

Article

# Mortality from leading causes of death by ethnic group, England and Wales: 2012 to 2019

Experimental analysis of ethnic differences in mortality and cause-specific mortality in England and Wales based on 2011 Census and death registrations.

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# 1 . Main points

This article presents experimental statistics on ethnic differences in leading causes of death in England and Wales, using death registrations linked to self-reported ethnicity from the 2011 Census. The White ethnic group accounted for more than 95% of registered deaths in each of the three-year rolling periods, between 2012 to 2019.

- In the latest period, 2017 to 2019, the White group had a statistically significantly higher [age-standardised mortality rate](#) (ASMR) from all-causes than any other ethnic group and had higher ASMRs than most other ethnic groups for many leading causes of death including dementia and Alzheimer's disease and a range of common cancers.
- Looking at the most common causes of death, ischaemic heart disease featured for all ethnic groups, and the highest ASMRs across time have been in the Bangladeshi, Pakistani and Indian ethnic groups.
- The White, Mixed, and Black Caribbean ethnic groups had the highest dementia and Alzheimer's disease ASMRs.
- Lung cancer ASMRs were highest among male Bangladeshi, Mixed, and White ethnic groups, and in female White and Mixed ethnic groups.
- While not one of the most common causes of death, suicide ASMRs in males were higher in White and Mixed ethnic groups than in other groups, and in females the rate for the Mixed ethnic group was higher than other groups.
- The results reveal important patterns in causes of death between ethnic groups that are complex but nevertheless consistent with most previous studies; further research is required to investigate the reasons for the differences, with potential explanations including past migration patterns, socio-economic composition of the groups, health-related behaviours, and clinical and biological factors.

If you are a journalist covering a suicide-related issue, please consider following the [Samaritans' media guidelines on the reporting of suicide](#) because of the potentially damaging consequences of irresponsible reporting. In particular, the guidelines advise on terminology and include links to sources of support for anyone affected by the themes in the article.

If you are struggling to cope, please call Samaritans for free on 116 123 (UK and ROI) or contact other sources of support, such as those listed on the NHS's [help for suicidal thoughts](#) webpage. Support is available round the clock, every single day of the year, providing a safe place for anyone struggling to cope, whoever they are, however they feel, whatever life has done to them.

## 2 . Purpose of the article and data used

This article provides [experimental statistics](#) on ethnic differences in [leading causes of death](#) in England and Wales using self-reported ethnic background from the 2011 Census linked to death registrations between 2012 and 2019. Experimental statistics are those which are still in the testing phase; strengths and limitations are described in [Section 8](#) and [Section 10](#).

This article follows from recently published experimental analysis of [ethnic differences in life expectancy and mortality from selected causes in England and Wales](#). This article aims to provide more detail around causes of death by ethnic group and to stimulate future research to improve understanding of the causes of these ethnic differences.

In England and Wales, the death registration process does not collect information on the deceased's ethnic background and linking death registrations to the census is the best way to study mortality by self-reported ethnic group. Records between the two datasets were linked using NHS numbers – these are available for each registered death and were added to the census by linking to the General Practice Patient Register.

The article is based on analysis of 50,189,388 records from the 2011 Census and 4,035,941 deaths that were registered between 2012 and 2019. The population used for the analysis does not include:

- people who were born or immigrated to the UK after the day of the 2011 Census (27 March 2011)
- those who were not enumerated in the census
- those who were enumerated in the census but could not be linked to the patient register

For each ethnic group we used statistical weighting techniques to address these linkage issues, and we applied weights to each year to reflect patterns of emigration for each ethnic group (see [Section 10](#)). The analysis is based on 94.6% of the enumerated census count, or 89.5% of the published 2011 Census count if we consider those who were not enumerated in the census, and 96.8% of all deaths registered during the period.

### 3 . Ethnic group breakdown used in this article

In this article we use the ethnic grouping, based on self-reported ethnic background collected in the 2011 Census. We use this breakdown, rather than the [harmonised expanded 18 group classification](#), because it provides categories with large enough numbers to estimate reliable male and female mortality rates with adequate precision for each group.

