Office for National Statistics

Article

Ethnic differences in life expectancy and mortality from selected causes in England and Wales: 2011 to 2014

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

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Release date:
26 July 2021

Next release:
To be announced

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1 . Main points

- This is the first use of linked 2011 Census and death registration data to produce experimental national estimates of life expectancy and mortality by cause of death by ethnic group in a pre-coronavirus (COVID-19) pandemic period; covering 95% of people enumerated in the census and using self-reported ethnic groups, it represents the most comprehensive data available.

- In the period 2011 to 2014 in England and Wales, both males and females in the White and Mixed ethnic groups had lower life expectancy at birth than all other ethnic groups, while the Black African group had statistically significant higher life expectancy than most groups.

- Statistically significant higher age-standardised mortality rates from cancer were present among males and females of the White ethnic group compared with Black and Asian ethnic groups.

- Statistically significant higher age-standardised mortality rates from circulatory (heart and related) diseases were present among Indian, Bangladeshi and Mixed males and Pakistani, Indian and Mixed females compared with the White group.

- Cancers and circulatory diseases account for 61% of male and 53% of female deaths in the study and are therefore an important influence on the life expectancy differences seen between ethnic groups.

- These results reveal important patterns in life expectancy and mortality by ethnic group which 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, socioeconomic composition of the groups, health-related behaviours, and clinical and biological factors.

Statisticians comment

"Today's new experimental data show that between 2011 and 2014 people of White and Mixed ethnic groups had lower life expectancy at birth than all other ethnic groups, with the Black African group having significantly higher life expectancy than most other groups.

"It also found the White ethnic group were more likely to die of cancer than their Black or Asian counterparts, while for both sexes, ischaemic heart disease mortality was highest in the Bangladeshi, Pakistani and Indian groups.

"Further research is required to investigate the reasons for the differences. However, these results reveal important patterns in life expectancy and mortality by ethnic group which are complex, but nevertheless consistent with most previous studies." - Julie Stanborough, Deputy Director Health Analysis and Life Events

2 . Linking death registrations to the 2011 Census

This article provides the first experimental analysis of ethnic differences in both life expectancy and cause-specific mortality in England and Wales based on the 2011 Census and death registrations. Experimental statistics are those which are still in the testing phase and not yet fully developed.

The analysis is based on self-reporting of ethnic groups and represents the whole population of England and Wales. This follows our experimental analyses of ethnic differences in deaths involving COVID-19. The aim of the article is to improve the evidence around health outcomes for different ethnic groups and highlight areas where further analysis is needed. While there is a large body of research on mortality patterns by geography, socioeconomic deprivation, and other demographic factors, reliable comparisons by ethnic group have until now been a major gap in knowledge.

Because the death registration process in England and Wales currently does not collect information on the deceased's ethnic group, linking death registrations to the census is currently the most reliable way to study mortality by ethnic group. This article is based on analysis of 50,189,388 records from the 2011 Census. It compares 1,303,274 deaths that occurred between 27 March 2011 (Census Day) and 26 March 2014 to people enumerated at the 2011 Census and linked to the patient register. We refer to these linked records as the "Study Population". The study population also excludes people who the census did not enumerate, so that approximately 89.5% of the number of individuals included in the published 2011 Census counts will have been included in our analyses.

The PR provided an NHS number for each linked individual, which was then used to link deaths to the study population. Deaths occurring in the period 27 March 2011 to 26 March 2014 could not be linked for those:

- enumerated at the census but not able to be linked to the PR

- not enumerated at the census

- born after the Census Day

- immigrating into the UK after the Census Day

The linked deaths covered 87.6% of all deaths occurring in the period. More detail on the data and methods is provided in Section 9.

The Office for National Statistics (ONS) will publish a wider range of causes of death by ethnic group covering the period 2012 to 2019 in August 2021.

3 . Ethnic breakdown

In this article we use a bespoke ethnic grouping, based on self-reported ethnic groups 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 of deaths to estimate reliable male and female mortality rates with adequate precision for each group.

Harmonised condensed classification: White
Ethnic grouping used in this publication: White (White British, White Irish, Gypsy and Irish Travellers, Other White)

Harmonised condensed classification: Asian
Ethnic grouping used in this publication: Bangladeshi, Indian, Pakistani, Asian Other

Harmonised condensed classification: Black
Ethnic grouping used in this publication: Black African, Black Caribbean, Black Other

Harmonised condensed classification: Mixed
Ethnic grouping used in this publication: All Mixed categories (White and Black Caribbean, White and Black African, White and Asian, Other Mixed or Multiple ethnic background)

Harmonised condensed classification: Other ethnic group
Ethnic grouping used in this publication: Other ethnic group (Arab, Chinese, Other)

4 . Life expectancy at birth, 2011 to 2014

Differences described as 'significant' in this release, are deemed to be significant in statistical terms.

Life expectancy in this report is based on death rates in the period 2011 to 2014 by age group. A template is available, which shows how life expectancy has been derived in this report.

Period life expectancies measure future length of life using current mortality rates and depend on having a representative picture of mortality since birth. As ethnic groups differ in terms of the proportion who are migrants and, therefore, their death rates early in life are not known, these statistics do not necessarily provide a full picture of mortality since birth. Further research is needed on how migration patterns impact on this analysis. More information on life expectancy can be found in this explainer article.

We present an overview of life expectancy at birth for males and females in Table 1.

Table 1: Life expectancy at birth by sex and ethnic group: England and Wales 2011 to 2014

Ethnic group	Females	Males	Sex gap (years)
Asian other	86.9	84.5	2.4
Bangladeshi	87.3	81.1	6.2
Black African	88.9	83.8	5.1
Black Caribbean	84.6	80.7	3.9
Black other	86.8	82.0	4.8
Indian	85.4	82.3	3.1
Mixed	83.1	79.3	3.8
Other	86.9	84.0	2.9
Pakistani	84.8	82.3	2.5
White	83.1	79.7	3.4
Ethnic group gap (years)	5.8	5.2	

Source: Office for National Statisitcs

Notes

1. Office for National Statistics (ONS) figures based on the linkage of Census 2011 to Patient Register records and subsequent deaths followed up to 26th March 2014.

2. 'Other' ethnic group includes Arab, Chinese and Other ethnic groups.

In the three years 27 March 2011 to 26 March 2014, Table 1 shows males of Black African, Asian Other and Other groups, had the three highest life expectancies. White and Mixed groups had the lowest life expectancies. For females, Black African, Bangladeshi, Asian Other and Other groups had the highest life expectancies and the lowest was also among the White and Mixed groups.

