Ethnicity and mortality

Understanding and addressing ethnicity and mortality in hospital activity during Covid-19

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Executive summary

It is now well understood that Covid-19 has not just extracted a terrible toll on the elderly population but that it has also had a disproportionate impact on minority groups. In this report we examine what the impact has been and also what we can do about it.

Black and Asian communities have been disproportionately affected by Covid where death rates are 3.3 times and 2.4 times higher respectively among black men and women than among their white peers. If the white population had the same risk of death from Covid as that faced by the black population at least 58,000 more people in England and Wales would have died to date from the virus.

Our analysis shows that co-morbidities and deprivation account for only a small proportion of this difference. There must be other unobserved confounding factors at play. To try to understand why, we have made use of the new ECDS dataset to analyse the emergency care and critical care pathway for patients with Covid diagnosis, although in 89% of cases the coding of ethnicity is not complete.

What the analysis shows is Black patients in particular as well as South Asian patients are more likely to be admitted to hospital, be admitted to ICU, and be mechanically ventilated – each of which implies presenting to hospital with more serious conditions and these more serious conditions requiring greater escalation. Additionally, we find that Black patients have a 7.6% increased fatality rate in critical care.

Many have written about this on both sides of the Atlantic and suggested that key reasons for this excess risk is that Black patients, and to lesser extent South Asian, are presenting later for care and also then getting worse care.

- Patients may present late for a host of documented contextual reasons including lower health literacy, cultural reasons, greater difficulty in accessing care, challenge of building a therapeutic relationship with predominantly white professionals and a hesitancy to present due to a lack of trust.
- The care they then receive may suffer from a number of documented factors including unconscious bias of staff in the care they provide and care pathways not being tailored to the specific physiological and cultural needs of Black and Asian patients.
- We also recognise that underdiagnosis of co-morbidities in Black and Asian communities along with potentially increased physiological risk may be contributing factors.

To address these issues we recommend five actions:

1. Routine collection of ethnicity data and equity of access to drive change.
2. Incorporate a lens on ethnicity in all targets and performance.
3. Work with Black and Asian communities to co-design clinical services and interventions.
4. Concerted action to better protect ethnic minorities from the impact of deprivation on Covid risk.
5. The NHS and LA as local anchor organisations need to work together to coordinate local services, ensure they meet the needs of their populations and positively impact the social determinants of health.

Our paper below sets out an analysis of mortality and recommendations. A technical appendix explaining the methodology is attached.

