mid-year estimates for England and Wales, and to explore reasons for those differences. See [Section 3: Population estimates used in this report](#) for a more detailed description of the two estimates.

This article also provides part of the suite of evidence that can be referred to as part of the consultation on the future population and social statistics system in mid-2023.

The Office for National Statistics (ONS) produces annual estimates of the resident population as at 30 June each year. These mid-year population estimates (MYEs) tell us how many people live in England and Wales as a whole, in each local area and include information on age-sex structure.

This article addresses the following questions for England and Wales:

- how might differences between the 2021 rolled-forward MYE and the official Census 2021-based MYE be explained?
- which age and sex groups and areas of England and Wales show the largest and smallest differences?

This article, alongside a more detailed look into local authority district patterns due for publication on 2 March 2023, will not only inform users as to the nature of and reasons for the differences, they will also inform the ONS' work to further improve the quality of future population estimates.

This article will examine the differences seen, then look at potential causes, before examining the impact of the differences at the country and regional level.

3 . Population estimates used in this report

Throughout this article we will be referring to two main mid-year estimates (MYE).

Census-based MYEs are the [official mid-2021 population estimates](#), these are based on Census 2021 for England and Wales. The usual resident population as at Census Day (21 March 2021), by single year of age, is aged on to 30 June 2021 and then births, deaths and migration are accounted for.

Censuses provide the most accurate estimate of the population and therefore the reliability of MYEs is very high immediately following a census. Quality information on Census 2021 can be found in our [Quality and methodology information \(QMI\) for Census 2021 report](#).

The 2021 rolled-forward MYEs use the population estimate from the previous reference date (2020 in this instance) as the starting point for estimating the population at the current reference date. The previous population estimate is aged on and data on births, deaths and migration are used to reflect population change during the reference period. This process has been repeated each year since the 2011 Census, when the last reconciliation and rebasing exercise took place.

The census has evolved throughout the decades, providing an insight every 10 years into who we are and how we live. While the census and mid-year population estimates based on the census provide the best picture of society at a moment in time, how the Office for National Statistics (ONS) produce population and social statistics is changing.

We are using a variety of data sources to provide more frequent, relevant, and timely statistics. This will allow us to understand population change in local areas this year and beyond.

Our [Dynamic population model for England and Wales: November 2022 article](#) was the second in a series of publications that outlined our plans to transform population and migration statistics. It described our initial research into a dynamic population model (DPM). Our research on provisional June 2022 population estimates for all local authorities derived from this DPM, were published concurrently with this article. This article is concerned with comparing the MYE from our “traditional” Census-based methods only. However, the DPM will provide insight into our rebasing exercise, which will follow this reconciliation exercise, and will help us to assign these differences in population estimates back across the decade to 2011. The rebasing exercise provides a time series of historical mid-year population estimates that benefit from the additional quality enabled by Census 2021 data and that are comparable with mid-year estimates produced after Census 2021.

4 . Total difference between estimates

The 2021 rolled-forward mid-year estimates (MYE) for England and Wales are 268,500 higher than Census 2021-based MYE, with 447,500 more males and 179,100 fewer females than the Census 2021-based MYE (Table 1). To put this difference into perspective, the 2021 rolled-forward MYE are 0.45% higher than the Census 2021-based MYE overall, 0.59% lower for females and 1.51% higher for males.

The main components that could contribute to this difference for England and Wales are:

- births
- deaths
- net migration
- variability in Census 2021 estimates
- cross border flows between England and Wales and the other countries of the UK
- the 2011 Census population base

As the registration of births and deaths that occur in the UK is compulsory, and the data quality is high overall, any attribution of differences to these causes will be relatively small. There is no evidence to show that there is any substantial error in the cross-border flows to and from Scotland and Northern Ireland.

At the England and Wales level, net international migration is likely to be the main contributor to the difference seen between the 2021 rolled forward MYE and the Census 2021-based MYE. In addition, both Census 2021 and the 2011 Census provided estimates of the population that are subject to statistical error. Some of the difference between the 2021 rolled-forward MYE and the Census 2021-based MYE will be because of this.

Table 1: Comparison of the 2021 rolled-forward mid-year estimate (MYE) and the Census 2021-based MYE

	2021 rolled-forward mid-year estimates	2021 census-based mid-year estimates	Difference to explain
Total	59,910,300	59,641,800	268,500
Female	30,260,700	30,439,700	-179,000
Male	29,649,600	29,202,100	447,500

Source: Office for National Statistics

For comparison, in 2011 the rolled-forward MYE were 464,000 lower than the 2011 Census-based estimates. This included 139,000 females and 325,000 males who had been undercounted in the rolled-forward MYE.

More detail on the post 2011 reconciliation can be found in our [Methods used to revise the national population estimates for mid-2002 to mid-2010 \(PDF, 172KB\)](#).

