Office for National Statistics

Article

Updating ethnic contrasts in deaths involving the coronavirus (COVID-19), England and Wales: deaths occurring 2 March to 28 July 2020

Updated estimates of mortality involving the coronavirus (COVID-19) by ethnic group and investigation of the explanatory power of hospital-based comorbidity on ethnic differences, building on previous models published by the Office for National Statistics.

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1 . Main points

- Considering deaths up to 28 July 2020, males and females of Black and South Asian ethnic background were shown to have increased risks of death involving the coronavirus (COVID-19) compared with those of White ethnic background; this is similar to our previous findings for deaths up to 15 May 2020.
- In England and Wales, males of Black African ethnic background had the highest rate of death involving COVID-19, 2.7 times higher than males of White ethnic background; females of Black Caribbean ethnic background had the highest rate, 2.0 times higher than females of White ethnic background.
- All ethnic minority groups other than Chinese had a higher rate than the White ethnic population for both males and females.
- In England, people of South Asian ethnic background had a higher prevalence of cardiovascular diseases and diabetes (using hospital data), which are associated with increased COVID-19 mortality, while those of Chinese background had the lowest prevalence.
- In England, based on a statistical model adjusting for age and excluding care home residents, the rate of death among Black African males was 3.8 times higher than those of White background, while for Black African females the rate was 2.9 times higher; all ethnic groups other than Chinese females were at higher risk of COVID-19 mortality than the White ethnic population.
- Taking into account geography, socio-economic characteristics and health measures, including pre-existing conditions, males of Black African background retained a 2.5 times higher rate than those of White background, while for females a 2.1 times greater risk remained.
- For males, all ethnic minority groups other than Chinese retained a raised rate of COVID-19 mortality following adjustments; for females, all other than Bangladeshi, Chinese and Mixed ethnic groups retained a raised rate of COVID-19 mortality following adjustments.
- Looking separately at the care home population, males of Asian ethnic background and females of Black and Asian ethnic backgrounds (using broader ethnic groupings) also had a raised rate of death involving COVID-19 compared with people of White ethnic background after taking account of geography and health measures.
- These findings show that ethnic differences in mortality involving COVID-19 are most strongly associated with demographic and socio-economic factors, such as place of residence and occupational exposures, and cannot be explained by pre-existing health conditions using hospital data or self-reported health status.

Statistician's comment

"Using more detailed ethnic group categories and adding measures of pre-existing health conditions from hospital data we have been able to build on previous analyses of ethnic disparities in COVID-19 mortality.

“Today’s report confirms that when adjusting for age, rates of death involving COVID-19 remain greater for most ethnic minority groups, and most notably so for people of Black African, Black Caribbean, Bangladeshi and Pakistani ethnic background.

“Our statistical modelling shows that a large proportion of the difference in the risk of COVID-19 mortality between ethnic groups can be explained by demographic, geographical and socioeconomic factors, such as where you live or the occupation you’re in. It also found that although specific pre-existing conditions place people at greater risk of COVID-19 mortality generally, it does not explain the remaining ethnic background differences in mortality.”

Ben Humberstone, Deputy Director, Health and Life Events Division, Office for National Statistics.

2 . Overview of ethnic group breakdowns

The Office for National Statistics (ONS) previously published analysis of deaths involving the coronavirus (COVID-19) by ethnic group taking account of demographic, social and geographic characteristics also associated with risk of infection and death. In this article, we extend the analyses to encompass measures of comorbidity (pre-existing health conditions) retrieved from hospital records during the past three years.

This article presents provisional analyses of deaths involving COVID-19 by ethnic group for England and Wales; the modelling of these deaths and the use of hospital data is restricted to England only. It includes deaths involving COVID-19 that occurred between 2 March and 28 July 2020, registered by 24 August 2020.[1] For more details on the data used, please refer to Section 11: Related links and the accompanying technical appendix.

The breakdown of ethnic group used in this article was guided by the number of deaths available for analysis, following the data linkage, and their distribution across ethnic groups. In this release, we have expanded the ethnic breakdowns to a nine-group classification, which separates the Black African and Black Caribbean ethnic groups, as well as the Bangladeshi and Pakistani ethnic groups, while the much smaller Black Other category is contained in “Other Ethnic Groups”.

Table 1 shows the breakdown of ethnic groups primarily used in this article.

Table 1. Ethnic breakdowns and percentage of study population

Ethnic groups used	Detailed composition of groups	Percent of study population
White	White British; Irish; Gypsy or Irish Traveller; Other White	86.4
Mixed\Multiple ethnic groups	White and Black Caribbean; White and Asian; White and Black African; Other Mixed	2.1
Bangladeshi	Bangladeshi	0.8
Indian	Indian	2.6
Pakistani	Pakistani	2.1
Chinese	Chinese	0.6
Black African	Black African	1.7
Black Caribbean	Black Caribbean	1.0
Other ethnic group	Asian other; Black other; Arab; Other ethnic group	2.6

Source: Office for National Statistics

Previous research has shown that people with certain pre-existing health conditions are at greater risk of death involving COVID-19.