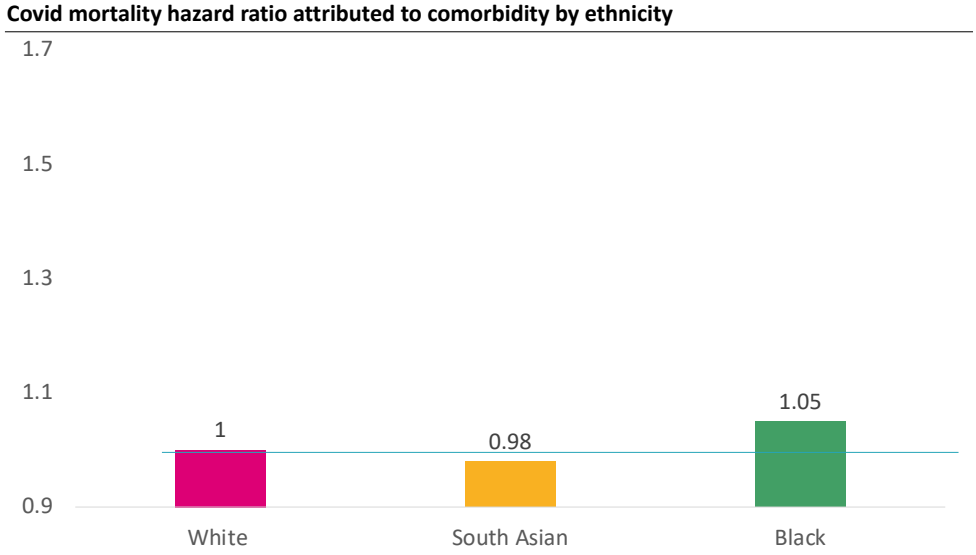
Analysis of ethnicity and mortality

By the 15 May 2020 we had observed over 37,000 deaths in the UK. As shocking as this statistic is, we calculate that if the white population had the same risk of death as the black population during this time we would have observed at least 95,000 deaths, 58,000 extra deaths. Similarly, if the white population faced the same risk as the Asian population we would have observed an extra 35,000 deaths. We set out the basis of this analysis in the Appendix.

The scale of this inequality deserves further investigation. We used hazard ratios estimated by Ben Goldacres' OpenSafely project to assess the effect of deprivation (using the Index of multiple deprivation) and prevalence of co-morbidities. These were combined with prevalence data on ethnic groups and the distribution of deprivation by ethnic group to estimate the increased risk of death from Covid due to these factors.

Neither differences in deprivation nor differences in disease prevalence explain the large differences in risk of death. Differences in the prevalence of co-morbidities (e.g. obesity, diabetes, hypertension and COPD) accounts for a 5% increase in risk in Black people and no increased risk in South Asian people. (**Figure 1)**

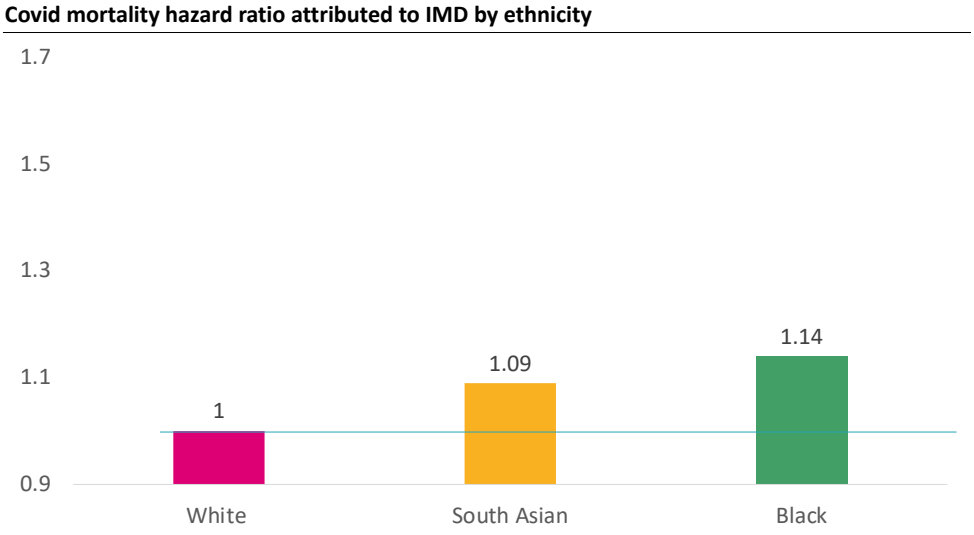
Figure 1- Documented co-morbidities do not account for increased risk of death from Covid in Black and Asian people



Sources: OpenSAFELY, Gov.uk IMD figures, Health Survey for England 2004, Health Survey for England 2017, KCL Department of Public Health, National Diabetes Audit (NDA) 2017-18, National Diabetes Audit (NDA) 2019, ONS 2011, CF analysis

A more significant, but still minimal effect was observed using IMD. We estimate that differences in deprivation as measured by the Index of Multiple Deprivation (IMD) lead to a 14% and 9% increased risk across Black and South Asian people respectively. **(Figure 2)**

