

Article

Deaths involving COVID-19 by religious group, England: 24 January 2020 to 28 February 2021

This article reports age-standardised rates of death involving the coronavirus (COVID-19) by religious group and uses statistical models to adjust for location, measures of disadvantage, occupation, living arrangements, and pre-existing health conditions. It compares the risk of COVID-19 mortality in two discrete periods aligned to each wave of the pandemic.

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1 . Main points

- In England, people identifying as Muslim, Hindu, Sikh, or Jewish had higher age-standardised mortality rates (ASMRs) for deaths involving coronavirus (COVID-19) than those identifying as Christian in the period 24 January 2020 to 28 February 2021.
- Men and women in the "no religion" group, and women identifying as "other religion", had lower ASMRs for deaths involving COVID-19 compared with the Christian group.
- In the first wave (defined as 24 January to 11 September 2020), adjustments for differences in location, measures of disadvantage, occupation, living arrangements, and pre-existing health conditions accounted for a large proportion of the excess COVID-19 mortality risk in those groups at higher risk; however, statistically significant increased risk remains unexplained for Hindu men and women, and men identifying as Jewish, Muslim, or Buddhist, compared with those in the Christian group.
- In the second wave (from 12 September 2020 onwards), a higher risk of death involving COVID-19 was observed among people identifying as Muslim, Hindu, or Sikh compared with those in the Christian group after adjusting for the same factors as above.
- These findings show that the patterns of excess COVID-19 mortality risk by religious group have changed over the course of the pandemic; after adjustments, the Hindu population and Muslim men were disproportionately affected throughout the pandemic; for other religious groups, the excess risk relative to the Christian group was only observed in the first wave (Jewish and Buddhist men) or second wave (Sikh men and women and Muslim women).

2 . Overview

As part of the Office for National Statistics (ONS) analysis of the impact of the pandemic on society, we have investigated [ethnic group](#), [occupation](#), [disability status](#), and religion as risk factors for mortality. We previously published [coronavirus \(COVID-19\) related deaths by religious group, England and Wales: 2 March to 15 May 2020](#). This article is an update to the previous analysis to reflect deaths occurring in England between 24 January 2020 ([the date when the first COVID-19 case was reported in the UK](#)) and 28 February 2021, which were registered by 19 April 2021.

The risk of coronavirus infection, and of severe outcomes if infected, is complex and involves a range of inter-related factors (for example, living circumstances and pre-existing health conditions). By using statistical modelling, we can assess the extent to which the increased risk of COVID-19 mortality in some religious groups is explained by differences in these factors at the population level.

Our previous analyses were adjusted for differences in location, socio-demographic factors (such as measures of disadvantage, occupation, living arrangements), and self-reported health retrieved from the 2011 Census. We have extended this by linking the 2011 Census to hospital and primary care records. This allowed us to account for differences in the prevalence of certain [pre-existing health conditions](#) between religious groups that are known to be related to the risk of dying from COVID-19.

We model the risk of death involving COVID-19 for the whole outcome period, and separately for the first and second waves of the pandemic to explore whether differences in the risk of COVID-19 mortality between different religious groups have changed over time. We classify deaths from 12 September 2020 onwards to have occurred during the second wave.

Estimates for the second wave of the pandemic should be considered provisional because our period of analysis does not encompass all deaths occurring during the second wave, which goes beyond 28 February 2021.

The study population consisted of 29.3 million people (aged 30 to 100) who were enumerated at the 2011 Census and were living in either private households or communal establishments in England at the start of the pandemic.

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

Age-standardised mortality rates (ASMRs) were calculated to allow comparison of absolute rates of death between religious groups with different age distributions (Figure 1).

The lowest ASMRs for deaths involving coronavirus (COVID-19) were observed in men identifying with "no religion" and women identifying with "other religion". For both men and women, the highest ASMRs involving COVID-19 were observed for those identifying as Muslim, whose rate of death was [statistically significantly](#) higher than for all other religious groups. ASMRs for deaths involving COVID-19 were also statistically significantly higher for those identifying as Hindu, Sikh, or Jewish when compared with the Christian group (the largest group).

Figure 1: People identifying as Muslim, Hindu, Sikh, or Jewish all had higher COVID-19 mortality rates compared with the Christian religious group

Age-standardised mortality rates of deaths involving COVID-19 per 100,000 person-years at risk, with 95% confidence intervals, by religious group and sex, England, 24 January 2020 to 28 February 2021

Notes:

1. Office for National Statistics (ONS) figures based on death registrations up to 19 April 2021 for deaths involving COVID-19 that occurred between 24 January 2020 and 28 February 2021, of people aged 30 to 100 years that could be linked to the 2011 Census and General Practice Extraction Service Data for Pandemic and Planning Research.
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), U07.2 (COVID-19, virus not identified) or U09.9 (post-COVID condition).
3. ASMRs are expressed per 100,000 person-years at-risk and can be interpreted as mortality rates per 100,000 population per year.

