Llywodraeth Cymru
Welsh Government

STATISTICS, DOCUMENT

Analysis of the rebased mid-year population estimates (mid-2012 to mid-2021) following Census 2021, Wales

This statistical article provides further analysis of the Office for National Statistics rebasing of mid-year population estimates following Census 2021 for Wales and England. The article focusses on the rebased estimates for Wales and local authorities in Wales for the period mid-2012 to mid-2021.

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Introduction

Between censuses, the Office for National Statistics (ONS) produces annual mid-year population estimates that use the previous census as a benchmark and roll forward the estimates each year. Over the ten-year period between censuses, these rolled-forward estimates can "drift" away from the next census results. On 23 November 2023, the **ONS published their rebasing of the mid-year population estimates following the Census 2021 in England and Wales**.

This article looks at the differences between the rolled-forward and rebased population estimates at a local authority level. All data are taken from the **rebased population estimates (StatsWales)** and the **rolled-forward population estimates (ONS)**.

Main points

- The rebased population estimates decreased the population of Wales by 66,600 between mid-2011 and mid-2021, from 3.17 million to 3.11 million.
- This is a decrease of 2.1%, which is a proportionally larger decrease than that seen for England (decrease of 0.4%) during the same time period.
- The rebased population estimates were lower than the rolled-forward population estimates for 20 of the 22 local authorities in Wales.
- Newport and Wrexham were the only local authorities whose rebased population estimates were higher than the rolled-forward estimates.
- The largest negative difference between the rolled-forward and rebased population estimates was in Gwynedd, whose population was decreased by 6.2% between mid-2011 and mid-2021, from 124,800 to 117,100.
- During this period the majority (58,700) of the overall decrease in Wales's population as a result of the rebasing exercise, was made up of

unattributable population change - change that could not be certainly accounted for by changes to births, deaths, or migration.

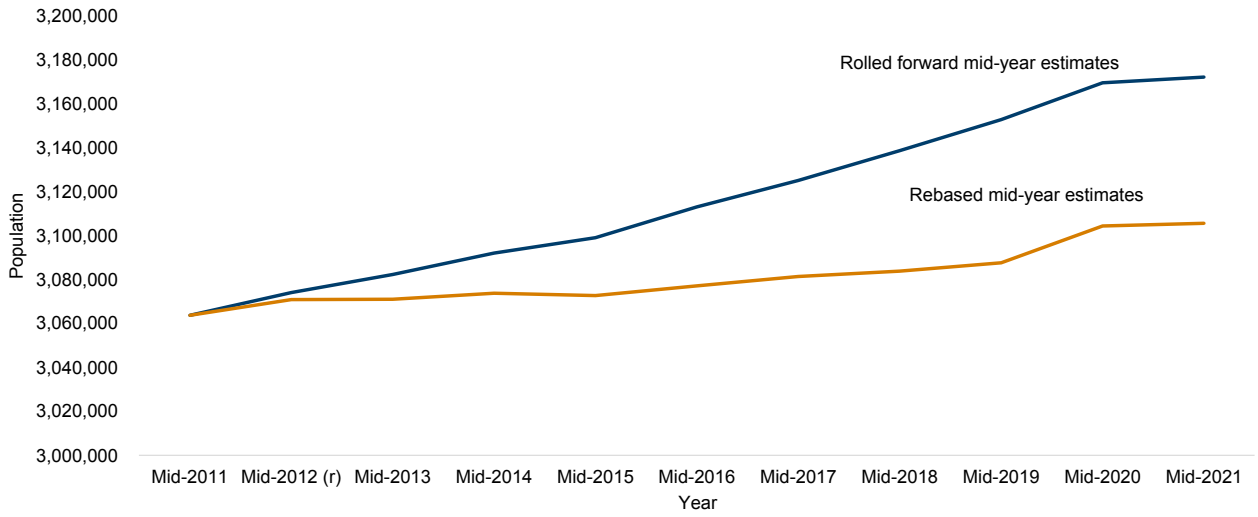
Impact on the population of Wales mid-2012 to mid-2021

Throughout this article, we look at the differences between the rolled-forward population estimates and the rebased population estimates. The rolled-forward population estimates refer to the population estimates that were based on Census 2011, and ‘rolled-forward’ every year. These rolled-forward population estimates used Census 2011 as a starting point, and each year the data is aged on, and data on births, deaths and migration are used to reflect population change during mid-2011 and mid-2021. Over the ten-year period between censuses, these rolled-forward estimates can "drift" away from the next census results.

The rebased population estimates refer to the population estimates that have been updated to be consistent with the population estimates from Census 2021. Further information is available in **ONS’ reconciliation report**.

The rebased population estimates are lower than the rolled-forward population estimates for Wales for every year between mid-2012 and mid-2021. By mid-2021, the rebased population estimate was 66,600 lower than the rolled-forward population estimate, decreasing from 3.17 million to 3.11 million.

Figure 1: Comparison between the rolled-forward population estimates and rebased population estimates, by year