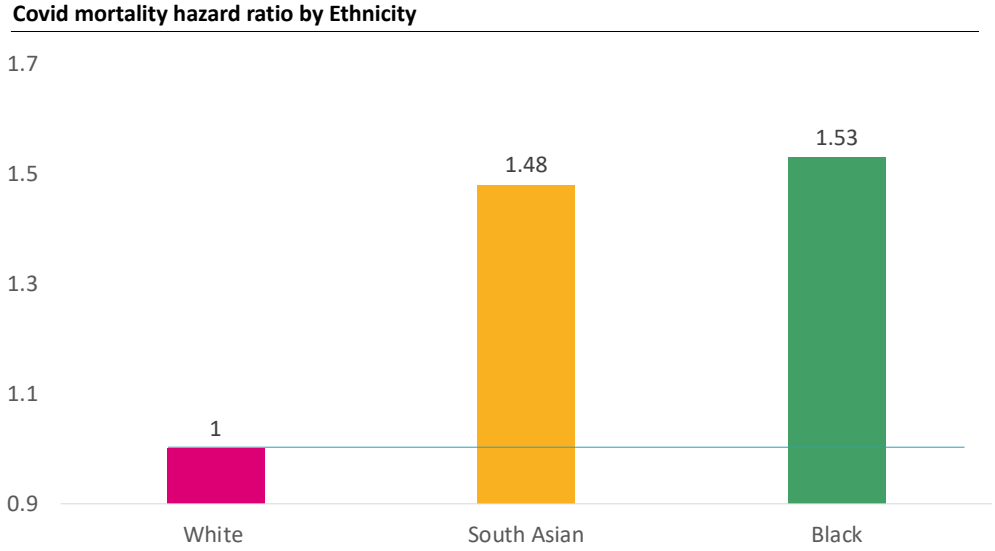
Figure 2- Differences in levels of deprivation (measured by IMD) account for a small part of increased risk of death from Covid in Black and Asian people



Sources: OpenSAFELY, Gov.uk IMD figures, Health Survey for England 2004, Health Survey for England 2017, KCL Department of Public Health, National Diabetes Audit (NDA) 2017-18, National Diabetes Audit (NDA) 2019, ONS 2011, CF analysis

After controlling for comorbidity and deprivation we then turn to see the residual explanation of ethnicity alone. It creates 48% higher risk for South Asian and 53% higher risk for Black people of dying from Covid. Since the wide genetic diversity within ethnic groups means genetics cannot explain the differences in risk of death, we are forced to assume that other unequal social conditions are the cause of this drastic differences in risk. There may be differences in occupation, housing and healthcare provision as well as a systemic racism that underlies these differences. (**Figure 3**)

Figure 3- Ethnicity accounts for significant increased risk of death from Covid, once IMD and documented co-morbidities are controlled for



Sources: OpenSAFELY, Gov.uk IMD figures, Health Survey for England 2004, Health Survey for England 2017, KCL Department of Public Health, National Diabetes Audit (NDA) 017-18, National Diabetes Audit (NDA) 2019, ONS 2011, CF analysis

In seeking to understand the differences in usage of the healthcare system during the pandemic, we examined the NHS Emergency Care dataset (ECDS). This analysis has not been performed before to our awareness. To do the analysis we extracted data from the ECDS for the period 1 April 2020 to 31 July 2020. This comprised 4,886,950 records of hospital contact. Of these 48,224 had Covid. Of these 5,445 had ethnicity recorded.