5 . Comparison between the Census 2021-based mid-year estimates and 2021 rolled-forward mid-year estimates by age and sex for England and Wales

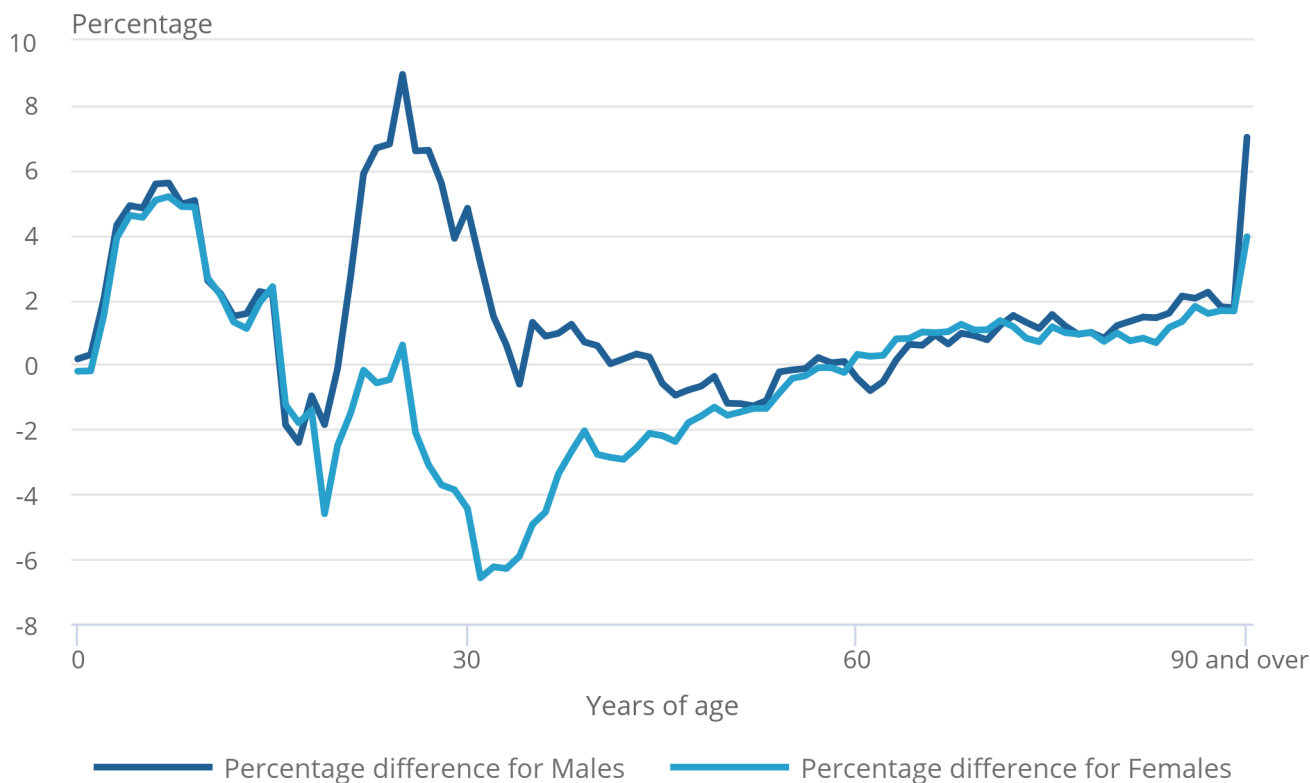
Generally, at the England and Wales level, there were five main groups, which differed for males and females between the two 2021 mid-year estimates (MYEs). Both male and female children (aged 3 to 15 years) were too high in the 2021 rolled-forward estimates, when compared with the Census 2021-based estimates, while females aged 17 to 21 years, 26 to 53 years, and aged 90 years and over were lower, in the 2021 rolled-forward estimates. Males aged 22 to 32 years, and aged 90 years and over were higher in the 2021 rolled-forward estimates when compared with the Census 2021-based estimates.

Figure 1: The largest differences between estimates were for children and young adults

Difference between 2021 rolled-forward mid-year estimates and Census 2021-based mid-year estimates for males and females

Figure 1: The largest differences between estimates were for children and young adults

Difference between 2021 rolled-forward mid-year estimates and Census 2021-based mid-year estimates for males and females



Source: Office for National Statistics - Mid-year estimates

Notes:

1. Positive value means the rolled-forward estimate is higher, negative value means the rolled-forward value is lower.
2. Differences are expressed as percentage difference from the rolled-forward 2021 value.

6 . Potential reasons for differences at the England and Wales level

At the England and Wales level, there are a number of factors that could have caused the observed differences and they may impact on age and sex groups differently.

Impact of Census 2021 confidence intervals

The Census 2021 results reflect the whole population of England and Wales and not just those who responded to the census. We use the Census Coverage Survey (CCS) to help estimate the number and the characteristics of people who did not respond to the census, so we can reflect those people in the results.

As the CCS surveys a sample of people, the census estimates have an element of sampling error. This means we could have arrived at different estimates based on the chance of who appeared in the survey sample.

Confidence intervals are a way to express this element of uncertainty in the estimates. More information about these confidence intervals and a comparison tool to examine them were published in our [Measures showing the quality of Census 2021 estimates methodology](#).

For the purposes of the reconciliation with 2021 rolled-forward mid-year estimates (MYE), it is important to remember that the Census population estimate for England and Wales had a 95% confidence interval of 137,200. This means that the true estimate for the population of England and Wales at Census Day is likely to lie between 59,546,000 and 59,684,000. It is therefore possible that some portion of the difference between Census 2021-based and 2021 rolled-forward MYE is accounted for by this confidence interval. It is not possible to further quantify the impact of this, but it remains a potential source of the observed difference between the estimates.

