

Article

# Coronavirus (COVID-19) related deaths by religious group, England and Wales: 2 March to 15 May 2020

Deaths involving the coronavirus (COVID-19) by religious group, including death counts, age-standardised mortality rates, and hazard rate ratios by age, sex and religious group.

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# 1 . Main points

- This provisional analysis for the period 2 March to 15 May 2020 has shown variation in the rate of death involving the coronavirus (COVID-19) between self-identified religious groups, as reported in the 2011 Census, including "No religion".
- The highest age-standardised mortality rates (ASMRs) of deaths involving COVID-19 were in the Muslim religious group with 198.9 deaths per 100,000 males and 98.2 deaths per 100,000 females; people who identified as Jewish, Hindu or Sikh also showed higher mortality rates than other groups.
- When taking account of region, population density, socio-demographic and household characteristics, and ethnic background, those who identified as Jewish at the time of the 2011 Census showed an increased risk of a death involving COVID-19 compared with the Christian population; Jewish males were at twice the risk of Christian males, with the difference in females being 1.2 times greater risk (additional data and analyses are required to understand this excess risk).
- Those who reported having "No religion" in the 2011 Census had the lowest rate of death involving COVID-19 with 80.7 deaths per 100,000 males and 47.9 deaths per 100,000 females.
- Our research was based on linking deaths to the 2011 Census, the timeliest Census data available, including people aged nine years and over; we used a regression modelling approach to adjust for specific characteristics of people in private households at the time of the census, and we aim to undertake further analysis that considers other characteristics such as pre-existing conditions.

## Statistician's comment

"The risk of death involving COVID-19 varies across religious groups, with those identifying as Muslims, Jewish, Hindu and Sikh showing a higher rate of death than other groups. For the most part the elevated risk of certain religious groups is explained by geographical, socio economic and demographic factors and increased risks associated with ethnicity. However, after adjusting for the above, Jewish males are at twice the risk of Christian males, and Jewish women are also at higher risk. Additional data and analyses are required to understand this excess risk."

Nick Stripe, Head of Life Events, Office for National Statistics

## 2 . Introduction

This article presents provisional analyses of deaths involving the coronavirus (COVID-19) by religious group in England and Wales. It includes deaths that occurred between 2 March and 15 May 2020, which were registered by 29 May 2020. As religion is not recorded on the death certificate, this information was retrieved through record linkage of death registrations to the 2011 Census, allowing us to ascertain the religious group and other demographic factors of the deceased. Analyses have been restricted to those aged nine years and over because children aged under nine years would not have been born and therefore included in the 2011 Census. More details on the data used can be found in the [technical appendix](#).

Religion and belief is one of the [protected characteristics](#) covered by the [Equality Act 2010](#). The 2011 Census question on religion was voluntary, and just over 7% of the population of England and Wales opted not to answer it, equivalent to just over 4 million people in total.

#### More about coronavirus

- Find the latest on [coronavirus \(COVID-19\) in the UK](#).
- All ONS analysis, summarised in our [coronavirus roundup](#).
- View [all coronavirus data](#).
- Find out how we're [working safely during the pandemic](#).

The breakdown of religious groups used in this publication was guided by the number of deaths available for use in analyses and its distribution across groups. Table 1 shows the breakdown of religious groups used and the proportion of the population they encompassed in the 2011 Census and in the study population at risk of a death involving COVID-19 on 2 March 2020.

Table 1: Religious groups used in this article

<b>Religious group</b>	<b>2011 Census percentage distribution</b>	<b>Study population percentage distribution</b>
No religion	25.1	26.0
Christian	59.3	58.6
Buddhist	0.4	0.4
Hindu	1.5	1.5
Jewish	0.5	0.5
Muslim	4.8	4.9
Sikh	0.8	0.8
Other religion	0.4	0.4
Not stated or required	7.2	7.0

Source: Office for National Statistics – Coronavirus (COVID-19) related deaths by religious group

### 3 . Religious group breakdown of COVID-19 deaths by age and sex

Table 2 shows the number of deaths involving the coronavirus (COVID-19) and their percentage distribution across religious groups among the study population.