There were large differences between males and females among the Black African and Bangladeshi groups. The gap in life expectancy between ethnic groups was larger for females than males (Table 2).
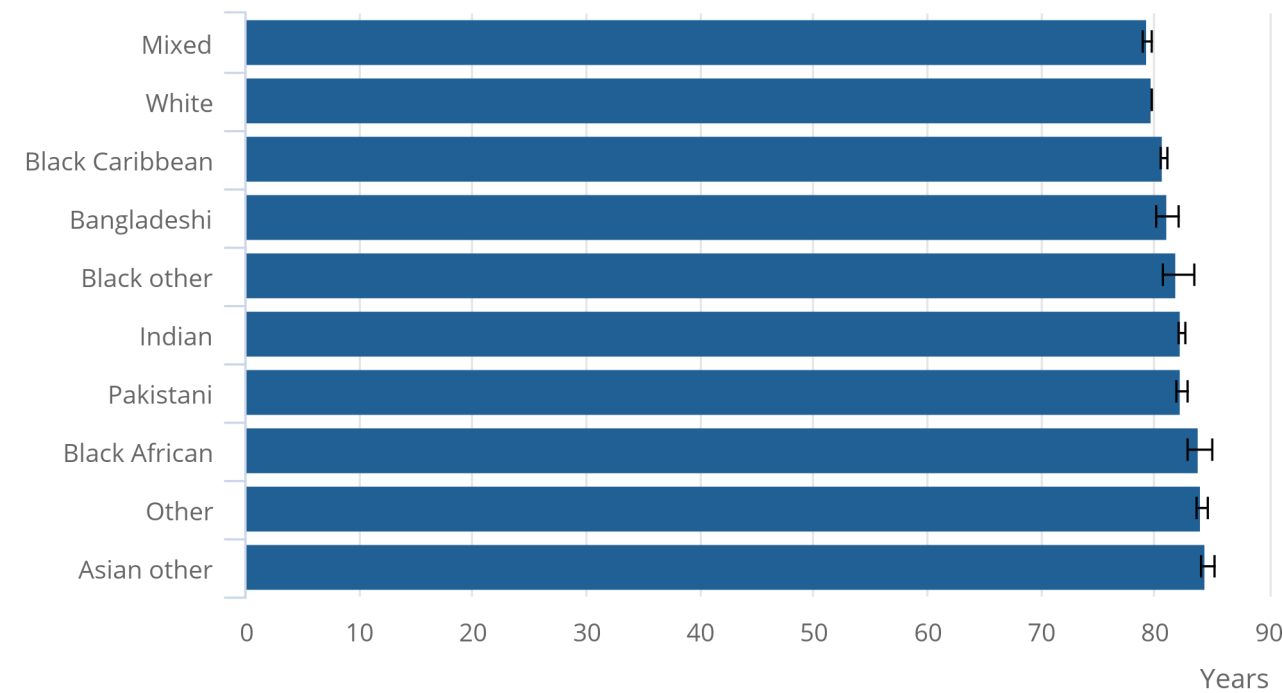
Males and females of White and Mixed ethnic groups had statistically significant lower life expectancy than all other ethnic groups (figures 1 and 2). The life expectancies of males and females of Bangladeshi, Indian and Pakistani groups did not differ significantly from each other. Black African males and females had statistically significant higher life expectancy than Black Caribbean males and females.

Figure 1: Males in the White and Mixed ethnic groups had significantly lower life expectancy than those in all other ethnic groups

Male life expectancy at birth by ethnic group, England and Wales, 2011 to 2014

Figure 1: Males in the White and Mixed ethnic groups had significantly lower life expectancy than those in all other ethnic groups

Male life expectancy at birth by ethnic group, England and Wales, 2011 to 2014

Years
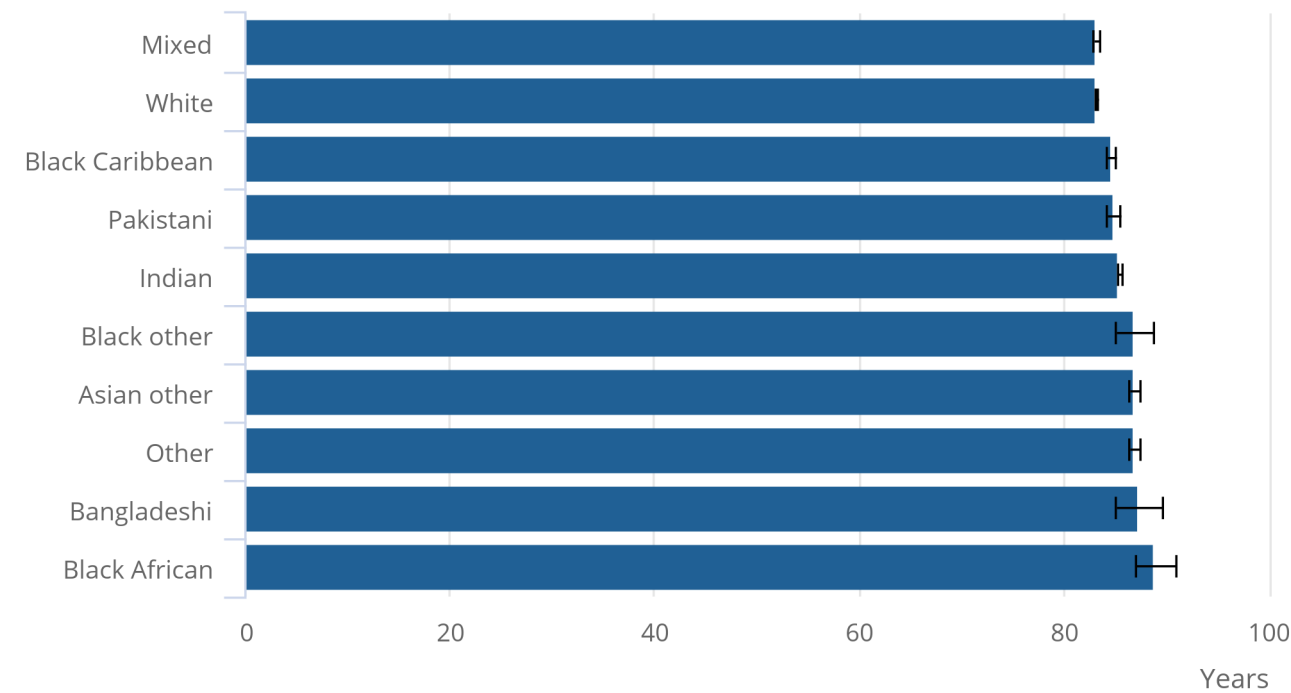
Source: Office for National Statistics

Notes:

1. Office for National Statistics (ONS) figures based on the linkage of Census 2011 to Patient Register and subsequent death registration records followed up to 26th March 2014

2. Other ethnic group includes Arab, Chinese and Other ethnic groups

3. Error bars show 95% confidence intervals of life expectancy at birth. Non-overlapping error bars denote a statistically significant difference in life expectancy.