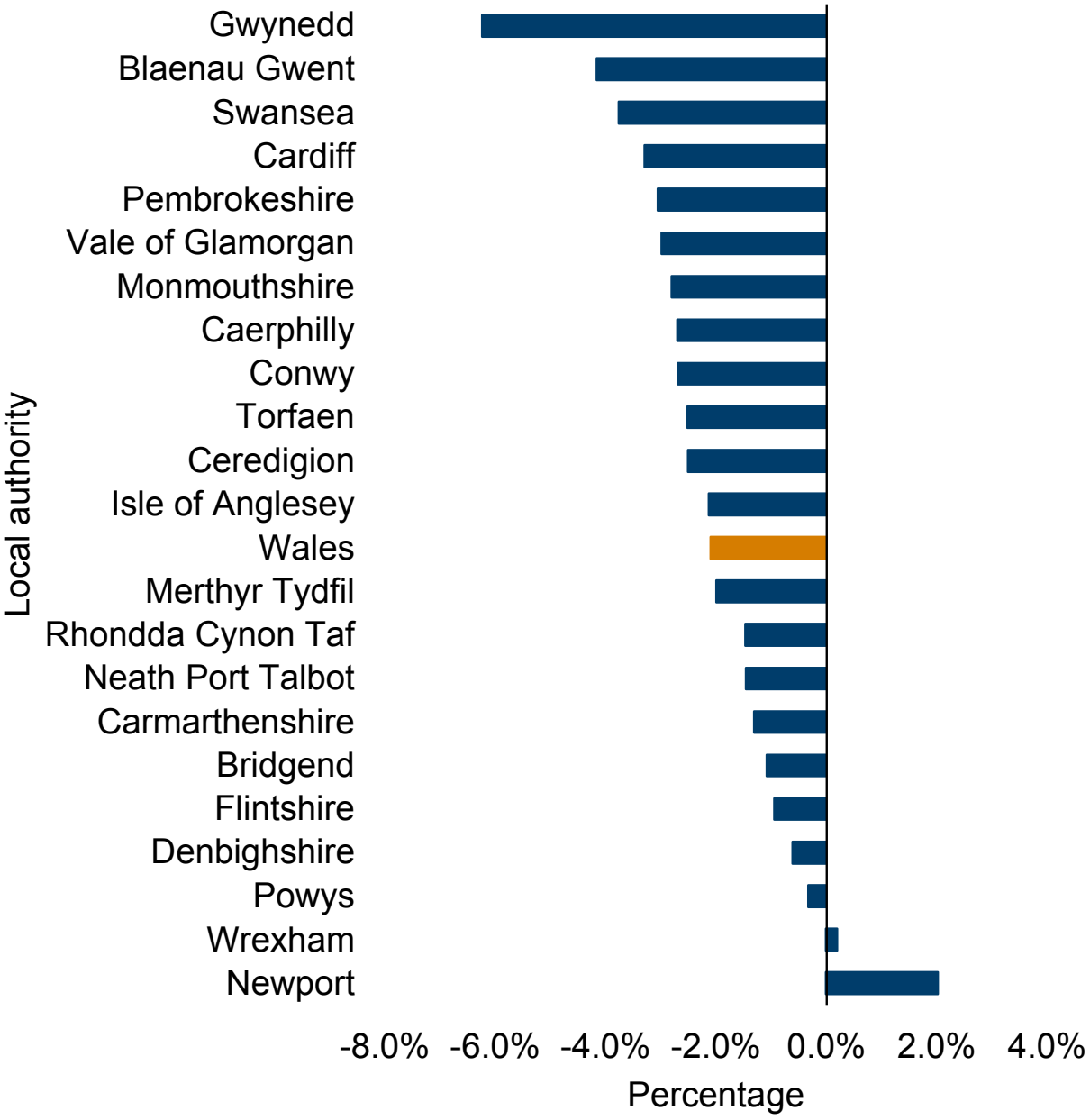


Description of Figure 1: Line chart showing that after mid-2011, the rebased population estimates are lower than the rolled-forward population estimates for every year up to mid-2021.

(r) The mid-2012 figure for the rolled forward population estimates in the chart was revised on 8 July 2024. The figure for the rolled forward population estimates for mid-2012 incorrectly matched the figure for the rebased population estimates for mid-2012.

Latest mid-year population estimates for Wales (StatsWales) and **rolled-forward population estimates (ONS)**

Figure 2: Percentage difference between the rolled-forward population estimates and rebased population estimates, by local authority in mid-2021 [Note 1]



Description of Figure 2: Bar chart showing that Gwynedd had the largest negative percentage difference between the rolled-forward population estimate and rebased population estimate, while Newport had the largest positive percentage difference by mid-2021.

[Note 1] A negative percentage difference means that the rebased population estimates are lower than the rolled-forward population estimates. A positive percentage difference means that the rebased population estimates are higher than the rolled-forward population estimates.

By mid-2021, for 20 out of 22 local authorities in Wales, the rebased population estimates were lower than the rolled-forward population estimates. The largest reduction in population estimates was for Gwynedd, whose population was reduced by 6.2%, from 124,800 to 117,100. This is followed by Blaenau Gwent, whose population estimates were reduced by 4.2%, from 69,900 to 67,000.

Newport and Wrexham were the only two local authorities whose rebased population estimates were higher than the rolled-forward population estimates by mid-2021. Newport had the largest increase in population estimates due to rebasing, increasing by 2.0%, from 156,500 to 159,700 in mid-2021.

Differences by sex and age

The rebased population estimates for Wales decreased both the number of males and females compared with the rolled-forward estimates. Rebasing decreased the male population by 2.8% and the female population by 1.4%

Figure 3: Percentage difference between the rolled-forward population estimates and rebased population estimates, by age and sex in mid-2021

Description of Figure 3: Line chart showing that for young adult ages (20 to 34 year olds), rebasing decreased the population estimates for both males and females, but more so for males.

Overall, in mid-2021, rebasing increased the population aged 16 to 19 years old in Wales by 1.3%. This varied slightly by sex, with the population of females aged 16 to 19 years old increasing by 1.7%, while the population of males increased by 0.9% in mid-2021.

Rebasing decreased the population aged 20 to 34 years old in Wales by 6.8%. This varied by sex, with the population of males aged 20 to 34 years old decreasing by 9.8%, while the population of females decreased by 3.7% in mid-2021.

