Scientists for Labour

BAME and COVID-19

Alison M Dunning
Ben Fernando
Adam Thompson
Roisin McCallion
Rachael Breen
Katherine Page
Olga Mun
Sian Brooke
Mohamed Hammeda
Juan Ignacio Rubio Gorrochategui
Michael Head
Lucy King
Daniel A. Villar
José Guilherme de Almeida
Hannah Alpert
Matt Dwyer

11-06-2020

Authors

Alison M Dunning, PhD, works as a genetic epidemiologist at the University of Cambridge and is a life-long Labour Party member.

Ben Fernando is the chair of Scientists for Labour and works as a postgraduate researcher in numerical modelling at the University of Oxford.

Adam Thompson is the Vice-Chair (Policy) of Scientists for Labour and a research fellow in metrology at the University of Nottingham.

Roisin McCallion is currently VP Welfare and Equal Opportunities of Oxford Student Union and will shortly commence masters study in Social Policy at the University of York.

Rachael Breen is a Critical Care nurse currently working in the West Midlands.

Katherine Page studied Chemistry at the University of Oxford and currently works in science policy.

Olga Mun is a doctoral student in the Department of Education, University of Oxford.

Sian Brooke is a doctoral researcher at the Oxford Internet Institute.

Mohamed Hammeda is an undergraduate at the University of St. Andrews currently studying Computer Science and Statistics.

Juan Ignacio Rubio Gorrochategui studied Chemistry and Science Communication at Imperial College and worked in health policy for the European Commission.

Michael Head is a Senior Research Fellow in Global Health, University of Southampton

Lucy King is an undergraduate in Earth Sciences at the University of Oxford.

Daniel A. Villar is a behavioural ecologist at the University of St. Andrews, and a member of the executive committee of Scientists for Labour.

José Guilherme de Almeida is a PhD student in computational biology at the University of Cambridge.

Matt Dwyer is a PhD student in theoretical chemistry at the University of Sheffield.

Hannah Alpert is a PhD student in Aeronautics and Astronautics at Stanford University.

Scientists for Labour

Scientists for Labour is a socialist society affiliated to the Labour Party. Our aims are to both promote good science in politics, and to promote Labour values in science. More information about Scientists for Labour, including how to join, can be found at www.scientistsforlabour.org.uk. You can follow us on Twitter @scientists4lab.

Throughout the COVID-19 crisis, Scientists for Labour are preparing briefings and summaries of the latest research into coronavirus for Labour Party representatives and their staff. If you

would like to receive these briefings or have any other queries, please contact Benjamin Fernando: chair@sfl.org.uk.

Aims and Scope

This report details the current disparities in the infection and death rates from COVID-19 in BAME communities. It should be emphasised that there is no clear scientific consensus on what causes this. It is, however, clear that external factors (e.g. inequality and disadvantage) play a very significant role; both directly through reduced access to healthcare and education, and indirectly through increased prevalence of comorbidities (e.g. obesity and diabetes). Possible links to internal factors (e.g. Vitamin D deficiency) are being explored but are not yet conclusive and should be treated with an appropriate degree of caution. Differentiation between internal and external factors is an oversimplification and should be regarded in this context, it is done here simply for explanatory purposes.

It should also be noted that the BAME community is an extremely diverse group and as such should not be treated in an unnecessarily reductionist manner. Intersectionality must not be ignored either, for example those BAME individuals with disabilities may face further challenges not entirely described here.

We emphasise that nothing in this report should be taken to 'blame' the BAME community for being disproportionately affected, and the roles of structural racism and societal disadvantage must not be ignored. **We stand in solidarity with those who have experienced these phenomena.** It should also be noted that nothing in this report should be construed as support for or against specific medical interventions.

The authors of this report include experts in epidemiology, immunology, education, and equality. Nonetheless, due to the timescale in which it has been written, and the rapidly changing nature of the research, we cannot claim that it is necessarily comprehensive or free of error or omission.

Table of Contents

Executive Summary

This report explores how, and potentially why, BAME individuals are disproportionately affected by the COVID-19 pandemic. It is clear that structural factors, such as discrimination in healthcare and education, play a substantial role, and manifest in a variety of different ways. These range from poorer healthcare literacy, to greater prevalence of underlying respiratory conditions from exposure to air pollution, to reduced access to public services.

The role of any possible internal factors, for example Vitamin D deficiencies, is less clear. Whilst such a hypothesis may have merit, there is no conclusive evidence on this topic at present. Nonetheless, we present the current state of research on Vitamin D deficiency, and encourage urgent funding of further research. What is abundantly clear is that evoking of 'genetics' to explain the current disparities between white and BAME communities is both scientifically meaningless and ethically dubious.

Many relevant comorbidities, such as obesity and diabetes, are more common in parts of the UK BAME population than their white counterparts. These phenomena may involve a mixture of internal and external factors, including but not limited to access to healthcare, occupation, and personal lifestyle choices. Individuals with such comorbidities are more likely to die from COVID-19, and as such these factors may go some way to explaining (but not excusing) the disproportionate effect of the pandemic on BAME communities.

Finally, we present a number of policy suggestions that may be applied to investigate or ameliorate the disproportionate effect of COVID-19 on BAME populations. We encourage the Labour Party to urgently consider these.

1. Introduction

1.1. Political Context

In the UK, the emergence of COVID-19 has laid bare the structural inequalities at the core of our democracy. At the time of writing (June 2020) there have been over 50,000 excess deaths (Office for National Statistics, ONS data), with at least 35,000 of these being directly attributed to SARS-CoV-2 infection. Hidden under this headline figure are huge differences in the death rates among specific groups within the UK population, **especially those from the BAME (Black, Asian & Minority Ethnic) population**. **Other traits correlated with increased risk of death include lower socioeconomic status, age, and the presence of certain underlying health conditions** (such as diabetes). An early report by the Intensive Care National Audit and Research Centre, finds that despite BAME people comprising only 14% of the population, they constitute 35% of all hospitalised patients (so those with more severe disease).

The Black Lives Matter protests in the UK, sparked by the murder of George Floyd in the USA, have brought the structural racism and social inequality present in UK society to the forefront. To this point, this reality has been largely ignored by government commissioned reports on the disproportionate effects of COVID-19 on BAME people; and concrete suggestions have been lacking. **This report aims to (partially) fill that gap.**

1.2. COVID-19 and BAME People

It has been observed that both the infection and death rate from COVID-19 are significantly higher in BAME groups: a recent ONS report (2020) details that the risk of death from COVID-19 infection is around 4 times higher among Black (Afro-Caribbean ancestry) men and about 2 times higher in South Asian ancestry men, when compared to British men of European ancestry . Similar reports of higher death rates among African Americans have come from the USA (APM Research Lab Staff, 2020).

The recently published Public Health England (PHE) report (PHE, 2020) on disparities in the risk and outcomes from COVID-19 experienced by different groups of people has been subject to notable public criticism.

Particularly, while the report presents disparities between groups clearly and presents increased risks of COVID-19 infection and death in certain groups, it does not offer any explanations for said disparities, nor any solutions to mitigate risks to these groups. The report notes a clear correlation of excess deaths with deprivation measures, with 10,678 excess deaths in the most deprived UK quintile relative to 8,621 in the least deprived UK quintile.

The report also notes that, even after accounting for age, sex, deprivation and UK region, people of Bangladeshi ancestry had a two-fold increased risk of death relative to the UK White population, and people in all other BAME groups showed a 10% – 50% increased risk. **The higher BAME death rate is apparent across all grades of NHS staff, even in the highest socioeconomic groups.**

1.3. The BAME population in the UK

The income poverty rate varies substantially between ethnic groups in the United Kingdom. As a percentage of the total UK population of each ethnicity, the percentage of each group that is considered as low-income is: Bangladeshi (65%), Pakistani (55%); Black African (45%); Black Caribbean (30%), Indian (25%), White Other (25%) and White British (20%). For British people who are White, income poverty is similar across areas of the country, whereas for people from minority ethnic groups the rates are much higher in inner London, the North of England, and the Midlands.

These regions are also the most deprived in the UK as a whole (ONS, 2020), and people in these areas are dying of COVID-19 at double the rate of more affluent areas.

In February 2020, growth in life expectancy was reported to have stalled for the first time in 100 years, and even reversed for the most deprived in society (Marmot, 2020). Structural racism in the UK means that those in poverty are overwhelming BAME, and inhabit the areas worst affected by COVID-19. Thus, whilst it is wise to pay heed to the multitude of socioeconomic factors that can impact susceptibility, it is important to do so in the context of structural inequality.

1.4. Internal factors

It must be stressed that the UK BAME population includes a wide range of ethnicities who do not share recent common ancestors and consequently do not share a common genetic background. This means that common genetic factors should **not** be used as a direct explanation for increased COVID-19 risk across different ethnicities.

One common factor could be that the higher levels of melanin (skin pigment) in most UK BAME groups may predispose them to **Vitamin D deficiency**, which we know can affect the immune response. Low Vitamin D levels as measured in blood could also provide a common link with other groups at high risk of death from COVID-19, including elderly people as well as people with diabetes, heart disease, or obesity, regardless of their ethnicity. This link is under exploration.