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4 . Risk of death involving COVID-19 by religious group, adjusting for location, measures of disadvantage, occupation, living arrangements, and pre-existing health conditions

We used statistical models to estimate how differences in the risk of death involving coronavirus (COVID-19) changed when adjusting for a range of factors affecting both the risk of COVID-19 infection, and the risk of death if infected. This approach helps us to understand which factors drive the differences in COVID-19 mortality by religious group. For full details of the variables included in the models, see the accompanying methodology article [Deaths involving COVID-19 by religious group and ethnic group, England methodology](#).

Figure 2 shows how the risk of death involving COVID-19 varied by religious group for the whole outcome period, and separately for men and women. We report hazard ratios (HRs) for each religious group relative to the Christian group. A HR greater than one indicates a greater rate of death involving COVID-19 than the reference group, while a hazard ratio of less than one indicates a lower rate of COVID-19 mortality than the reference group.

After adjusting for age only (green bar in Figure 2), the rate of death involving COVID-19 was [statistically significantly](#) increased for the Muslim (men HR 2.7, women HR: 2.4), Hindu (men HR: 1.6, women HR: 1.5), Sikh (men HR: 1.6, women HR: 1.5) and Jewish (men and women HR: 1.2) groups compared with the Christian group. People who identify as "no religion" were 20% less likely to die from COVID-19 than the Christian group (HR: 0.8).

Figure 2: Excess COVID-19 mortality risk for those identifying as Muslim, Hindu, Sikh, or Jewish was substantially reduced by adjustments for location, socio-demographic factors and pre-existing health conditions

Hazard ratios of death involving COVID-19 by religious group and sex, England, 24 January 2020 to 28 February 2021

Notes:

1. Cox proportional hazards models adjusting for age (green bar), plus location, measures of disadvantage, occupation, living arrangements, and pre-pandemic health status (blue bar).
2. Office for National Statistics (ONS) figures based on death registrations up to 19 April 2021 for deaths involving COVID-19 that occurred between 24 January 2020 and 28 February 2021, of people aged 30 to 100 years that could be linked to the 2011 Census and General Practice Extraction Service Data for Pandemic and Planning Research.
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), U07.2 (COVID-19, virus not identified) or U09.9 (Post-COVID condition).
4. An error bar not crossing the x-axis at value 1.0 denotes a statistically significantly different rate of death compared with the reference category (Christian group).

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The blue bar in Figure 2 shows HRs after adjusting for location variables, measures of disadvantage, occupation and living arrangements, and pre-pandemic health status. After adjusting for these factors, the rate of death involving COVID-19 over the whole period for Jewish and Sikh women was similar to that of Christian women. However, rates remained statistically significantly elevated for Jewish men (HR: 1.2) and Sikh men (HR 1.1), and people identifying as Muslim (men HR: 1.7, women HR: 1.3) or Hindu (men HR: 1.3, women HR: 1.2).

These results show that differences in location, socio-demographic factors, and certain pre-existing health conditions between religious groups account for a large proportion (but not all) of the excess COVID-19 mortality risk observed in some religious groups. Residual unexplained risk may be attributable to factors that we have not been able to account for in the analysis. Only [certain pre-existing conditions](#) are accounted for so we do not capture all pre-existing conditions prevalent in the religious groups under study.

For some religious groups, there is considerable overlap with ethnic background. This means that it is difficult to separate the observed association between COVID-19 mortality risk and religion from the risk associated with [ethnic background](#). Results from models adjusting for ethnic background are available in the [accompanying datasets](#) but should be interpreted with caution.

5 . Difference between the risk of death involving COVID-19 by religious group in the first and second waves of the pandemic

Figure 3 shows the HRs by religious group in the first wave of the pandemic (24 January to 11 September 2020). After adjusting for age only (green bar), the rates of coronavirus (COVID-19) mortality were [statistically significantly](#) higher for people identifying as Muslim (men HR: 2.3, women HR: 1.9), Hindu (men HR: 1.7, women HR: 1.8), or Jewish (men HR: 1.7, women HR: 1.5) compared with the Christian group. Rates of death involving COVID-19 were also 1.3 times greater for Sikh and Buddhist men compared with Christian men. However, there was a large degree of statistical uncertainty surrounding the estimate for Buddhist men, so this finding should be interpreted with caution.

After adjusting further for location, measures of disadvantage, occupation, living arrangements, and certain pre-existing conditions (blue bar in Figure 3), excess COVID-19 mortality risk remained statistically significantly higher in the first wave for Hindu men and women (men HR: 1.1, women HR: 1.2), and men identifying as Jewish (HR: 1.5), Muslim (HR: 1.3), or Buddhist (HR: 1.3), compared with the Christian group. A small elevated risk also remained for Jewish women (HR: 1.2) but this was not statistically significant.