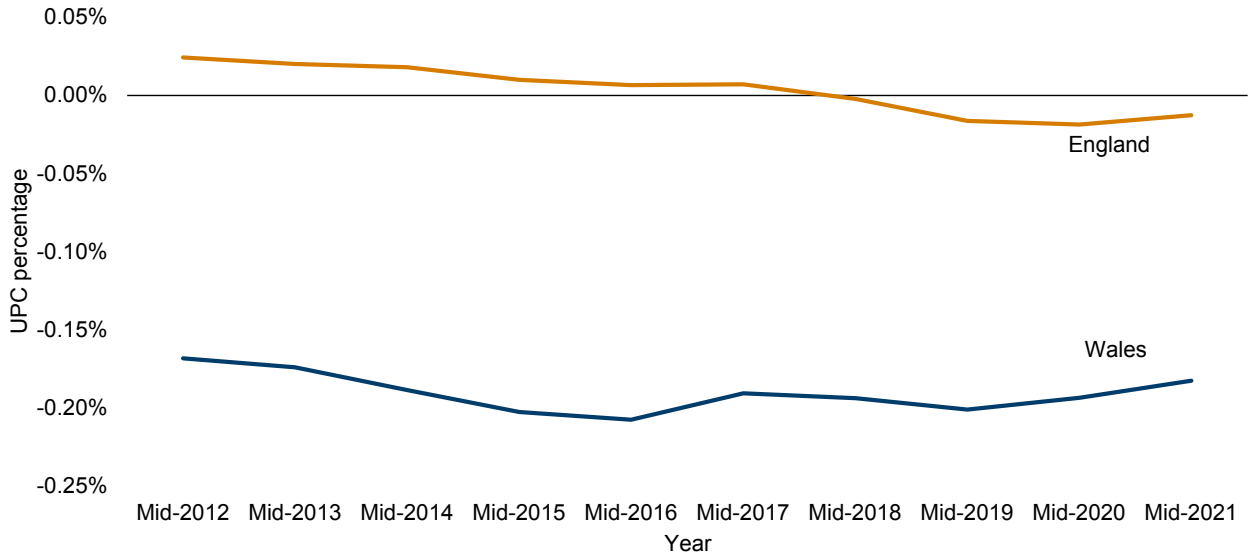
Unattributable change in population

Unattributable population change (UPC) is the remaining population change that can be seen between the census-based and the rolled-forward population estimates allocated over the decade, which cannot be explained by any of the components of change, namely births, deaths, and migration. This is a natural feature of rebasing the estimates and represents uncertainty affecting the components and the base population estimates. UPC has impacted local authorities, ages and sexes in different ways and to different extents, and represents uncertainty affecting the components of change for these local authorities.

Overall, in the period from mid-2012 to mid-2021, Wales's cumulative UPC was -58,700 This means that the majority of the overall decrease in Wales's population during this period as a result of the rebasing exercise (66,600) was made up of change that could not be accounted for by changes to births, deaths, or migration.

For all years in this period, UPC for Wales was negative. This compares with a mixture of positive and negative UPC in England from mid-2012 to mid-2021, resulting in a cumulative UPC of 18,300.

Figure 4: Unattributable population change as a percentage of the population for Wales and England, mid-2012 to mid-2021 [Note 1]

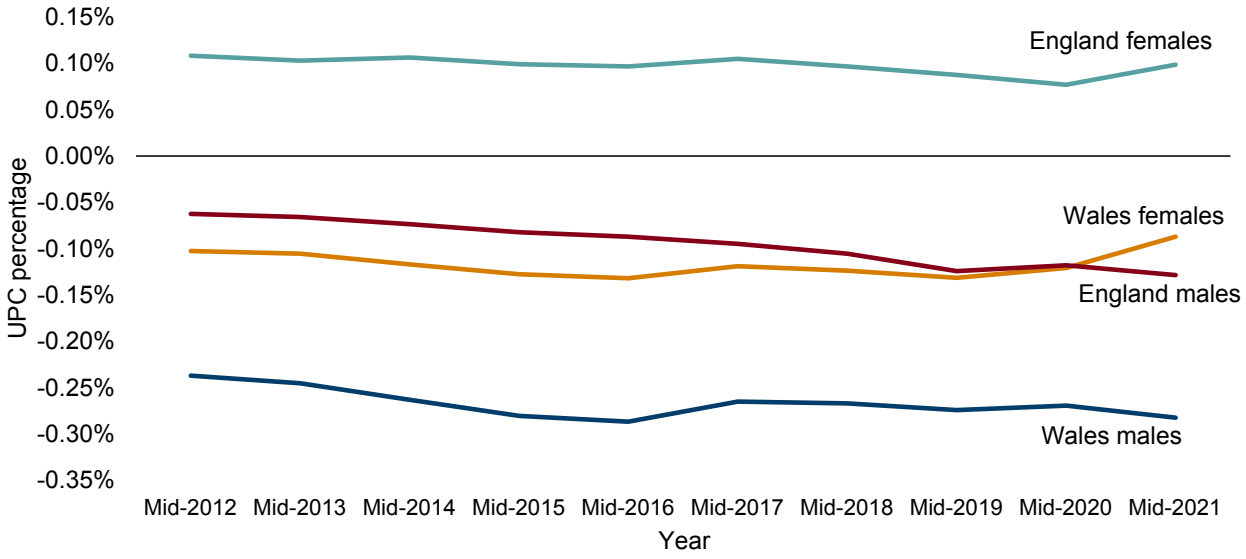


Description of Figure 4: Line chart showing that in every year from mid-2012 to mid-2021, Wales's UPC had a larger impact on population change as a percentage of the population compared with England.

[Note 2] UPC that is close to zero represents scenarios where any population change between the rolled-forward estimates and the rebased estimates can be accounted for by any changes to births, deaths or migration. Larger UPC (positive or negative) represents scenarios where any population change between the rolled-forward estimates and the rebased estimates cannot be accounted by for any changes to births, deaths and migration, i.e. the source of the population change is uncertain.

Figure 5: Unattributable population change by sex as a percentage of the population for Wales and England,