Work in the field of **epigenetics** has shown how an environment can affect gene expression, the process by which the information in our DNA is expressed. Lifestyle factors, such as diet, obesity, physical activity, tobacco smoking, alcohol consumption, environmental pollutants, psychological stress, and working on night shifts (Alegría-Torres et al., 2011) can all result in epigenetic changes.

1.5 Outlook

The devastating effect of SARS-COV-2 in BAME requires fast and decisive action by the government; no longer should discrimination, cultural exclusion, poverty, and class be allowed to determine who lives and who dies.

In this report, we shall consider possible underlying reasons for the disproportionate levels of infection and death among the BAME population, put forward hypotheses that can be quickly tested, and suggest interventions and policy changes that can be implemented in a timely manner to rapidly improve the situation.

2. External Factors

2.1. Introduction

In this section, a set of 'external' factors suggested in the relevant literature as likely to contribute to the increased risk of COVID-19 to BAME communities is discussed. **As noted previously, such 'external' factors may well have an 'internal' effect as well,** for example in contributing to underlying health conditions.

A number of these factors are described in the recent report by PHE (PHE, 2020) into BAME issues; however, we have supplemented the sections presented in the PHE report with others that are apparent in the literature.

This section has been divided into two primary subsections, focussing on health inequality and structural racism, respectively. Under health inequality, focus is given to the impact of COVID-19 on BAME people from factors such as geography, deprivation, occupation, homelessness, care homes and health education. In the section on structural racism, a summary of scientific research into how structural racism affects the impact of COVID-19 on BAME communities is presented, focussing on healthcare, the environment, NHS staff and other key workers, housing, policing, and language, and communication.

2.2. Health inequality

Health inequalities are widespread in BAME communities. Recent studies show that several diseases are more prevalent in these communities (Bradford District Care NHS Foundation Trust, 2016) and that older BAME people suffer from poorer health outcomes as a result of these diseases, even after controlling for social and economic disadvantage (Evandrou et al., 2020).

Additionally, 6 out of every 10 health workers that have died from COVID-19 are BAME (Marsh and McIntyre, 2020), an especially shocking statistic considering that less than 2 out of every 10 UK residents belong to BAME communities (Institute of Race Relations, 2020). Whilst a few meaningful conclusions regarding the impact of COVID-19 in BAME individuals can be drawn from analysis of the PHE report (PHE, 2020) there are a number of notable shortcomings, which will be addressed at the end of this section.

2.2.1. Geography

The burden of COVID-19 has been felt more strongly in regions with greater deprivation. After controlling for age, sex, ethnicity and region, the most deprived regions have 16% greater risk of death when compared with those least deprived.

2.2.2. Occupation

Not all occupations are equally affected by COVID-19. Among those professions with the highest death toll are road transport drivers, caring personal services, elementary security occupations, construction and building trades, and sales assistants and retail cashiers.

However, without information on these workers' ethnic background it is difficult to analyse the peculiarities of their situation. Nevertheless, an independent report (McKinsey &

Company, 2020) has shown that BAME people in the workforce are more impacted by and at a greater risk of complications from COVID-19.

Data from the Annual Population Survey 2018 (Nomis, 2018) reveals that those from Asian backgrounds, particularly Pakistani and Bangladeshi, are disproportionately employed in "distribution, hotels and restaurants" and "transport and communication", which includes road transport drivers as well as key workers such as sales assistants and retail cashiers.

According to the same survey, individuals with a Black background are disproportionately employed in "public admin, education & health", which includes caring/personal services. However, this comparison between two studies (the PHE report (PHE, 2020) and the Annual Population Survey 2018 (Nomis, 2018)) may not be appropriate, as such a comparison assumes that different occupational categories had similar distributions of ethnicities.

As such, and in the face of the disproportionate number of deaths among the BAME health workers (individuals with a Black background, while constituting 3% of the population in England, represented 23.5% of health worker deaths; for Asians the figure is 7.8% and 34%), it is crucial to have data that allow us to disentangle and understand how BAME communities are affected within different occupational sectors.

Those born in the UK have also suffered smaller increases in excess mortality compared to those born outside of the UK, with the worst-case scenario being a 4.5-fold increase in the excess mortality for those born in Central & Western Africa compared to those born in the UK (PHE, 2020). Those born outside the UK/EU have at least a 2.8-fold increase in excess mortality for this year, whereas the excess mortality is at most slightly above 2-fold for those born in the UK/EU.

The risk of exposure within a healthcare context is heavily dependent on working conditions, such as access to and quality of personal protective equipment (PPE). Given that the NHS is such a large institution and is controlled by the government, it is, inevitably, not free of structural discrimination (evidence of which can be found in data from the NHS Workforce Race Equality Standard and staff surveys (Farah, 2020)).

This study notes that "BAME staff are more likely to be harassed by managers and subjected to disciplinary procedures by their Trusts, Royal Colleges and regulators, and are therefore less likely to speak out. How far such fears prevented BAME clinicians challenging managers over PPE, or any disproportionate allocation to COVID-19 wards, must be given full consideration." Additionally, senior doctors are more likely to be White than junior doctors (HM Government, 2020a) and in 2018, in every region of England, BAME NHS staff were at least twice as likely as White staff to say they had personally experienced discrimination at work from a colleague in the last 12 months (HM Government, 2020a).

2.2.3. Education
Existing literature suggests that older people, those with learning disabilities, children and young people, migrants and BAME people have a lower health literacy (HL, PHE, 2015).

HL is defined as the degree to which an individual can obtain, process, and understand basic health information and services, but also includes the confidence and ability to make

informed decisions that contribute to managing and improving their own health. HL levels are particularly important in relation to COVID-19 because **HL is considered a more accurate predictor of an individual's health status than age, income, employment status, education level, race or ethnicity** (Ad Hoc Committee on Health Literacy, 1999).

BAME people are more likely than White people to have lower incomes, which is commonly associated with lower levels of literacy and, consequently, HL. Research on the effects of inadequate health literacy have shown an association with poorer preventive care, greater use of medical services including more frequent and longer hospitalisations, a reduced likelihood of adherence to treatments and self-care plans, greater difficulty of managing long-term illnesses, poorer ability to communicate with health professionals, worse health and mental status, and higher mortality, especially among older adults (Easton et al., 2010; Rowlands et al., 2014; PHE, 2015; Sudore et al., 2016; Protheroe et al., 2017).

Among minorities, these problems are often exacerbated due to fear or mistrust of the medical community, which leads to a lack of confidence and cultural misunderstandings (Ford et al., 2007; Schmotzer, 2007).

Improving health literacy for at-risk populations is important, as there is a proven relationship between health literacy and health outcomes. However, further research is necessary to fully understand the impact of health literacy in the BAME population on health outcomes, particularly in association with COVID-19.

2.2.4. Testing
The government's 5 pillar testing strategy has so far failed to mention the increased risk to BAME individuals. Without widespread community testing it is hard to get a true picture of the risks and impacts of COVID-19, especially within vulnerable groups. Testing is especially important for BAME people, as they are more likely to work in crucial frontline roles and live in larger, multigenerational households where shielding and isolation are more difficult to maintain.

2.3 Structural racism
Structural racism refers to inequitable status between individuals of different ethnic groups, which results in differential access to goods and services. 'Structural' is used here to denote how this racial inequality is perpetuated and reinforced by the historically conditioned differential allocation of societal, economic, and political rights, resources and opportunities (Atkinson et al., 2018).

Research exploring ethnic inequalities in healthcare quality and access is not extensive in the UK. **The extent to which structural racism affects the health of BAME people in Britain is difficult to quantify, due to both the limited volume of studies that have been conducted and the fact that racism at the structural level is often dismissed by political leaders, institutions, and individuals**. However, the studies that have been conducted (as referenced in the following paragraphs) suggest that structural racism is present and must be considered when addressing BAME issues.

2.3.1. Healthcare

A study on ethnic inequalities in health in later life shows that health inequalities between ethnic groups are greatest in later life (Evandrou et al., 2020), which in turn increases the risk of COVID-19 to elderly BAME people.

In this work, BAME individuals were also reported as less likely to use GP services and generally more likely to report poor general health than the White British population. Evandrou et al. noted that "the increasing ethnic inequalities in health with age in the UK could reflect the accumulation of risks over the life course and the long-term consequences of exposure to hazards (such as socioeconomic disadvantage, poor healthcare experience and racial discrimination) in early life"; hazards which are exacerbated by structural racism.

In a report by the Department of Health and Social Care (2009) on the experiences of NHS patients from BAME groups, results indicated that in general BAME groups are less likely than their White British counterparts to report a positive experience. Questions relating to 'access and waiting' and 'better information and more choice' had particularly negative responses from BAME individuals.

Hospital inpatients from Bangladeshi, Black Caribbean and other Black backgrounds were the least satisfied with hospital services in 2017/2018 (HM Government, 2020a). Evandrou et al. (2020) note that inadequate healthcare may cause slower recovery times for BAME individuals, and delays in treatment (caused by, for example, poor access to healthcare) could lead to an accumulation of health problems in later life.