A recent study analysing COVID-19 Clinical Information Network (CO-CIN) data of 20,133 UK patients in hospital with COVID-19 found that their study population’s most common conditions were chronic heart disease (31%), uncomplicated diabetes (21%), chronic lung disease (not asthma) (18%) and chronic kidney disease (16%). A further study using CO-CIN data investigated ethnic variations in the risks of critical care admission, invasive mechanical ventilation (IMV) and in-hospital mortality among hospitalised patients with COVID-19. A higher prevalence of diabetes was observed in minority[2] ethnic groups, but there was a lower prevalence of chronic heart disease and dementia than those of White ethnic background.

Given the links between comorbidity and deaths involving COVID-19, the possibility has to be considered that the distribution of certain pre-existing health conditions across ethnic groups might account for the disparities in COVID-19 mortality between ethnic groups that were previously observed even after adjusting for geographic, demographic and socioeconomic factors. To investigate this, our analysis uses data from NHS hospital episode statistics (HES) to show how having a hospital contact in the past three years for each of a list of relevant health conditions affects the risk of death involving COVID-19. It is important to note that this article does not discuss risk of infection directly.

Notes for: Overview of ethnic group breakdowns

1. As we update linked mortality data on a monthly basis, it was not possible to include more recent mortality data in this release.

2. Minority refers to all ethnic groups other than the White ethnic group.

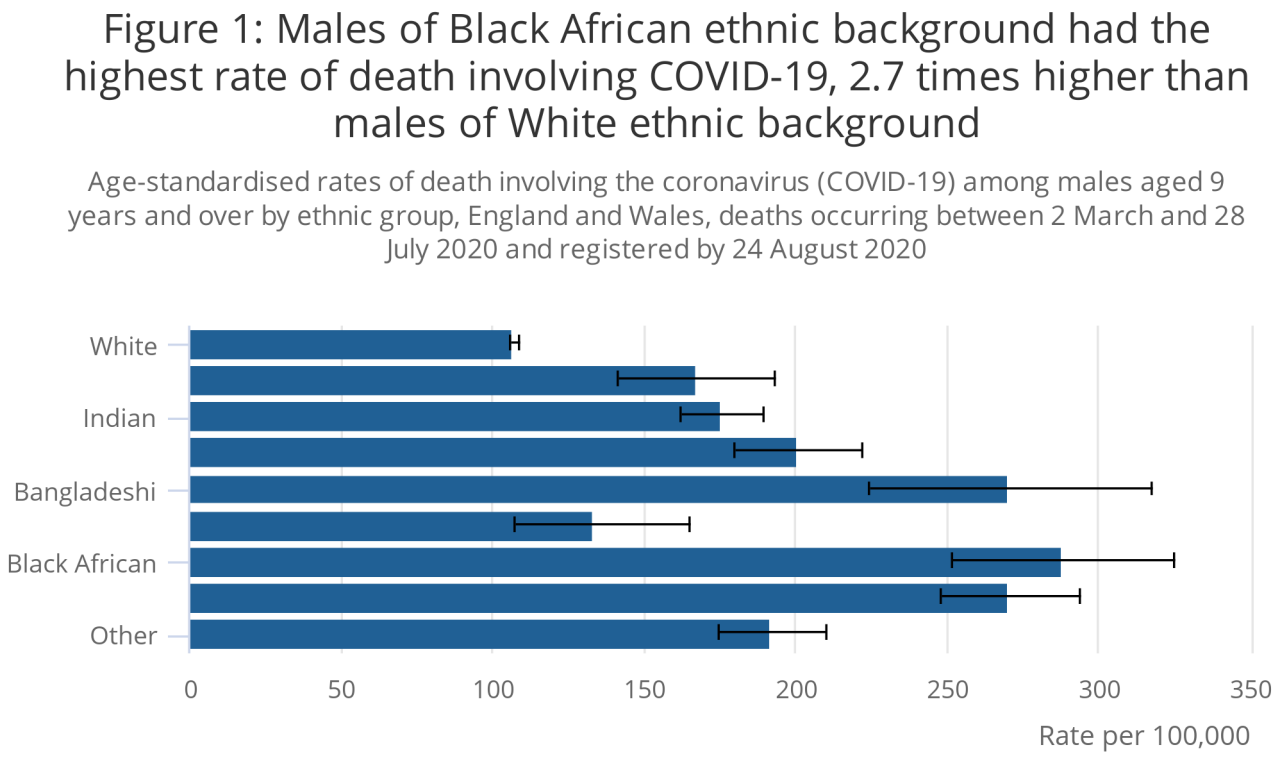
3 . Age-standardised rates of death involving COVID-19 by ethnic group

A total of 52,164 deaths involving the coronavirus (COVID-19) occurred between 2 March and 28 July 2020, registered by 24 August 2020. Of these, 47,082 (90.3%) were successfully linked to 2011 Census records and could be used in our comparison of ethnic group-specific death rates in England and Wales.

In Figures 1 and 2, we update the age-standardised rates of death involving COVID-19 by ethnic background for males and females respectively to 28 July. This is to establish whether ethnic disparities and their extent found previously have persisted as more data have accrued, which forms the baseline for explaining differences presented in the following modelling section.

Figure 1: Males of Black African ethnic background had the highest rate of death involving COVID-19, 2.7 times higher than males of White ethnic background

Age-standardised rates of death involving the coronavirus (COVID-19) among males aged 9 years and over by ethnic group, England and Wales, deaths occurring between 2 March and 28 July 2020 and registered by 24 August 2020



Source: Office for National Statistics – Updating ethnic contrasts in deaths involving the coronavirus (COVID-19), England and Wales

Notes:

1. Office for National Statistics (ONS) figures based on death registrations up to 24 August 2020 that occurred between 2 March and 28 July 2020 that could be linked to the 2011 Census.