Figure 3: Rates of COVID-19 mortality in the first wave were highest for Hindu men and women, and men identifying as Muslim, Jewish, or Buddhist, following adjustments

Hazard ratios of death involving COVID-19 by religious group and sex, England, 24 January 2020 to 11 September 2020

Notes:

1. Cox proportional hazards models adjusting for age (green bar), plus location, measures of disadvantage, occupation, living arrangements, and pre-pandemic health status (blue bar).
2. Office for National Statistics (ONS) figures based on death registrations up to 19 April 2021 for deaths involving COVID-19 that occurred between 24 January and 11 September 2020, of people aged 30 to 100 years that could be linked to the 2011 Census and General Practice Extraction Service Data for Pandemic and Planning Research.
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), U07.2 (COVID-19, virus not identified) or U09.9 (Post-COVID condition).
4. An error bar not crossing the x-axis at value 1.0 denotes a statistically significantly different rate of death compared with the reference category (Christian group).

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Figure 4 shows the HRs by religious group during the portion of the second wave of the pandemic we investigated (12 September 2020 to 28 February 2021). After adjusting for age only (green bar), the rates of COVID-19 mortality were statistically significantly higher than the Christian group for people identifying as Muslim (men HR: 3.0, women HR: 2.8), Hindu (men HR 1.6, women HR: 1.3), or Sikh (men HR: 1.7, women HR: 1.6). Further adjustments for geography, socio-demographic factors, and certain pre-existing conditions (blue bar in Figure 4) reduced the excess risk observed in these groups, but rates of death involving COVID-19 remained statistically significantly increased for all three groups compared with those identifying as Christian.

Figure 4: Rates of death involving COVID-19 in the second wave were highest for people identifying as Muslim, Hindu, or Sikh, even after adjustments

Hazard ratios of death involving COVID-19 by religious group and sex, England, 12 September 2020 to 28 February 2021

Notes:

1. Cox proportional hazards models adjusting for age (green bar), plus location, measures of disadvantage, occupation, living arrangements, and pre-pandemic health status (blue bar).
2. Office for National Statistics (ONS) figures based on death registrations up to 19 April 2021 for deaths involving COVID-19 that occurred between 12 September 2020 and 28 February 2021, of people aged 30 to 100 years that could be linked to the 2011 Census and General Practice Extraction Service Data for Pandemic and Planning Research.
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), U07.2 (COVID-19, virus not identified) or U09.9 (Post-COVID condition).
4. An error bar not crossing the x-axis at value 1.0 denotes a statistically significantly different rate of death compared with the reference category (Christian group).

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These findings show that the patterns of excess COVID-19 mortality risk by religious group have changed over the course of the pandemic. The Hindu population and Muslim men were disproportionately impacted by COVID-19 throughout the pandemic, even after accounting for age, location, measures of disadvantage, occupation, living arrangements, and certain pre-existing health conditions. For other religious groups, the excess risk relative to the Christian group was only observed in the first wave (Jewish and Buddhist men) or second wave (Sikh men and women and Muslim women). Further work is needed to increase our knowledge and understanding of the possible mechanisms underlying this unexplained risk.

6 . Deaths involving COVID-19 by religious group, England, data

[All data relating to: Deaths involving COVID-19 by religious group, England](#)

Dataset | Released 13 May 2021

Age-standardised mortality rates (ASMRs) and hazard ratios for deaths involving COVID-19 by religious group, England: deaths occurring between 24 January 2020 and 28 February 2021.

7 . Glossary

Age-standardised mortality rates

Age-standardised mortality rates (ASMRs) are used to allow comparisons between populations that may contain different proportions 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 religious group), 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 1 indicates the rate of mortality is higher and, less than 1 indicates that the rate of mortality is lower in the population group under study compared with a reference group.

Coronavirus (COVID-19) deaths

Coronavirus (COVID-19) deaths are those deaths where COVID-19 was mentioned on the death certificate at registration. A doctor can certify the involvement of COVID-19 based on symptoms and clinical findings - a positive test result is not required.

Statistical significance

The [statistical significance](#) of differences noted within the release are determined based on non-overlapping [confidence intervals](#).

8 . Data sources and quality

These analyses are based on a unique linked dataset that encompasses Census 2011 records, death registrations, [Hospital Episode Statistics \(HES\)](#), and primary care records retrieved from the [General Practice Extraction Service \(GPES\) Data for Pandemic Planning and Research \(GDPPR\)](#) with England coverage only. For further details on the data used, including how they were constructed, and the diagnostic information used, please refer to [Deaths involving COVID-19 by religious group and ethnic group, England methodology](#).

9 . Related links

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

Article | Released 19 June 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.

[Deaths involving COVID-19 by religious group and ethnic group, England: methodology](#)

Methodology article | Released 14 May 2021

Detailed quality and methodology information for “Deaths involving COVID-19 by religious group, England: 24 January 2020 to 28 February 2021” and “Updating ethnic contrasts in deaths involving the coronavirus (COVID-19), England: 24 January 2020 to 31 March 2021.