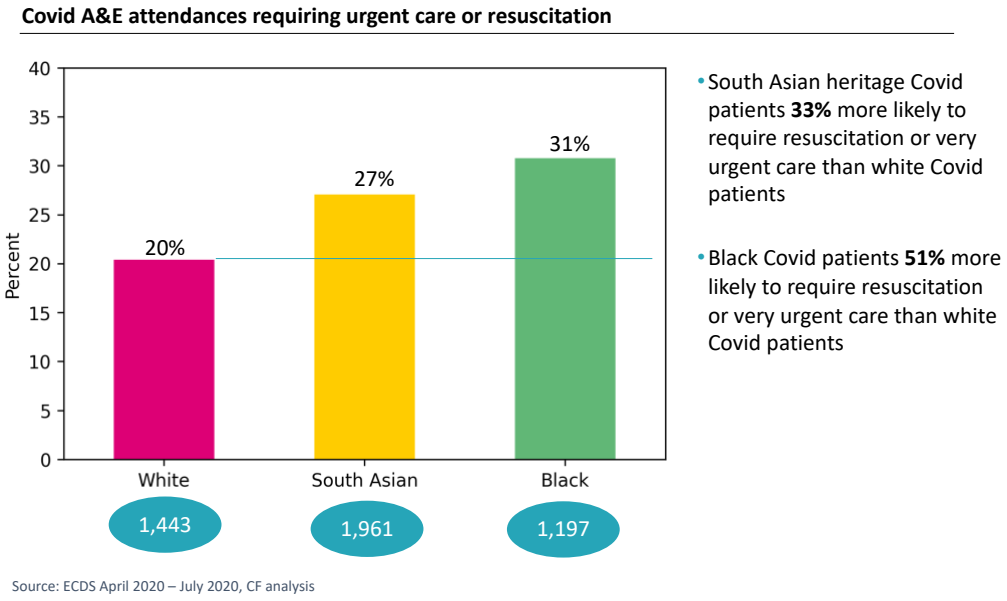
In reviewing the resulting analysis a clear pattern emerges. Black and South Asian people at just about every step had more serious condiditions and progressed to more serious treatment of conditions placing them at much worse risk of poor outcome. This includes:

- They present with more serious conditions at A&E
- They have a higher rate of admission to hospital
- Black people are twice as likely to be admitted to critlcal care
- Black people experience slight higher mortality rate in critical care

We set out each step of this analysis below:

Both Black and South Asian patients present to A+E with more severe Covid symptoms; (51% and 33% increased acuity (**Figure 4**)

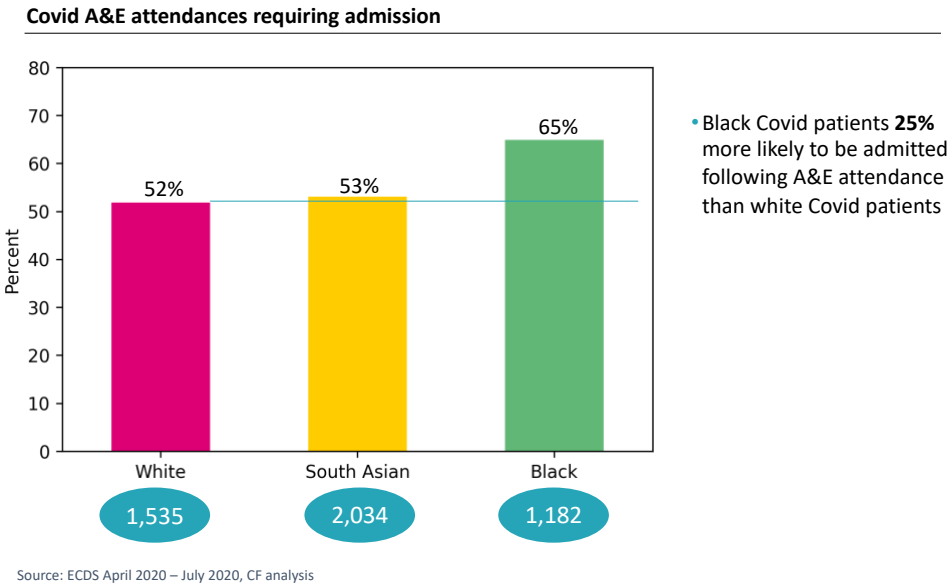
Figure 4-Black and South Asian people present to A&E with more serious conditions



Source: ECDS April 2020 – July 2020, CF analysis

Black patients have a 25% increased admission rate to hospital, although there is no associated increase for South Asian population. (**Figure 5**)