2. Deaths were defined using the International Classification of Diseases, tenth revision (ICD-10). Deaths involving the coronavirus (COVID-19) include those with an underlying cause, or any mention, of ICD-10 codes U07.1 (COVID-19, virus identified) or U07.2 (COVID-19, virus not identified).

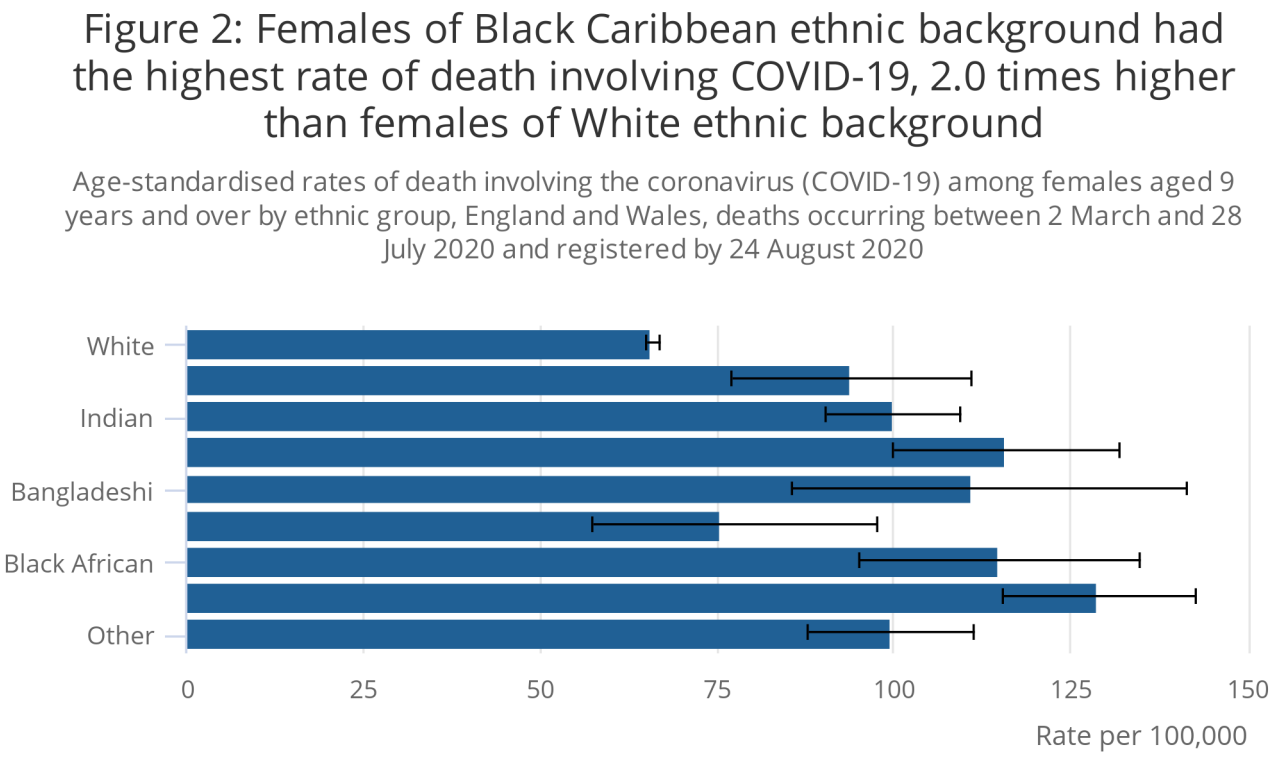
3. Age-standardised mortality rates (ASMRs) of death involving COVID-19 can be interpreted as deaths per 100,000 of the population during the 149-day period at risk.

4. Other ethnic group encompasses Asian other, Black other, Arab and Other ethnic group categories in the classification.

5. Non-overlapping error bars denote a statistically significant difference in rates of death.

Figure 2: Females of Black Caribbean ethnic background had the highest rate of death involving COVID-19, 2.0 times higher than females of White ethnic background

Age-standardised rates of death involving the coronavirus (COVID-19) among females aged 9 years and over by ethnic group, England and Wales, deaths occurring between 2 March and 28 July 2020 and registered by 24 August 2020



Source: Office for National Statistics – Explaining ethnic contrasts in deaths involving the coronavirus (COVID-19), England and Wales

Notes:

1. Office for National Statistics (ONS) figures based on death registrations up to 24 August 2020 that occurred between 2 March and 28 July 2020 that could be linked to the 2011 Census.

2. Deaths were defined using the International Classification of Diseases, tenth revision (ICD-10). Deaths involving the coronavirus (COVID-19) include those with an underlying cause, or any mention, of ICD-10 codes U07.1 (COVID-19, virus identified) or U07.2 (COVID-19, virus not identified).

3. Age-standardised mortality rates (ASMRs) of death involving COVID-19 can be interpreted as deaths per 100,000 of the population during the 149-day period at risk.

4. Other ethnic group encompasses Asian other, Black other, Arab and Other ethnic group categories in the classification.

