UNCOVER

Usher **N**etwork for **COV**ID-19
Evidence **R**eviews

Summary: What is the evidence on ethnic variation on COVID-19 incidence and outcomes?

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Title: What is the evidence on ethnic variation on COVID-19 incidence and outcomes?

In order to answer this question in full, our analysis breaks it down into the following 4 sub-questions:

1. What is the evidence for differences in COVID-19 incidence and outcomes (hospitalisation, ICU admission, death)?

2. Are differences in living and working conditions among ethnic groups associated with differences in COVID-19 incidence and outcomes?

3. Are differential rates of relevant comorbid conditions associated with differences in COVID-19 outcomes?

4. What COVID-19-related risks and challenges are faced by refugees and asylum seekers in the UK?

Summary answer:

1. **What is the evidence for differences in COVID-19 incidence and outcomes (hospitalisation, ICU admission, death)?**

Our analysis looks first at Intensive Care Unit (ICU) outcomes. This is in two parts: (i) an analysis of Intensive Care National Audit and Research Centre (ICNARC) data and (ii) a rapid systematic literature review.

ICU outcomes:
- Analysis of INARC data are shown in tables 1 – 5. This analysis suggests that when compared to ICU patients with white ethnicity, people from Black, Asian and Minority Ethnic (BAME) backgrounds have a higher proportion than expected for needing advanced respiratory support (p=1.30e-15), for needing any renal support (p=5.41e-12) and for dying after being admitted to ICU with COVID-19 (p=0.0003).
- People from BAME backgrounds have a higher proportion than expected by chance of being admitted to ICU when compared to ICU admissions of non-COVID-19 viral pneumonia from 2017-2019 (p=1.17e-184) and to the underlying general population (p=1.52e-96).
- Findings were similar when we restricted the analysis to patients of Asian or Black ethnicity.
- This analysis is descriptive, and it was not adjusted for potential confounding factors including age, sex, obesity and other comorbidities (that could explain these findings).
- ICNARC report indicated critically ill patients of Asian ethnicity had a higher risk of dying when compared to patients with White ethnicity (Hazard Ratio ~1.3 and 95% CI did not cross 1). Critically ill patients of Black ethnicity had also a higher risk of dying (HR ~ 1.1, but the 95% CI crossed 1) (ICNARC, 2020).
- We found only one study on ICU data (Badawi, et al, 2020). This was a very small study from USA, which found that the proportion of patients with Hispanic ethnicity doubled (7.8% to 16.6%; p<0.01) during the pandemic period compared to calendar year 2019. The proportion of African American patients increased from 16.6 % to 20.6 % but the difference was non-significant. This was a very small study,

conducted over a short period (23 March – 6 April) and as such is just a snap-shot of a point in time.

For other COVID-19 outcomes we found two relevant UK-based studies:

- A study of the UK Biobank community cohort suggested that people of Black ethnicity were at higher risk (OR 4.05, CI 2.55 to 6.43, p=2.90E-09) of testing positive for COVID-19, with South Asians and other ethnicities having intermediate risks (Atkins et al., 2020) compared to their White counterparts.
- The most recent report from the UK Office of National Statistics showed that Black males are 4.3 times more likely to die from COVID-19 related death and Black women are 4.3 times as likely than White men and women.
- Abedi and others conducted a cross-sectional study in the seven most impacted states in the US investigating the association between infection and/or dying of COVID-19 based on race, health and economic inequality (Abedi, 2020). The results show that African Americans were more vulnerable to COVID-19 than other ethnic groups (1,981 African American infected cases versus 658 Whites per million).
- In Norway people born in Somalia have infection rates more than 10 times above the national average (rate of 1,586 per 100,000).
- A cohort study in Spain found that there was an increased risk for sub-saharan African (RR 3.66, 95%CI) 1.42-9.41, p=0.007), Caribbean (RR 6.35, 95% CI 3.83-10.55, p<0.001) and Latin-America (RR 6.92, 95% CI 4.49-10.67, p<0.001) populations (Guijarro 2020).
- These results provide just a snap-shot in time in a quickly-evolving situation.