Structural racism can still exist without individual displays of racism, and its existence makes it more difficult to detect and mitigate instances of interpersonal racism. Interpersonal racism can negatively affect relationships between doctors and patients. Implicit racial bias within medical staff can lead to poorer-quality care provided to BAME individuals, and a BAME patient may feel misunderstood by a predominately White staff. **These problems may be exacerbated by a lack of race-conscious curricula in public health programs and a lack of encouragement to report unfair practices within care (Jones, 2002).**

2.3.2. Housing

It is clear from many studies that socioeconomic status has a significant influence on health, and thus it is important to recognise that socioeconomic disadvantage is often inevitably linked to structural racism. BAME individuals are more likely to live in densely populated urban areas, which is partially reflective of low household income among BAME groups (HM Government, 2020a).

Between 2015 and 2018, the households most likely to have a weekly income of less than £400 were from the Mixed and Black ethnic groups (HM Government, 2020a). Evandrou et al. (2020) report that "even within the same social class, BAME individuals on average have a lower income than their White British counterparts"; for example, they may be less likely to be promoted or considered for higher paying jobs. Analysis of data from a study conducted by the TUC shows that **BAME groups are persistently disadvantaged in the labour market compared to their white counterparts** (TUC, 2017), and are more likely to hold jobs characterised by low wages and a lack of employment rights.

Low household income is relevant to COVID-19 risk due to, among other things, its impact on housing. Households with low income are more likely to be **overcrowded or have damp** problems than higher income households, because they cannot afford to move to a larger house or to fix damp problems. Bangladeshi and Black African households, in particularly, are more likely to have damp problems than White British households (HM Government, 2020a). **This is highly pertinent as COVID-19 attacks the respiratory system, which can be compromised by chronic exposure to damp conditions.**

White British households are also less likely to be overcrowded than households from all other ethnic groups combined (HM Government, 2020a). **This factor is particularly important as the probability of being infected by COVID-19 is likely to be higher in close contact settings; social distancing and self-isolation rules will be much more difficult to uphold in overcrowded households** (Holden & Kenway, 2020).

A recent preprint study by Nazroo and Bacares (2020) on ethnic inequalities in mortality related to COVID-19 infections suggested that this increase in the mortality rate results from **ethnic minority people living in more densely populated, more polluted and more deprived areas** (including among key workers), driven by entrenched structural and institutional racism and racial discrimination.

There appears to be a lack of research into the effects of COVID-19 on homeless BAME people and BAME people in care homes. These gaps in knowledge leave researchers using summative reports (such as the recent PHE report, 2020) which are unable to properly account for interactions between different factors. There is an urgent need for significant further work examining how these factors affect the impact of COVID-19 on BAME people, to address the issues and limitations presented in the PHE report under section 9.

2.3.3. Policing

The establishment of lockdown and its constituent legal requirements of individuals has resulted in British police being granted powers they did not have previously (HM Government, 2020c). The recent murder of George Floyd by Minneapolis police in the US acts as a reminder that police forces can, unintentionally, play a particularly significant role in upholding structural racism.

In the UK, Black people were over three times as likely to be arrested as White people in 2017/2018, and people with Mixed ethnicity were nearly twice as likely to be arrested as White people (HM Government, 2020a). Black people had the highest arrest rates in every police force area for which there was data (HM Government, 2020a). Between April 2018 and March 2019 there were 4 stop and searches for every 1,000 White people, compared to 38 for every 1,000 Black people (HM Government, 2020a). The use of on-the-spot penalties as punishment for violating lockdown regulations may potentially have more detrimental consequences for BAME groups than for White people. BAME individuals may be more likely to be stopped by police and receive a penalty, and fines will have a greater detrimental impact on those living in low income households who are already struggling to pay for essentials.

2.3.4. Language and communication barriers

Several studies have shown that language barriers are a significant factor in the quality, speed, access to, and method of treatment of immigrant patients both abroad (Diamond and Jacobs, 2010) and the UK (O'Donnell et al., 2007). Studies in the US revealed that monolingual Spanish speakers had higher chances of experiencing medical errors (Flores et al., 2003) or longer hospital stays (John-Baptiste et al., 2004), and were less likely to receive appropriate medical examinations (Kirkman-Liff and Mondragon, 1991).

While the situation in the UK is better, in part due to the availability of interpreters (Llano, 2011), there were still instances of the interpretation quality not meeting the standards needed for successful patient-healthcare worker communication (O'Donnell et al., 2007). A precarious understanding of a non-English language by an interpreter may, in fact, be overall detrimental to non-English speaking patients. Research carried out in the US showed that such situations only increased confusion and caused even larger miscommunication between the actors involved (Diamond and Jacobs, 2010).

Considering that older BAME individuals are likelier to have less command of the English language (ONS, 2013), and that they are one of the demographic groups most affected by COVID-19, **it is essential that translation and interpretation services function effectively in order to minimise any extra-medical factors that could hinder diagnosis, treatment and recovery.**

The British government has published official guidelines for healthcare workers on how to better communicate with patients who struggle with English (HM Government, 2017). However, some of the resources offered (e.g., Google Translate), are not adequate for serious occasions that demand near-flawless communication between all parties involved. Additionally, there are also communication-related issues that are not related to interpretation but still of pivotal importance. Specifically, there are studies that have found that first generation immigrant Britons may be less aware of what they need to do if they require medical care and ways in which the NHS can help them (O'Donnell et al., 2007).

3. Internal Factors

3.1. Comorbidities

Comorbidities are underlying health conditions that place a person at higher risk of contracting other diseases, having more complex clinical management, or having worse outcomes if they do become ill (Valderas et al, 2009). The PHE report found that having certain underlying health conditions put people at higher risk of poor outcomes if they contracted COVID-19 (PHE, 2020). **A high percentage of the death certificates of people deceased with COVID-19 mentioned comorbidities such as diabetes, hypertension, obesity and chronic kidney disease, amongst others. Many of these comorbidities are more common in BAME populations.**

3.1.1 Diabetes

Diabetes is a chronic disease in which the pancreas is no longer able to make insulin or use insulin properly to control blood sugar levels (International Diabetes Federation, 2020). **Type 2 diabetes is reported to be six times more likely in those of South Asian descent than in White Europeans, and up to five times more likely in people of African and Afro-Caribbean descent** (Khunti et al, 2009).

There exists a significant inequality in the prevalence of diabetes on death records from COVID-19 patients. Diabetes was most likely to be mentioned in males aged 60-69 and was more prevalent in all BAME groups than in White patients: 43% for Asian patients in this age range, 45% in the Black patients, and only 18% in White patients.

The most deprived populations in the UK are 2 to 2.5 times more likely to develop diabetes than the rest of the population (Diabetes in BME Communities Working Group, 2014). There is evidence showing deprivation and ethnic background impact a person's likelihood to access healthcare (NHS Health Development Agency, 2004), which indicates that people from BAME groups may both face barriers to healthcare access and experience more negative health outcomes.

Those with diabetes from South Asian backgrounds have a higher chance of developing heart disease and chronic kidney disease resulting in end stage renal failure, when compared to White Europeans with diabetes (Diabetes in BME Communities Working Group, 2014). Additionally, those from Black African Caribbean backgrounds are more likely to develop hypertension, another COVID-19 comborbidity (Diabetes in BME Communities Working Group, 2014). **There is evidence showing that complications due to diabetes are 3.5 times higher in lower socioeconomic groups** (All-Party Parliamentary group for Diabetes and Diabetes UK, 2006).

3.1.2 Hypertension

Hypertension is a long-term disorder where the pressure in a person's blood vessels is unusually high, and, if persistent, can substantially increase the risk of stroke, coronary heart disease, vascular dementia and chronic kidney disease. Hypertension in Black patients has a different pathophysiology than in patients of other ethnic groups.

Khan and Beevers (2005) found that Black people have higher salt sensitivity and lesser ability to excrete ingested salt, which leads to more water retention, thus increasing their blood pressure. Having a diet that contains high levels of sodium is also a factor in the development of the condition, as medications are less effective in people with diets that contain high levels of sodium. **Hypertension in COVID-19 deaths was mentioned in 17% of White ethnic group deaths, 40% of Black ethnic group deaths, and 33% of Asian ethnic backgrounds.**

Lifestyle changes, such as eating a healthier diet and engaging in physical activity, are another way of preventing hypertension or reducing its complications. **However, making healthier food choices depends on having the resources to make choices based on health rather than solely on what is readily available at an affordable price**. There is evidence that higher occupational social class is associated with higher food expenditure, which is in turn associated with healthier purchasing (Pechey and Monsivais, 2016). **Similarly, accessing sports facilities and equipment tends to require spare income.**

3.1.3 Obesity

Obesity has also been cited as a risk factor for COVID-19, as 7.7% of COVID-19 patients on Intensive Care Units in the UK were morbidly obese, compared to 2.9% in the general population (ICNARC, 2020). Obesity is also linked to poor dietary habits and lower physical activity levels.