5. Non-overlapping error bars denote a statistically significant difference in rates of death.

In England and Wales, males of Black African, Black Caribbean and Bangladeshi ethnic background had the highest rates of death involving COVID-19, all exceeding 250 deaths per 100,000 and significantly higher than all other ethnic groups. We combined Pakistani and Bangladeshi groups in our previous release, but these new estimates show the latter had a significantly higher risk of COVID-19 mortality. Males of White ethnic background continued to have the lowest rate at 106.8 deaths per 100,000, significantly lower than all other ethnic groups apart from Chinese. Males of Black African ethnic background had a rate of death 2.7 times higher than those of White ethnic background.

For females, the White ethnic group also had the lowest rate at 65.7 deaths per 100,000, significantly lower than all ethnic groups other than Chinese. Females of Black Caribbean ethnic background had the highest rate (128.8 deaths per 100,000), almost twice that of the White group, and significantly higher than those of White, Indian, Mixed, Chinese and “Other” ethnic backgrounds.

Rates of death at ages 9 to 64 years and 65 years and over separately are included in the dataset accompanying this release. The figures reported here demonstrate that the higher rates among people of Black and Asian ethnic backgrounds previously reported have persisted with only minimal change in the magnitude of differences to those of White ethnic background. For example, in our last publication males of Black ethnic background had a rate of death involving COVID-19 that was 2.9 times higher than White ethnic background males, and for females it was 2.3 times.

4 . Hospital-based pre-existing conditions by ethnic group

This section examines the association between hospital-based comorbidity in the previous three years and deaths involving the coronavirus (COVID-19) as well as whether the distribution of selected pre-existing conditions treated in hospital differs by ethnic groups.

We used three years of NHS hospital episode statistics (HES) data[1] to retrieve patient diagnostic information needed to calculate prevalence rates in this analysis. The information within these datasets is at patient episode level (each period of care under a consultant) and covers admitted patient care, out-patients and Accident and Emergency. To preserve all information when linking on to the 2011 Census and deaths data, we created a single person-level dataset, containing the necessary diagnostic information for analysis available in episodes of care records.[2] Further information on how the data were constructed, and the diagnostic information used, can be found in the technical appendix.

We grouped a set of pre-existing health conditions previously implicated as raising risk of death from COVID-19 into broad categories mostly aligned to the International Classification of Diseases, tenth revision (ICD-10), shown in Table 2 with the specific ICD-10 codes contained within the broad categories.

Table 2. Pre-existing health conditions included in the analyses

Broad groupings with components		ICD10 codes
Cancer	All	C00-D48
Cardiovascular diseases	Ischaemic heart diseases	I10-I15; I20-125; I48; I50; I60-I69
	Heart failure	
	Cerebrovascular diseases	
	Atrial fibrillation	
	Hypertension	
Digestive disorders	Inflammatory bowel disease	K50-K52; K70-K77
	Liver disease	
Mental health conditions	Alzheimer's disease	G30; F00-F03; F20-F39; F70-F79; F84-F84.9
	Dementia	
	Serious mental illness	
	Learning disability and autism	
Metabolic disorders	Diabetes	E10-E14
Musculoskeletal disorders	Osteoarthritis	M19.9; M80-M82; M05-M06
	Osteoporosis	
	Rheumatoid arthritis	
Neurological disorders	Motor neuron disease	G12.2; G20-G22; G35; G40
	Parkinson's disease	
	Multiple Sclerosis	
	Epilepsy	
Renal disorders	Chronic kidney disease	N17-N19
	Other renal failure	
Respiratory disorders	Asthma	J09-J18; J20-J22; J44-J45; J47; J96;
	Influenza and Pneumonia	
	Other acute respiratory infection	
	Chronic obstructive pulmonary disease	
	Respiratory failure	
	Bronchiectasis	

Source: International Classification of Diseases 10th revision

We investigated whether the risk of death involving COVID-19 differed across the groups of conditions listed in Table 2 and whether the populations with a history of these conditions were at greater risk than those not having them on their hospital record or having no hospital contact in the past three years. This analysis is based on 44,706 linked deaths occurring to residents in England during the period 2 March to 28 July 2020.

We find having hospital contact in the past three years and having one or more of the conditions listed in Table 2 is associated with substantially raised risk of COVID-19 mortality compared with those either without hospital contact or with hospital contact but without any of the conditions in Table 2 mentioned on their hospital record. The rates of COVID-19 mortality by these health condition groupings are available in the dataset accompanying this release.

Differential prevalence of these conditions across ethnic groups could be a potential mediator of the relationship between ethnic group and death involving COVID-19 reported earlier. We compared the prevalence of our selected condition groupings across ethnic groups by sex (Figure 3). Our prevalence rates are age-adjusted to account for differences in the age structure of the ethnic groups examined

Figure 3: Males and females of South Asian ethnic groups show a higher prevalence of cardio-vascular and metabolic (diabetes) conditions, which are associated with a raised risk of death involving COVID-19

Age standardised prevalence rates of grouped conditions found in hospital episode statistics data

Download the data

.xlsx

Notes:

1. Prevalence estimates based on past three years of hospital episode statistics data.
2. Other ethnic group encompasses Asian other, Black other, Arab, and other ethnic group categories in the classification.
3. Non-overlapping error bars denote a statistically significant difference in prevalence all other notes to be removed from this figure.