Impact of adjustments for relatively small populations

Previous work has shown that post-census adjustment of population estimates runs the risk of creating implausible population groups, from plausible adjustments. An example can be found in our [Further understanding of the causes of discrepancies between rolled forward and census based local authority mid-year population estimates for 2011 paper \(PDF, 1,569 KB\)](#).

This research demonstrates that older ages are particularly vulnerable to this kind of population inflation. As the older population experiences mortality, the proportion that the adjustment makes up increases and is cumulative, as any overestimate in the 2011 MYE is carried forward and is not removed by mortality. What starts as a small overestimate in the base year can become a proportionally much larger overestimate in the 2021 rolled-forward MYE. It is likely that much of the 26,600 overestimate of the population aged 90 years and over, seen when the 2021 rolled-forward and Census 2021-based MYE are compared, is because of small overestimates in the 2011 Census base. This creates “phantom people” who cannot be removed by deaths as they are not actually present in the population.

Further research carried out in 2016 on this and other quality considerations can be found in our [Accuracy of official high-age population estimates, in England and Wales: an evaluation methodology](#).

International migration for children (aged up to 16 years) in MYE

The Office for National Statistics (ONS) published research in response to stakeholder feedback following the 2011 Census. This research suggests that the methods used to estimate international immigration age and sex distribution and international emigration age and sex distribution may be having an adverse effect on the accuracy of the age and sex split of these figures. Further information on this can be found in Section 8: Analysis of estimates of children and age distributions of international migrants of our [Mid-year population estimates QMI](#).

Our rolled-forward MYEs show more children than the Census 2021-based estimates, for both males and females, for almost all ages under 16 years.

Table 2: The difference between 2021 rolled-forward mid-year estimates (MYEs) and Census 2021-based MYEs for children in 2021

Age (years)	Females	Males
0	-600	500
1	-700	800
2	4,700	6,600
3	12,400	14,400
4	14,900	17,000
5	15,400	17,200
6	17,000	19,600
7	17,500	19,800
8	16,900	18,000
9	17,400	18,900
10	9,600	9,800
11	7,600	8,100
12	4,600	5,500
13	3,900	5,900
14	6,500	8,000
15	8,000	7,600
Total	155,100	177,700

Source: Office for National Statistics

Notes

1. A positive value in the table shows an overestimate for that age in the 2021 rolled-forward MYE, and a negative value shows an underestimate for that age in the 2021 rolled-forward MYE.

This means that by using the Census 2021-based MYE we believe that the 2021 rolled-forward MYE overestimated the number of 0- to 15-year-olds by approximately 332,800 people (2.93% of the 0 to 15 years estimate in 2021).

Information on adjustment to the number of young children as part of Census 2021 quality assurance, can be found in Section 7: Changes made because of the quality assurance process of our [Maximising the quality of Census 2021 population estimates methodology](#).

The rebasing exercise that follows this reconciliation article will be incorporating improved international migration estimates. This discrepancy will be resolved as part of this new international migration series. The ONS continues to develop our [Methods to produce provisional long-term international migration estimates](#) and this work will look to prevent a recurrence of this issue.

We are working with the Home Office to develop methods to estimate the migration of EU nationals, from 2021, with the introduction of new immigration routes for EU nationals. This will provide better estimates of the migration of EU and non-EU nationals aged under 16 years.

Impact of the 2011 national adjustment

The 2011 Census identified an issue with the sex ratio of the estimates for 2011, and a national adjustment for certain age groups of men was made to correct for this. Detail of why the adjustment was judged necessary and how it was constructed can be found in [Making a National Adjustment to the 2011 Census \(PDF, 1300KB\)](#).

As part of this reconciliation, we considered whether the 2011 national adjustment may have led to some of the difference in estimates of men that we can see between Census 2021-based and 2021 rolled-forward estimates.

To explore the effect of the national adjustment, we aged on the males in the five-year age bands where the national adjustment was applied in 2011 (five-year age bands for those aged between 20 and 49 years) by ten years to see its impact on the rolled-forward estimates.