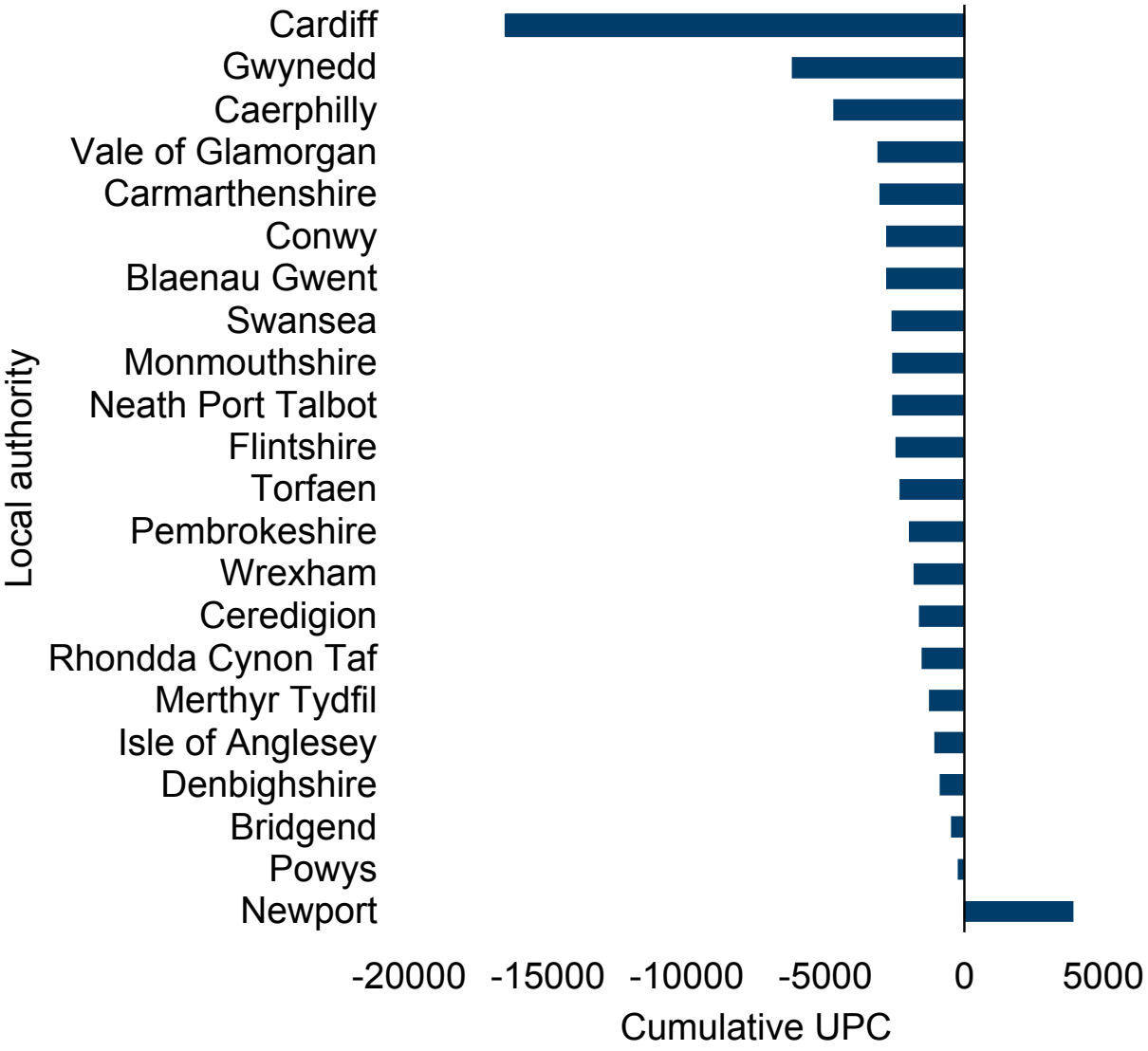
mid-2012 to mid-2021



Description of Figure 5: Line chart showing that in every year from mid-2012 to mid-2021, except mid-2021, UPC as a percentage of the population is greater in Wales than in England for both males and females. In mid-2021 males in England experienced a greater negative UPC as a percentage of the population compared to females in Wales.

As a percentage of the population in each given year, UPC varied in Wales between mid-2012 and mid-2021. In mid-2021, UPC accounted for -0.18% of Wales's population, compared with -0.01% for England. However, the year where UPC accounted for the highest percentage of the population in Wales was mid-2016 (-0.21%). The percentage in mid-2016 for males was -0.29% and for females -0.13%.

Figure 6: Cumulative unattributable population change, by local authority in Wales, mid-2012 to mid-2021



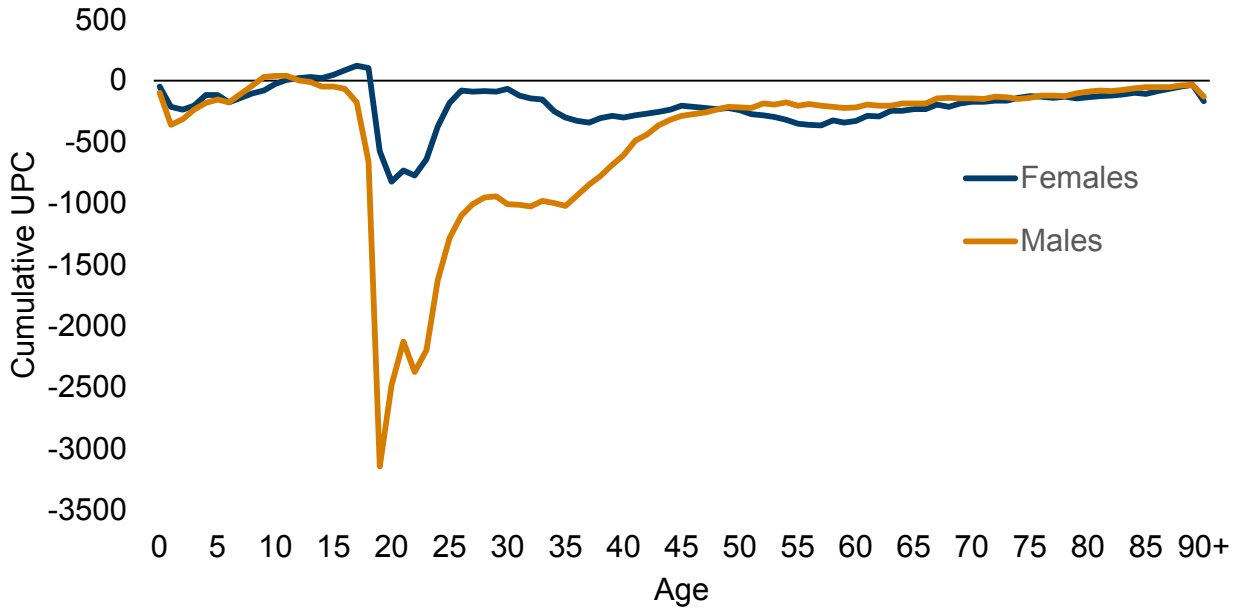
Description of Figure 6: Bar chart showing that Cardiff had the largest cumulative UPC in the period mid-2012 to mid-2021, while Newport was the only local authority that had positive cumulative UPC.