In our analysis, mental health conditions (60% of which were Alzheimer's disease and dementia) had the strongest association with COVID-19 mortality (see dataset accompanying this release); males of Black Caribbean, Bangladeshi and Mixed ethnic backgrounds had the highest prevalence rates of these disorders, while those of Chinese background had the lowest. For females, those of Bangladeshi, Pakistani and Black Caribbean ethnic background had significantly higher prevalence than all other ethnic groups.

For cardiovascular diseases (where prevalence was generally greatest) and metabolic disorders (diabetes), males and females of Bangladeshi and Pakistani ethnic background had statistically significant higher prevalence rates than all other ethnic groups.

Figure 3 shows prevalence rates of these health conditions are uneven between ethnic groups and therefore it is appropriate to treat disease prevalence as a potential confounder of the relationship between ethnic group and risk of death involving COVID-19.

Notes for: Hospital-based pre-existing conditions by ethnic group

1. HES data contain admitted patient care, out-patients and Accident and Emergency components. We used annual data from April 2017 onwards that could be linked to the Census 2011 records to estimate prevalence of a selected set of pre-existing conditions. HES data is restricted to England only.
2. All data linkage processes are conducted within our secure data access platform with legal restrictions on access and use.

5 . Risk of death involving COVID-19 between ethnic groups among people living in private households in England

In this section, we explore associations between ethnicity and coronavirus (COVID-19) mortality rates in more detail using adjustment models, to examine the impact of comorbidities on ethnic group differences in the rates of death involving the coronavirus (COVID-19) reported in Section 3: Age-standardised rates of death involving COVID-19 by ethnic group.

We use Cox proportional hazards regression models to estimate how differences in the risk of death involving COVID-19 change when adjusting for a range of factors affecting both the risk of infection and the risk of death if infected. This approach helps us understand which factors drive the differences in mortality across ethnic groups.

In our baseline model, we present hazard ratios adjusted only for age. We then adjust for factors likely to affect the risk of infection mostly but also the risk of having a pre-existing existing condition too and therefore prognosis. Estimates of COVID-19 infection rates by ethnic group are available from the ONS COVID Infection Survey, but the small number of participants testing positive for antibodies in some ethnic groups means that the estimates are imprecise, with wide confidence intervals reflecting considerable uncertainty.

First, we adjust for geographic factors, such as location of residence and population density. We then include in our model demographic and socio-economic characteristics, such as area and household deprivation, household tenancy, household composition, measures of socio economic status (educational level, National Statistics Socio-economic Classification (NS-SEC) of household head) and occupational exposure measures (exposure to disease and contact with others using O*NET data as well as key worker status) both at individual and household level. Most of these characteristics were retrieved from the 2011 Census.

We adjust for self-reported health and the presence of activity limitation because of a long-standing health condition, as reported in the 2011 Census. We also use data from hospital episode statistics (HES), as described earlier, to identify individuals who had hospital contact for a range of conditions, including cardiovascular diseases, cancer, respiratory problems and mental health conditions. More details can be found in the technical appendix.

The modelling analysis is based on those that were enumerated in private households at the 2011 Census, as only private household enumerations had the entirety of the socio-demographic and household characteristics used in the modelling of mortality risk. We exclude people who were identified as living outside England or in a care home in 2019 according to the Patient Register. This means deaths occurring to care home residents will be mostly excluded in this part of the analyses, which has a greater focus on community deaths.

The number of deaths involving COVID-19 used in this section amounted to 31,874; therefore, measures of effect may vary from what was presented in Section 3: Age-standardised rates of death involving COVID-19 by ethnic group where all linked deaths were used across England and Wales. Section 6: Risk of death involving COVID-19 between ethnic groups among people living in care homes in England focuses on people living in a care home.

In Figure 4, we report the hazard ratios[1] for each ethnic minority group relative to the White ethnic group, after adjusting for age, plus geography, plus socio-economic factors, plus self-reported health or disability and hospital comorbidities

Figure 4: Statistically significant raised rates of COVID-19 mortality remained for both males and females of Black African, Black Caribbean, Indian, Pakistani and Other ethnic groups compared to the White ethnic group after taking account of demographic, socio-economic and health-related factors

Rate of death involving the coronavirus (COVID-19) by ethnic group and sex relative to the White population, England, 2 March to 28 July 2020

Download the data

.xlsx

Notes:

1. Cox proportional hazards models adjusting for age, geography (local authority and population density), socio-economic factors (area deprivation, household composition, socio-economic position, highest qualification held, household tenure, multigenerational household flags and occupation indicators (including keyworkers and exposure to others), and health (self-reported health and disability status in March 2011, and hospital-based comorbidities since April 2017).

2. ONS figures based on death registrations up to date that occurred between 2 March and 28 July and could be linked to the 2011 Census.

3. Deaths were defined using the International Classification of Diseases, 10th Revision (ICD-10). Deaths involving COVID-19 include those with an underlying cause, or any mention, of ICD-10 codes U07.1 (COVID-19, virus identified) or U07.2 (COVID-19, virus not identified).

4. Rate of death between 2 March and 28 July 2020.

5. Other ethnic group encompasses Asian other, Black other, Arab, and other ethnic group categories in the classification.

6. Error bars not crossing the x axis at value 1.0 denote a statistically significant difference in relative rates of death.