3.2. The Vitamin D hypothesis - *see Appendix 1 for more details*

The hypothesis that Vitamin D may have a protective effect from COVID-19 infection and death is rational, relatively easy to test. If demonstrated to have a useful protective role, it will be reasonably simple and very cost-effective to improve at a population-wide level by acting now, during the summer months. There is not yet sufficient evidence for the NHS to recommend supplementation as a preventive measure against COVID-19, and this should be a research priority going forward. Lee (2020) **note that there is currently no clear clinical evidence for a causal link between Vitamin D levels and COVID-19 infection severity, but note that this is not due to contradictory facts, but rather due to insufficient reported robust research**.

Here in the UK almost all our Vitamin D comes from the action of sunlight on our skin, with very little from our diets. At the UK latitude (50 °N – 60 °N) sunlight levels are not strong enough from October to March for anyone to make Vitamin D in skin. As a result, by March a very high proportion of the UK population is Vitamin D deficient. This is considered one the important factors in the seasonality of viral infection rates.

Deficiency is common and has been reported in about 20% of Northern European populations (Lips et al., 2019). **In the UK Vitamin D deficiency is common among all ethnicities, especially in winter, but is particularly pronounced among BAME communities and elderly people.** Several studies have compared Vitamin D levels in different UK ethnicities in summer and winter (Ford, Graham et al. 2006; Smith, 2010; Patel et al., 2013; Kift, Berry et al. 2013; Darling et al., 2013). These are summarised in Figure 1 (see Appendix for more details of these studies). In general, UK white populations (marked in green) have the highest levels and these

are adequate in summer, but not in winter while UK Asian populations (marked in red) are mostly deficient all year round.
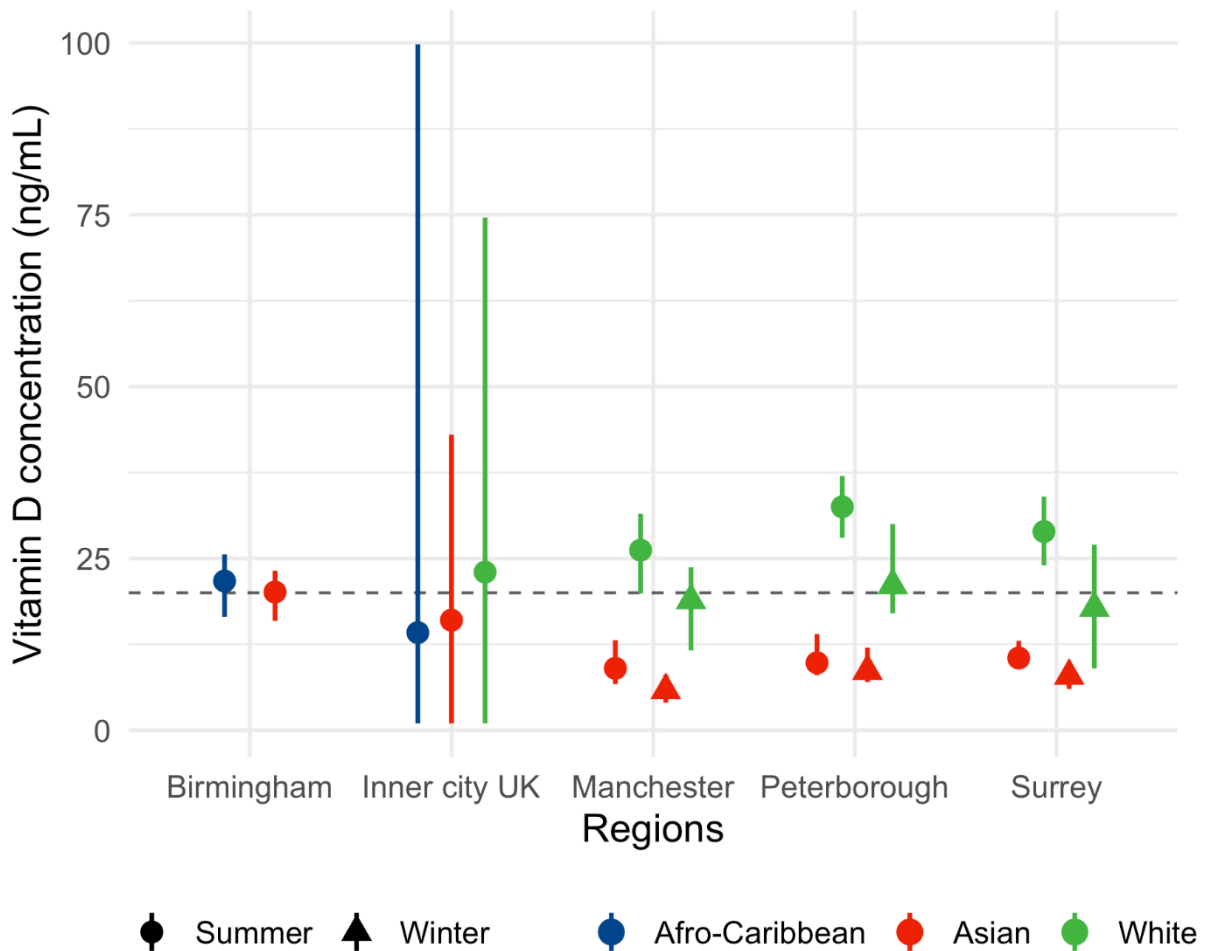

Figure 1. Summary of data presented by (Ford, Graham et al. 2006; Smith, 2010; Patel et al., 2013; Kift, Berry et al. 2013; Darling et al., 2013) on Vitamin D concentration by region and ethnicity. Median values from each study group are shown as points with lines denoting interquartile ranges. Values below the grey dashed line are considered deficient. (Figure Credit: **Scientists for Labour**)

3.2.1 Possible reasons for low Vitamin D levels in certain UK groups
Studies investigating why some people have low Vitamin D levels are limited but they suggest that older skin has a reduced capacity to make Vitamin D when exposed to the same amount of light (MacLaughlin and Holick 1985). Similarly, skin containing more melanin (dark pigment) required up to 10 times more exposure to sunlight to produce the same amount of Vitamin D_3 (a sub-type of Vitamin D) as paler skin (Holick 2003).

3.2.2 Vitamin D and protection from other infections
Vitamin D acts against infection in multiple ways. There is good evidence that people with low Vitamin D levels are at increased risk of contracting acute respiratory tract infections (ARTI) and that taking regular Vitamin D supplements helps protect people against such infections (Pham et al., 2019; Martineau et al., 2019; More details of these studies are given in the

Appendix). **It should be noted that the incidence and severity of some diseases may correlate with Vitamin D levels, without there being a causal link. Furthermore, feedbacks exist – the severely ill may not be able to venture outdoors.**

3.2.3 Vitamin D in COVID-19 infection

Studies of Vitamin D in COVID-19 patients have begun to be published but few, as yet, have been peer-reviewed, **so these need to be treated with strong caution (Lee, 2020)**. A study in Louisiana found that COVID-19 patients requiring intensive care treatment in had lower Vitamin D levels than those needing only standard hospital care: 85% of patients admitted to intensive care had Vitamin D insufficiency vs 57% admitted to ordinary care in New Orleans in March/April 2020 (Lau et al., 2020). **As noted, care should be taken when extrapolating a correlated relationship to a causative one.**

In Belgium, most COVID-19 patients admitted to intensive care had Vitamin D deficiency and all those aged under 75 were deficient: 186 confirmed COVID-19 patients admitted to hospital in Belgium in March & April 2020 were compared to population controls. Vitamin D deficiency was more common in male cases (67.0%) than in controls (49.2%). Levels were lower in the cases (17.6ng/mL) compared to controls (20.3 ng/mL) and lowest in the most severely affected cases (De Smet et al., 2020).

Areas of the world experiencing the most severe epidemics thus far are all above 30 °N latitude (the only exception is Brazil). A modelling study examined 239 locations across the globe from January to May 2020 and found outbreaks with large numbers of fatalities have occurred exclusively above +30ºN latitude in the winter hemisphere. Deaths per million ranged from 3% up to 37%, (mean 11%) for latitudes between 30 °N and 55 °N. By contrast, outbreaks in the tropics and southern summer hemisphere have been mild with a mean of 0.2% deaths per million (Davies et al., 2020).

3.2.4 Deprivation and Access to Sunlight

Sunlight is an effective and inexpensive way to increase Vitamin D levels which many people would find acceptable or even pleasurable. During the UK summer there would be little harm in encouraging people outdoors (to sunbathe even if exercise is difficult) to increase their Vitamin D levels. **Whilst the role of Vitamin D in preventing COVID-19 infection remains unclear, the role of Vitamin D levels in general health, and the structural barriers to achieving recommended doses, are clear.**

Barriers preventing people accessing sunlight include:

- No access to a garden or convenient green space
- Lack of free time during daylight hours due to occupation
- Lack of mobility
- Religious coverings
- Fear of sunburn / skin cancer
- Access to public open space may have been reduced by lockdown rules that strongly discouraged people from sunbathing in public parks and required high risk "shielded" groups to remain indoors

Without the intention of assigning any 'blame' to BAME communities, it is clear that some of these factors will effect people from different ethicities differently.