Out of all local authorities in Wales, Cardiff had the largest UPC (positive or negative) over the period mid-2012 to mid-2021. Cardiff's total UPC during this period was -16,500. The next largest UPC was in Gwynedd, which was -6,200. This means Cardiff and Gwynedd experienced the largest amounts of population change in Wales in the period mid-2012 to mid-2021 that could not be explained by births, deaths, or migration.

Newport is the only local authority to see positive cumulative UPC during this period, of 3,900.

Powys (-230) and Bridgend (-460) experienced the lowest levels of cumulative UPC in Wales in the period mid-2012 to mid-2021. This means that these local authorities experienced the least change in population between mid-2012 and mid-2021 that could not be accounted for by any changes to births, deaths, or migration.

Figure 7: Cumulative unattributable population change (mid-2012 to mid-2021) by age and sex, Wales



Description of Figure 7: Line chart showing that males aged 18 to 25 in Wales experienced the largest cumulative UPC over the period mid-2012 to mid-2021.

Cumulative UPC was much higher for males in Wales compared with females. Over the period mid-2012 to mid-2021, males experienced a UPC of -40,400 while for females, this figure was -18,300. UPC was most prominent at university ages. The cumulative UPC for 18 to 25 year olds was -19,900. This accounts for over a third (33.9%) of all UPC in Wales over the total period mid-2012 to mid-2021. This is made up of UPC of -15,900 for males aged 18 to 25 years old, and a UPC of -4,000 for females aged 18 to 25 years old.

Case studies

This next section will explore the implications of the rebasing for two local authorities in Wales, focusing on the reasons for the UPC for areas that changed the most as a result of the rebasing.

Each case study will have a table presenting the components of population change relating to each local authority included, showing the impact of the rebasing on the population estimate for 2021, the net impact of UPC, and the net impacts of the revisions to internal and international migration between mid-2012 and mid-2021. Impacts of revisions to births and deaths have not been included as revisions over the period were very small.

The impacts of UPC and of revisions to migration will not total the overall change to the population because of the exclusion of births, deaths and special changes to the population.

Gwynedd

Gwynedd is a local authority situated in the north-west of Wales and contains a university campus (Bangor University).

Table 1: Population change and net components of change by mid-2021 in Gwynedd

	Total	Males	Females
Impact of rebasing on population	-7,800	-4,700	-3,000

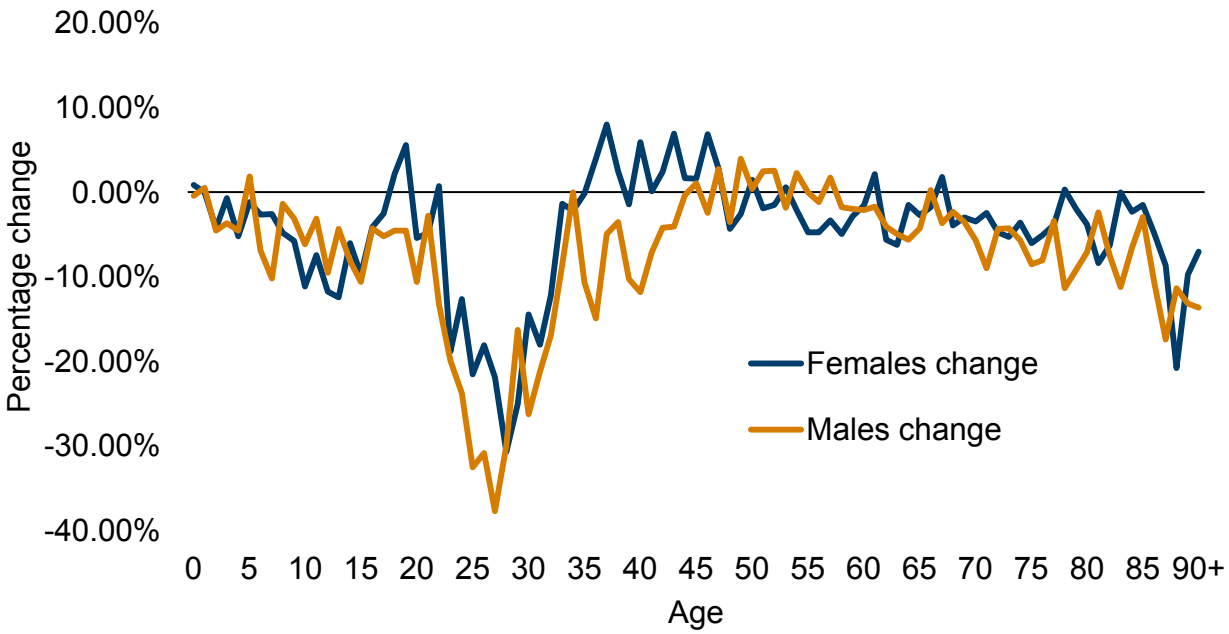
	Total	Males	Females
Impact of UPC	-6,200	-4,000	-2,100
Impact of revisions to internal migration	-100	100	-200
Impact of revisions to international migration	-1,500	-700	-800

Description of Table 1: Table showing that for Gwynedd, rebasing has reduced the population by 7,800 people by 2021. Most of this change is due to UPC.

Following the rebasing of the population estimates from mid-2012 to mid-2021, the population in Gwynedd by mid-2021 was reduced by 4,700 males and 3,100 females, from 124,800 to 117,100 people (a decrease of 6.2%). This is largely driven by UPC, i.e., changes that cannot be accounted for by any changes to births, deaths or migration.

The UPC for Gwynedd was high with a net reduction of 6,200 people across mid-2012 to mid-2021, made up of 4,100 males and 2,100 females.