Figure 2: Females in the White and Mixed ethnic groups had significantly lower life expectancy than those in all other ethnic groups

Female life expectancy at birth by ethnic group, England and Wales, 2011 to 2014

Figure 2: Females in the White and Mixed ethnic groups had significantly lower life expectancy than those in all other ethnic groups

Female life expectancy at birth by ethnic group, England and Wales, 2011 to 2014

Source: Office for National Statistics

Notes:

1. Office for National Statistics (ONS) figures based on the linkage of Census 2011 to Patient Register and subsequent death registration records followed up to 26 March 2014.

2. Other ethnic group includes Arab, Chinese and Other ethnic groups.

3. Error bars show 95% confidence intervals of life expectancy at birth. Non-overlapping error bars denote a statistically significant difference in life expectancy.

A comparison with national life expectancy estimates published by ONS for the period 2011 to 2013 shows that life expectancy at birth in this analysis is 0.7 years higher for males and 0.3 years higher for females. This suggests that life expectancy in our analysis is slightly overestimated, which can occur because of under-enumeration and under-estimation of census-recorded emigration by our emigration weighting method. The exact results should therefore be treated with caution, but the overall patterns are consistent with the findings of other published studies (See Causes of complex patterns in life expectancy section).

Our datasets accompanying this release provide life expectancy estimates at other ages such as 65 years.

5 . Mortality from selected causes of death, 2012 to 2014

We calculated age-standardised mortality rates (ASMRs) for selected causes of death shown by other research to vary by ethnic group or country of birth (Global Burden of Disease Database; Bhaskaran 2021; Health Equity Report Focus on ethnicity; Scott and Timeus 2013; Bhopal et al 2018, Marmot et al 1984, Wild and Mckeigue 1997). The analysis was based on deaths in the three calendar years 2012 to 2014 and limited to people aged 10 years and over. While in section 4 higher values represent a desirable outcome and better health, in this section higher mortality rates represent worse health.

Malignant neoplasms (cancers) and circulatory (heart and related) diseases made up 60.6% of male and 53.3% of female deaths in our study population, similar proportions to published death statistics for England and Wales. The proportion of total deaths that these conditions cause varies by ethnic group, ranging from 64.7 percent of male deaths in the Black Caribbean ethnic group to 55.0 percent in the Mixed ethnic group, and 65.4 percent of female deaths in the Black African ethnic group to 53.1 percent in the White ethnic group.

Males in the White ethnic group had a significantly higher mortality rate from cancer than males in all other ethnic groups except for the Mixed ethnic group (figure 3). Cancer mortality was lowest among males in the Indian and Asian Other ethnic groups. Females in the White ethnic group had a significantly higher mortality rate from cancer than females in all other ethnic groups (figure 4) while females in the Pakistani, Indian and Asian Other ethnic groups had the lowest rates.

Figure 3: Mortality from all cancers was highest among males of the White ethnic group

Age-standardised mortality rates from all malignant neoplasms (cancers), by ethnic group: males, England and Wales 2012 to 2014
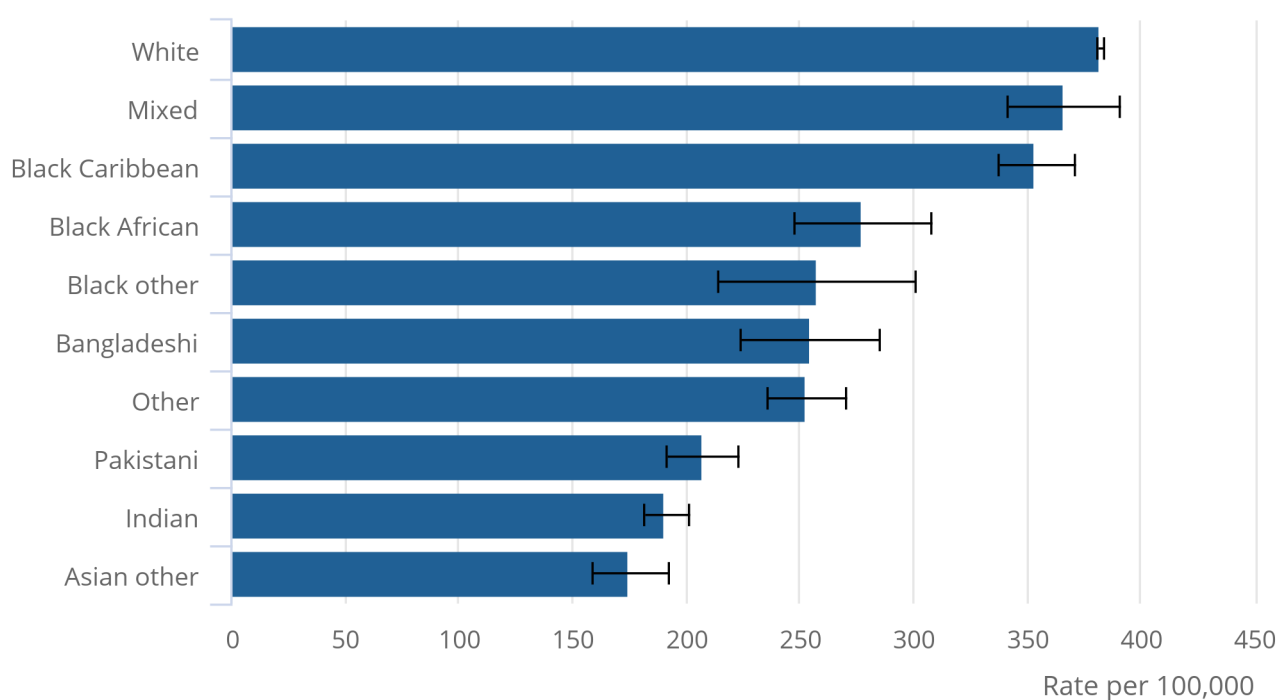
Rate per 100,000

