








RESEARCH NOTE

# COVID-19 in-patient hospital mortality by ethnicity [version 1; peer review: 2 approved]

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## Abstract

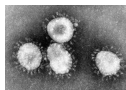
There is debate about the extent to which COVID-19 affects ethnic groups differently. We explored if there was variation in hospital mortality in patients with COVID. Mortality rates in 1,276 inpatients in Bradford with test results for COVID-19 were analysed by ethnic group. The age-adjusted risk of dying from COVID-19 was slightly lower in South Asian compared to White British patients. (RR =0.87, 95% CI: 0.41 to 1.84).

## Keywords

Covid19, mortality, ethnicity, gender



This article is included in the [Born in Bradford gateway](#).



This article is included in the [Coronavirus \(COVID-19\) collection](#).

## Open Peer Review

Reviewer Status  

	Invited Reviewers	
	1	2
<b>version 1</b> 04 May 2020	 report	 report

1 **Colin Simpson** , Victoria University of Wellington, Wellington, New Zealand

2 **Arpana Verma**, University of Manchester, Manchester, UK

Any reports and responses or comments on the article can be found at the end of the article.

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**Author roles:** **Santorelli G:** Conceptualization, Formal Analysis, Investigation, Methodology, Software, Writing – Review & Editing; **Sheldon T:** Conceptualization, Writing – Original Draft Preparation, Writing – Review & Editing; **West J:** Funding Acquisition, Writing – Review & Editing; **Cartwright C:** Writing – Review & Editing; **Wright J:** Funding Acquisition, Writing – Review & Editing

**Competing interests:** No competing interests were disclosed.

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## Introduction

There is a concern that COVID-19 may be disproportionately affecting people from ethnic minorities<sup>1</sup>. This could be because of increased exposure, affecting incidence, underlying comorbidities and other factors affecting severity of disease and mortality following infection. There are few reliable data on community prevalence of infection. However, hospital electronic records contain information on ethnicity, test results and mortality. We aimed to explore variations in hospital mortality for people testing positive by ethnic group.

## Methods

### Data sources

Information on age, sex, ethnicity, COVID-19 test result and death were collected on all hospital patients who were tested for COVID-19 between 18<sup>th</sup> March to 27<sup>th</sup> April 2020 in a large teaching hospital in Bradford, a city with a diverse population of which 24.9% are of South Asian (20.4% Pakistani) origin<sup>2</sup>. We compared the mortality rate of those with a positive and negative COVID-19 test result in hospital and explored whether this differential varied by gender, and ethnicity. These de-identified data are available from Harvard Dataverse<sup>3</sup>.

### Statistical analysis

In order to take into account possible confounding due to factors related to age and the likelihood of hospitalisation or of being tested, we estimated the ratio of the risk of death in those tested positive relative to the risk in those also hospitalised, but who tested negative with the same gender or belonging to the same ethnic group, adjusted for age using multivariable regression. Mortality rates of White British and South Asian patients were compared using a chi-square test. All analyses were conducted using STATA/SE

software (Stata/SE 15, StataCorp, College Station, TX, USA).

### Ethical considerations

The recent Health Service (Control of Patient Information) Regulations 2002 notices requires NHS Trusts and others to process confidential patient information without consent for COVID-19 public health, surveillance and research purposes, thus no ethical approval or consent for publication was required.

### Results

In total, 812 patients tested negative (63.6%) and 464 positive (36.4%). The overall mortality rate in those testing positive for COVID-19 was 23.5% (see [Table 1](#)). This was over twice the mortality rate of those inpatients with negative results (8.9%), risk ratio (RR) = 2.65 (95% confidence interval (CI): 2.02 to 3.49).

The mortality rate in those testing positive for COVID-19 was higher in White British patients (25.4%) than those of South Asian origin (18.1%) but this was not statistically significant (P-value 0.122). Mortality among non-COVID-19 cases was 10.0% and 8.2% in White British and South Asian patients, respectively.

South Asian origin patients were significantly younger than White British patients (mean 49 vs 66 years), reflecting the local demographics. The age-adjusted RR of dying after a positive versus a negative result was 1.98 for women, 2.11 for men, 2.10 for White British and 1.72 for South Asian. The age-adjusted relative increased risk of dying from COVID-19 compared to test negative was lower, though not statistically significantly so, in South Asian compared to White British (RR = 0.87; 95% CI 0.41 to 1.84).

**Table 1. Characteristics of the hospital inpatients tested for COVID-19.** Numbers are n (%) except where otherwise stated.

Characteristic	Tested	Test for COVID-19		Died	
	n=1,276	Negative n=812 (63.6)	Positive n=464 (36.4)	Negative n=72 (8.9)	Positive n=109 (23.5)
Age, years, median	65	62	68	80.5	76
Sex					
Male	661	403 (61.0)	258 (39.0)	39 (36.5)	68 (63.6)
Female	615	409 (66.5)	206 (33.5)	33 (44.6)	41 (55.4)
Ethnic group					
White: British	656	439 (66.9)	217 (33.1)	44 (44.4)	55 (55.6)
South Asian	322	195 (60.6)	127 (39.4)	16 (41.0)	23 (59.0)
Other	187	108 (57.8)	79 (42.3)	7 (25.0)	21 (75.0)
Not stated	111	70 (63.1)	41 (36.9)	5 (33.3)	10 (66.7)

## Conclusions

Data from the last month of the outbreak in a large District general hospital in Bradford show that COVID-19 increases risk of death for infected individuals compared to hospital patients with similar symptoms with no COVID-19 infection. They also suggest that this increased risk is not greater in people of South Asian (mainly Pakistani) ethnicity.