The ethnic groups used in this article are:

- White: White British, White Irish, Gypsy and Irish Travellers, Other White
- Bangladeshi
- Indian
- Pakistani
- Asian Other
- Black African
- Black Caribbean
- Black Other
- Mixed: White and Black Caribbean; White and Black African; White and Asian; Any other Mixed or Multiple ethnic background
- Other: Arab, Chinese, Other.

## 4 . Mortality from leading causes of death: 2012 to 2019

We calculated [age-standardised mortality rates](#) (ASMRs) for leading causes of death. Because of the small numbers of deaths for some ethnic groups, we present results for three-year rolling periods for deaths registered in England and Wales between 2012 and 2014 and 2017 and 2019. The analysis is limited to people aged 10 years and over, and only includes people from our study population (see [Section 10](#)).

The White group accounted for more than 95% of registered deaths in each period. In all periods the all-cause mortality rate for the White group was statistically significantly higher than all other ethnic groups, except the Mixed ethnic group where this was only true for the latest periods.

### Figure 1: The White ethnic group has had higher all-cause mortality rate than all other ethnic groups in the latest periods

Age-standardised rates of death per 100,000 from all causes, deaths registered in England and Wales, 2012-14 to 2017-19

#### Notes:

1. Figures are for those aged 10 years and above from our study population (see [Section 10](#)).
2. The “Other” ethnic group includes Arab, Chinese, and Other ethnic groups.
3. “\*” flags the ethnic groups that have seen statistically significant differences, when comparing the 2012 to 2014 and 2017 to 2019 ASMRs.

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The commentary focuses on the five most common leading causes of death for each ethnic group, as determined by ranking ASMRs. Rates and numbers of deaths for all of the Office for National Statistics’ (ONS) list of leading causes of death are in the accompanying data tables. The leading causes of death for each ethnic group have generally been consistent across time; Tables 1 and 2 summarise the leading causes in the latest period (2017 to 2019) for each ethnic group.

### Table 1: For males in all ethnic groups except Black Caribbean, the leading cause of death was Ischaemic heart diseases

Deaths registered in England and Wales, 2017-19, age-standardised mortality rates per 100,000 for the most common leading causes of death for each ethnic group, males aged 10 years and above

#### Notes:

1. See Figure 1 for other relevant notes.
2. Underlying cause of death defined using the International Classification of Diseases, tenth revision (ICD-10): Ischaemic heart diseases (I20 to I25); Dementia and Alzheimer's disease (F01, F03, G30); Chronic Lower Respiratory Disease (J40 to J47); Malignant neoplasm of trachea bronchus and lung (C33 to C34); Influenza and pneumonia (J09 to J18); Cerebrovascular diseases (I60 to I69); Malignant neoplasm of prostate (C61).
3. We only provide figures based on at least 20 deaths.

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## **Table 2: For females in all ethnic groups except Bangladeshi, Indian and Pakistani the leading cause of death was Dementia and Alzheimer's disease**

Deaths registered in England and Wales, 2017-19, age-standardised mortality rates per 100,000 for the most common leading causes of death for each ethnic group, females aged 10 years and above

**Notes:**

1. See Figure 1 for other relevant notes.
2. Underlying cause of death defined using the International Classification of Diseases, tenth revision (ICD-10): Ischaemic heart diseases (I20 to I25); Dementia and Alzheimer's disease (F01, F03, G30); Chronic Lower Respiratory Disease (J40 to J47); Malignant neoplasm of trachea bronchus and lung (C33 to C34); Influenza and pneumonia (J09 to J18); Cerebrovascular diseases (I60 to I69); Diabetes (E10 to E14); Malignant neoplasm of breast (C50).