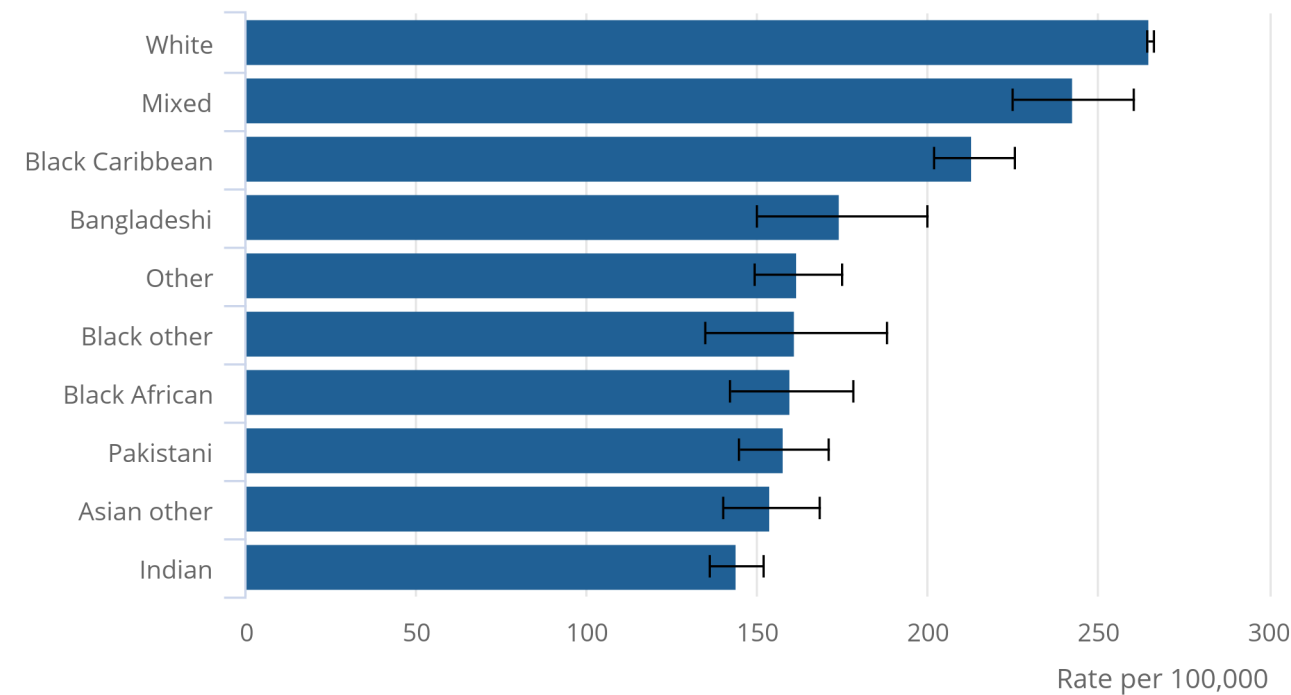**Source: Office for National Statistics**

Notes:

1. Deaths registered during 2012 to 2014 which were linked to the study population.

2. The "Other" ethnic group includes Arab, Chinese and Other ethnic groups.

3. Underlying cause of death defined by International Classification of Diseases (ICD-10 codes) C00-C97.9.

Figure 4: Mortality from all cancers was highest among females in the White ethnic background

Age-standardised mortality rates from all malignant neoplasms (cancers), by ethnic group: females, England and Wales 2012 to 2014

Figure 4: Mortality from all cancers was highest among females in the White ethnic background

Age-standardised mortality rates from all malignant neoplasms (cancers), by ethnic group: females, England and Wales 2012 to 2014

Source: Office for National Statistics

Notes:

1. Deaths registered during 2012 to 2014 which were linked to the study population.

2. The "Other" ethnic group includes Arab, Chinese and Other ethnic groups.

3. Underlying cause of death defined by International Classification of Diseases (ICD-10 codes) C00-C97.9.

Males in the Bangladeshi, Indian and Mixed ethnic groups had statistically significantly higher mortality rates from circulatory diseases than males in the White ethnic group and most other groups (figure 5). Females in the Pakistani ethnic group had the highest mortality rate from circulatory diseases, followed by those in the Mixed, Indian and Black Caribbean groups (figure 6).

Figure 5: Mortality from circulatory diseases was highest among males in the Bangladeshi ethnic group

Age-standardised mortality rates from all circulatory diseases, by ethnic group: males, England and Wales, 2012 to 2014

Figure 5: Mortality from circulatory diseases was highest among males in the Bangladeshi ethnic group

Age-standardised mortality rates from all circulatory diseases, by ethnic group: males, England and Wales, 2012 to 2014