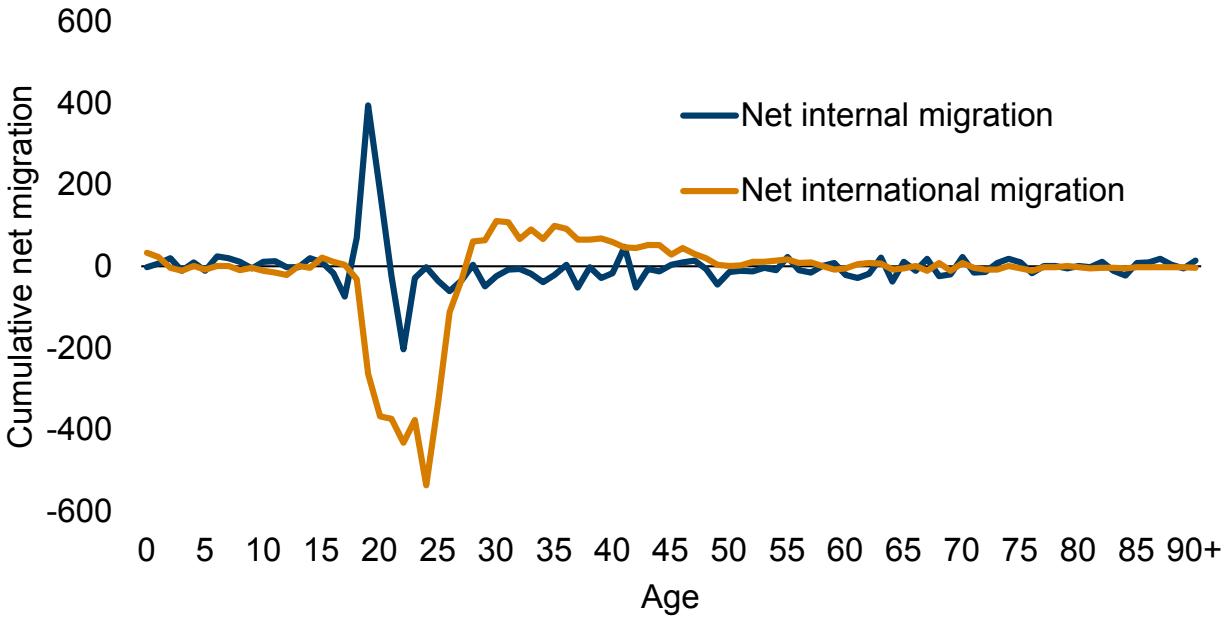
Figure 8: Percentage difference between the rolled-forward population estimates and rebased population estimates for Gwynedd, by age and sex in mid-2021



Description of Figure 8: Line chart showing that for Gwynedd, rebasing has reduced the population aged 20 to 34 years old for both males and females by mid-2021.

Figure 8 shows that by mid-2021 the population aged 20 to 34 years old was reduced from 25,900 to 21,500, a decrease of 17.0%. Males aged 25 to 29 decreased by 30.0%, compared with 23.6% for females.

Figure 9: Cumulative impact of revisions to net migration by mid-2021 in Gwynedd by age

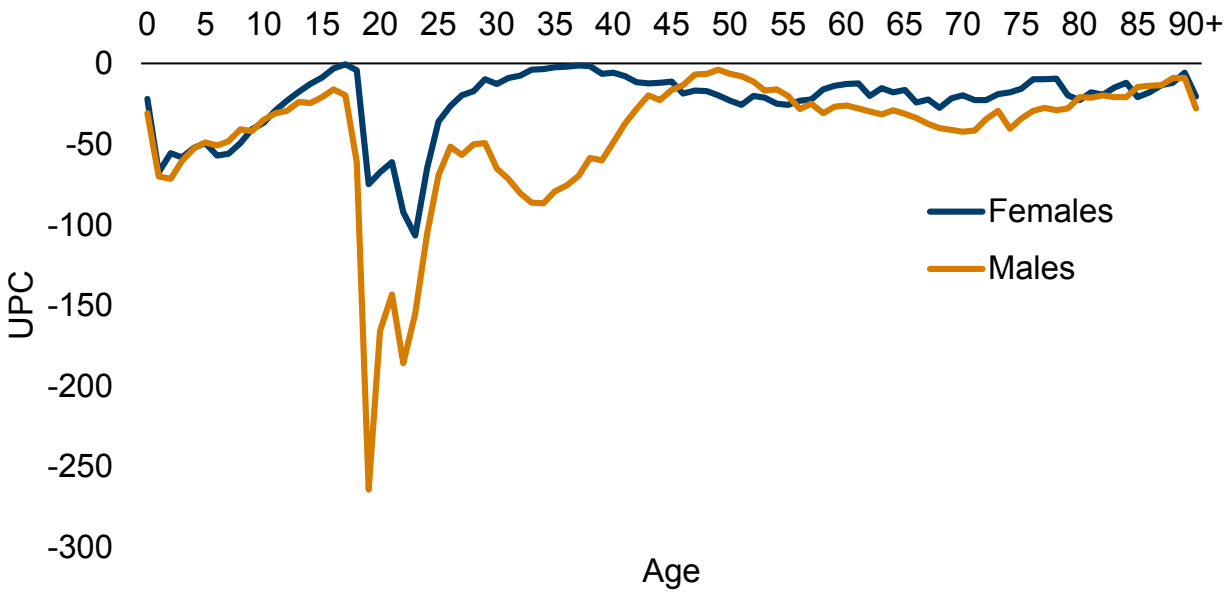


Description of Figure 9: Line chart showing that for Gwynedd, the population aged 18 to 21 years old has increased due to revisions to net internal migration. The population aged 18 to 25 years old decreased due to revisions to net international migration.

For university student ages (18 to 21 year olds) during the period mid-2012 to mid-2021, the population was increased by 620 people due to revisions to net internal migration. The population aged 18 to 25 years old was decreased by 2,700 people because of revisions to net international migration. This suggests that the rolled-forward estimates had underestimated net internal migration for university aged people, but overestimated net international migration for university aged people and young adults (ages 18 to 25 years old).

These trends were similar for both males and females in cumulative internal and international net migration in Gwynedd.

Figure 10: Cumulative Unattributable Population Change impact by mid-2021 in Gwynedd by age and sex



Description of Figure 10: Line chart showing that by mid-2021 for Gwynedd, the population was reduced the most for people aged 18 to 25 years old for both males and females due to UPC. The reduction was greater for males than for females.

In Gwynedd, the population aged 18 to 25 years old by mid-2021 was reduced by 1,700 people due to UPC. This accounts for 26.7% of all UPC in Gwynedd. This means that of the population change that cannot be accounted for by any changes to births, deaths and migration, over a quarter of it is concentrated to young adults and students.