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## **Ischaemic heart diseases**

Ischaemic heart diseases (IHD), heart problems caused by narrow heart arteries, are one of [the top leading causes of death in the population as a whole](#), and featured in the five most common causes for all ethnic groups and for both sexes throughout 2012 to 2019. IHD accounted for 10.5% (162,804 deaths in 2017 to 2019) of death registrations in the latest period.

The highest mortality rates in males have been in the Bangladeshi, Pakistani, and Indian ethnic groups. In the latest period, these groups had rates of 219.1, 206.7, and 190.9 deaths per 100,000 males, respectively, all of which were statistically significantly higher than the rate in the White group (157.9 deaths per 100,000).

**Figure 2: In males, the highest mortality rates from ischaemic heart disease were in the Bangladeshi, Pakistani, and Indian ethnic groups**

## Age-standardised rates of death per 100,000 from ischaemic heart disease by ethnic group, deaths registered in England and Wales, males, 2012-14 to 2017-19

### Notes:

1. See Figure 1 for other relevant notes.
2. Underlying cause of death defined using the International Classification of Diseases, tenth revision (ICD-10 codes I20 to I25).
3. “\*\*” flags the ethnic groups that have seen statistically significant differences, when comparing the 2012 to 2014 and 2017 to 2019 ASMRs.

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In females, the same ethnic groups tended to have the highest rates (Bangladeshi, Pakistani, Indian), and in the latest period the rates for these ethnic groups (114.8, 109.6, and 99.3 per 100,000 females, respectively) were statistically significantly higher than the rate in the White group (70.5 deaths per 100,000).

### Figure 3: In females, the highest mortality rates from ischaemic heart disease have been in the Bangladeshi, Pakistani, and Indian ethnic groups in recent periods

## Age-standardised rates of death per 100,000 from ischaemic heart disease by ethnic group, deaths registered in England and Wales, females, 2012-14 to 2017-19

### Notes:

1. See Figure 1 for other relevant notes.
2. Underlying cause of death defined using the International Classification of Diseases, tenth revision (ICD-10 codes I20 to I25).
3. “\*\*” flags the ethnic groups that have seen statistically significant differences, when comparing the 2012 to 2014 and 2017 to 2019 ASMRs.

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## Dementia and Alzheimer’s disease

Dementia and Alzheimer’s disease are leading causes of death in the general population and featured in the five most common causes for most ethnic groups and for both sexes since 2012 to 2014. This cause represents 12.9% (200,111 deaths in 2017 to 2019) of death registrations in the latest period.

Black Caribbean, Mixed, and White ethnic groups have had similar rates for this cause in males, and in 2017 to 2019, rates in these groups (122.2, 111.1, and 121.6 deaths per 100,000 males, respectively) were statistically significantly higher than all other groups, except Bangladeshi and Black Other.

**Figure 4: Males in the White ethnic group had statistically higher mortality rates from dementia and Alzheimer's disease than most ethnic groups, except Mixed, Black Caribbean, and Black Other groups**

Rates of death from dementia and Alzheimer's disease by ethnic group, deaths registered in England and Wales, males, 2012-14 to 2017-19

**Notes:**

1. See Figure 1 for other relevant notes.
2. Underlying causes of death defined using the International Classification of Diseases, tenth revision (ICD-10 codes F01, F03, G30).
3. “\*\*” flags the ethnic groups that have seen statistically significant differences, when comparing the 2012 to 2014 and 2017 to 2019 ASMRs.

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In females, the same ethnic groups had the highest rates across time (White, Mixed, Black Caribbean), and, for the latest period, rates in these groups (142.0, 139.2, and 120.8 per 100,000 females, respectively) were statistically significantly higher than all other groups.

**Figure 5: In females, the mortality rate from dementia and Alzheimer's disease in the White group was statistically significantly higher than all other groups, except for Mixed, in 2017-19**

Age-standardised rates of death per 100,000 from dementia and Alzheimer's disease by ethnic group, deaths registered in England and Wales, females, 2012-14 to 2017-19

**Notes:**

1. See Figure 1 for other relevant notes.
2. Underlying cause of death defined using the International Classification of Diseases, tenth revision.
3. “\*\*” flags the ethnic groups that have seen statistically significant differences, when comparing the 2012 to 2014 and 2017 to 2019 ASMRs.