Rate per 100,000
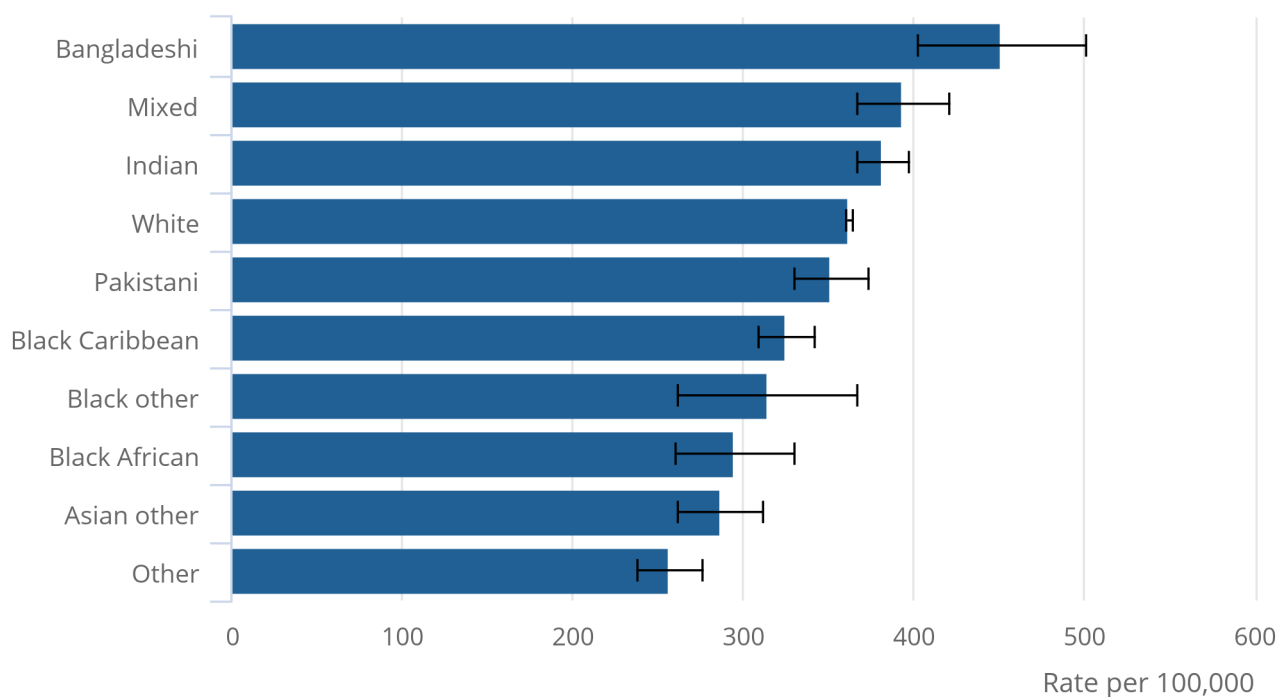
Source: Office for National Statistics
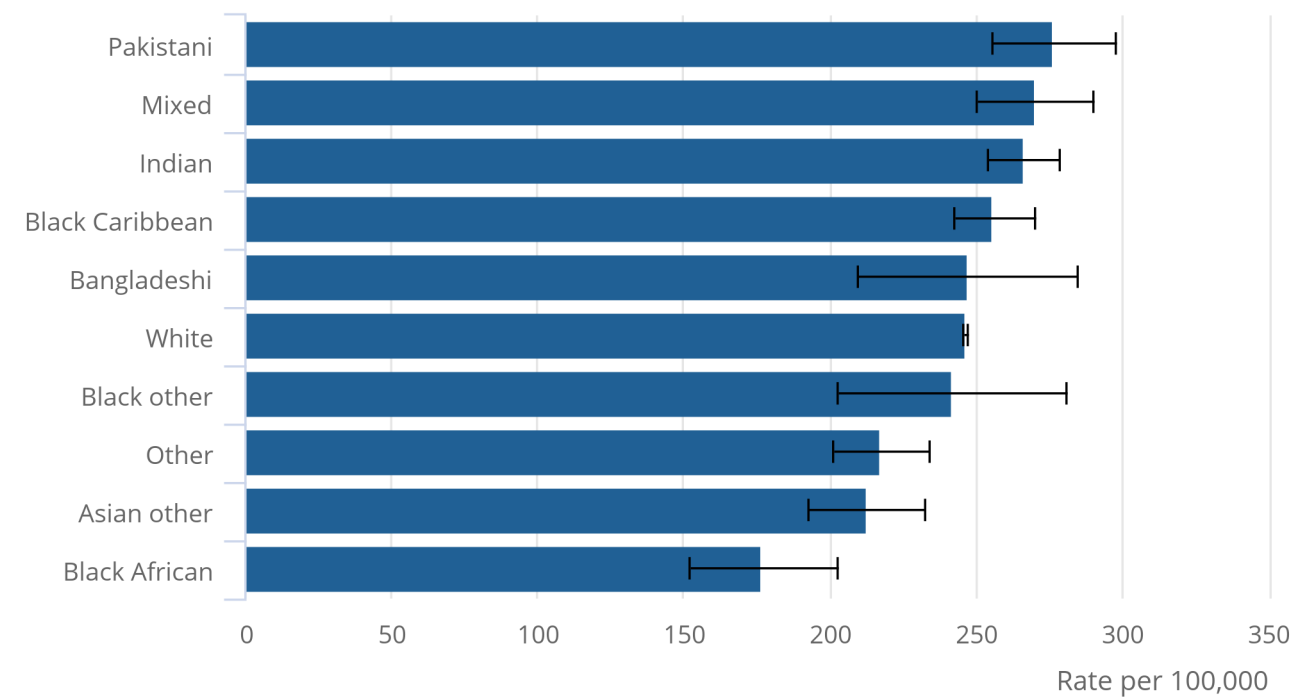
Notes:

1. Deaths registered during 2012 to 2014 which were linked to the study population.

2. The "Other" ethnic group includes Arab, Chinese and Other ethnic groups.

3. Underlying cause of death defined by International Classification of Diseases (ICD-10 codes) I00-I99.

Figure 6: Mortality from circulatory diseases was highest among females in the Pakistani ethnic group

Age-standardised mortality rates from all circulatory diseases, by ethnic group: females, England and Wales 2012 to 2014

Figure 6: Mortality from circulatory diseases was highest among females in the Pakistani ethnic group

Age-standardised mortality rates from all circulatory diseases, by ethnic group: females, England and Wales 2012 to 2014

Rate per 100,000

Source: Office for National Statistics

Notes:

1. Deaths registered during 2012 to 2014 which were linked to the study population.

2. The "Other" ethnic group includes Arab, Chinese and Other ethnic groups.

3. Underlying cause of death defined by International Classification of Diseases (ICD-10 codes) I00-I99.

Please note not all differences outlined in this section are statistically significant.

Mortality rates for more detailed selected causes of death are given in the dataset accompanying this article. Key points are:

- for both sexes, ischaemic heart disease mortality was highest in the Bangladeshi, Pakistani and Indian ethnic groups and lowest among Black ethnic groups

- mortality from cerebrovascular diseases was highest in the Bangladeshi ethnic group for both sexes

- the Black Caribbean and Black Other ethnic groups had higher mortality from hypertensive diseases than the White ethnic group

- diabetes mortality was lowest among those in the White ethnic group, while the highest rates were observed in the Bangladeshi and Pakistani ethnic groups for each sex and the Black Caribbean ethnic group for females

- males in the White, Mixed and Bangladeshi ethnic groups had a significantly higher mortality rate from lung cancer than males in the Pakistani, Indian and Black African ethnic groups; among females, the White and Mixed ethnic groups had significantly higher rates than all others

- colorectal cancer mortality was highest in males in the White ethnic group and females in the Black Caribbean ethnic group

- the highest breast cancer mortality rates were among females in the White and Black Caribbean ethnic groups, significantly higher than females in the Bangladeshi, Indian, and Black African ethnic groups

- prostate cancer mortality was highest among males in the Black Caribbean and Black African ethnic groups and lowest in the Bangladeshi ethnic group, (Bangladeshi rate deemed to be unreliable).

6 . Causes of complex patterns in life expectancy

These results reveal complex patterns in life expectancy and mortality by ethnic group. Our results are nevertheless consistent with most previous research (Gruer et el 2016, Bhopal et al 2018, Wallace and Kulu 2016, Public Health Outcomes Framework: Health Equity Report 2017). The analysis is experimental and has some limitations which are noted in Section 9.

Potential reasons for the higher life expectancy found in the Black African and Asian Other ethnic groups include that they contain a higher proportion of more recent migrants than other ethnic groups (2011 Census analysis: Ethnicity and religion of the non-UK born population in England and Wales: 2011). Previous research (Scott and Timeus 2013, Wallace and Darlington-Pollock 2020, Wallace M, Kulu H 2015) shows that people who migrate tend to be healthier than others.