After adjusting for age, males and females from all ethnic minority groups (except females of Chinese ethnic background) were at greater risk of death involving COVID-19 than the White ethnic group. The rate of death involving COVID-19 was 3.8 times greater for Black African males and 2.9 times greater for Black African females than the White ethnic group. The rate of death was also notably greater for people of Bangladeshi, Black Caribbean or Pakistani ethnic background than the White population, with hazard ratios of 3.5, 2.8, and 2.5, respectively, for males and 2.5, 2.2 and 2.6, respectively, for females.

The results for the Black African, Black Caribbean, Bangladeshi and Pakistani ethnic groups are not comparable with those reported in our previous publication, when rates of death involving COVID-19 up until 15 May 2020 were included in the study, because of differences in ethnic grouping structure. However, results for the other ethnic groups are broadly comparable with those in the previous publication, suggesting little change in the age-adjusted risk profile of COVID-19 mortality by ethnicity.

The second and third set of bars in Figure 4 show estimates of differences in the risk of death after further adjusting for geography (local authority and population density) and demographic and socio-economic characteristics (area deprivation, household deprivation, socio-economic position, household composition, living arrangements with regard to multigenerational households, and measures of occupational exposure to the disease (including key worker status and exposure to others) respectively.

More information on how the hazard ratios change when adjusting for different sets of characteristics and diagnostics for the various models can be found in the technical appendix. Model diagnostics can be found in the dataset accompanying this article.

These adjustments for geography and socio-economic factors make a sizable contribution to the reduction in estimated risk of death involving COVID-19 for ethnic minority groups relative to the White population, but significant differences remain. For example, the relative difference in the rate of death involving COVID-19 among Black African males reduced to 2.3 times as great as that for comparable White males; for males of Bangladeshi, Black Caribbean and Pakistani ethnic background, it reduced to 1.9, 1.7, and 1.6 times greater, respectively. In addition, males of Chinese ethnic background were no longer at significantly greater risk of COVID-19 mortality than White males, though significant excess risk remained for all other minority ethnic groups.

Adjusting for geographic and socio-economic factors reduces the size of the hazard ratios between ethnic minority groups and the White ethnic group more so for females than males. Females from Bangladeshi, Chinese and Mixed ethnic backgrounds were no longer at significantly greater COVID-19 mortality risk than White females following adjustments. However, risk remained significantly elevated for all other groups, with the hazard ratios being greatest for females of Black African, Pakistani or Black Caribbean ethnic background (1.6, 1.5 and 1.3, respectively).

Further adjusting for self-reported health and disability status in 2011 and hospital-based comorbidities since 2017, as shown in blue in Figure 4, does not substantially change the COVID-19 mortality risk profile for either males or females, and their effect is differential in terms of the direction of change. Hazards for ethnic minority groups that were statistically significantly different from that for the White population after adjusting for socio-economic factors remain so after further adjusting for measures of health. However, there are notable decreases in the hazard ratios for people of Bangladeshi or Pakistani ethnic background (1.4 and 1.3, respectively, for males and 1.1 and 1.3, respectively, for females).

Conversely, there are notable increases in the hazard ratios for people of Black African or Chinese ethnic background (2.5 and 1.2, respectively, for males and 2.1 and 1.2, respectively, for females). These changes in relative mortality rates reflect differences in the prevalence of comorbidities that are associated with COVID-19 mortality risk between each of the ethnic minority groups and the White population, as discussed in Section 4: Hospital-based pre-existing conditions by ethnic group.

Our results confirm statistically significant raised rates of death remain for males and females of Black African, Black Caribbean, Indian, Pakistani and Other ethnic groups after taking account of pre-existing health conditions in addition to the previously investigated factors. While there is clear evidence of a relationship between hospital contact in the past three years with a discrete set of health conditions specified in Section 4: Hospital-based pre-existing conditions by ethnic group, and some imbalance in the prevalence of these conditions across ethnic groups, hospital-based comorbidity was unable to explain away the differences observed in age-adjusted models for most ethnic groups.

To gain a better understanding of the differences in risk of death involving COVID-19 across ethnic groups, we also investigate whether these differences are more marked in some demographic and socio-economic groups than others (full results can be found in the dataset accompanying this release). We estimate separate Cox proportional hazard models for different population components. First, we examine whether the differences in rates of death involving COVID-19 vary across age groups focusing on people aged under 70 years and people aged 70 years and over.

We find the magnitude of the relationship between COVID-19 mortality and ethnic group is different across age groups. The relative differences between ethnic groups are larger for those younger than 70 years; the pattern is similar for males and females. This could be partly explained by the greater likelihood of the younger population being economically active and in employment; although we account for some measures of occupational exposure, an imbalance across ethnic groups in likelihood to be working in at-risk occupations, such as front-facing occupations, could be a determining factor yet to be explored in detail with additional data sources.

We also investigate, estimated for individuals aged under 70 years, whether differences in rates of death involving COVID-19 across ethnic groups vary by:

- residency within or outside of London
- whether a key worker (defined according to the occupation and industry provided in the 2011 Census) lives in the household
- whether the household is deprived; and whether the individual is employed in a routine or a professional occupation (according to the National Statistics Socio-economic Classification (NS-SEC))

While there is evidence that some of the hazard ratios vary according to some of the population contrasts, there are no consistent patterns to differences in hazard ratios across ethnic groups, and the contrasts are not as marked as that between people aged under 70 years and people aged 70 years and over. This suggests ethnic contrasts are similar within socioeconomic strata.