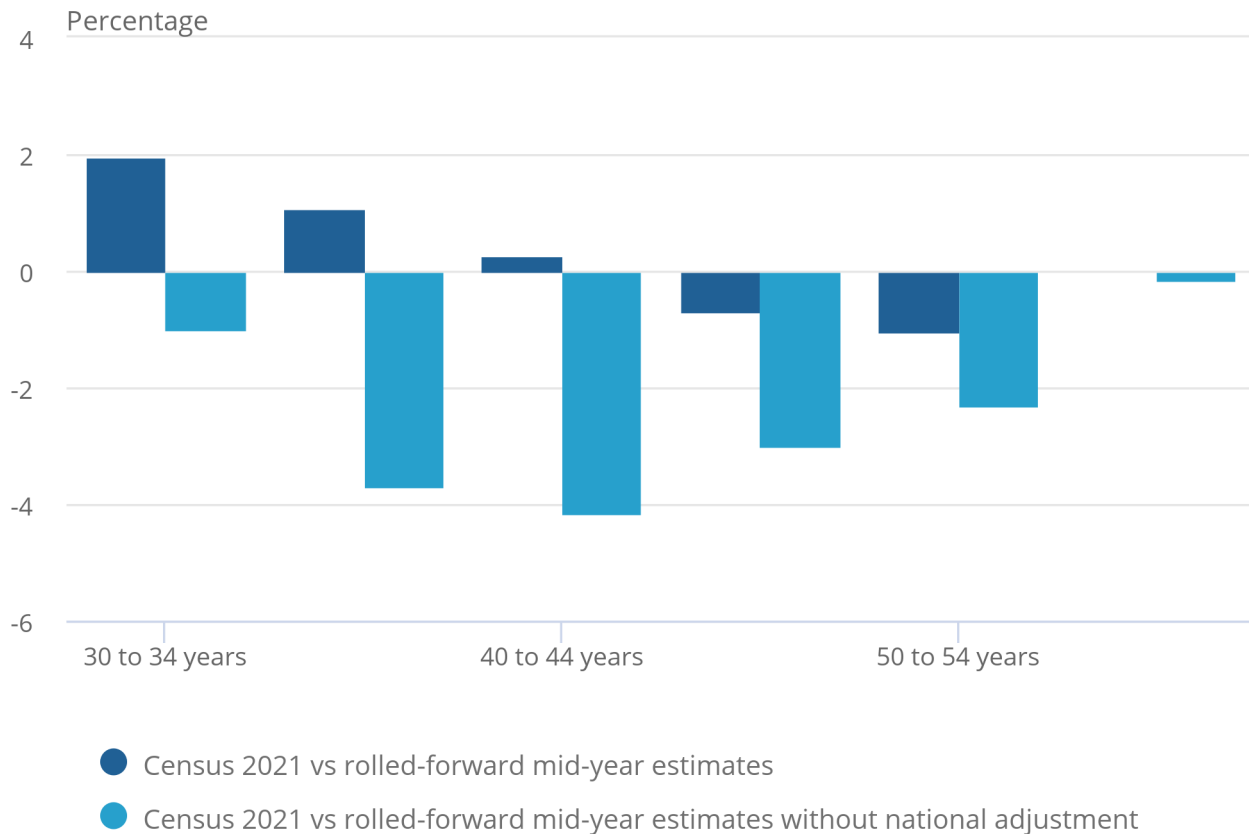
We then subtracted the estimates added by the national adjustment from each corresponding five-year age group from the rolled-forward estimates and calculated the percentage differences between these estimates and the Census estimates.

Figure 2: Removal of the national adjustment would have made differences larger for most age groups

Percentage difference between Census 2021-based and 2021 rolled-forward estimates with and without the 2011 national adjustment

Figure 2: Removal of the national adjustment would have made differences larger for most age groups

Percentage difference between Census 2021-based and 2021 rolled-forward estimates with and without the 2011 national adjustment



Source: Office for National Statistics - Mid-year estimates

Notes:

1. A positive percentage difference denotes that the rolled-forward estimate is higher than the Census, and negative value means the rolled-forward value is lower than the Census.

Our research suggests that the 2011 national adjustment does not play a significant role in the differences seen for the 2021 estimates. Removal of the national adjustment would not have materially improved the closeness of the 2021 estimates, and for most age groups would have made the difference larger (Figure 2).

It is possible there are other issues with the 2011 Census base, and in common with Census 2021, it does have a margin of error. This was calculated as 81,000 for 2011 in chapter 8 of [our 2011 Census general report for England and Wales \(PDF, 351 KB\)](#), but our analysis presents no evidence that the overall differences seen in 2021 estimates are caused by the 2011 Census base.

Revised estimates of international migration

The ONS has long recognised the need to modernise the way our migration data are collected. For much of the last decade (2011 to 2021), long-term international migration (LTIM) was estimated using a number of data sources. The International Passenger Survey (IPS) was the largest component, providing information on a persons intention to migrate, with additional components and adjustments to produce the final estimates of international migration.

Since 2019 the ONS has been [transforming the way long-term migration is estimated](#). We are now using the best available administrative data from the Home Office and the Department for Work and Pensions to estimate international migration. Using innovative methods based on actual behaviors recorded in administrative data to show arrival into the UK and sustained residency after arrival. This work can provide useful insight into the difference between the 2021 rolled-forward and Census 2021-based MYEs, through the provision of alternative estimates of migration flows.

Having investigated other potential causes of the difference at the England and Wales level, we believe that most of the difference between the Census 2021-based and 2021 rolled-forward estimates is because of missed or overestimated international migration flows over the period 2011 to 2021.

A net difference for any age and sex group could be caused by misestimation of either inflow or outflow. For the purposes of rebasing and reconciliation it can be useful to split the misestimation of migration into two components.

Known missed migration

This relates to migration estimates that we have already improved on since the original published statistics were used in the MYE series. The improvements might be because of new methods, or new data sources that were not available when the estimates were originally constructed.

In November 2022 we published our best estimates of [Long-term international migration, provisional: year ending June 2022](#). This release also included a new revised estimate for international migration for the year ending June 2020, a net migration figure for the UK of 88,000 people.

This revised 2020 figure, constructed using our most up to date data and methods results in a reduction of 177,000 net inflow for England and Wales compared with the previously published international migration estimate for June 2020.