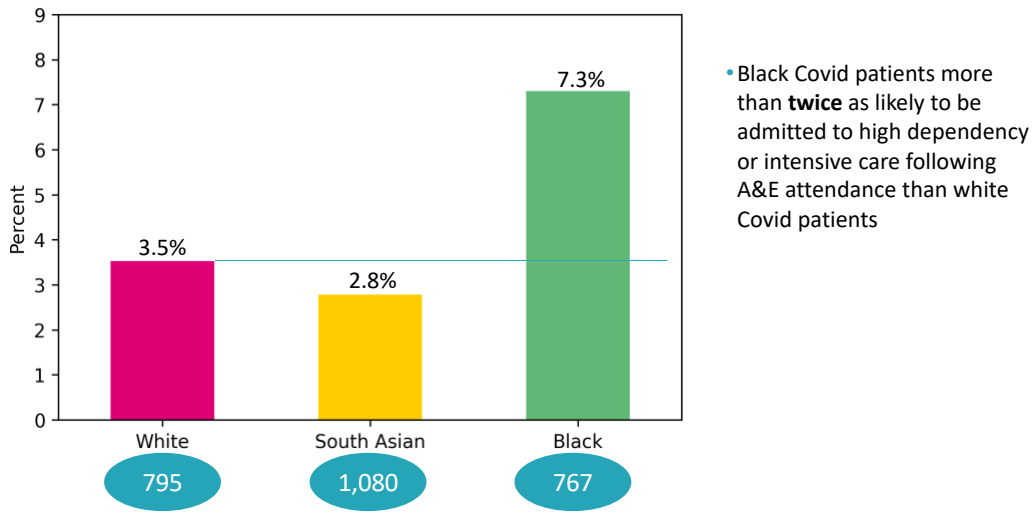
Figure 5 Black people are more likely to be admitted to hospital after attending A&E



Source: ECDS April 2020 – July 2020, CF analysis

Black patients are more than twice as likely to required critical care (**Figure 6**)

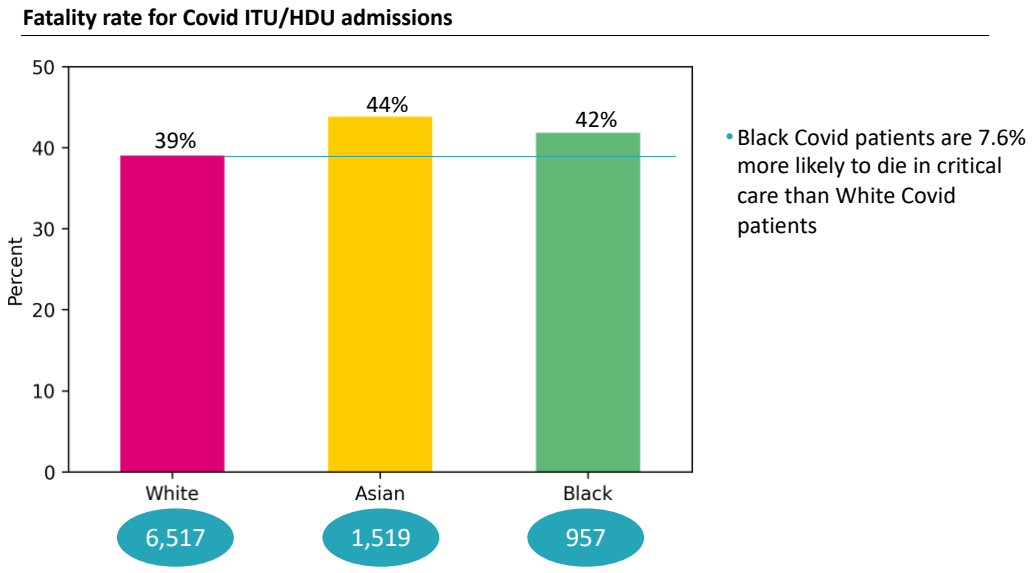
Figure 6 High dependency or intensive care following A&E attendance



Source: ECDS April 2020 – July 2020, CF analysis

Black patients have a 7.6% increased fatality rate in critical care (**Figure 7**)

Figure 7 Deaths in critical care



Source: ICNARC report on COVID-19 in critical care, 24 July 2020, table 10, page 23

Exploring root causes

Having set out what the statistics say we have also reviewed the literature to consider the main reasons that could be driving what we observe. The conclusion of many on both sides of the Atlantic—including Dr David Williams at Harvard and Dr Kevin Fenton in the UK. —is that a key reason for excess risk from Covid is that Black patients, and to lesser extent Asian, are presenting later for care and also then getting worse care.