Our adjustments for demographic, socio-economic and health-related circumstances have temporal limitations. Most of the demographic and socio-economic characteristics used in the models were retrieved from the 2011 Census, and therefore they may not accurately reflect the study population's current circumstances in 2020.

While we have built on our previous publication by adjusting for hospital-based comorbidities observed since April 2017 in addition to self-reported health and disability status reported in the 2011 Census, this only provides a partial picture of comorbidity. For example, it excludes people admitted to hospital for one or more of the conditions of interest prior to April 2017 with no subsequent hospital contact; such people's pre-existing conditions will not be captured. Furthermore, many conditions such as diabetes and hypertension are often managed in primary care and do not require hospital attendance.

Consequently, the prevalence of these conditions will be under-recorded in hospital data. For these reasons, it will be necessary to revisit this analysis once more complete data on disease prevalence become available following our acquisition of General Practice Extraction Service data.

Our results are consistent with a recent study using data from OpenSAFELY that show that elevated mortality risk among ethnic minority groups remain after adjusting for pre-existing conditions (defined using both hospital and primary care data). Unlike our analyses, this study only adjusts for basic demographic and geographic factors. Combining comprehensive data on pre-existing conditions with detailed socio-economic factors may help explain the remaining differences in mortality between ethnic groups. In addition, the small impact of pre-existing comorbidities is in line with results from the Real-time Assessment of Community Transmission-2 (REACT-2) study, which indicate that differences in infection drive differences in mortality rates between ethnic groups.

Notes for: Risk of death involving COVID-19 between ethnic groups among people living in private households in England

1. The hazard ratio is a measure of how much greater or lesser is the rate of death involving COVID-19 for each minority ethnic group relative to the White population. A hazard ratio greater than one indicates a greater rate of death involving COVID-19 than the reference group while a hazard ratio less than one indicates a lower rate of COVID-19 mortality than the reference group.

6 . Risk of death involving COVID-19 between ethnic groups among people living in care homes in England

In addition to our analysis of those resident in private households, we present analyses of those resident in a care home as of 31 December 2019. This analysis excludes those who became care home residents during 2020. We categorise the care home population in a more condensed fashion as “White”, “Asian”, “Black” and “Other Ethnicity”. The number of deaths involving the coronavirus (COVID-19) by ethnic group during the period 2 March to 28 July 2020 is presented in Table 3.

Of the male population resident in care homes between 2 March and 28 July 2020, 6.5% suffered a death involving COVID-19; for females, it was 4.5%, in line with the increased risk we observe for males in the general population.

Table 3: Care home residents in study population as of 31 December 2019 and number of deaths involving COVID-19 between 2 March to 28 July 2020, England

	Males			Females		
	Care home population	Number of deaths involving COVID-19	% of deaths	Care home population	Number of deaths involving COVID-19	% of deaths
White	75,747	4,958	6.5%	151,968	6,736	4.4%
Asian	1,792	102	5.7%	1,994	125	6.3%
Black	1,862	118	6.3%	1,807	102	5.6%
Other	1,079	32	3.0%	1,072	44	4.1%
Total	80,480	5,210	6.5%	156,841	7,007	4.5%

Source: Office for National Statistics

Notes

1. Care home status identified from Patient Register 2019.
2. Office for National Statistics (ONS) figures based on death registrations up to 24 August 2020 that occurred between 2 March and 28 July 2020 that could be linked to the 2011 Census.
3. Deaths were defined using the International Classification of Diseases, 10th Revision (ICD-10). Deaths involving COVID-19 include those with an underlying cause, or any mention, of ICD-10 codes U07.1 (COVID-19, virus identified) or U07.2 (COVID-19, virus).
4. Ethnic group based on high level grouping with Mixed multiple ethnic groups included in "other" category because of small numbers.

As in Section 5: Risk of death involving COVID-19 between ethnic groups among people living in private households in England, Cox regression is applied to model relative rates of death of ethnic minorities compared with the White population. In our baseline model, we present hazard ratios[1] adjusted only for age. We then adjust for region and population density based on the 2011 Census. Finally, we adjust for self-reported health and disability status and the comorbidities explained in Section 4: Hospital-based pre-existing conditions by ethnic group.

The models demonstrate that the age-adjusted risks for Asian males and females are approximately 1.6 and 2.0 times greater than the risk to White males and females respectively, while for Black males and females it was 1.6 and 1.7 times greater respectively (Figure 5). Notably, the level of increased risk is lower than that presented in the private household models. We also observe a greater age-adjusted risk for Asian females than Asian males, which contrasts with the higher differential in risk we observe among males than females in the general population.

Controlling for region and population density reduces risk for all ethnic groups, when compared with the White population; for example, the risk to Black males is reduced from 1.6 to 1.3 and for Black females from 1.7 to 1.4, while for Asian males the risk is reduced from 1.6 to 1.4 and for Asian females from 2.0 to 1.7.

Adjusting for underlying health status (comorbidities from hospital data and self-reported health and disability status at the 2011 Census) reduces the risk further for Asian and Black males and females; however, this reduction is small and not statistically significant. For example, the hazard ratios observed for Black males and females reduce to 1.2 and 1.3 respectively. As explained in Section 4: Hospital-based pre-existing conditions by ethnic group, it is likely that not all comorbidities are captured in hospital admissions.