There is growing evidence that the epidemiology of COVID-19 affects people differentially depending on age, socioeconomics, existing health status and ethnicity. As such, COVID-19 shares many characteristics with the 19th century diseases of poverty. Although not understood at the time, the Victorian parks and gardens movement improved public health, particularly for respiratory infections, by improving Vitamin D levels in the population. This existing knowledge seems to have been forgotten during the latter part of the 20th century – perhaps due to an overemphasis on protection from skin cancer. Although multiple structural issues are needed to reduce the effects of poverty on public health, increasing Vitamin D levels among at-risk groups could be achieved quickly and inexpensively over the coming summer. **Beyond that, a longer-term study of structural inequalities is urgently needed.**

4. Policy suggestions

A series of policy suggestions have been generated based on the research presented throughout this report. These policy suggestions are divided by the timeframe appropriate to each policy.

4.1. Short-term

4.1.1. Prioritisation of BAME individuals in Pillar 1 testing

The current testing prioritisation strategy used by the government does not make any mention of the increased risk to BAME individuals. The government should consider explicitly making ethnicity a factor in devising testing priority and frequency plans, both in Pillar 1 ("those with a medical need and the most critical key workers") and the later pillars.

4.1.2. Risk assessments for BAME individuals

In line with current frontline care procedures, the government should devise guidance for BAME individuals and their employers to ensure that they are able to considerately and constructively engage with the added risks that being a member of an ethnic minority may bring. They should also take steps to reassure BAME workers, especially those in frontline roles, that their concerns over increased risks are being taken seriously. This should include restating whistleblower protections.

4.1.3. Shielding

For individuals in a 'moderate risk' shielding group, consideration should be made of whether being from an ethnic minority is enough to justify moving the individual to the 'high risk' group in marginal cases.

The extra concerns associated with shielding status must be allayed and should be considered within a socioeconomic context, such as the difficulty of isolation within a multigenerational household that includes frontline workers.

4.1.4. Education of health professionals – understanding differently presenting symptoms

Medical professionals have reported a lack of training on diagnosis of conditions for those with darker skin tones. In relation to COVID-19 this can provide specific challenges with Kawasaki syndrome and cyanosis; and as such these conditions may take longer to diagnose or be missed altogether on BAME patients, disproportionately contributing to their mortality. Whilst cultural stereotypes may not actively be endorsed in healthcare settings, their existence within society influences how information about individuals is processed and as a result may lead to unconscious bias in decision making. By making physicians aware of their susceptibility to such bias, health care discrepancies could reduce (Chapman et al. 2013).

Urgent training for medical professionals on recognising conditions in various ethnicities should be provided, and the NHS website updated to include pictures on different skin tones to assist those at home considering whether to seek medical assistance or not. The British Association of Dermatologists have recently supported this, tweeting 'We are working on a project to collate images representative of BAME skin types in dermatology for use across all our workstreams'.

The government should consider advising a precautionary approach, wherein medical staff are encouraged to flag potential symptoms on BAME patients for more specialist attention when unclear about symptom presentation on those from ethnic minorities. Interventions to guard against possible unconscious bias should also be put in place.

4.1.5. Better support for and understanding of intergenerational households

Much of the communication of guidance on household activities, including isolation and shielding, is mostly presented in the context of 'traditional' households. It should be recognised that intergenerational households are more common in Asian communities than White ones; and that these communities often contain a higher proportion of frontline healthcare workers. When older family members are co-resident with these workers, the risks of infection to those who are in a shielding group are elevated.

Although some guidance on multi-generational households does exist, the government should undertake urgent consultations with members of these groups to explore how to better support them within the existing familial structures, and also to better understand the transmission of COVID-19 in such settings.

4.1.6. Continual public health messaging

As has been discussed, BAME individuals are more likely to suffer from comorbidities, such as obesity or diabetes, and to present other health issues such as Vitamin D deficiency. The government should ensure that standard NHS messaging on these public health issues is reinforced within BAME communities during the pandemic.

These could include advice on ensuring that individuals receive enough Vitamin D (through exposure to sunlight, diet, or supplements) and that they are also exercising outdoors where possible. The government should carefully consider the evidence base around recommendations for Vitamin D supplements within the BAME community (which are cheap and low risk if taken in the correct doses) given the hypotheses around potential links between Vitamin D deficiency and increased severity of COVID-19. *This suggestion is intended purely to encourage current NHS advice to be followed, and to pose a question to the government about a possible precautionary measure. At time of writing, the NHS has a statement on their website that there is not enough evidence to support any current recommendations around Vitamin D and reduction of COVID-19 risks. This policy suggestion should not be taken as SfL proposing specific medical interventions.*

4.1.7. Racism

From early in the pandemic, racist behaviour was observed against those of East Asian heritage due to the Chinese origin of the SARS-CoV-2 virus. The government should remain vigilant against such behaviour and work with the East Asian communities in the UK to support them against any potential resurgences (for example, those arising from the publication of reports into the origins of the virus).

4.1.8. British residents abroad

Due to travel restrictions, numerous BAME individuals found themselves stranded abroad in countries whilst visiting family. Whilst there, many were left without the medicine they

required and other resources, leaving them vulnerable physically, mentally, and financially. It is likely that as a result these individuals may have suffered not only psychologically, but also financially due to loss of earnings and/or employment. Specific support should be put in place for these groups.

4.1.9. Communication and messaging

Whilst government COVID-19 guidance has been translated into multiple languages, it is unclear how effective this messaging campaign has been. Those with limited English comprehension may also have lower reading comprehensions (e.g. if unable to read at all, or if disabled), making it difficult for these individuals to understand public health messaging. They may also have reduced access to news if they are unable to use and access the internet; or may be reliant on news sources from other countries with different public health rules. Promotion of the NHS among BAME communities should be more thorough and use means that allow reaching most parts of the population, including promotional material written or spoken in languages other than English. While it is true that the NHS does have resources in other languages on its website, they should be advertised more widely, and a public review should be carried out to determine more appropriate techniques to reach to BAME communities, such as screening for health literacy and English proficiency.

4.2 Medium-term or overlapping suggestions

4.2.1 Air pollution

Air pollution disproportionately affects inner cities, and areas without close access to greener, cleaner spaces. As mentioned in the body of this report, BAME households are more likely to live in densely populated, urban areas, and in unsuitable housing. *See the SfL report on air pollution for more on the links between it and COVID-19.*

4.1.2. Language

Language barriers can have a severe effect on the quality, speed, access to and method of treatment. Although there is some advice for health professionals on how to better communicate with those who are not proficient in English, these are often not of a high enough standard for use in emergency situations where it is essential that communication services in of the utmost importance.

It is therefore vital that the government improves interpretation and translation services in front-line environments to ensure sufficient patient-clinician communication. The quality of these services should not vary between trusts.

The government should also ensure that all public health information is provided in a wide range of languages including, but not limited to, Polish, Punjabi, Bengali, Arabic, Urdu, and Gujarati, French, Chinese, Portuguese and Spanish. At present, not all materials appear to be available in all of these languages.

4.2.3 Funding calls to understand issue affecting minority communities and COVID-19

The Clinical Informatics Research Unit at University of Southampton are tracking public and charitable investments in COVID-19 related research (Brown and Head, 2020). Their results show just 15 awards ($2.6m, 0.3% of total $1.0 billion funding tracked) so far are focused on Black, Asian and Minority Ethnic populations (BAME). There are now funding calls by UKRI and the UK NIHR focusing on this topic, but at time of writing, there are clear gaps in knowledge that are not yet being filled by research, as described in the body of this report. Efforts should be made to support studies on the full impacts of the COVID-19 pandemic on BAME populations.

4.2.4 Financial security and no recourse to Public Funds

The government should consider what the effects of 'no recourse to public funds' and other limitations on support services are having on BAME communities in a disproportionate manner. They should consider temporary easing of controls.

4.2.5 Prison population

BAME individuals make up 13% of the UK population, and the UK prison population statistics showed that in 2018, 27% of the prison population identified as being from an ethnic minority. Given the increased risk to those in prisons, and BAME individuals especially, the government should provide an update on the ongoing protections for prisoners, including their early release policy. The government should also take further steps to protect the prison population, and prison workers, given service workers are also disproportionately BAME.

4.3 Long-term - *see Appendix 2 for more details*

4.3.1 Housing inequality
Dense urban environments do not have to lead to outbreaks of COVID-19; as dense cities like Seoul and Singapore have shown, if appropriate test and trace and social distancing measures are taken (Kulu and Dorey, 2020). Clearly housing inequality cannot be solved immediately, but policies to remedy some of the structural racism that it brings should be urgently considered.

4.3.2 Temporary or unstable accommodation
Living without safe and secure accommodation can be detrimental to mental and physical health at the best of times. As mentioned above, rent is less affordable for BAME households, access to services whilst homeless or displaced for BAME individuals may be more challenging than for their white counterparts.

Long term there needs to be more support for Local Authorities to provide both safe temporary accommodation and accessible social housing. There should be an evaluation of how pandemics can affect those in unstable accommodation, especially focussing on improving resources, communication and access for these marginalised groups to health care services.

Homelessness charities have indicated some of the steps that they think governments should implement in order to ensure that the homeless are not so vulnerable come the next pandemic (FEANTSA, 2012). The simplest of these is to ensure that there are not any homeless by guaranteeing housing to all people temporarily. Short of that, building up trust between health authorities and the homeless, and guaranteeing that there is safe and accessible government owned accommodation for the homeless to live in will be crucial in protecting this vulnerable population come the next pandemic.