Additionally, in 2019 we introduced preliminary adjustments to the published LTIM estimates from 2009 onwards. This reflected the fact that some migrants had greater uncertainty in their intentions to migrate to and from the UK. These adjustments were made at an aggregate level so these could not be incorporated into the regular MYE series. We have conducted research as part of this reconciliation project to investigate the impact that using these unadjusted LTIM figures has had on the series overall, compared with if the adjusted figures had been available with the necessary granularity to be used in MYE.

Impact of adjusted and unadjusted LTIM

From 2012 to 2019 a total of 103,000 more people would have been included in the MYEs if the adjusted LTIM estimates had been used.

For the purposes of reconciliation and rebasing, this difference was explored but the rebased migration series planned for publication in the national rebasing will supersede both the adjusted and unadjusted time series.

Unknown error in migration

In addition to these differences known as a result of recently published estimates, there are further differences that we hope to explain when our latest methods and best sources are used to examine the previous decade. We are continuing to research these, and we hope that our April England and Wales level rebasing will be able to attribute these differences to specific flows and years.

We are also continuing to research how we can apportion the differences (both known and unknown) to the required level of age and sex split.

In our planned April rebasing report, we will be including international migration estimates using our best sources and methods for all available years back to 2012 for England and Wales. We expect this improved series of estimates will account for the majority of the accumulated difference in MYE for mid-2021 (and for the back series).

Our planned rebasing May publication will further split these new migration estimates down to the local authority level. The MYE rebased series will not be splitting these flows into their component flows (British, EU, non-EU). However, we intend to publish a revised back series of international migration on 25 May 2023 alongside the LTIM release which will disaggregate the net flows into immigration and emigration split by nationality group.

Known error in births and deaths

As stated previously, the quality of births and deaths data used in the MYE is high. However, there are two specific issues that affect these data of relevance for this reconciliation.

Birth registrations were suspended during the early part of the coronavirus (COVID-19) pandemic, and this affected how the ONS collated the data. We estimate that the data in the 2020 MYE release covered at least 99.7% of births in the reference period, but there are thought to be around 1,000 births missed for 2020.

Deaths data are of high quality but there will be a known minimal adjustment for missed late registrations of deaths. This is because deaths referred to coroners through the decade can create a small tail of very late registrations, which fall outside our normal late registration calculation.

7 . Differences at the Wales and English regional level

This section provides a high-level overview of the differences at the Wales and English regional level between the Census 2021-based and 2021 rolled-forward mid-year estimates (MYEs). A positive difference indicates the 2021 rolled-forward MYE are higher than the Census 2021-based MYE.

People moving around England and Wales, or internal migration, has an impact on these differences. Examination of internal migration however, is outside the scope of this reconciliation article, but is a major contributory factor to intercensal population change for local and regional areas. Some of the differences seen regionally therefore, will be caused by internal migration.

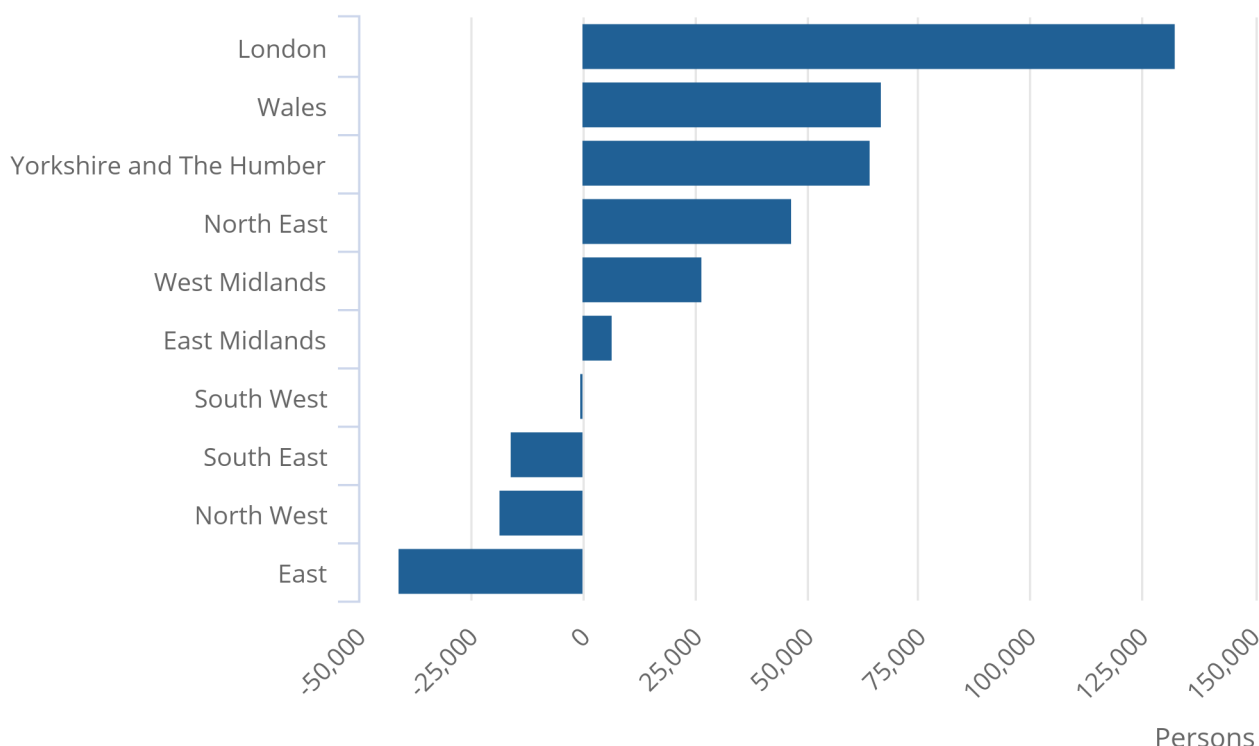
Figure 3 summarises the overall difference between the two 2021 estimates at regional and Wales level. For all the regions, the difference between the 2021 rolled-forward and Census 2021-based MYE are under 2.5%. The highest absolute difference in number of people was seen in London, with 132,500 more people in the 2021 rolled-forward MYE, compared with the Census 2021-based MYE. This is a relatively small percentage difference, with the rolled-forward estimate being 1.48% higher than the Census-based estimate. Similarly, Wales has the highest percentage difference between the two MYEs, of 2.11%, with an absolute difference of 66,800 more people in the 2021 rolled-forward MYE (Figure 3).