2. **Are differences in living and working conditions among BAME groups associated with differences in COVID-19 incidence and outcomes?**

Living conditions:

- Overcrowded or multigenerational households occur more frequently within BAME British homes when compared to White British homes (Haque, 2020). Within the UK population, Ho and colleagues (2020) found evidence that there is a 37% increase in risk per 1 standard deviation of the Townsend Index, which uses measurements relating to non-home ownership, high density within the household, non-car ownership, and unemployment.
- BAME persons within the UK may experience a pay gap when compared to White British income (ONS, 2019). The US indicate that income may be a risk factor of concern as Hispanic/Latinx residents within Orange County, California that live below the county median income experienced a higher risk of COVID-19 (Chow et al., 2020). Residents across all 50 states making less than $25,000 per year have 46% odds of infection (Adams, Grandpe and Katz, 2020).
- Pollution may be another risk factor, as BAME persons within the US are more likely to live within close proximity to high pollution locations (Brandt et al., 2020) and a study from the Netherlands provides evidence that areas with 2.5 atmospheric particular matter experience higher incidence of COVID-19 (Andree, 2020).

Working conditions:

- People with BAME backgrounds are more likely to be employed in occupations with higher COVID-19 transmission risks.
- Aside from the specific nature of the job, there may be additional factors that create higher risk, such as language barriers and the ability to communicate health and safety information.
- The ability to perform one's job from home may directly impact an individual's risk of COVID-19, and those with minority backgrounds often hold jobs considered "essential" and which cannot be done remotely.
- It is not only the type of work, but the need to travel to and from the workplace, that may disproportionately expose people from ethnic minority backgrounds to COVID-19.

3. Are differential rates of relevant comorbid conditions associated with differences in COVID-19 outcomes?

- Certain racial groups such as African Americans, Hispanics, Asians, and Native Americans highly prone to develop severe obesity, diabetes, hypertension, have been found to be partially COVID-19 positive. This has been attributed to disparities in health care, low socioeconomic status and living in close urban clusters.
- The mechanisms underlying the disproportionate effect of COVID-19 infection on BAME patients remain incompletely understood and are still under investigation.

4. What COVID-19-related risks and challenges are faced by refugees and asylum seekers in the UK?

- According to the International Organisation for Migration's Migration Data Portal, 10 of the 15 countries with the highest current rates of COVID-19 have a migrant population of at least 10% (compared to a worldwide average of 3.5%).
- Migrants (potentially including refugees and asylum seekers) may be over-represented in marginalised populations, such as homeless people (Ly-2020). These groups are exposed to specific risks as a result of precarious living conditions and shared accommodation.
- Refugees and asylum seekers around the world tend to live in poor conditions, facing overcrowding, poor sanitation, and other issues which are in themselves risk factors for COVID-19 (Júnior-2020).

Review limitations:

- The overall quality of the evidence from the literature was moderate. This largely reflects the fact that we are in the middle of a novel and fast-moving pandemic.
- We are committed to reviewing the literature on this topic regularly as new data emerge, to refining and improving review quality.
- For the INARC analysis, we did not have access to individual-level data, so it was not possible to adjust for potential confounding factors including age, sex, obesity and other comorbidities.   ICNARC are in the process of conducting multivariable analyses of risk factors for critical care outcomes for ICU patients with confirmed COVID-19. We will update our findings with any new results that become available.

Extended abstract:

For a description of the underlying literature search, please see link for the full review. We searched PubMed and MedRxiv on 29 April to 15 May 2020. We identified additional relevant articles through searching the reference lists of relevant articles. We screened 737 records. We excluded 551 publications by screening titles and abstracts and a further 189 at the full text screen/quality assessment phase, leaving 63 articles for inclusion in the final review. Screening was shared between six reviewers (GC, EM, DK, AK, PK, and KO). Each article was screened by one person, with exclusions checked by a second at both stages. Data extraction and quality assessment were carried out by the same 6 reviewers these elements were checked by a second reviewer. Data were summarised narratively.