Males aged 18 to 25 years old were reduced by 1,200 people which may be due to graduates not updating their administrative records (for example, GP registrations) following graduation.

Newport

Newport is a local authority situated in the south-east of Wales and contains a university campus (University of South Wales).

Table 2: Population change and net components of change by mid-2021 in Newport

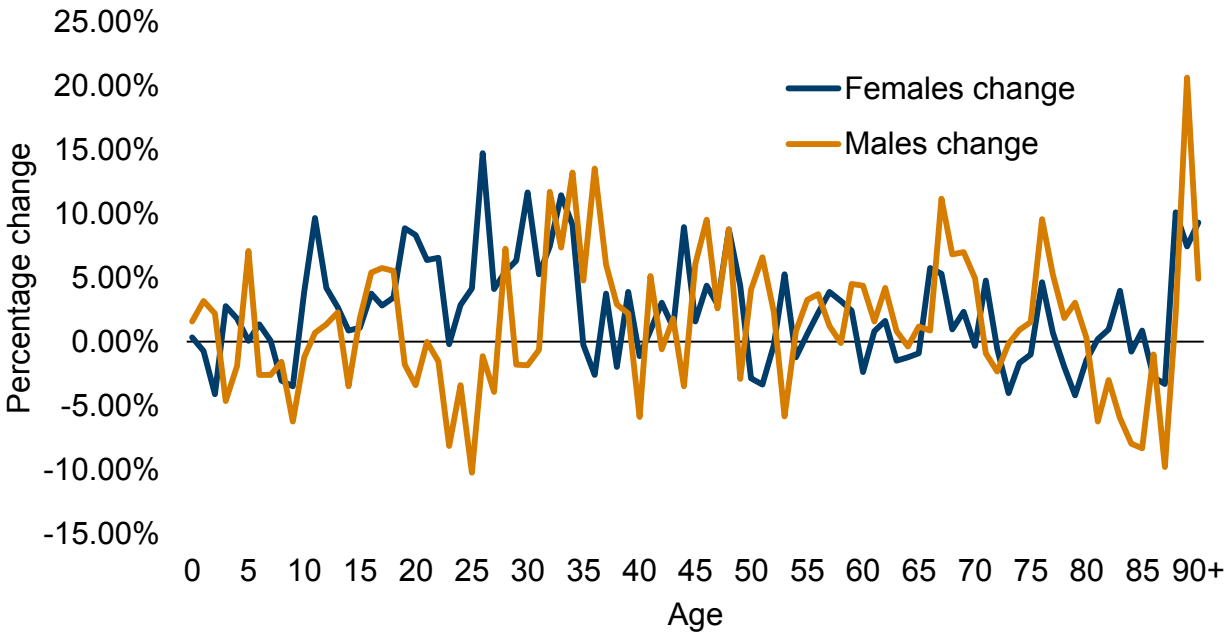
	Total	Males	Females
Impact of rebasing on population	3,200	1,200	2,000
Impact of UPC	3,900	1,700	2,300
Impact of revisions to internal migration	-100	~0	-100
Impact of revisions to international migration	-500	-400	-100

Following the rebasing of the population estimates from mid-2012 to mid-2021, the population of Newport in mid-2021 was increased by 1,200 males and 2,000 females, from 156,500 to 159,700 people (an increase of 2.0%). Similar to Gwynedd, this change is largely driven by UPC.

The UPC for Newport was high with a net increase of 3,900 people across mid-2012 to mid-2021, made up of 1,700 males and 2,300 females. This was higher than the overall rebasing of the population with net migration (both internal and international migration) reducing the population by 600.

Figure 11: Percentage difference between the rolled-forward

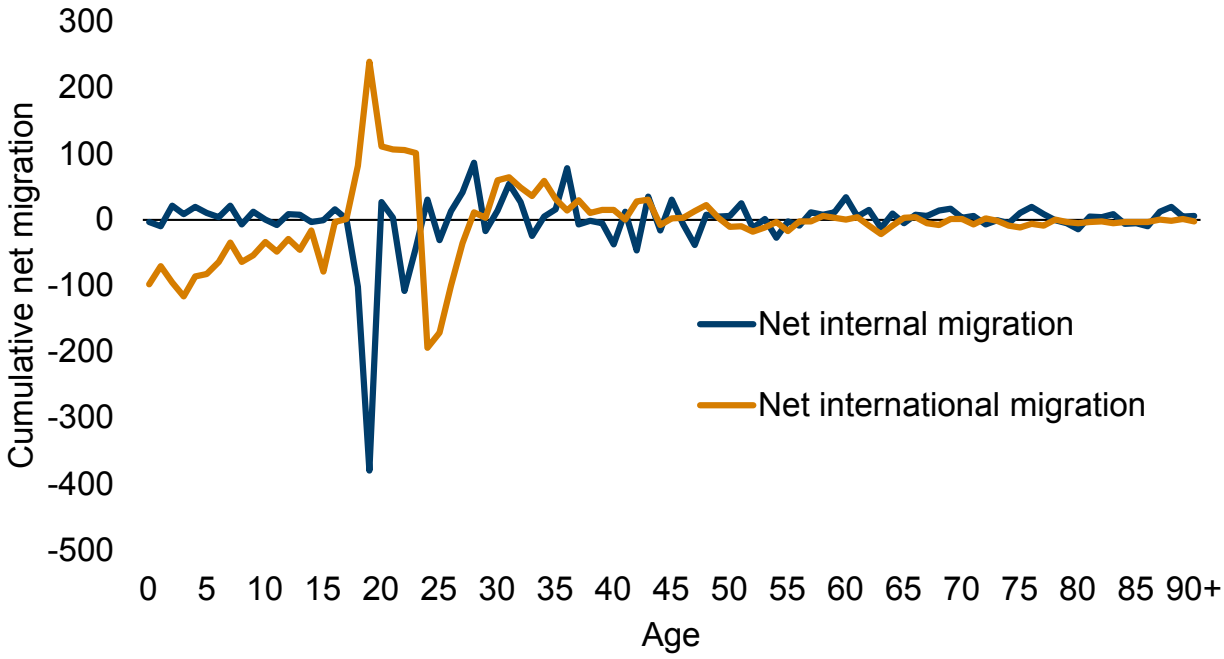
population estimates and rebased population estimates for Newport, by age and sex in mid-2021



Description of Figure 11: Line chart showing that for Newport, rebasing has reduced the population aged 20 to 25 years old for males but increased the population aged 20 to 25 years old for females by mid-2021.