Table 2: Death occurrences involving COVID-19 by religious group, England and Wales, 2 March to 15 May 2020

<b>Religious group</b>	<b>Number of deaths</b>	<b>Percentage of deaths</b>
No religion	3,595	9.5
Christian	28,888	76.1
Buddhist	98	0.3
Hindu	594	1.6
Jewish	453	1.2
Muslim	1,307	3.4
Sikh	258	0.7
Other religion	98	0.3
Not stated or required	2,665	7.0
<b>Total</b>	<b>37,956</b>	<b>100.1*</b>

Source: Office for National Statistics – Coronavirus (COVID-19) related deaths by religious group

#### Notes

1. Office for National Statistics (ONS) figures based on death registrations up to 29 May 2020 that occurred between 2 March and 15 May 2020 that could be linked to the 2011 Census. [Back to table](#)
2. Deaths were defined using the International Classification of Diseases, 10th 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). [Back to table](#)
3. \*Percentage totals do not add up to 100 because of rounding. [Back to table](#)

Those identifying with the Christian religion experienced over three-quarters of deaths involving COVID-19 that occurred in the period investigated.

Breaking the deaths down further by age and sex, we see that deaths involving COVID-19 were more numerous for males, and in people aged 65 years and over compared with those aged under 65 years, for all religious groups (Table 3).

Table 3: Death occurrences involving COVID-19 by age, sex and religious group, England and Wales, 2 March to 15 May 2020

Religious group	Males		Females	
	Aged 9 to 64 years	Aged 65 years and over	Aged 9 to 64 years	Aged 65 years and over
No religion	484	2,068	218	825
Christian	1,261	13,958	863	12,806
Buddhist	15	48	6	29
Hindu	90	271	43	190
Jewish	16	252	7	178
Muslim	297	584	125	301
Sikh	42	119	20	77
Other religion	11	44	13	30
Not stated or required	152	1,344	82	1,087
Total	2,368	18,688	1,377	15,523

Source: Office for National Statistics – Coronavirus (COVID-19) related deaths by religious group

#### Notes

1. Office for National Statistics (ONS) figures based on death registrations up to 29 May 2020 that occurred between 2 March and 15 May 2020 that could be linked to the 2011 Census. [Back to table](#)
2. Deaths were defined using the International Classification of Diseases, 10th 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). [Back to table](#)

## 4 . Age-standardised mortality rates of death involving COVID-19 by religious group

We calculated age-standardised mortality rates (ASMRs)<sup>1</sup> for males and females aged nine years and over, aged 9 to 64 years, and aged 65 years and over to assess when contrasts were different among younger and older populations. ASMRs of death involving the coronavirus (COVID-19) can be interpreted as deaths per 100,000 of the population during the analysis period.

Table 4 shows ASMRs per 100,000 population for deaths involving COVID-19 in the period 2 March to 15 May 2020 for those aged 9 years and over.

Table 4: Age-standardised mortality rates involving COVID-19 for those aged nine years and over by sex and religious group, England and Wales, 2 March to 15 May 2020

Religious group	Age-standardised mortality rates involving COVID-19	
	Males	Females
No religion	80.7	47.9
Christian	92.6	54.6
Buddhist	113.5	57.4
Hindu	154.8	93.3
Jewish	187.9	94.3
Muslim	198.9	98.2
Sikh	128.6	69.4
Other religion or not stated	84.2	49.2

Source: Office for National Statistics – Coronavirus (COVID-19) related deaths by religious group

#### Notes

1. Office for National Statistics (ONS) figures based on death registrations up to 29 May 2020 that occurred between 2 March and 15 May 2020 that could be linked to the 2011 Census. [Back to table](#)
2. Deaths were defined using the International Classification of Diseases, 10th 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). [Back to table](#)
3. Age-standardised mortality rates (ASMRs) of COVID-19-related death can be interpreted as deaths per 100,000 of the population during the period at risk. [Back to table](#)
4. ASMRs with 95% confidence intervals can be found in the datasets accompanying this release. [Back to table](#)

Males identifying with the Muslim religion had the highest rates of death involving COVID-19, which was [statistically significantly](#) higher than that of all groups other than the Jewish religious group; for females, it was higher for all groups other than the Hindu and Jewish religious groups.