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## Cerebrovascular diseases

In 2017 to 2019, cerebrovascular diseases, conditions that affect the blood supply to the brain such as stroke, appeared in the five most common leading causes for all ethnic groups and for all sexes except the White male group. The cause represents 5.8% of deaths registered in the latest period (90,106 deaths in 2017 to 2019).

For both sexes, and since 2012 to 2014, the Bangladeshi group had the highest rate of death from this cause. In 2017 to 2019 the male and female rates for the Bangladeshi group (112.6 deaths per 100,000 males; 80.4 deaths per 100,000 females) were statistically significantly higher than the rates seen in all other ethnic groups of the same sex, except for females in the Mixed and Pakistani ethnic groups.

## Malignant neoplasm of trachea, bronchus and lung

In males, mortality rates from lung cancer have been highest in the Bangladeshi, Mixed, and White ethnic groups, and in 2017 to 2019 these groups had statistically significantly higher rates compared with all other groups, except for Black Caribbean and Black Other.

### Figure 6: In males, mortality rates for lung cancer have been consistent for most ethnic groups

Age-standardised rates of death per 100,000 from malignant neoplasm of trachea, bronchus and lung by ethnic group, deaths registered in England and Wales, males, 2012-14 to 2017-19

#### Notes:

1. See Figure 1 for other relevant notes.
2. Underlying cause of death defined using the International Classification of Diseases, tenth revision (ICD-10 codes C33 to C34).
3. “\*” flags the ethnic groups that have seen statistically significant differences, when comparing the 2012 to 2014 and 2017 to 2019 ASMRs.

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In females, the Mixed and White groups had the highest rates, with both groups having statistically significantly higher rates than all other ethnic groups in the latest period.

The cause represents 5.5% (85,967 deaths in 2017 to 2019) of deaths registered in the latest period.

### Figure 7: In females, mortality rates from lung cancer were highest in the White and Mixed ethnic groups

Age-standardised rates of death per 100,000 from malignant neoplasm of trachea, bronchus and lung by ethnic group, deaths registered in England and Wales, females, 2012-14 to 2017-19



**Notes:**

1. See Figure 1 for other relevant notes.
2. Underlying cause of death defined using the International Classification of Diseases, tenth revision (ICD-10 codes C33 to C34).
3. We only provide figures based on at least 20 deaths.
4. “\*\*” flags the ethnic groups that have seen statistically significant differences, when comparing the 2012 to 2014 and 2017 to 2019 ASMRs.
5. We only provide figures based on at least 20 deaths.

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## 5 . Other common leading causes of death

Influenza and pneumonia, chronic lower respiratory disease, prostate cancer (males), breast cancer (females), and diabetes were common leading causes of death but for fewer ethnic groups. Further information about these causes are in Tables 1 and 2 but the main findings are:

- Influenza and pneumonia: the ethnic group with the highest rate has varied. In 2017 to 2019, the White group had the highest rate for males, and the Pakistani group had the highest rate for females
- Chronic lower respiratory disease: in males, the Bangladeshi, White, and Mixed ethnic groups had the highest rates; for females, the highest rates were in the White group
- Malignant neoplasm of prostate (males): The Black Caribbean group has had the highest rate, followed by the Black Other and Black African groups
- Malignant neoplasm of breast (females): The mortality rate has consistently been higher in the White group; in 2017 to 2019, the rate in the White group was statistically significantly higher than all other ethnic groups except the Mixed and Black Other groups
- Diabetes: Rates in most ethnic groups have been higher than the White group; the highest rates were in the Bangladeshi group for both sexes in 2017 to 2019

## 6 . Other causes of death

Here we describe findings for additional causes of death, hypertensive diseases, other cancers, and suicide, based on widespread user interest.