Ethnicity itself appears to carry increased Covid risk for five reasons:

1. Patients from Black and Asian communities are presenting later to hospital with more severe symptoms.
2. Patients from Black and Asian communities are receiving worse care once in contact with healthcare providers.
3. Additionally, there may be under diagnosis of co-morbidities in these communities.
4. Black and Asian patients may have a worse physiological/immunological response to Covid.
5. Increased risk of contracting Covid may in part be due to socio-economic circumstances not explained by IMD.

1. Late presentation

From a patient perspective, there is evidence that patients from BAME communities are less likely to engage with healthcare services at an early stage:

- **Health literacy and cultural reasons**. There is evidence in both the UK and US that patient health beliefs, attitudes, experiences and behaviours may impact ethnic minorities willingness to engage with prevention and early intervention support and instead this leads to late presentations. A lack of culturally tailored early interventions reinforces this.[1]
- **Challenge of building a therapeutic relationship**. There is some evidence that BAME patients are less likely to engage with and build up effective therapeutic relationships with clinicians where there is patient- clinician ethnic and socioeconomic discordance with resultant worse communication and health outcomes.[2]

- **Suspicion or reluctance to present.** There is some evidence that BAME patients engage late due to discrimination, fear and lack of trust. Stakeholder engagement[3] reported that fear of Covid diagnosis and death in BAME communities negatively impacts uptake of Covid testing and early presentation for treatment and care.

2. Worse care

There is evidence from the literature that health services provide poorer care for ethnic minorities:

- **Care not tailored to physiological or cultural requirements**- There is evidence that different ethnic minorities have different disease presentations, but health services are not always tailored to respond to this. Additionally, early intervention support to manage co-morbidities is frequently not tailored to different communities with language and cultural barriers getting in the way of engagement. Treatment regimes are not always compatible with patients' beliefs and cultural and religious practice.[4]
- **Unconscious clinician bias.** There is evidence that unconscious clinician bias leads to ethnic minorities at times having poorer quality treatments, their symptoms not being taken as seriously and resultant poorer outcomes. A large US study of ED presentations found that, Black patients received lower triage scores and yet had higher mortality rates.[5]

3. Underdiagnosis of co-morbidities in Black and Asian populations

Another reason that ethnicity is such a significant independent risk factor for Covid may be that Black and Asian populations have a level of under diagnosed co-morbidities which could increase the risk of Covid fatality. This under diagnosis of co-morbidities is likely to occur for two reasons both of which have been described above: Firstly, under engagement of Black and Asian communities with the healthcare system and secondly worse care provided to these communities.[6]

4. Ethnic discrimination impacts on physiology which may lead to worse clinical outcomes

There is growing evidence that ethnic discrimination impacts on physiological response to acute illness. This may be contributing to a proportion of the excess Covid risk which Black and Asian communities are facing. There is evidence that self-reported discrimination is associated with preclinical indicators of disease, including increased allostatic load, inflammation, shorter telomere length, coronary artery calcification, dysregulation in cortisol. Linkages between self-reported racial discrimination and physical health outcomes have been documented in multiple recent reviews with research indicating positive associations between reports of discrimination and adverse cardiovascular outcomes, incidence of obesity, hypertension, engaging in high-risk behaviours, alcohol use and misuse, and poorer sleep.[Ibid]

Recommendations

In order to move forward and address these stark drivers of health inequality, we believe the following should be prioritised:

1. **Routine collection of ethnicity data and equity of access to drive change.** We know this has been called for already and we know that some areas are better at recording data than others. But it is vitally important that the information to permit this kind of analysis is collected. Hence, NHSE should mandate comprehensive and quality ethnicity routine data collection at all stages of the clinical pathway including on death certification. It should share an analysis of completion of ethnicity information to support improved data collection.
2. **Incorporate a lens on ethnicity in all targets and performance.** The NHS has often been characterised as a performance and targets oriented culture. For progress to be made to

support equality we should ensure an understanding of ethnicity in key targets from top to bottom in the NHS, including:

- Access targets (e.g, cancer, long waits, 18 weeks, A&E);
- Resourcing levels including capacity, staffing, and spending;
- Outcomes including survival and complication rates.