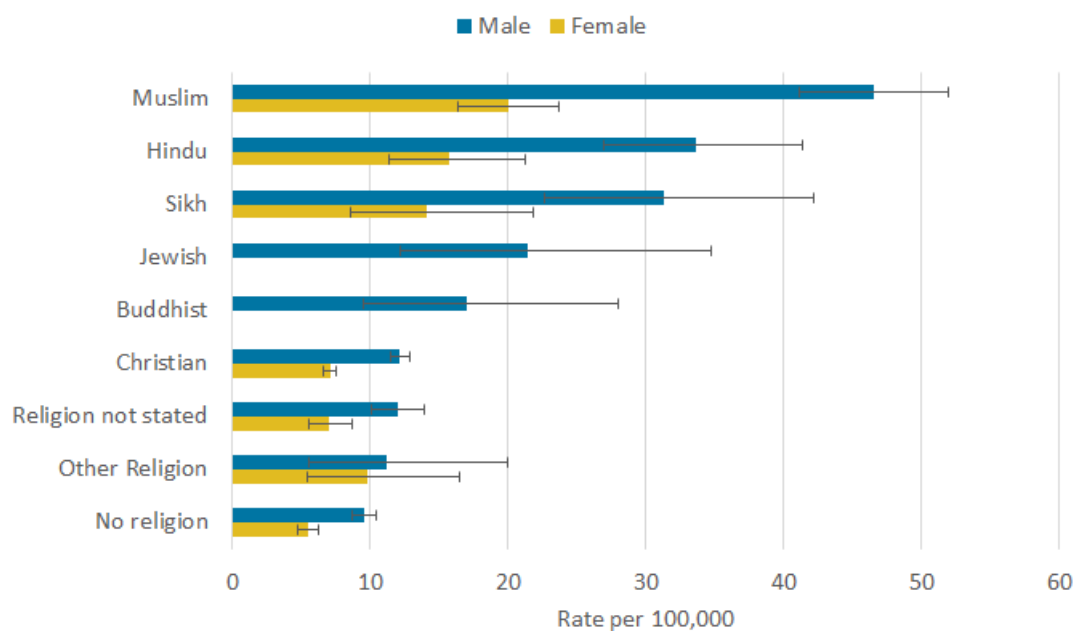
The lowest rates of death involving COVID-19 were observed in those identifying with "No religion" for males and females; Muslim males had a rate of death involving COVID-19 that was 2.5 times higher than males identifying with no religion, while for females it was 2.1 times higher.

We also calculated ASMRs for those aged 9 to 64 years and 65 years and over, when most deaths occur (Table 3). Figures 1 and 2 present a comparison of ASMRs of death involving COVID-19 for males and females among those aged 9 to 64 years and 65 years and over, respectively.

For males aged 9 to 64 years, those identifying as Muslim have a raised rate of death involving COVID-19 compared with all other religious groups, at 46 deaths per 100,000. Among females, those who identified as Muslim, Sikh or Hindu had higher mortality rates compared with the Christian and no religion populations (Figure 1).

**Figure 1: Females who identified as Muslim, Sikh or Hindu had higher mortality rates compared with the Christian and no religion populations**

Age-standardised mortality rates of death involving COVID-19 for those aged 9 to 64 years by sex and religious group, England and Wales, 2 March to 15 May 2020



Source: Office for National Statistics – Coronavirus (COVID-19) related deaths by religious group