Overall, the mortality rates among ethnic groups do not show the same extent of increased risk observed among ethnic minorities in the general population. After controlling for geography and health, we observe only a small significant increased risk for Asian males and Black and Asian females; the risk to Asian females after adjustment is 1.7 times the risk to White females.

Figure 5: For the care home population, males in the Asian ethnic group and females in the Black and Asian ethnic groups had raised rates of COVID-19 mortality compared to those in the White ethnic group after taking account of geography and health measures

Rate of coronavirus (COVID-19) death by ethnic group and sex relative to the White population in care homes, England, 2 March to 28 July 2020

Download the data

.xlsx

Notes:

1. Cox proportional hazards models adjusting for age, geography (region and population density), and health (self-reported health and disability status in March 2011, and hospital-based comorbidities since April 2017).

2. ONS figures based on death registrations up to date that occurred between 2 March and 28 July and could be linked to the 2011 Census.

3. Deaths were defined using the International Classification of Diseases, 10th Revision (ICD-10). Deaths involving COVID-19 include those with an underlying cause, or any mention, of ICD-10 codes U07.1 (COVID-19, virus identified) or U07.2 (COVID-19, virus not identified).

4. Rate of death between 2nd March and 28th July 2020.

5. Other ethnic group encompasses Arab, Other ethnic group and Mixed ethnic group

6. Error bars not crossing the x axis at value 1.0 denote a statistically significant difference in relative rates of death.

Notes for: Care home models

1. The hazard ratio is a measure of how much greater or lesser is the rate of death involving COVID-19 for each minority ethnic group relative to the White population.

7 . Ethnic contrasts in COVID-19 deaths data

Model estimates of deaths involving the coronavirus (COVID-19) by ethnic group for people in private households, England
Dataset | Released 16 October 2020
Model estimates of deaths involving the coronavirus (COVID-19) by ethnic group for people in private households in England.

Counts of coronavirus (COVID-19) related deaths by ethnic group, Wales
Dataset | Released 16 October 2020
Counts of coronavirus (COVID-19) related deaths by ethnic group in Wales.

Counts of coronavirus (COVID-19) related deaths by ethnic group, England and Wales
Dataset | Released 16 October 2020
Counts of coronavirus (COVID-19) related deaths by ethnic group in England and Wales.

Rates of deaths involving the coronavirus (COVID-19) where individuals have specific comorbidities and sex, England
Dataset | Released 16 October 2020
Rates of deaths involving the coronavirus (COVID-19) where individuals have specific comorbidities and sex in England.

Prevalence rates of comorbidities by ethnic group, England
Dataset | Released 16 October 2020
Prevalence rates of comorbidities by ethnic group in England.

8 . Glossary

Age-standardised mortality rates

Age-standardised mortality rates are used to enable populations with different age structures to be compared validly. Those of White ethnic background have an older population structure than other ethnic groups, and coronavirus (COVID-19) deaths are more common in older populations; therefore, it is necessary to adjust for population age structure.

Cox proportional hazards model

The Cox proportional hazards model is a multiple regression procedure that measures the association between survival time and a characteristic of interest such as ethnic background, while adjusting for other characteristics expected to also be associated with survival duration.

Hazard ratio

A hazard ratio is a measure of the relative differences in the instantaneous rate of mortality between groups. A hazard ratio greater than one indicates the rate of mortality is higher and likewise less than one lower in the population group under study.

Coronavirus (COVID-19) deaths

Coronavirus (COVID-19) deaths are those deaths registered in England and Wales in the stated week where COVID-19 was mentioned on the death certificate. A doctor can certify the involvement of COVID-19 based on symptoms and clinical findings – a positive test result is not required. Definitions of COVID-19 for deaths in Scotland and Northern Ireland are similar to England and Wales.

9 . Data sources and quality

For details on the data used, including how they were constructed and the diagnostic information used, please refer to Section 11: Related links and the accompanying technical appendix.

10 . Future developments

Although we account for some measures of occupational exposure, an imbalance across ethnic groups in likelihood to be working in at-risk occupations, such as front-facing occupations, could be a determining factor yet to be explored in detail with additional data sources.

The prevalence of some conditions such as hypertension and diabetes will be under-recorded in hospital data. It will therefore be necessary to revisit this analysis once more complete data on disease prevalence become available following our acquisition of General Practice Extraction Service data.

Further information on future developments is available in the technical appendix.

11 . Related links

Coronavirus (COVID-19) related deaths by ethnic group, England and Wales: 2 March to 15 May 2020
Article | Released 19 June 2020
Deaths related to the coronavirus (COVID-19) by ethnic group, including death counts, age-standardised mortality rates, and hazard rate ratios by age, sex and ethnic group.

Coronavirus (COVID-19) related deaths by ethnic group, England and Wales: 2 March to 10 April 2020
Article | Released 7 May 2020
Comparison of deaths where COVID-19 was mentioned on the death certificate by broad age group, sex and ethnic group, using linked census and mortality records on deaths registered up to 17 April 2020. Includes death counts, cause-specific mortality ratios and odds ratios to identify differential risks of COVID-19-related deaths.