### Hypertensive diseases

Since 2012 to 2014, Black (Black Other, Black Caribbean, Black African) ethnic groups have tended to have higher mortality rates from hypertensive diseases, high blood pressure, compared with other ethnic groups.

## Other cancers

The White ethnic group had higher mortality rates than most ethnic groups for a wide range of cancers including cancers of the:

- bladder
- brain
- colon
- oesophagus
- kidney

In 2017 to 2019, for all the cancers included in the [leading causes of death definition](#), the White group accounted for 95.7% (or 352,142 out of 368,070 cancer deaths) of registrations in the study population.

## Suicide

In males, the highest rates of suicide have been in the Mixed and White ethnic groups. Rates for these two groups have not statistically differed over time, and in 2017 to 2019 rates in the Mixed (14.7 deaths per 100,000 males) and White (14.9 deaths per 100,000) groups were almost identical.

Rates for most ethnic groups have generally been stable since 2012 to 2014. The pattern of increase and decrease in the White ethnic group closely follows the trend presented in [all registered suicides](#) in the population. Suicide rates in the other ethnic groups, including the Other group, have generally not seen statistically significant changes, because of the relatively smaller numbers of deaths creating a wide degree of statistical uncertainty.

### **Figure 8: Males from White and Mixed ethnic groups had the highest rates of suicide since 2012-14**

Age-standardised rates of death per 100,000 from suicide by ethnic group, deaths registered in England and Wales, males, 2012-14 to 2017-19

#### Notes:

1. See Figure 1 for other relevant notes.
2. See [Glossary](#) for National Statistics definition of suicide.
3. We only provide figures based on at least 20 deaths.

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In females, the highest rate of suicide has been in the Mixed ethnic group, and the rate in this group has been statistically significantly higher than the rate in the White group in five of the six periods of study (all periods except 2012 to 2014). In 2017 to 2019 there were 7.1 deaths per 100,000 females in the Mixed ethnic group, compared with 4.9 suicides per 100,000 in the White group.

The White group has accounted for the greatest number of suicides across time and, [as seen for all registered suicides in the population](#), the rate increased significantly between 2012 to 2014 and 2017 to 2019. Suicide rate changes for other ethnic groups were not found to be statistically significant, because of the relatively smaller number of deaths.

## Figure 9: Females in the mixed ethnic group had the highest rate of suicide since 2012-14

Age-standardised rates of death per 100,000 from suicide by ethnic group, deaths registered in England and Wales, females, 2012-14 to 2017-19

### Notes:

1. See Figure 1 for other relevant notes.
2. See [Glossary](#) for National Statistics definition of suicide.
3. We only provide figures based on at least 20 deaths.

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## 7 . Discussion of the findings

The findings show a complex pattern of mortality by ethnic group. In 2017 to 2019, the White group had a statistically significantly elevated all-cause mortality rate when compared with all other ethnic groups. This finding is explained by the White group, on the whole, having higher mortality rates than other ethnic groups for many causes of death such as dementia and Alzheimer's disease and a range of cancers. Previous research has also found [higher all-cause mortality in the White group](#), and other analysis has shown [lower life expectancy in the White group when compared with some ethnic minority groups](#).

Other ethnic groups had higher mortality rates, when compared with the White group, for several leading causes of death. This was found for ischaemic heart diseases, cerebrovascular diseases, diabetes, hypertensive diseases, and suicide (females only).

Reasons behind the pattern of findings described in this article are complex and differ by cause of death. They include socio-economic characteristics, where people live (such as the role played by local area deprivation), exposure to different risks such as [cigarette smoking habits](#), health-related behaviours, biological factors, access to and use of healthcare services, and the [healthy migrant effect](#). We will work with academic experts and other interested parties to gain a better understanding of the factors contributing to these results.

## 8 . Strengths and limitations

This article provides the first national analysis of levels and trends of overall and cause-specific mortality for ethnic groups in England and Wales. Our analysis is based on self-reported ethnicity from the census, recognised as [the most robust information for the purpose of long-term monitoring and research of ethnic inequalities in health \(PDF, 352KB\)](#).