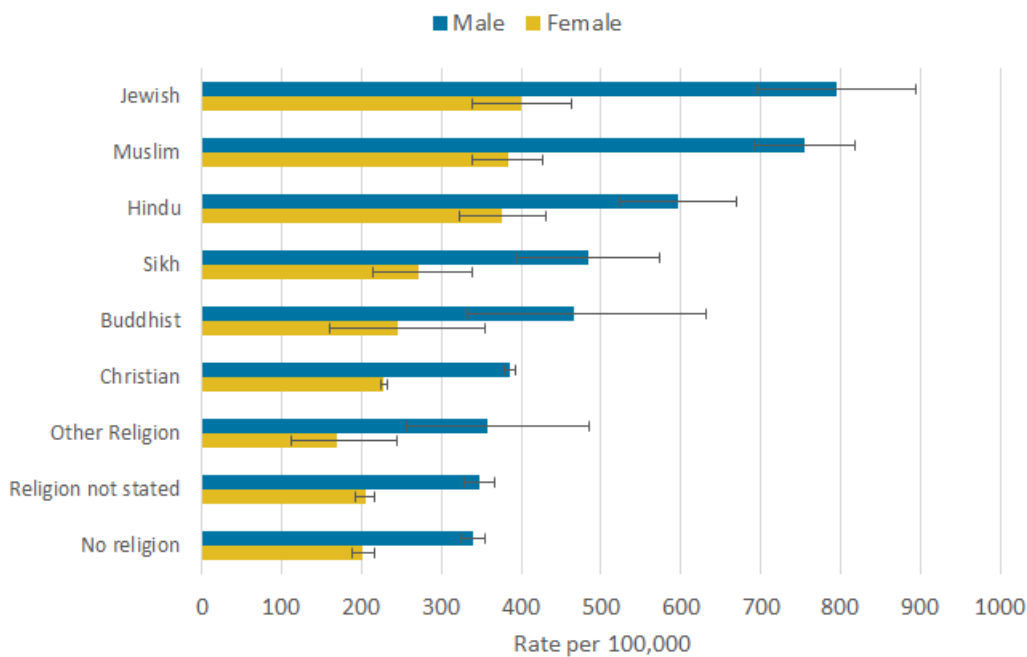
**Notes:**

1. Office for National Statistics (ONS) figures based on death registrations up to 29 May 2020 that occurred between 2 March and 15 May 2020 that could be linked to the 2011 Census for the coronavirus (COVID-19) rate of death.
2. 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).
3. Age-standardised mortality rates (ASMRs) of death involving COVID-19 can be interpreted as deaths per 100,000 of the population during the period at risk.
4. Horizontal lines on bars represent 95% confidence intervals.
5. Because of low counts, female rates for those identifying as Buddhist, Jewish and “other religion” are deemed unreliable, with rates for Jewish and Buddhist females not calculated.
6. Statistical significance has been assessed using z-scores. More information about this z-test can be viewed in Appendix 1 of the [Sullivan guide](#).

For males aged 65 years and over, those identifying as Jewish and Muslim had a raised rate of death involving COVID-19 compared with all other religious groups, at 795 deaths per 100,000 and 755 deaths per 100,000 respectively. For females aged 65 years and over, those who identified as Hindu, Muslim or Jewish had a higher rate of death involving COVID-19 compared with all other religious groups (Figure 2).

**Figure 2: Jewish and Muslim males aged 65 years and over had a raised rate of death involving COVID-19 compared with all other religious groups**

Age-standardised mortality rates of death involving COVID-19 for those aged 65 years and over by sex and religious group, England and Wales, 2 March to 15 May 2020



Source: Office for National Statistics – Coronavirus (COVID-19) related deaths by religious group

**Notes:**

1. Office for National Statistics (ONS) figures based on death registrations up to 29 May 2020 that occurred between 2 March and 15 May 2020 that could be linked to the 2011 Census for the coronavirus (COVID-19) rate of death.
2. 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).
3. Age-standardised mortality rates (ASMRs) of death involving COVID-19 can be interpreted as deaths per 100,000 of the population during the period at risk.
4. Horizontal lines on bars represent 95% confidence intervals.
5. Statistical significance has been assessed using z-scores. More information about this z-test can be viewed in Appendix 1 of the [Sullivan guide](#).

These figures show that those identifying as Muslim, Jewish or Hindu are more vulnerable to death involving COVID-19, as are other religious groups to differing extents. When assessing these results, it is important to take account of whether the difference in risk of dying across religious groups is driven by geographic factors, household characteristics or measures of disadvantage such as socio-economic class and deprivation. The following section explores how much variation in risk can be accounted for by some of the social determinants of health and measures of susceptibility to infection derivable from the 2011 Census.

**Notes for: Age-standardised rates of death involving COVID-19 by religious group**



1. ASMRs enable populations with different age structures to be compared validly. Those of Christian and Jewish religious affiliation have an older population structure than other religious groups, and as COVID-19 deaths are more common in older populations, it is necessary to adjust for population structure.

## 5 . Religious group differences in deaths involving COVID-19, adjusted for socio-demographic factors

Differences in the risk of dying from the coronavirus (COVID-19) across different religious groups are dependent on factors related to the risk of being infected and the risk of dying given infection.