Figure 3: London had the greatest difference between estimates and the South West had the smallest

Difference in population estimates for mid-2021, comparison of census-based mid-year estimates and rolled-forward mid-year estimates at country and regional level

Figure 3: London had the greatest difference between estimates and the South West had the smallest

Difference in population estimates for mid-2021, comparison of census-based mid-year estimates and rolled-forward mid-year estimates at country and regional level



Source: Office for National Statistics - Mid-year estimates

Notes:

1. Positive value means the rolled-forward estimate is higher, negative value means the rolled-forward value is lower.
2. Differences are expressed as percentage difference from the rolled-forward 2021 value.

The North East regional estimates similarly had 46,800 more people in the 2021 rolled-forward MYE, compared with the Census 2021-based MYE, a difference of 1.74%. Yorkshire and The Humber had an extra 64,400 or 1.16% more people in the 2021 rolled-forward MYE. The West and East Midlands also had more people in the 2021 rolled-forward MYE with 26,500 (0.44%) and 6,800 (0.14%) more people respectively (Figure 3).

In contrast, the 2021 rolled-forward MYE had fewer people compared with the Census 2021-based MYE in four regions. For the North West, there were 18,200 fewer people in the 2021 rolled-forward MYE compared with the Census 2021-based MYE, a difference of 0.25%. For the East of England and South East regions, there were 40,900 (0.65%) and 15,900 (0.17%) respectively, fewer people in the 2021 rolled-forward MYE compared with the Census 2021-based MYE. Lastly for the South West region, there were 300 fewer people in the 2021 rolled-forward MYE, a percentage difference of 0.01% (Figure 3).

Sex differences at the country and regional level

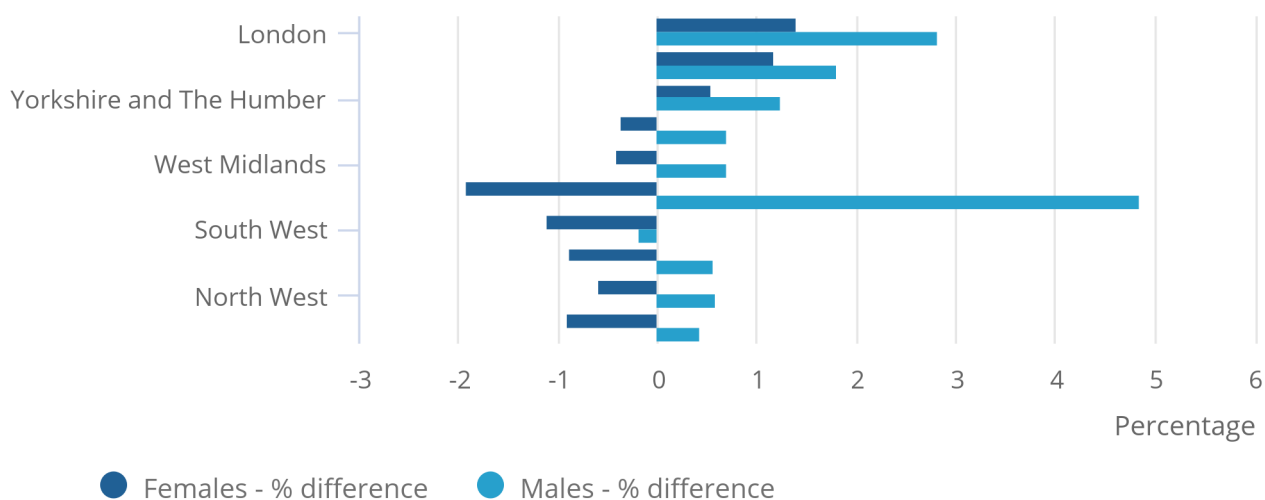
Differences between females and males varied regionally between the 2021 rolled-forward and the Census 2021-based MYEs (Figure 4).