These data are only for hospitalised patients, and do not account for patients who subsequently died after the date of analysis. It also sheds no light on variations by ethnicity in exposure to, risk of coronavirus infection or the severity of COVID-19 illness in the community.

## Data availability

### Underlying data

Harvard Dataverse: Replication Data for COVID-19 in-patient hospital mortality by ethnicity. <https://doi.org/10.7910/DVN/I6ORLP><sup>3</sup>.

‘Covid19EthnicityData’ contains de-identified patient-level data analysed in this study.

Data are available under the terms of the [Creative Commons Zero ‘No rights reserved’ data waiver](#) (CC0 1.0 Public domain dedication).

## References

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1. Khunti K, Singh AK, Pareek M, *et al.*: **Is ethnicity linked to incidence or outcomes of covid-19?** *BMJ*. 2020; 369: m1548. [PubMed Abstract](#) | [Publisher Full Text](#)
2. ONS: **KS201UK Ethnic group, local authorities in the United Kingdom (2011 Census ethnic group)**. accessed on 23.04.20. [Reference Source](#)
3. Santorelli G: **Replication Data for COVID-19 in-patient hospital mortality by ethnicity**. HarvardDataverse. 2020. <http://www.doi.org/10.7910/DVN/I6ORLP>

# Open Peer Review

Current Peer Review Status:  

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## Version 1

Reviewer Report 15 June 2020

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### Arpana Verma

Manchester Academic Health Sciences Centre, School of Health Sciences, University of Manchester, Manchester, M13 9PT, UK

Many thanks for a well researched and timely piece of analysis from a large teaching hospital with a large population from BAME communities (N.B. South Asian and Pakistani in origin).

The dataset can be downloaded from the Harvard Dataverse and includes all the participants listed in the paper to allow for replication of results.

I agree with the conclusions and would only ask for the abstract to reflect this - perhaps "The age-adjusted risk of dying from COVID-19 was not significant but slightly lower in South Asian compared to White British patients. (RR =0.87, 95% CI: 0.41 to 1.84)."

Otherwise an excellent paper that will add to the evidence base and perhaps this publication will facilitate further consortia combing datasets coming together to improve the evidence base further.

**Is the work clearly and accurately presented and does it cite the current literature?**

Yes

**Is the study design appropriate and is the work technically sound?**

Yes

**Are sufficient details of methods and analysis provided to allow replication by others?**

Yes

**If applicable, is the statistical analysis and its interpretation appropriate?**

Yes

**Are all the source data underlying the results available to ensure full reproducibility?**

Yes

**Are the conclusions drawn adequately supported by the results?**

Partly

**Competing Interests:** No competing interests were disclosed.**Reviewer Expertise:** Public health and epidemiology.**I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.**

Reviewer Report 01 June 2020

<https://doi.org/10.21956/wellcomeopenres.17454.r38627>

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**Colin Simpson** 

School of Health, Faculty of Health, Victoria University of Wellington, Wellington, New Zealand

This is an interesting and clearly presented study which used hospital data from a large Teaching Hospital in Bradford to explore variations in hospital mortality for people testing positive for SARS-CoV-2 by ethnic group. De-identified data was sourced from the Harvard Dataverse.

Mortality for those with positive and negative test results in hospital were explored using a multivariate regression analysis for any variation in outcome by gender and ethnicity, adjusting for a number of confounding factors. The methodological approach seems an appropriate analysis for this study.

Amongst other study findings, the study found that mortality for COVID-19 for patients of South Asian (mainly Pakistani) ethnicity was lower (although not significantly) than White British ethnicity.

It is important to clarify throughout that tests were performed on symptomatic patients (and presumably not all patients) i.e. there were testing criteria. Where described in the report, the comparison group for this project should be stated as 'hospital patients (with similar symptoms to positive) tested negative' or similar.

In the study conclusions, further cautious language could be used, for instance there could be a brief discussion regarding the power of the study to detect differences in mortality by sex and ethnicity.

**Is the work clearly and accurately presented and does it cite the current literature?**

Yes

**Is the study design appropriate and is the work technically sound?**

Yes

**Are sufficient details of methods and analysis provided to allow replication by others?**

Yes

**If applicable, is the statistical analysis and its interpretation appropriate?**

Yes

**Are all the source data underlying the results available to ensure full reproducibility?**

Yes

**Are the conclusions drawn adequately supported by the results?**

Yes

**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** Infectious Disease Epidemiology.

**I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.**

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## Comments on this article

Version 1

Reader Comment 12 May 2020

**Mike Lonergan**, University of Dundee, UK

The conclusion that these data "suggest that this increased risk is not greater in people of South Asian (mainly Pakistani) ethnicity" seems a bit strong. The confidence interval doesn't rule out the risk being nearly twice as high (RR 1.84). So, while the risk is probably lower, it could still be a lot higher. Until someone publishes a study with a tight confidence interval containing 1, or a confidence interval that excludes 1, the question remains unanswered

**Competing Interests:** None

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