We use Cox proportional hazards regression models to estimate the risk of dying from COVID-19 across religious groups compared with the Christian population. The Christian population is used as the reference group because it has the largest population in the data used. We adjust the model for geographic, demographic, socio-economic, occupational exposure and self-assessed health measures from the 2011 Census; these characteristics have the potential to confound any association between COVID-19 mortality risk and religion. We therefore adjust for these in the model to estimate any excess risk for different religion groups. However, we are currently unable to adjust for factors such as prevalence levels of pre-existing conditions in religious groups; any unexplained increase in risk may be because of factors we have not accounted for as opposed to religion. The statistical models are explained in the [technical appendix](#).

In Figure 3, we show how the risk of death involving COVID-19 varies by religious group for males and females. We report the hazard ratios relative to the Christian group (the reference group) for a range of geographic, demographic and socio-economic characteristics in green as well as for these plus a White and non-White ethnicity indicator (a marker of ethnicity) in blue. The hazard ratios in this analysis relate to the relative differences in the rate of deaths involving COVID-19, assuming survival until that point, between religious groups compared with the Christian group. A hazard ratio greater than one denotes that the outcome occurs at a greater rate than the reference group, while less than one indicates a lower rate.

The risk of death involving COVID-19 is highly correlated with age. After adjusting for age (in green), males and females from all religious groups are at greater risk of a death involving COVID-19 compared with those identifying as Christian. Among Muslim males, the rate was 2.5 times greater than that for Christian males, while for females it was 1.9 times greater.

We also adjust for population density, region, rural and urban classification, area deprivation, household composition, socio-economic position, highest qualification held, household tenure, household exposure, and self-reported health and disability in 2011 (in blue). The fully adjusted results show differences in risk between religious groups that are specific to those religious groups and are unlikely to be associated with any of the factors listed earlier.

### Figure 3: How the risk of death involving COVID-19 varies by religious group for males and females

Hazard ratios of death involving COVID-19 by religious group and sex, England and Wales, 2 March to 15 May 2020

Notes:

1. Cox proportional hazards models adjusting for age plus age<sup>1</sup>. Fully adjusted models also include region, population density, area deprivation, household composition, socio-economic status, Index of Multiple Deprivation (IMD) deciles, highest qualification held, household tenure, multigenerational household flags and occupation indicators (including key workers and exposure to others) in 2011.
2. Fully adjusted models include region indicators, population density, household composition and socio-economic position, highest qualification held, NS-SEC of household person of reference, household tenure, and health status (self-reported health and having a limiting health problem or disability).
3. Office for National Statistics (ONS) figures based on death registrations up to 29 May 2020 that occurred between 2 March and 15 May 2020 that could be linked to the 2011 Census for the coronavirus (COVID-19) rate of death.
4. Risk of death between 2 March and 15 May 2020.
5. 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).
6. Error bars not crossing the x-axis at value 1.0 denote a statistically significant difference in relative rates of death.

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However, for some religious groups, ethnicity is correlated with religion. That means we cannot be sure whether the observed association between mortality risk involving COVID-19 and religion is because of religion or ethnicity. The impact of ethnicity is explained in [Coronavirus \(COVID-19\) related deaths by ethnic group, England and Wales: 2 March to 15 May 2020](#). Table 5 shows the breakdown by religious groups by White and non-White ethnic groups regarding deaths involving COVID-19 and populations at risk.

Table 5: Breakdown of deaths and populations of religious groups by a binary breakdown of White and non-White ethnic groups

	Percentage of deaths involving COVID-19 among White ethnic group	Percentage of deaths involving COVID-19 among non-White ethnic groups	Percentage identifying as White at the 2011 Census	Percentage identifying as non-White at the 2011 Census
No religion	94.0	6.0	94.3	5.7
Christian	94.1	5.9	93.0	7.0
Buddhist	26.6	73.4	34.4	65.6
Hindu	1.4	98.6	1.1	98.9
Jewish	95.6	4.4	93.6	6.4
Muslim	7.8	92.2	7.5	92.5
Sikh	1.6	98.4	1.5	98.5
Other religion	66.3	33.7	76.5	23.5
Religion not stated	90.6	9.4	87.4	12.6

Source: Office for National Statistics – Coronavirus (COVID-19) related deaths by religious group

#### Notes

1. Office for National Statistics (ONS) figures based on death registrations up to 29 May 2020 that occurred between 2 March and 15 May 2020 that could be linked to the 2011 Census. [Back to table](#)
2. Deaths were defined using the International Classification of Diseases, 10th 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). [Back to table](#)

Table 5 shows the breakdown by religious groups by White and non-White ethnic groups regarding deaths involving COVID-19 and populations at risk. A full breakdown from the 2011 census can be found in the response to [this Freedom of Information request](#).