The pattern in the selected causes of death is consistent with several studies of disease prevalence. For example, a review of the health of people from ethnic minority groups in England published by the King's Fund (2021) showed infant mortality, cardiovascular disease (CVD) and diabetes are higher among Black and South Asian ethnic groups. An analysis of data from the Clinical Practice Research Datalink (Lawson et al 2020) showed that people in the South Asian ethnic group (including Bangladeshi, Indian and Pakistani ethnic groups) had higher ischaemic heart disease, hypertension and diabetes prevalence than those in the White ethnic group. Conversely, those in the Black ethnic group had lower ischemic heart disease than those in the White ethnic group.

The National Cancer Intelligence Network (NCIN) and Cancer Research UK showed that cancer incidence (overall and for most individual cancers) is generally lower among ethnic minority groups compared with the White ethnic group (National Cancer Intelligence Network and Cancer Research UK 2009). An exception was a higher incidence of prostate cancer in the Black ethnic group.

In addition to corroborative disease prevalence and incidence statistics, it is also likely that Asian and Black ethnic groups engage less in harmful health-related behaviours, such as being less likely than the White ethnic group to smoke or drink alcohol (Adult Smoking Habits 2019, Health Equity Report PHE 2017, Joseph Rowntree Foundation 2010).

The relationship between some common wider determinants of health and ethnic group is not clear. For example, Public Health England (2018) and The King's Fund (2021) showed that Bangladeshi, Pakistani and Black ethnic groups are more likely than others to live in deprived neighbourhoods. However, while the relationship between area disadvantage and health is well established (Marmot Review: 10 years on 2020), further research is needed on how this relationship applies across ethnic groups. Follow-up research will aim to establish whether the area deprivation mortality pattern varies across ethnic groups, and the possible mechanisms by which such differences may arise.

Further research is also needed on the reasons for the cause-specific mortality patterns observed, such as exposure to different risks, health-related behaviours, biological factors, and use of healthcare services. We intend to publish future analyses throwing light on these issues, and on the possible effects on the figures of methodological issues such as differences in the census non-response and data linkage. This is a high priority subject for research, and we will work with academic experts and other interested parties to gain a better understanding of the factors contributing to the results presented in the article.

Finally, the coronavirus (COVID-19) pandemic has had a disproportionately adverse effect on Black and Asian ethnic groups, which contrasts with the more favourable mortality pattern observed in the period 2011 to 2014. The all-cause mortality rates in the period January 2020 to February 2021 published by the Office for National Statistics (ONS) (2021) showed that, compared with the White British ethnic group:

- males and females in the Bangladeshi and Pakistani ethnic groups, and males in the Black Caribbean ethnic groups, had higher mortality

- Other males and females, and Females in the Black African, Chinese and Indian ethnic groups had lower mortality

- remaining ethnic groups showed no statistically significant differences

This suggests that overall, the pandemic moderated the lower mortality seen in ethnic minority groups during 2011 to 2014: it reversed the lower mortality in some ethnic groups, some showed no difference, and some continued to have lower mortality.

The analyses and methods used are experimental and we would like your feedback on the usefulness and quality of the estimates provided. To provide feedback please email Health.Data@ons.gov.uk

7 . Life expectancy by ethnic group data

Life expectancy estimates for England and Wales by age, sex and ethnic group, 2011 to 2014
Dataset | Released 26 July 2021
Experimental analysis of ethnic differences in life expectancy in England and Wales based on the 2011 Census and death occurrences.

Age standardized mortality rates for England and Wales by sex and ethnic group, 2012 to 2014
Dataset | Released 26 July 2021
Experimental analysis of ethnic differences in cause-specific mortality rates in England and Wales based on the 2011 Census and death registrations.

Emigration weights by age, sex, ethnic group and year between 27th March 2011 to 26th March 2014
Dataset | Released 26 July 2021
Emigration weights calculated by age, sex and ethnic group based on data from the International Passenger Survey (IPS) and the Office for National Statistics' (ONS) Longitudinal Study (LS).

Odds of the 2011 Census records linking to the patient register in the period 2011 to 2013
Dataset | Released 26 July 2021
Odds ratios based on sex, age in single years, square of age in single years, age in five-year age bands, regions, deprivation quintile and ethnic group.

8 . Glossary

Period life expectancy

Life expectancy is the average number of years a person could expect to live if age, sex and ethnic group specific mortality rates for the time period covered prevail into the future.

Age-standardised mortality rate

Age-standardised mortality rates enable populations with different age structures to be compared validly. Those in the White ethnic group have an older population structure than all other ethnic groups. It is necessary to adjust for population age structure.

9 . Data sources and quality

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 complete 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).

The benefit of this approach is that we were able to study a population that covers the vast majority of people resident in England and Wales at the time of the census. A limitation of this approach is that the completeness of linkage between the census and PR varied by ethnic group (Figures 7 and 8).

Figure 7: Males of the White ethnic group had the highest level of coverage in the study population while males in the Black Other group had the lowest

The proportion of published 2011 Census counts which linked to the GP Patient Register, for males by ethnic group

Figure 7: Males of the White ethnic group had the highest level of coverage in the study population while males in the Black Other group had the lowest