Link to full review and any relevant updates: https://edin.ac/ethnicity

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The UNCOVER network is committed to responding quickly and impartially to requests from policymakers for evidence reviews. This document has therefore been produced in a short timescale and has not been externally peer-reviewed.

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Table 1 Ethnicity of patients critically ill with confirmed COVID-19 that received advanced respiratory support (n=5330) versus those that received only basic respiratory support (n=1842)

Ethnicity	Advanced Respiratory Support	Only basic respiratory support	Pearson's chi square p-value[1]
	N (%)	N (%)	
White	3153 (65.2%)	1298 (75.7%)	
All ethnic minorities	1686 (34.8%)	417 (24.3%)	1.03e-15
Asian	*764 (15.8%)*	*205 (12.0%)*	*5.58e-07*
Black	*515 (10.6%)*	*105 (6.1%)*	*2.49e-10*

[1] P-values represent the following comparisons: All ethnic minorities versus White, Asian versus White, Black versus White.

Table 2 Ethnicity of patients critically ill with confirmed COVID-19 that received any renal support (n=1848) versus those that did not receive any renal support (n=5495)

Ethnicity	Patients receiving any renal support	Patients not receiving any renal support	Pearson's chi square p-value[1]
	N (%)	N (%)	
White	1029(61.1%)	3531 (70.2%)	
All ethnic minorities	654 (38.9%)	1496(29.8%)	5.41e-12
Asian	*278 (16.5%)*	*712 (14.2%)*	*0.0002*
Black	*253 (15.0%)*	*382 (7.6%)*	*4.89e-21*

[1] P-values represent the following comparisons: All ethnic minorities versus White, Asian versus White, Black versus White.

Table 3 Ethnicity of patients critically ill with confirmed COVID-19 that were discharged alive (n=1820) versus those that died (n=1863)

Ethnicity	Discharged alive	Died	Pearson's chi square p-value[1]
	N (%)	N (%)	
White	2633 (69.8%)	1983 (65.9%)	
All ethnic minorities	1139 (30.2%)	1037 (34.3%)	0.0003
Asian	*497(13.2%)*	*507 (16.8%)*	*1.45e-06*
Black	*331 (8.8%)*	*310 (10.3%)*	*0.011*

[1] P-values represent the following comparisons: All ethnic minorities versus White, Asian versus White, Black versus White.

Table 4 Ethnicity of patients critically ill with confirmed COVID-19 (n=9026) compared to a historic cohort of patients critically ill with viral pneumonia (non-COVID-19) during the years 2017-2019 (n=5782).

Ethnicity	Critically ill with COVID-19	Critically ill with non-COVID-19 viral pneumonia 2017-2019	Pearson's chi square p-value[1]
	N (%)	N (%)	
White	5468 (66.8%)	4951 (88.4%)	
All ethnic minorities	2717 (33.2%)	649 (11.6%)	1.17e-184
Asian	*1245 (15.2%)*	*325 (5.8%)*	*2.29e-88*
Black	*797 (9.7%)*	*155 (2.8%)*	*1.58e-76*

[1] P-values represent the following comparisons: All ethnic minorities versus White, Asian versus White, Black versus White.

Table 5 Ethnicity of patients critically ill with confirmed COVID-19 (n=5993) compared to the English/ Wales/ Northern Ireland populations' ethnicity.

Ethnicity	Critically ill with COVID-19	English/Wales/ N. Ireland population[1]	Pearson's chi square p-value[2]
	N (%)	N (%)	
White	5468 (66.8%)	46707655 (76.6%)	
All ethnic minorities	2717 (33.2%)	14289796 (23.4%)	1.52e-96
Asian	*1245 (15.2%)*	*7437014(12.2%)*	*2.90e-30*
Black	*797 (9.7%)*	*3968540 (6.5%)*	*6.65e-47*

[1] Estimates based on ICNARC reported percentages and current population estimates obtained by [ONS 2018 estimates](#).

[2] P-values represent the following comparisons: All ethnic minorities versus White, Asian versus White, Black versus White.