We therefore also adjust for whether someone is of White or non-White ethnicity in Figure 4. Adjustment for these factors substantially reduces the risk of death involving COVID-19 relative to those of Christians. More information on how the hazard ratios change when adjusting for different sets of characteristics can be found in the [technical appendix](#). Model diagnostics can be found [Model estimates of deaths involving COVID-19 by religious group, England and Wales: 2 March to 15 May 2020](#). In the fully adjusted model, Jewish males are twice as likely, and females are 1.2 times more likely, to experience a death involving COVID-19 than Christians. Men and women who identify as no religion are around 0.82 and 0.83 times less likely to die from COVID-19, respectively, than Christians.

#### Figure 4: How the risk of death involving COVID-19 varies by religious group for males and females, adjusted for whether someone is of White or non-White ethnicity

Hazard ratios of death involving COVID-19 by religious group and sex, adjusting for White and non-White ethnic background, England and Wales, 2 March to 15 May 2020

#### Notes:

1. Cox proportional hazards models adjusting for age plus age<sup>1</sup>. Fully adjusted models also include region, population density, area deprivation, household composition, socio-economic status, Index of Multiple Deprivation (IMD) deciles, highest qualification held, household tenure, multigenerational household flags and occupation indicators (including key workers and exposure to others) in 2011.
2. Fully adjusted models include region indicators, population density, household composition and socio-economic position, highest qualification held, NS-SEC of household person of reference, household tenure, and health status (self-reported health and having a limiting health problem or disability).
3. Office for National Statistics (ONS) figures based on death registrations up to 29 May 2020 that occurred between 2 March and 15 May 2020 that could be linked to the 2011 Census for the coronavirus (COVID-19) rate of death.
4. Risk of death between 2 March and 15 May 2020.
5. 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).
6. Error bars not crossing the x-axis at value 1.0 denote a statistically significant difference in relative rates of death.

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This fully adjusted model (Figure 4), with ethnicity included, demonstrates that a substantial part of the difference in mortality involving COVID-19 between religious groups is explained by the different circumstances in which members of these groups are known to live; for example, living in areas with higher levels of socio-economic deprivation and differences in ethnic makeup. However, for the Jewish group, these factors do not fully explain the difference, suggesting that other causes are still to be identified.

Our adjustment for demographic and socio-economic profile has limitations since the characteristics we use were retrieved from the 2011 Census. Therefore, these may not accurately reflect the study population's circumstances in 2020. While we adjust for some dimensions of health (self-reported health and having a limiting health problem or disability), the information was collected in 2011 and does not distinguish between different types of co-morbidities, which are a likely modifier of the differential risks observed.

Similarly, some religious groups may have a greater propensity to suffer from co-morbidities that are associated with worse outcomes among those infected by COVID-19, which we will take account of in future analyses.

#### **Notes for: Religious group differences in deaths involving COVID-19 adjusted for socio-demographic factors**

1. The hazard coefficient can be interpreted as a measure of relative risk.

## **6 . Glossary**

### **Age-standardised mortality rates**

Age-standardised mortality rates (ASMRs) are used to allow comparisons between populations that may contain different proportions of people of different ages. The 2013 European Standard Population is used to standardise rates.

## **Cox proportional hazards regression model**

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

### **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 compared with a reference group.

### **Coronaviruses**

The World Health Organization (WHO) defines coronaviruses as "a large family of viruses that are known to cause illness ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS)". Between 2001 and 2018, there were 12 deaths in England and Wales due to a coronavirus infection, with a further 13 deaths mentioning the virus as a contributory factor on the death certificate.

### **Coronavirus (COVID-19)**

COVID-19 refers to the "coronavirus disease 2019" and is a disease that can affect the lungs and airways. It is caused by a type of coronavirus. Further information is available from the WHO.