Figure 4: Patterns of country and regional differences varied by sex, with female differences being smaller or negative

Difference in population estimates for mid-2021, comparison of census-based estimates and rolled-forward estimates at country and regional level in females and males

Figure 4: Patterns of country and regional differences varied by sex, with female differences being smaller or negative

Difference in population estimates for mid-2021, comparison of census-based estimates and rolled-forward estimates at country and regional level in females and males



Source: Office for National Statistics - Mid-year estimates

Notes:

1. Positive value means the rolled-forward estimate is higher, negative value means the rolled-forward value is lower.
2. Differences are expressed as percentage difference from the rolled-forward 2021 value.

Variations in females

When looking at the differences at the Wales and English regional level, the biggest differences for females were in Wales, with the 2021 rolled-forward MYE estimating 22,500 (1.40%) more females here and in London, with 85,200 (1.92%) fewer females, compared with the Census 2021-based MYE (Figure 4). Other regions where the 2021 rolled-forward MYEs were higher than the Census 2021-based MYE, include the North East, and Yorkshire and The Humber, with 16,200 (1.18%) and 15,200 (0.54%) more females respectively. For all other regions, the 2021 rolled-forward MYE were lower for females than the Census 2021-based estimate (Figure 5).

Figure 5: Percentage differences were largest for Wales and London for both males and females

Difference in population estimates for mid-2021, comparison of census-based estimates and rolled-forward estimates at regional and Wales level in males, females and persons

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In the West and East Midlands, the 2021 rolled-forward estimate was 10,500 (0.35%) and 9,900 (0.40%) lower for estimates of females than the Census 2021-based estimate. Similarly, the South West, North West and East of England regions had 17,000 (0.59%), 34,100 (0.91%) and 35,100 (1.10%) fewer females in the 2021 rolled-forward MYE compared with the Census 2021-based MYE. Lastly, the South East region had 41,400 (0.88%) fewer females in the 2021 rolled-forward estimate compared with the Census 2021-based estimate.

Variations in males

The biggest differences in Wales and the English regions in males between the two 2021 MYEs were seen in London, where the 2021 rolled-forward MYE included 217,600 more males (4.85%), than the Census 2021-based MYE (Figure 5). All regions, apart from the East of England, had higher estimates for males in the 2021 rolled-forward estimates compared with the Census 2021-based estimate. In the East of England, the 2021 rolled-forward estimates for males were 5,800 lower than the Census 2021-based estimates, or 0.19% (Figure 5).

The 2021 rolled-forward MYEs for males in Wales and Yorkshire and The Humber were 44,300 (2.87%) and 49,200 (1.81%) higher than those seen in the Census 2021-based MYE. Likewise, male estimates were higher in the 2021 rolled-forward estimates in the West and East Midlands, with 37,000 (1.25%) and 16,700 (0.69%) respectively more males, and the North East and North West regions, with 30,600 (2.31%) and 15,900 (0.43%) respectively, more males than the Census 2021-based estimate. Finally, the South East and South West regions had 25,400 (0.56%) and 16,700 (0.59%) more males in the 2021 rolled-forward estimate compared with the Census 2021-based estimate (Figure 5).

Age and sex differences at regional level and country level

The pattern for England is so similar to that of England and Wales that we have not repeated the analysis here. We have however investigated each English region, and Wales, to see whether the differences observed are replicated evenly. The pattern at regional level can be complicated by national issues being compounded by sub-national variations, which can sometimes make the regional patterns quite different to the national picture for England. To avoid unnecessary repetition, only the differences in the main patterns are highlighted here.

When comparing the 2021 rolled-forward MYE and the Census 2021-based MYE by single year of age at a regional level, the biggest differences were seen in:

- children aged under 13 years
- people aged between 20 and 49 years
- the older ages (aged 90 years and over)

The biggest regional differences were seen in London (Figure 6). Differences in London broadly followed the England patterns.

Figure 6: Explore the data by region

Difference in population estimates for mid-2021, comparison of census-based estimates and rolled-forward estimates by region and country

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The pattern in the West Midlands partially followed that seen nationally (Figure 6). However, contrary to the England pattern, there were more females in the 2021 rolled forward MYE aged 14 and 15 years and aged between 21 and 30 years, and fewer males aged between 39 and 72 years compared with the Census 2021-based estimates.

In the South East region, the difference between the two MYE for females demonstrated a pattern similar to that seen for England (Figure 6). In contrast, there were some differences in males, with fewer males aged between 16 and 20 years, aged between 31 and 53 years, and aged 61 to 62 years in the 2021 rolled-forward estimates compared with the Census 2021-based estimates. Other age groups followed the England patterns (Figure 6).

Males and females demonstrated a similar pattern to the England pattern in the East of England, when examining the differences between the 2021 rolled-forward and Census 2021-based estimates (Figure 6).

The region of Yorkshire and The Humber, similarly, followed England patterns for children and females when examining the differences between the two 2021 MYEs. Males, were lower however, for ages between 16 and 19 years, between 34 and 42 years, between 44 and 53 years, and between 60 and 62 years in the 2021 rolled-forward estimates compared with the Census 2021-based estimates (Figure 6).

In the East Midlands, the patterns in differences between the two MYEs for males were similar to the England level, apart from between the ages 30 and 55 years, which were lower in the 2021 rolled-forward estimates compared with the Census 2021-based estimates (Figure 6).