Our study population of more than 50 million individuals makes this one of the largest cohort studies in existence in England and Wales. More than 96% of registered deaths during the study period are captured in the analyses.

While the study population covers most usual residents of England and Wales, we were unable to include new migrants and births since the 2011 Census. We adjusted the population at risk to account for patterns of emigration in each ethnic group, however, we do not have data on who exactly in our study population has emigrated. Further limitations are described in [Section 10](#) and [our previous analysis](#).

The analyses and methods used are experimental and we would like your feedback on the usefulness and quality of the estimates provided. You can email [Health.Data@ons.gov.uk](mailto:Health.Data@ons.gov.uk).

### Comparisons with past research

Several findings are consistent with prior research. A [review of the literature published by the King's Fund](#) highlights the many studies showing elevated rates of heart disease and stroke in South Asian ethnic groups, as well as more diabetes and in South Asian and Black ethnic groups, and hypertension in Black ethnic groups.

Fewer studies have addressed ethnic differences in dementia and Alzheimer's disease. Existing studies show that ethnic differences in dementia may be affected by risk factors such as socio-economic status and education level ([Chen and Zissimopoulos, 2018](#); [Shalden and others, 2006](#)).

For cancers, consistent with our findings, the National Cancer Intelligence Network and Cancer Research UK showed that cancer incidence (overall and for most individual cancers) is generally lower among ethnic minority groups when compared with the White ethnic group ([National Cancer Intelligence Network and Cancer Research UK, 2009 \(PDF, 992KB\)](#)). As with our findings, the exception was a higher incidence of prostate cancer in the Black ethnic group. Higher incidence of cancer in White ethnic groups has also been found in a range of other studies (see [King's Fund review](#)).

Looking at suicide, prior research has also found rates of suicidal behaviour to be lower in some ethnic minority groups. For instance, [Bhui and McKenzie \(2008\)](#) found that South Asian males and females had lower suicide rates than White males and females. Studies on hospital self-harm admissions and measures of suicidal ideation have also, on the whole, found lower risk in ethnic minority groups ([Cooper and others, 2010](#); [Polling and others, 2021](#); [Crawford and others, 2005](#)). Our research provides key evidence for England and Wales suggesting that the Mixed ethnic group has either equivalent (males) or significantly higher (females) suicide risk compared with the White group. More research is needed to understand this finding. Future iterations of the analysis should also consider age, with previous studies finding ethnic differences particularly in younger ([Bhui and McKenzie, 2008](#); [Raleigh, 1996](#)) and older groups ([McKenzie and others, 2018](#)).

## 9 . Glossary

### Leading causes of death

[Causes most commonly listed](#) on death certificates as the underlying cause; a list developed by the World Health Organization based on the International Classification of Diseases version 10 (ICD-10).

## Suicide

Any death with an underlying cause of intentional-self harm (those aged 10 years and above) or injury or poisoning of undetermined intent (those aged 15 years and above). Suicide registrations are impacted by [death registration delays](#).

## Age-standardised mortality rate

A weighted average of the age-specific mortality rates per 100,000 people and standardised to the 2013 European Standard Population. Age-standardised mortality rates allow for differences in the age structure of populations and therefore allow valid comparisons to be made between geographic areas, the sexes and over time.

## Statistical significance

The term "significant" refers to statistically significant changes or differences based on unrounded figures. Significance has been determined using the 95% [confidence intervals](#), where instances of non-overlapping confidence intervals between figures indicate the difference is unlikely to have arisen from random fluctuation.

## 10 . Data sources and quality

A summary of the data used and explanation of its strengths and limitations. Please also see [Ethnic differences in life expectancy and mortality from selected causes in England and Wales](#).