4.3.3 Long term poverty

The government Race Disparity Audit from 2018 showed that people in the most deprived neighbourhoods tend to be disadvantaged across multiple aspects of life. Pakistani and Bangladeshi people were overrepresented in the most deprived neighbourhoods in England, and all the Black ethnic groups were also disproportionately likely to live in the most deprived neighbourhoods.

The government needs to initiate radical change to lift all citizens out of poverty in order to prevent deaths, not just of COVID-19, but of other diseases of poverty. The last decade of austerity is known to have had serious medical costs on the working class in Britain, both in terms of premature deaths and working health amongst the living (Darlington-Pollock and Norman). COVID-19 has just seen an exacerbation of these trends, rather than their start. In order to reverse them, the government would have to not only undo a decade's worth of austerity, but also widen social services to help the health of working-class Britons. A working class which is disproportionately BAME. It seems that welfare cuts, benefit changes, and reductions in community health services disproportionally affects BAME communities.

4.3.4 Long term education of health professionals

Medical textbooks often show symptoms of diseases only as they would manifest in White men (Louie and Wilkes, 2018) and in a teaching setting this has been raised multiple times in recent years (Gishen and Lokugamage, 2018)[7]. The issue with this is not just one of inclusion but can also have serious health implications for when doctors are treating BAME, and especially BAME women, patients.

There have been multiple studies showing that physicians often treat White and BAME patients differently (Hoffman et al., 2016), and part of this difference can be explained by doctors not understanding how symptoms of certain diseases express themselves differently in BAME and White individuals (Feagin and Bennefield, 2014).

This systematic racism within the medical system applies to all diseases, not just COVID-19, and to grapple with it would involve changing how physicians are trained so they don't centre all treatment around young White men, and instead understand how to best treat anyone who enters their practice.

This should also be extended to a better understanding of comorbidities, and how they present across all ethnicities. This should also sit alongside initiatives to help improve understanding of cultural and social differences across different groups, so medical professionals have more context for external factors their patients may be facing.

4.3.5 Social mobility and frontline jobs

Having a job which involves work on the frontline, either as a nurse or physician, or even in non-healthcare related jobs which involve regular interaction with people, increase the odds of contracting COVID-19. The risk of deaths from having these jobs can be reduced, by proper use of disinfectants, wearing masks, and maintaining social distancing at work when possible, but the risk cannot be minimised entirely, meaning that those who cannot work remotely are always going to be at higher risk of COVID-19 than the rest of us.

Racial bias may mean that BAME workers become 'trapped' in lower skilled or more manual roles, despite being more highly qualified than the work requires. Specific social mobility schemes to assist BAME populations may be in order.

4.3.6 Pillar 4 and 5 testing

Pillar 4: Surveillance testing to learn more about the disease and help develop new tests and treatments

Pillar 5: Diagnostics National Effort to build a mass-testing capacity at a completely new scale

Testing is a powerful tool in monitoring the spread of the virus and ensuring containment of cases. As the government moves forward with its testing strategy, it should take particular care in the long term to consider how Pillar 4 and 5 can be used to further investigate the links between BAME communities and COVID-19, particularly in multigenerational or non-traditional households. This could be used to inform measures to improve outcomes both in the short and long term.

References

Ad Hoc Committee on Health Literacy (1999) "Health literacy: report of the council on scientific affairs. ad hoc committee on health literacy for the council on scientific affairs, American medical association." JAMA **281**(6): 552–557.

Alegría-Torres, J. A., et al. (2011) "Epigenetics and lifestyle." Epigenomics **3**(3):267–277.

All-Party Parliamentary group for Diabetes and Diabetes UK (2006). "Diabetes and the disadvantaged: reducing health inequalities in the UK" (Diabetes UK).

APM Research Lab Staff 2020 "The color of coronavirus: COVID-19 deaths by race and ethnicity in the U.S." (APM Research Lab)

Atkinson, H., et al. (2018) *Race, ethnicity & equality in UK history: a report and resource for change*. (Royal Historical Society).

Ashwell, M., et al. (2010) "UK Food Standards Agency Workshop Report: an investigation of the relative contributions of diet and sunlight to vitamin D status." Br J Nutr **104**(4): 603-611.

Bradford District Care NHS Foundation Trust (2016) "Race evidence of health inequalities affecting black and minority ethnic people." (Bradford District Care NHS Foundation Trust).

Boucher, B. J., et al. (1995) "Glucose intolerance and impairment of insulin secretion in relation to vitamin D deficiency in east London Asians." Diabetologia **38**(10): 1239-1245.

Brown, RJ and Head MG (2020) . "Monitoring investments in coronavirus research and development". Lancet Microbe. 1(2):E61.

Chapman, E. N., et al. (2013) "Physicians and implicit bias: how doctors may unwittingly perpetuate health care disparities." J Gen Intern Med **28**(11): 1504–10.

Darling, A. L., et al. (2013) "Vitamin D deficiency in UK South Asian Women of childbearing age: a comparative longitudinal investigation with UK Caucasian women." Osteoporos Int **24**(2): 477-488.

Darlington-Pollock, F. and Norman, P. (2020) "Stalling life expectancy and increased mortality in working ages deserve urgent attention." Lancet Public Health **4**(11): e543–e544.

Davies, D. (2020) "Coronavirus and homelessness: 'No one will have to go back'." (BBC News).

Davies, D. et al. (2020) "Evidence supports a causal model for vitamin D in COVID-19 outcomes" medRxiv https://doi.org/10.1101/2020.05.01.20087965.

De Smet, D., et al. (2020) "Vitamin D deficiency as risk factor for severe COVID-19: a convergence of two pandemics." medRxiv https://doi.org/10.1101/2020.05.01.20079376.

Department of Health and Social Care (2009) "Report on the self-reported experience of patients from black and minority ethnic groups." (HM Government).

Diabetes in BME Communities Working Group (2014) "Diabetes in BME communities: raising awareness, improving outcomes and sharing best practice." (Diabetes in BME Communities Working Group).

Diamond, L. and Jacobs, E. (2010) "Let's not contribute to disparities: the best methods for teaching clinicians how to overcome language barriers to health care." J Gen Intern Med **25**(2): 189–S193

Durazo-Arvizu, R. A., et al. (2014) "25-Hydroxyvitamin D in African-origin populations at varying latitudes challenges the construct of a physiologic norm." Am J Clin Nutr **100**(3): 908-914.

Easton P., et al. (2010) "Health in the 'hidden population' of people with low literacy. a systematic review of the literature." BMC Public Health **10**(1):459.

Evandrou, M. et al. (2020) "Ethnic inequalities in limiting health and self-reported health in later life revisited." J, Epidimiol. Community Health **70**: 653-622.

Feagin, J. and Bennefield, Z. (2014) "Systemic racism and U.S. health care." Soc Sci Med **103**: 7-14.

FEANTSA (2020) "Seven measures authorities must take to protect homeless people from COVID." (FEANTSA).

Farah, W. (2020) "Institutional racism in the NHS intensifies at times of crisis." (Institute of Race Relations).

Fernández-Reino, M. (2020) "Migrants and discrimination in the UK." (The Migrant Observatory at the University of Oxford).

Ferrari, D., et al. (2017) "Concerning the vitamin D reference range: pre-analytical and analytical variability of vitamin D measurement." Biochem Med (Zagreb) **27**(3): 030501.

Flores, G., et al. (2003) "Errors in medical interpretation and their potential clinical consequences in pediatric encounters." Pediatrics. **111**(1):6-14.

Florida, R., (2020) "The geography of Coronavirus" (Citylab).

Ford, J. G., et al. (2007) Barriers to recruiting underrepresented populations to cancer clinical trials: a systematic review Cancer **122**(2): 228-242.

Ford, L., et al. (2006) "Vitamin D concentrations in an UK inner-city multicultural outpatient population." Ann Clin Biochem **43**(6): 468-473.

Garvie, D. (2017) "BAME homelessness matters and is disproportionately rising – time for the government to act." (Shelter).

Gishen, F. and Lokugamage A. (2020) "Diversifying and decolonising the medical curriculum." Br Med J **364**: I300.

Hakim, O. A., et al. (2016) "Vitamin D production in UK Caucasian and South Asian women following UVR exposure." J Steroid Biochem Mol Biol **164**: 223-229.

HM Government (2017) "Language interpretation: migrant health guide" (HM Government)

HM Government (2020a) "Ethnicity facts and figures." (HM Government).

HM Government (2020b) "Overcrowded households." (HM Government).

HM Government (2020c) "The Health Protection (Coronavirus) Regulations 2020." (HM Government).

Hoffman, K. M., et al. (2016) "Racial bias in pain assessment and treatment recommendations, and false beliefs about biological differences between blacks and whites" Proc Natl Acad Sci USA **113**(16): 4296-4301.

Holick, M. F. (2003) "Vitamin D: A millennium perspective." J Cell Biochem **88**(2): 296-307.