3. **Concerted action to better protect ethnic minorities from the impact of deprivation on Covid risk.** This will require action to ensure
   - Ensure that all workers in frontline roles including Black and Asian people have adequate access to PPE.
   - Ethnicity should be considered a factor in any triaging of the test and trace system.
   - Health and care providers to work together at place level to reduce Covid risk factors including ensuring that all individuals have accesss to temporary accommodation to isolate in if living in overcrowded conditions.
4. **Work with Black and Asian communities to co-design culturally helpful clinical services and interventions in order to support earlier presentation to the NHS.** This needs to include:
   - Work with communities to understand their local needs, issues and the barriers they face.
   - Co-design with local communities health promotion and disease prevention programmes for Covid risk factors.
   - Co-design health services which effectively engage and support the bespoke needs of Black and Asian communities.
5. **The NHS and LAs as anchor organisations need to work together in each local place to coordinate local services, ensure they meet the needs of their populations and positively impact the social determinants of health.** Local authorities and local NHS organisations have a commitment to address health inequalities. As significant changes are required in the NHS and locally to make change they have a unique role to support appropriate action through their own staff and their communications and engagement with local communities.

Technical notes on our methodology

We set out below the key aspects of the methodology used in this report.

1. **Calculation of deaths in the white population if they had the same risk as other ethnic groups:**

Excess deaths from each group were calculated using age (0-64 , 65+) and sex specific mortality rates using Covid death data by ethnic groups between 2 March 2020 to 15 May 2020 from Public Health England[8] and demographic data from the ONS 2011 census[9]. Age and sex specific mortality rates from each ethnic group were then applied to the different populations to calculate the expected differences in deaths if each population had the same mortality as rate either the White (White British, Irish, or other White) , Black (African, Caribbean or other Black) or Asian population (Indian, Pakistani, Bangladeshi, Chinese or other Asian).

2. **Understanding the difference in risk of death from Covid**

To understand the difference in risk of death from Covid we used hazard ratios estimated using a multivariate Cox proportional hazard model from the paper Factors associated with Covid related death using the OpenSAFELY data[10]

3. **Estimate of Co-morbidities**

The expectation of the estimates for the hazard ratios for each co-morbidity were combined with prevalence data for each ethnic group where available (White, Black and South Asian) to estimate risk for each ethnic group in comparison to the reference individual within the OpenSAFELY paper. The product of these prevalence standardised hazard ratios were then used to estimate the average risk for an individual from that ethnic group relative to the reference individual[11-18].

Risk was then normalised by ethnicity such that the white population was the reference group. Differences in prevalence between men and women were averaged assuming a 1:1 gender split. We note a key limitation is that many co-morbidities are strongly correlated with age but we did not standardise the prevalence by age in this analysis. Due to the differences in demographic structure this may underestimate the risk from these co-morbidities in the Black and South Asian population.