### Study population and completeness

The study population comprised 50,189,388 individuals enumerated in the 2011 Census in England and Wales, who could be linked to the General Practice Patient Register (PR), which provide the NHS number for each linked person. The linked population made up 94.6% of all enumerated census counts. However, if we take into account people who were not enumerated in the census, the linked data covered 89.5% of the [published census counts](#). We used PR records applicable to the years 2011 to 2013, as these records were most likely to include the population resident in England and Wales on the Census Day (27 March 2011).

With this approach we were able to study a population covering the vast majority of people resident in England and Wales at the time of the census. However, it is important to note that completeness of the linkage between the census and PR varies by ethnic group.

For men, the highest level of linkage was for the White ethnic group and the lowest for the Black Other ethnic group; for females, linkage rates were generally higher. Different linkage rates by ethnic group causes statistical bias; to deal with this we used weighting procedures to adjust the population denominators and death registrations (see "Weighting the data").

After linking census and PR records, we then linked death registrations using NHS numbers. Some 4,035,941 deaths are included in the analysis, 96.8% of the total number (4,167,931) registered in England and Wales between 2012 and 2019. The study population excludes people who were not counted in the census, for example, babies born after the Census Day, immigrants arriving after the Census Day, and anyone in a household that did not return a census form.

Since 2012 to 2014, most deaths among those born in the UK were successfully linked whereas the lowest linkage rates were in those born in Central and Western Africa. The differential proportion of linked deaths by country of birth and, by implication, by ethnic group, is a potential source of bias influencing the findings and requires further investigation.

Further bias is introduced by [known non-response in the 2011 Census](#), causing under-coverage error. Under-coverage is particularly concentrated in those aged 30 to 39 years and is highest for males and Mixed, Chinese, Black, and Other Ethnic minority groups. Further investigation of this is required; however, given that fewer than 4% of all registered deaths during the period are excluded from the analysis, for the reasons stated here, the impact of such biases for interpreting the findings should be small.

## Weighting the data

To improve robustness of our analysis and take account of the linkage issues outlined, we applied two statistical weighting procedures.

The first was an inverse probability weight (IPW), to help address the bias caused by linkage rates differing by ethnic group (see “study population and completeness”). For this we modelled the probability a given census record linked to the PR using logistic regression using a person’s age, sex, ethnic group, region of residence, and area deprivation quintile. The [odds of 2011 Census records linking to the patient register in the period 2011 to 2013](#) are available in our previous release.

The second weighting was to adjust the population at risk considering emigrants from the study population since the 2011 Census. Throughout the analysis, we applied weights reflecting the probability of having remained in England and Wales based on data from the Longitudinal Survey and the International Passenger Survey. Weights were applied to each year in the study. Please see our previous release for information on how these rates were computed, and our accompanying reference tables for the weights used for each year.

The statistical weighting procedures will continue to be refined in any future iterations of this analysis. For a further discussion on the techniques used, see [Ethnic differences in life expectancy and mortality from selected causes in England and Wales](#).

## 11 . Related links

[Ethnic differences in life expectancy and mortality from selected causes in England and Wales: 2011 to 2014](#)

Article | Released July 2021

Experimental analysis of ethnic differences in life expectancy and cause-specific mortality in England and Wales based on 2011 Census and death registrations.

[Updating ethnic contrasts in deaths involving the coronavirus \(COVID-19\), England: 24 January 2020 to 31 March 2021](#)

Article | Released May 2021

Estimates of differences in COVID-19 mortality risk by ethnic group for deaths occurring up to 31 March 2021, using linked data from the 2011 Census, death registrations, and primary care and hospital records.

[Deaths registered in England and Wales: 2020](#)

Bulletin | Released July 2021

Registered deaths by age, sex, selected underlying causes of death.

[Leading causes of death, UK: 2001 to 2018](#)

Article | Released March 2020

Registered leading causes of death by age, sex, and country.

[Suicides in England and Wales: 2019 registrations](#)

Bulletin | Released September 2020

Registered deaths in England and Wales from suicide analysed by sex, age, area of usual residence, and suicide method.