Holden, J. & Kenway, P. (2020) "Housing and homelessness: Self-isolation doesn't work for crowded households – Government needs to take the WHO's advice and respond." (New Policy Institute).

Institute of Race Relations (2020) "Ethnicity and religion statistics." (Institute of Race Relations).

Intensive Care National Audit & Research Centre (2020) ICNARC report on COVID-19 in critical care (Intensive Care National Audit & Research Centre).

International Diabetes Federation (2020) "International Diabetes Federation - What is diabetes." (International Diabetes Federation).

John-Baptiste, A. et al. (2004) "The effect of English language proficiency on length of stay and in-hospital mortality." J Gen Intern Med **19**(3):221-8.

Jones, C. P. (2002) "Confronting institutionalized racism." Phylon **50**(1): 7–22.

Khan, J. M. (2005) "Management of hypertension in ethnic minorities." *Heart* **91**(8): 1105–1109.

Khunti, K., et. al (2009). "Diabetes UK and South Asian Health Foundation recommendations on diabetes research priorities for British South Asians." (Diabetes UK).

Kift, R., et al. (2013). "Lifestyle factors including less cutaneous sun exposure contribute to starkly lower vitamin D levels in U.K. South Asians compared with the white population." Br J Dermatol **169**(6): 1272-1278.

Kirkman-Liff, B. and Mondragón, D. (1991) "Language of interview: relevance for research of southwest Hispanics." Am J Public Health **81**(11):1399-404.

Kulu, H. and Dorey, P. (2020) "The contribution of age structure to the number of deaths from COVID-19 in the UK by geographical units." medRxiv https://doi.org/10.1101/2020.04.16.20067991.

The Lancet. (2020) "COVID-19 in Brazil: "So what?"" Lancet **395**(10235): 1451.

Lau, F. H., et al. (2020) "Vitamin D insufficiency is prevalent in severe COVID-19." medRxiv https://doi.org/10.1101/2020.04.24.20075838.

Lee J. et al. (2020) Vitamin D: A rapid review of the evidence for treatment or prevention in COVID-19. (The Centre for Evidence Based-Medicine).

Li, X., et al. (2018) "The Effect of Vitamin D Supplementation on Glycemic Control in Type 2 Diabetes Patients: A Systematic Review and Meta-Analysis." Nutrients **10**(3).

Lips, P., et al. (2019) "Current vitamin D status in European and Middle East countries and strategies to prevent vitamin D deficiency: a position statement of the European Calcified Tissue Society." Eur J Endocrinol **180**(4): 23-54.

Llano, R. (2011) "Immigrants and Barriers to Healthcare: Comparing Policies in the United States and the United Kingdom," Stanford Journal of Public Health

Lo, C. W., et al. (1986) "Indian and Pakistani immigrants have the same capacity as Caucasians to produce vitamin D in response to ultraviolet irradiation." Am J Clin Nutr **44**(5): 683-685.

Louie, P. and Wilkes, R. (2018) "Representations of race and skin tone in medical textbook imagery" Soc Sci Med **202**: 38-42.

MacLaughlin, J. and M. F. Holick (1985) "Aging decreases the capacity of human skin to produce vitamin D3." J Clin Invest **76**(4): 1536-1538.

Marmot, M. et al. (2020) Health equity in England: the Marmot review 10 years on (The Health Foundation).

Martineau, A. R., et al. (2019) "Vitamin D supplementation to prevent acute respiratory infections: individual participant data meta-analysis." Health Technol Assess **23**(2): 1-44.

Marsh, S. and McIntyre, N. (2020) "Six in 10 UK health workers killed by COVID-19 are BAME." The Guardian.

McKinsey & Company (2020) "COVID-19 in the United Kingdom: Assessing jobs at risk and the impact on people and places." (McKinsey & Company).

National Institute for Health and Care Excellence (2004) "Health Inequalities: concepts, frameworks and policies."

Nazroo, J. and Becares, L. (2020) "Evidence for ethnic inequalities in mortality related to COVID-19 infections: Findings from an ecological analysis of England and Wales." medRxiv https://doi.org/10.1101/2020.06.08.20125153.

Nomis (2018) "Annual population survey/labour force survey." (Office for National Statistics).

O'Donnell, C.A., et al. (2007) "'They think we're OK and we know we're not'. A qualitative study of asylum seekers' access, knowledge and views to health care in the UK". BMC Health Serv Res **7**(75)

ONS, (2013) 2011 Census: Detailed analysis – English language proficiency in England and Wales, Main language and general health characteristics

Patel, J. V., et al. (2013) "Vitamin D deficiency amongst minority ethnic groups in the UK: a cross sectional study." Int J Cardiol **167**(5): 2172-2176.

Pham, H., et al. (2019) "Acute respiratory tract infection and 25-Hydroxyvitamin D concentration: a systematic review and meta-analysis." Int J Environ Res Public Health **16**(17).

Pechey, R. and Monsivais, P. (2016) "Socioeconomic inequalities in the healthiness of food choices: Exploring the contributions of food expenditures". Prev Med **88**: 203–209.

Perez-Stable, E. J. and El-Toukhy, S. "Communicating with diverse patients: How patient and clinician factors affect disparitites" Patient Education and Counseling 101 (2018) 2186–2194

Protheroe, J., et al. (2017) "Health literacy, associated lifestyle and demographic factors in adult population of an English city: a cross-sectional survey." Health Expect. **20**(1): 112-119.

Public Health England (2015) "Local action on health inequalities: improving health literacy to reduce health inequalities." (HM Government).

Public Health England (2020) "Disparities in the risk and outcomes from COVID-19." (HM Government).

Quinio, V. (2020) "Have UK cities been hotbeds of the COVID-19 pandemic?" (Centre for cities).

Rowlands, G., et al. (2014) "Health literacy: report from an RCGP-led health literacy workshop." (Royal College of General Practitioners).

Rafiq, S. and Jeppesen, P. B. (2018) "Body mass index, vitamin D, and type 2 diabetes: a systematic review and meta-analysis." Nutrients 10(9).

Sabherwal, S., et al. (2010) "Effect of oral vitamin D and calcium replacement on glycaemic control in South Asian patients with type 2 diabetes." Int J Clin Pract 64(8): 1084-1089.

Schmotzer, G. L. (2012) "Barriers and facilitators to participation of minorities in clinical trials." Ethnic. Dis. 22(2): 226-230.

Scientific Advisory Committee on Nutrition (2016) "Vitamin D and health." (HM Government).

Smith, M. (2010). "Seasonal, ethnic and gender variations in serum vitaminD3 levels in the local populations of Peterborough." Biosci Horiz 3(2): 124-131.

Sudore, R. L. and Schillinger, D. (2009) "Interventions to improve care for patients with limited health literacy." J Clin Outcomes Manag. 16(1): 20–29.

Tahrani, A. A., et al. (2010) "The prevalence of vitamin D abnormalities in South Asians with type 2 diabetes mellitus in the UK." Int J Clin Pract 64(3): 351-355.

The Conservative Party (2020) "We're ending free movement." (The Conservative Party).

Tsai, J. (2020) "COVID-19: a potential public health problem for homeless populations." Lancet Public Health 5(4): e186–e-187.

TUC (2017) "Insecure work and Ethnicity." (TUC).

UNISON (2020) "COVID-19: Black and female workers on the frontline." (UNISON).

Valderas, J. M., et al. (2009) "Defining comorbidity: implications for understanding health and health services." Ann. Fam. Med. 7(4): 357–363.

White, C. & Nafilyan, V. (2020) "Coronavirus (COVID-19) related deaths by ethnic group, England and Wales: 2 March 2020 to 10 April 2020." (Office for National Statistics).

Williamson, E. et al. (2020) "OpenSAFELY: factors associated with COVID-19-related hospital death in the linked electronic health records of 17 million adult NHS patients." medRxiv https://doi.org/10.1101/2020.05.06.20092999.

Zwysen, W. and Longhi, S. (2016) "Labour market disadvantage of ethnic minority British graduates: university choice, parental background or neighbourhood?" (Institute for Social and Economic Research).

Appendix 1

1. A study of people from different ethnic backgrounds, living in Peterborough, conducted in summer (n = 106) and winter (n = 94) found Asian people would classify as Vitamin D deficient all year round. (Smith, 2010).

2. A randomly sampled, group of hospital out-patients (n = 830) from UK inner city areas in September classified 12% Caucasians, 26% Black Afro-Caribbeans and 31% Asians as Vitamin D deficient. Levels of deficiency were highest (43%) among Asian women. Gender differences in rates of deficiency were not apparent in Europeans or Afro-Caribbeans but were among Asians, where women had lower levels than men (Ford, Graham et al. 2006).

3. A Birmingham multi-ethnic study (n = 748) found 42% of South Asians and 12.5% Afro-Caribbeans had severe Vitamin D deficiency (Patel et al., 2013).

4. A study in South Asians (n = 25) living in Manchester found mean Vitamin D levels of 9·0 ng/mL in summer, falling to 5.8 ng/mL in winter. Comparable measures in White Mancunians were 26.2 ng/mL in summer and 18·9 ng/ mL in winter. These are low levels across the board, but dramatically low among the Asian population. Furthermore, South Asian volunteers in this study who wore UV dosimeters, recorded low light exposures, indicating that they were avoiding the sun when they were outdoors (Kift, Berry et al. 2013).