Table of Co-morbidities, prevalence by ethnicity and adjusted risk

Risk Factor	Hazard Ratio	White Prevalence	Black Prevalence	Asian Prevalence	White Adjusted risk	Black Adjusted risk	Asian adjusted risk
Obese Class I	1.06	12.0%	17.9%	8.7%	1.01	1.01	1.01
Obese Class II	1.42	12.0%	17.9%	8.7%	1.05	1.08	1.04
Obese Class III	1.96	3.4%	5.1%	2.5%	1.03	1.05	1.02
Current Smoker	0.93	15.5%	11.0%	9.5%	0.99	0.99	0.99
Hypertension	0.89	16.0%	32.6%	16.0%	0.98	0.96	0.98
Respiratory disease	1.64	1.6%	0.6%	0.8%	1.01	1.00	1.00
Cancer year 1 (non haematological)	1.74	3.8%	3.4%	2.1%	1.03	1.02	1.02
Stroke/Dementia	2.16	2.9%	3.9%	2.9%	1.03	1.05	1.03
Kidney disease 2-3	1.33	4.1%	4.5%	3.1%	1.01	1.01	1.01
Kidney disease 4-5	2.5	0.2%	0.2%	0.3%	1.00	1.00	1.00
Controlled Diabetes	1.27	2.7%	4.6%	5.5%	1.01	1.01	1.01
Un-controlled diabetes	1.87	1.3%	2.9%	2.7%	1.01	1.03	1.02
Risk relative to reference group					**1.18**	**1.24**	**1.16**
Risk relative to white population					**1.00**	**1.05**	**0.98**

Prevalence data for the following disease states were obtained :

- Obese Class I (30-34.9 kg/m^2)
- Obese Class II (35-39.9 kg/m^2)
- Obese Class III (40+ kg/m^2)
- Current smoking status
- Hypertension
- Respiratory disease (COPD used as proxy)
- Stroke and Dementia
- Chronic Kidney disease (Stage 3-4)
- Chronic Kidney disease (Stage 4-5)
- Controlled diabetes
- Uncontrolled diabetes

The following prevalence data was not available by ethnicity:

- Ex-smoking status
- Asthma with no recent OCS use
- Asthma with recent OCS use
- Chronic heart disease
- Cancer diagnosed 1 – 4.9 years ago
- Cancer diagnosed >= 5 years ago
- Liver disease
- Other neurological disease
- Rheumatoid/Lupus/Psoriasis
- Asplenia

4. Estimate of impact of deprivation

The distribution of deprivation is not equal between ethnic groups. To calculate the impact on the differing distribution of deprivation between ethnic groups we calculate the weighted IMD impact for each ethnic group[19]. This risk is compared to the reference group and then normalised such that the white population is considered to have a risk of 1.

Table of weighted risk by IMD quintiles by ethnic group

IMD	Hazard Ratio	White distribution	Black distribution	Asian Distribution	White Weighted Risk	Black Weighted Risk	Asian Weighted Risk
IMD 1	1	21%	5%	10%	0.21	0.05	0.10
IMD 2	1.12	21%	8%	13%	0.24	0.09	0.14
IMD 3	1.21	21%	16%	19%	0.25	0.20	0.23
IMD 4	1.48	19%	33%	27%	0.28	0.49	0.40
IMD 5	1.72	18%	37%	31%	0.31	0.64	0.53
Risk relative to reference group					**1.29**	**1.47**	**1.41**
Risk relative to white population					**1.00**	**1.14**	**1.09**

5. Exploration of differences in presentation and admission

The NHS Emergency Care Dataset containing Accident and Emergency attendance records spanning 1 April 2020 to 31 July 2020 in England were queried for SNOMED codes representing positive diagnosis for SARS-CoV-2 (Covid) and relevant ethnicity information (hereafter, relevant records). Ethnicity categories as defined in ECDS were aggregated into relevant groups, e.g. South Asian comprised 'Bangladeshi or British Bangladeshi', 'British Asian', 'Indian or British Indian' and 'Pakistani or British Pakistani'. The majority (70%) of Covid positive records with ethnicity data were assigned the ambiguous category 'British or Mixed British' and were excluded. For acuity measures, from relevant records also containing acuity SNOMED codes the proportions of attendances categorised as requiring resuscitation or very urgent care versus urgent/standard/non-urgent care were calculated. For admissions, proportions of relevant records containing discharge destination SNOMED codes indicating destination within a hospital setting (e.g. 'ward') were calculated. Of those admitted, the proportions admitted to a 'high dependency unit' or 'intensive care unit', versus all other destinations (e.g. 'short stay ward') were calculated.

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