Figure 11 shows that by mid-2021, the male population aged 20 to 25 years old decreased by 4.7% compared to an increase of 4.3% for the female population aged 20 to 25 years old. The population aged 26 to 34 years old increased for both males and females. Rebasing increased the population aged 26 to 34 years old for males by 3.4% and for females by 8.4%.

Figure 12: Cumulative impact of revisions to net migration mid-2021 in Newport by age



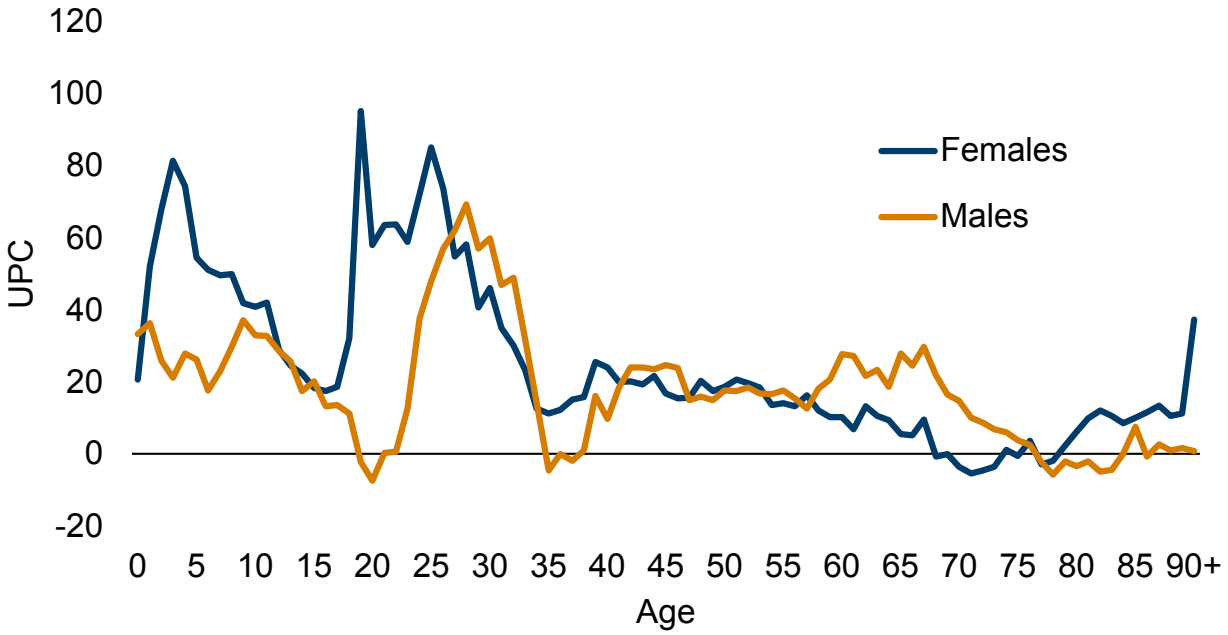
Description of Figure 12: Line chart showing that for Newport, the population aged 18 to 21 years old has decreased due to revisions to net internal migration. The population aged 18 to 21 years old has increased due to revisions to net international migration.

For university student ages (18 to 21 years old) across mid-2012 to mid-2021, the population was decreased by 450 people (made up of around 240 males and 220 females) because of net internal migration. For the same age group, the population was increased by 540 people because of net international migration (made up of 240 males and 300 females). This suggests that the rolled-forward estimates had overestimated net internal migration for university aged people but underestimated net international migration for university aged people.

These trends were similar for both males and females in cumulative internal and

international net migration in Newport.

Figure 13: Cumulative Unattributable Population Change impact by 2021 in Newport by age and sex



Description of Figure 13: Line chart showing that by mid-2021 for Newport, the population was increased the most for people aged 18 to 34 years old, for both males and females due to UPC. The increase was greater for females than for males.

In Newport, the UPC added population to most ages with only minor reductions for some age groups. The population aged 18 to 30 years old was increased by 1,200 people by mid-2021 because of UPC. This accounts for nearly a third of all UPC in Newport (30.6%). This means that of the population change that cannot be accounted for by any changes to births, deaths and migration, just under a third of it is concentrated to young adults and students.

Next steps

As part of ONS' ongoing work on improving the quality of their data and understanding population estimates they are conducting research to assess the impacts of alternative methods for distributing UPC over time and the age profile. They hope to update users on the outcome of this and any implications in due course.

They will also publish the latest admin-based population estimates (ABPEs) from their dynamic population model (DPM), which will use the revised components from the rebasing to inform its modelling and provide additional insight into patterns of population change over time. The ABPEs will include comparisons with the mid-year population estimates at the LA level, along with measures of uncertainty.

Glossary

Census-based estimates

The method used in years in which a census takes 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

Components of change are the factors that contribute to population change. This includes births and deaths (referred to as natural change) and net migration. Migration includes movements of people between the UK and the various countries of the world (international migration) and between local authority areas

within the UK (internal migration).

Internal migration

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

International migration

International migration describes the flow (or movement) of migrants to and from the UK. This report uses the UN-recommended definition of a long-term international migrant, as explained in the **Recommendations on Statistics of International Migration paper (United Nations statistics)**. It is defined as “A person who moves to a country other than that of his or her usual residence for a period of at least a year (12 months), so that the country of destination effectively becomes his or her new country of usual residence”.

Rolled-forward estimates

The practice of using the population estimate form 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.

Unattributable population change (UPC)

UPC is the remaining population change between the census-based and the rolled-forward population estimates, once methodological changes and

estimated errors in the components had been taken into account. In other words, UPC is population change that cannot be specifically explained by any of the components of change – births, deaths or migration. For example, people may not change their home address on their GP records when they move, they would have a different address on the census meaning an area's population would be less than originally estimated using the rolled forwards method.

UPC is a natural feature of rebasing the estimates and represents uncertainty affecting the components and the base population estimates. This is allocated across the decade to create a plausible distribution of change.

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