The proportion of published 2011 Census counts which linked to the GP Patient Register, for males by ethnic group
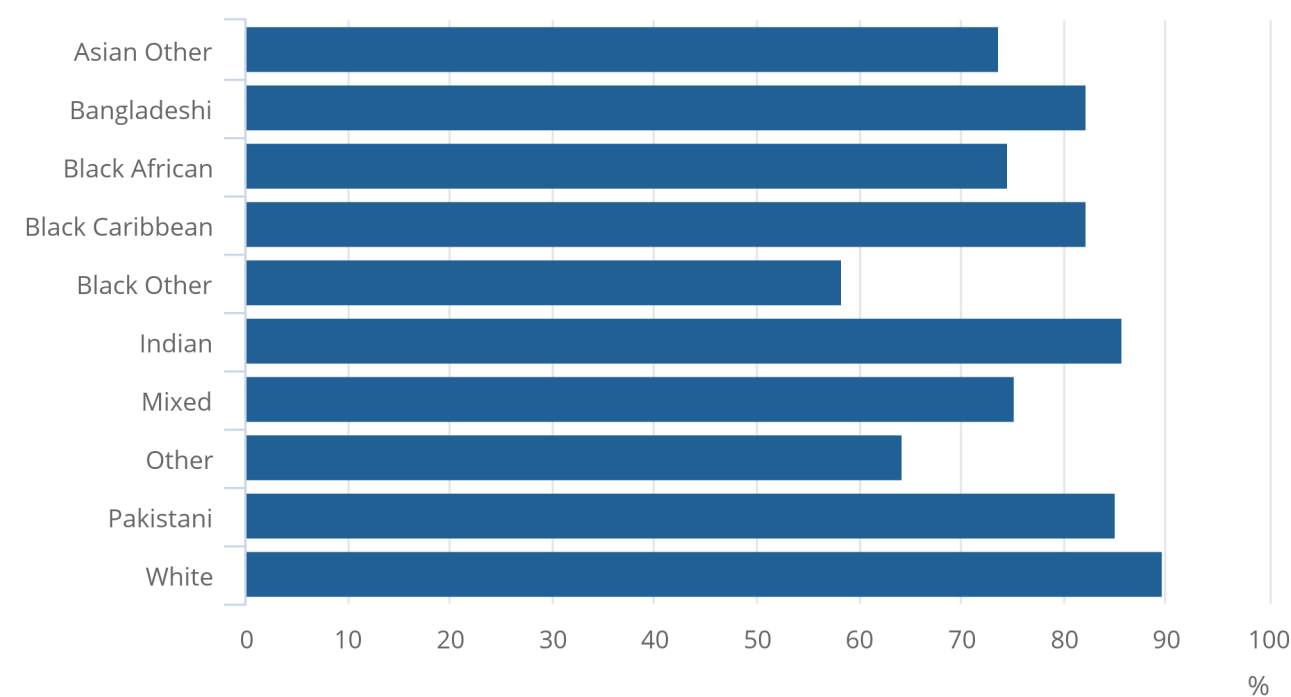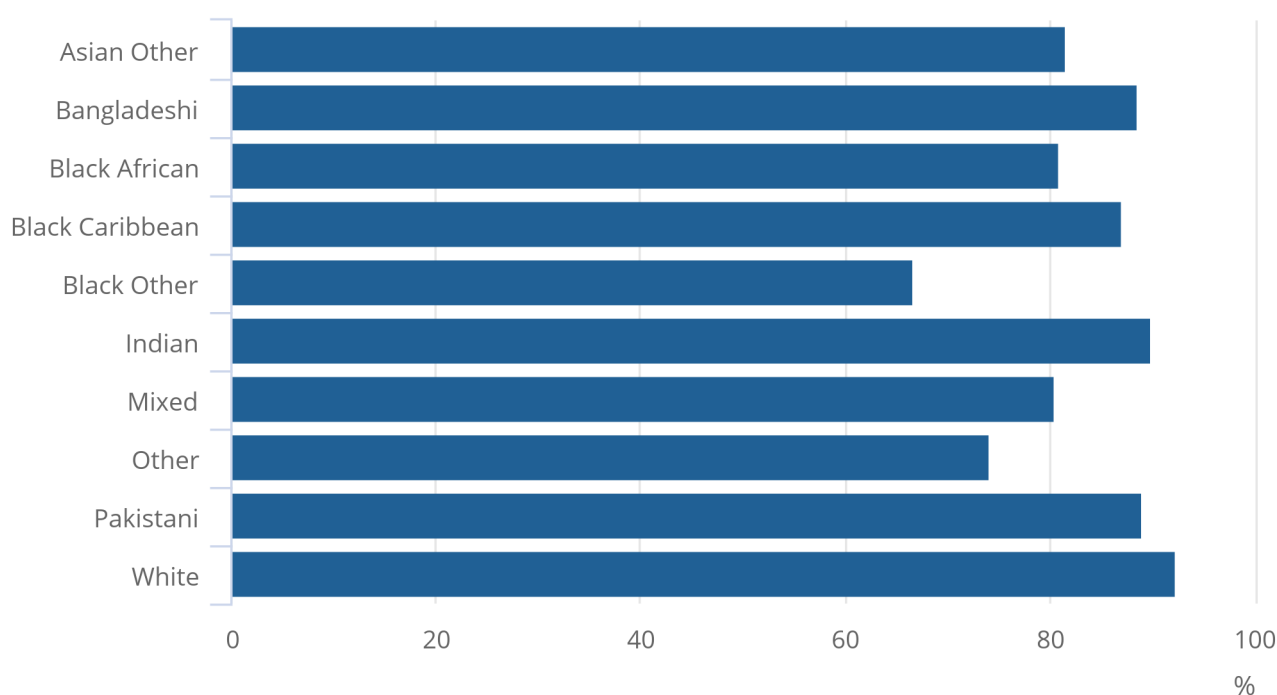

Source: Office for National Statistics

Figure 8: Females of the White ethnic group had the highest level of coverage in the study population while females in the Black Other group had the lowest

The proportion of published 2011 Census counts which linked to the GP Patient Register, for females by ethnic group

Figure 8: Females of the White ethnic group had the highest level of coverage in the study population while females in the Black Other group had the lowest

The proportion of published 2011 Census counts which linked to the GP Patient Register, for females by ethnic group

Source: Office for National Statistics

The highest level of linkage was for the White ethnic group and the lowest for the Black Other ethnic group. Linkage rates for females were higher than for males in all ethnic groups. This causes statistical bias, such that (for example) our study population covered 90% of usually resident males in the White ethnic group but only 58% of males in the Black Other ethnic group, compared with the corresponding published census counts. To deal with this uneven coverage we used weighting procedures to adjust the population denominators and death occurrences (see section on Weighting).

After linking the census and PR records, we then linked death records using NHS number. The linkage rate of deaths for those completing the census forms was 89.1%. 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. Consequently, the proportion of all deaths that occurred in England and Wales in the period included in the analysis was 87.6%.

The proportion of deaths that could not be linked to the study population could be analysed by country of birth collected at death registration (ethnic group is not recorded when a death is registered). Unlinked deaths were highest among people born in Central and Western Africa (37.4%) and North Africa (26.1%) (figure 8). The differential proportion of linked deaths by country of birth, and by implication by ethnic group, is a potential source of bias influencing the results and requires further investigation.