5. A study assessing South Asian (n = 35) and Caucasian (n = 105) premenopausal women living in Surrey, UK (51 °N) over the course of a year found that 80% of South Asian women had year round Vitamin D deficiently (Darling et al., 2013).

A.2 Summaries of the meta-analyses on Vitamin D and protection from Acute Respiratory Tract Infections (ARTIs)

A large meta-analysis showed that low Vitamin D levels increased the risk of ARTI and found a significantly higher risk of ARTI in the lowest compared with the highest Vitamin D category (pooled Odds Ratio 1.83; 95% Confidence Intervals 1.42–2.37). The sharpest increase in infection risk occurred at the lowest Vitamin D levels (Pham et al., 2019).

A second meta-analysis of 25 randomised trials found that regular Vitamin D supplements reduced the risk of ARTI by 12%, again with the biggest benefit in people with the very lowest Vitamin D levels. It found that daily or weekly supplements were protective but monthly injections were not (Martineau et al., 2019).

A.3 Summaries of the studies on the relationship between obesity, diabetes and Vitamin D levels

Rafiq and Jeppesen (2018) published a meta-analysis of the relationship between obesity and Vitamin D levels. Vitamin D deficiency is associated with high BMI (a measure of obesity) across all ethnicities. This association of low Vitamin D with obesity was more pronounced

among people with diabetes (19 studies) than in non-diabetic people (45 studies) but it was present in both.

Li et al., (2018) meta-analysed the results from 20 intervention trials where people with diabetes were given Vitamin D supplements. This study found that people given daily of weekly supplements increased their circulating Vitamin D levels and reduced their insulin resistance (a measure of diabetes severity). The positive effects of Vitamin D supplements were strongest in people who were Vitamin D deficient but not obese at the beginning of the studies. The effects were also strong people of middle eastern ethnicity.

A small trial in South Asian people with type 2 diabetes (T2D) given Vitamin D supplements. All participants (n = 52) achieved normal Vitamin D levels and those who had been Vitamin D deficient showed significant decreases in both obesity and HbA1c – a measure of glycemic control. (Sabherwal et al., 2010).

A trial in South Asians in the UK: 170 with- and 40 without- T2DM. Low Vitamin D was common in both groups and even more prevalent among diabetics (83%) than in controls (70%) and modelling suggested that Vitamin D deficiency was an independent risk factor for poor glycemic control in women (Tahrani et al., 2010).

Vitamin D levels were assessed in people 'at risk' of diabetes (n = 44) and matched 'low-risk' controls (n = 15) all from the East London East Asian population. Again, Vitamin D deficiency was prevalent in both groups and the proportion was even higher in the at-risk group (95%) compared to the low-risk (80%) group. (Boucher et al., 1995).

A.4 Sources of Vitamin D

In 2010 a Food Standards Agency workshop, reported that UVB exposure (sunshine) is the major contributor to Vitamin D levels in the UK. Vitamin D can be produced in summer in the UK, with minimal risk of sunburn, by exposing the skin to sunlight for a short period at midday, when the intensity is strongest (Ashwell et al., 2010). The action of UVB on a cholesterol compound in the skin generates Provitamin D. This circulates in the blood and is converted to a biologically active form in the kidneys and liver and it acts by binding to Vitamin D Receptors on the surface of cells. (Ferrari et al., 2017) Vitamin D in the UK diet is limited – with oily fish and eggs being the main natural sources. It is added as a supplement to breakfast cereals and margarine and some people take Vitamin D as a supplement by tablet or injection.

A.5 Appropriate levels of Vitamin D

Appropriate Vitamin D levels in circulating in blood are not completely defined but generally accepted ranges are:

- **Sufficien**t >50 nmol/L (>20 ng/mL)
- **Deficient** <50 nmol/L (<20 ng/mL),

where a conversion factor of 2.496 is used to convert values in ng/mL from nmol/L.

A.6 Possible reasons for low Vitamin D levels in certain UK groups

There are relatively few published Vitamin D studies the UK Afro-Caribbean population, but a study of African ancestry people living at different latitudes is useful: Vitamin D levels decreased from mean 30.4 ng/mL in Kumasi, Ghana (6 °N) to 17.2 ng/mL in Chicago, USA (41 °N). This study also noted that body mass index (a measure of obesity) and blood pressure increased in the groups with the lowest Vitamin D levels (Durazo-Arvizu et al., 2014).

People with BAME ancestry and low initial Vitamin D levels need longer sun exposure to achieve adequate circulating levels. A more recent study found that South Asian women manufactured Vitamin D efficiently with the same dose of UV as white controls and that baseline Vitamin D, rather than ethnicity or skin tone, influenced the amount synthesised (Hakim et al., 2016). Another study in Asians also concluded that Asian people may need longer exposure to sunlight, but that capacity to produce Vitamin D is not different (Lo et al. 1986).

A.7 Vitamin D levels in people with diabetes

From the beginning of this epidemic it has been noted that people with diabetes and/or obesity are at increased risk of severe COVID-19 infection and of death. It is not yet known whether diabetes is a complicating factor or whether there are common risk factors for both diseases, but there is evidence that low Vitamin D levels could be a common factor in both. Rafiq and Jeppesen (2018) in a meta-analysis showed that Vitamin D deficiency is associated with high BMI (a measure of obesity) across all ethnicities. This association was more pronounced among people with diabetes but was also present in people without. A meta-analysis (Li et al., 2018) of intervention trials found that people given daily or weekly supplements increased their circulating Vitamin D levels and reduced their insulin resistance (a measure of diabetes severity). The positive effects of Vitamin D supplements were strongest in people who were Vitamin D deficient but not obese at the beginning of the studies. These broad findings have also been confirmed in smaller studies on south Asian people with diabetes in the UK (Sabherwal et al., 2010; Tahrani et al., 2010; Boucher et al., 1995)

Appendix 2

Numbering corresponds that those in section 4.3.

Long-term Policy Suggestions

4.3.1 Density and urban housing environments are not in and of themselves problems; indeed the struggles of the Scottish government to cope with COVID-19 in the Highlands (Kulu and Dorey, 2020) have shown that there may actually be advantages to urban environments compared to rural ones in coping with this pandemic. But it is true that a denser population gives more opportunity for the virus, like any other virus, to spread, and thus that the government ought to take special precautions in dense urban environments to slow COVID-19 spread.

However, in the absence of these health interventions, dense urban areas, especially those that see lots of travel from other urban areas, can become centres of the epidemic, as has occurred internationally in cities like New York (Florida, 2020) and Sao Paulo (Lancet, 2020) and domestically in London.

This is often not due to the density itself, but rather do the socioeconomic factors such as lack of access to doctors or people working in jobs that cannot be done remotely (Quino, 2020). In the UK, these urban environments and jobs are disproportionately lived in and done by BAME people, especially Bangladeshi, Pakistani, Arab, and Black African Britons (HM Government, 2020b). BAME Britons are also more likely to work in jobs which cannot be done remotely (Nomis, 2018), increasing their risk of contracting COVID-19.

The Government's race disparity audit in 2018 found that the households that are most likely to rent social housing were headed by someone in the African, Caribbean, Other Black, Bangladeshi, Irish and Arab groups, or the Mixed groups other than Mixed White and Asian. BAME households are more likely to spend a higher proportion of their incomes on rent, and housing tends to be lower quality particularly among households of Pakistani origin. Overcrowding is affects ethnic minority households disproportionately, and London has one of the highest rates of overcrowding in England.

For long term change to public health outcomes, the government has to look into building more urban dwellings to prevent overcrowding, ensuring access to open spaces, and preparing relief measures for future pandemics.

4.3.2 Figures from Shelter (Garvie, 2017) suggest one in three homeless households are not White, compared to one in seven households in the general population. Homeless individuals are known to be at high risk of contracting COVID-19, because of their inability to socially distance, their inability to take some of the personal hygiene steps recommended by public health officials, and the lack of contact of medical professionals with the homeless community (Tsai and Wilson, 2020). There has been some good work from local authorities to ensure that homeless individuals are given shelter so they can avoid the pandemic, and in Wales the Labour government has indicated that they will house all homeless people until the pandemic is over (Davies, 2020).

4.3.3 The PHE report reviewing the disparities in risks and outcomes of COVID-19 showed that the mortality rates from COVID-19 in the most deprived areas were more than double the least deprived areas. The reasons for this higher rate of contagion and death from COVID-19 in deprived neighbourhoods is multifaceted, and likely includes issues such as lack of engagement from healthcare professionals in these communities, more dangerous occupations, and environmental factors.

4.3.5 As mentioned above, BAME people are much more likely to work in jobs where working from home is not an option. Within that category, healthcare workers are at the highest risk of contracting COVID-19, as expected given their direct work with infected people. These workers in the health sector are disproportionately BAME (UNISON, 2020). Lack of adequate PPE has contributed to a number of unnecessary deaths of healthcare workers. Given BAME people are much more likely to work the sort of frontline medical jobs where inadequate PPE is most deadly, this lack of PPE has hit BAME healthcare workers hard.