Similarly, for females, the differences followed national patterns, apart from between the ages 20 and 22 years which were higher in the 2021 rolled-forward estimates. For males and females aged 78 years and over the estimates varied if the 2021 rolled-forward estimates were higher or lower than the Census 2021-based estimates (Figure 6).

The differences between the two 2021 MYEs generally followed the England pattern in the North West. However, differences to the England pattern were seen in females aged between 21 and 25 years, which were higher in the 2021 rolled-forward estimates compared with the Census 2021-based estimates, while there were fewer males aged between 33 and 70 years in the 2021 rolled-forward MYE (Figure 6).

In the South West, males generally followed the England pattern of differences between the two MYEs, however female patterns varied between the ages 22 to 33 years and between 57 to 59 years. The 2021 rolled-forward estimates were higher for females in these age categories compared with the Census 2021-based estimates (Figure 6).

In the North East, the 2021 rolled-forward MYE were generally higher than the Census 2021-based estimates, apart from a few age groups (Figure 6). For females, the noticeable difference from the England patterns, were that there were more females aged between 20 and 32 years, aged 35 and 36 years, aged 38 to 39 years, aged 44 years and aged 51 to 52 years, in the 2021 rolled-forward estimates. Males generally followed the England patterns in the differences between the two MYEs (Figure 6).

In Wales, the 2021 rolled-forward estimates were generally higher than the Census 2021-based estimates, apart from a few age groups (Figure 6). Notably, females aged between 17 and 19 years and between 33 and 39 years, were lower in the 2021 rolled-forward estimates compared with the Census 2021-based estimates, demonstrating a different pattern to that seen for England.

The patterns of difference seen for Wales and the North East are quite similar, and this may be because of similar drivers of population change over time. Both have relatively low levels of international migration, and their internal migration flows are heavily influenced by student migration to and from higher education.

8 . Reconciliation of mid-year population estimates with Census 2021, England and Wales data

[Population estimates: quality information](#)

Dataset | Released 21 December 2022

Quality information on the mid-year population estimates at local authority and region level for England and Wales, by age and sex.

[Estimates of the population for the UK, England and Wales, Scotland and Northern Ireland](#)

Dataset | Released 21 December 2022

National and subnational mid-year population estimates for the UK and its constituent countries by administrative area, age and sex (including components of population change, median age and population density).

9 . Glossary

Census-based estimates

The method used in years in which a census take place. The mid-year estimates (MYEs) are based on the census estimates rolled-forward only by the time between Census Day and 30 June.

Components of change

Factors contributing to population change, including births and deaths (commonly referred to as natural change), and net migration. Migration includes movements of people between England and the various countries of the world (international migration) and between local authority areas within the UK (internal migration).

Internal migration

Moves made between local authorities, regions or countries within the UK. Unlike international migration, there is no internationally agreed definition.

Rolled-forward estimates

The practice of using the population estimate from the previous reference date as the starting point for estimating the population at the current reference date. The previous population estimate is aged on and data on births, deaths and migration are used to reflect population change during the reference period.

Usually-resident population

The standard United Nations definition is used, including only people who reside in a country for 12 months or more, making them usually resident in that country. As such, visitors and short-term migrants are excluded.

10 . Future developments

The next stage is the production and publication of a rebased mid-year population estimates (MYE) series for England and Wales. Our goal is to publish this in April 2023. This will include the new official estimates of population for England and Wales for the years 2011 to 2020, to accompany the published census-based figures. These estimates will incorporate new migration estimates using our latest developments, where appropriate and available. This will allow us to spread any migration attributed error over time, as well as make adjustments to other population groups (such as older ages and children).

For the purposes of this reconciliation article, internal migration (moves within England and Wales) is not a causative factor for differences at the national level, though it can have profound effects at the subnational level. A more detailed look at the effects of internal migration and how it has affected local authorities (LAs) and regions will be included in the sub-national rebasing report planned for publication later in 2023.

Our aim is to follow the national rebasing with a rebased subnational MYE series in late May 2023. This will distribute the revised national level estimates down to LAs and will incorporate the improved migration estimates and other improvements from the national rebasing. It will also include subnational specific improvements such as the improved internal migration methods (HELM) described in our [Population estimates for the UK, mid-2021: methods guide](#), for the whole decade.

We plan to provide tools to allow users to explore the impact of the rebasing for their local area, to allow them to understand how the rebased estimates differ from previous estimates, and the groups that are most affected.

Alongside this, we have ambitious plans to further develop our dynamic population model (DPM). The DPM uses a range of innovative sources to measure population counts and components of population change in a timely and coherent manner. These are not yet official statistics, while we develop our methodology and assess the quality of our outputs. We have also published our first attempt at producing DPM estimates for all 331 local authorities in England and Wales. In the summer of 2023, we will be updating this with improved data sources to compare against the Office for National Statistics (ONS) MYE for 2022.

11 . Related links

[Rebasing and reconciliation of mid-year population estimates following Census 2021, England and Wales: 2022](#)

Article| Released 5 September 2022

An update for users of population statistics, explaining the process used to integrate Census 2021 data into population estimates (2012 to 2021).

[Methods to produce provisional long-term international migration estimates](#)

Methodology| Released 22 November 2022

An explanation of the methods used to produce the latest provisional experimental statistics on migration flows into and out of the UK.

12 . Cite this article

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