Figure 9: Deaths of people born in Central and Western Africa were least likely to link to the study population

Proportion of deaths between 27 March 2011 to 26 March 2014 not linked to the study population, by country of birth at death: England and Wales

Figure 9: Deaths of people born in Central and Western Africa were least likely to link to the study population

Proportion of deaths between 27 March 2011 to 26 March 2014 not linked to the study population, by country of birth at death: England and Wales
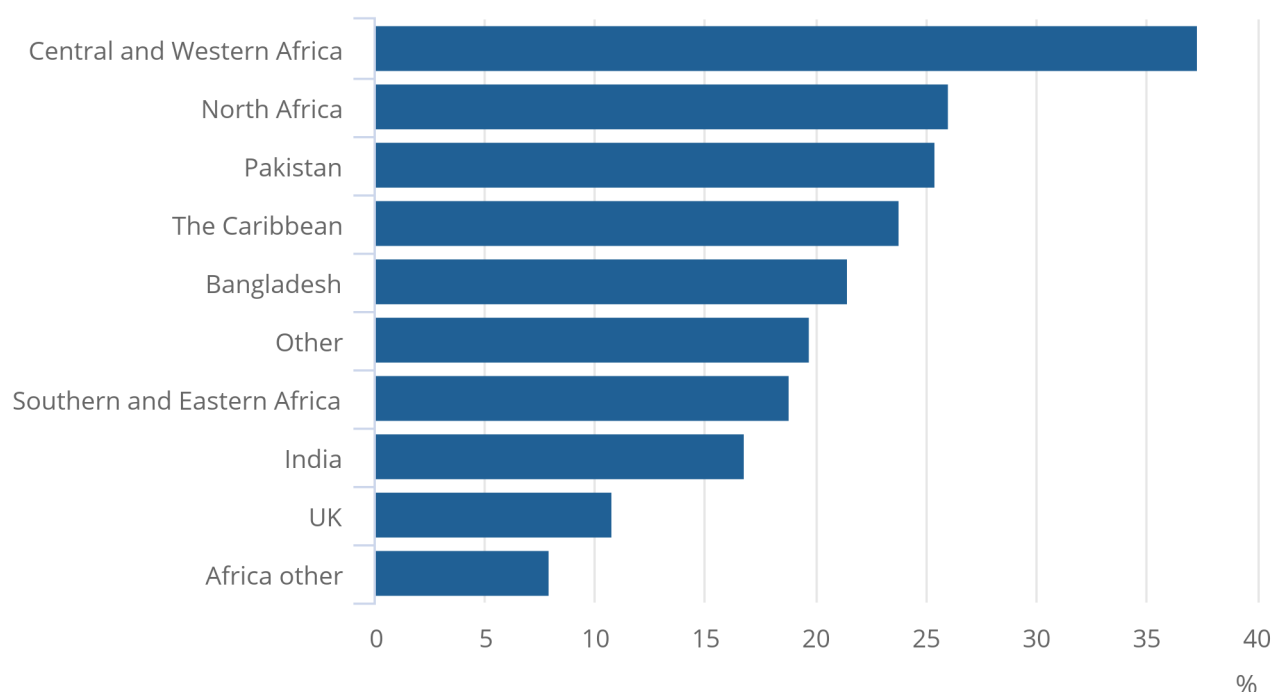
Source: Office for National Statistics

Notes:

1. The proportion of unlinked deaths is based on deaths occurring in the period 27 March 2011 to 26 March 2014. Country of birth is collected at death registration and enables these deaths to be differentiated by linkage status and country of birth.

Our study population does not include babies born since the 2011 Census Day. To estimate mortality in the first year of life so as to calculate life expectancy, we used infant mortality (birth cohort) tables covering the period 27 March 2011 to 26 March 2014. This means that, for some ethnic groups, those at the youngest age will be exclusively born in the UK, whereas at other ages a greater mix of migrants and those born in the UK will be present. This will affect Black and Asian ethnic groups more than those in the White ethnic group. Further information on the data can be found in Child and infant mortality statistics Quality and Methodology Information.

Weighting the data

To improve the 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), and the second an emigration weight. To create the IPW we modelled the probability a given census record linked to the PR using logistic regression given a person's age, sex, ethnic group, region of residence and area deprivation quintile. The logistic regression results together with the IPWs and their calculation are available in the datasets accompanying the release.

When we compare the weighted-up death count in the study population with actual death occurrences in the period 27 March 2011 to 26 March 2014, there was a shortfall of 4.3%, suggesting that this procedure did not entirely adjust for the known biases. As a result, the reported life expectancy is likely to be slightly raised especially for those ethnic groups where linkage was least complete. In particular, the IPWs produced a percentage growth in population that exceeded the growth in deaths among all ethnic groups. This imbalance in weighting up the population compared with deaths was largest for females in the Bangladeshi ethnic group, which is a possible factor in the higher life expectancy among females in the Bangladeshi ethnic group. The method to weight up deaths to general population totals therefore requires further investigation and refinement.

The second weighting was to adjust the population at risk considering emigrants from the study population since the 2011 Census. As we are unable to determine whether those emigrating died in the follow-up period, they must be excluded from the population denominator used in mortality rate calculations. This section briefly describes the calculation of emigration weights based on survey and administrative data to account for emigration between 27 March 2011 and 31 December 2014.

The Office for National Statistics' (ONS) Longitudinal Study (LS) is a census and vital events (births and deaths) linked data source covering approximately 1% of the population of England and Wales. It records whether study members emigrated, which can be shown either directly through recorded emigration, or indirectly through de-registration from the patient register[1] . It can therefore be used to estimate emigration for ethnic groups by broad age and sex.

The International Passenger Survey (IPS) is a continuous survey conducted at major ports of entry into or exit from the UK and is used to estimate short-term and long-term migration. The IPS does not collect data on ethnic group but does collect data on citizenship. We therefore produced an IPS-based out-migration rate using the relationship between citizenship and ethnic group found at the 2011 Census by age and sex.

We developed weights building on the relationship between the LS and IPS-based rates. The methodology uses the mean of LS and IPS-based rates for years 2012 to 2013 through to 2013 to 2014; a slight modification is applied for years 2011 to 2012, which gives greater weight to the LS based rate, because of data issues with IPS data for 2011 and 2012. The resulting emigration weights by age, sex and ethnic group are available in the datasets accompanying the release.

Notes for: Data sources and quality

1. Johnson and Blackwell. Review of methods for estimating life expectancy by social class using the ONS Longitudinal Study. Health Stat Q 2007;35:28-36.

10 . Related links

[Updating ethnic contrasts in deaths involving the coronavirus (COVID-19), England: 24 January 2020 to 31 March 2021](#)
Article | Released 05 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. Risk of COVID-19 mortality is compared between the first and second waves of the pandemic.

[Updating ethnic contrasts in deaths involving the coronavirus (COVID-19), England](#)
Dataset | released 05 2021
Age-standardised mortality rates (ASMRs) and hazard ratios for deaths involving COVID-19 by ethnic group, England: deaths occurring between 24 January 2020 and 31 March 2021.