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Race Differences in Deaths from Coronavirus in England and Wales: Demographics, Poverty, Pre-existing Conditions, or Intelligence?

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Death rates from SARS-Cov2 in England and Wales are examined for the major ethnic minorities. Substantial differences in death rate of different ethnicities were found that are not easily explained by demographic characteristics of these groups such as age and urban-versus-rural residence. This study looks at possible explanations for these disparities. Socio-economic factors such as income and housing conditions are related to the observed differences in Covid-19 death rates, but average intelligence appears to be the best correlate. We also explore ethnic differences in the prevalence of some major chronic medical conditions that are associated with Covid-19 mortality, and find that these appear insufficient as explanations for the different mortality rates. It is hypothesized that intelligence has both direct effects by making people more able to avoid infection, and indirect effects through socio-economic conditions and through lifestyle factors that can lead to chronic health problems.
Key Words: SARS-Cov2; Covid-19; Race; Ethnicity; Intelligence; SES; Income; Death rates; Britain; England

Ethnic disparities in Covid-19 death rates

The novel human coronavirus, severe acute respiratory syndrome coronavirus-2 (SARS-Cov2, causing the disease Covid-19), was declared a pandemic by the WHO on March 11, 2020. Since then it has affected almost every country in the world. Britain has been one of the most severely affected countries, with 35,341 confirmed deaths by May 19. Early during the pandemic, it has been

noted that death rates from Covid-19 in England and Wales were higher for blacks than for whites. As shown in a report from the Office of National Statistics (2020), blacks were 4.2 (males) and 4.3 (females) times more likely than whites to die from the disease. This report also showed that Indians, Pakistanis and Bangladeshis were more likely than whites to die from Covid-19 and examined the reasons for this excess mortality by adjusting the rates for age, region, rural and urban residence, area deprivation, household composition, socio-economic position, highest qualification held, household tenure, and health or disability as recorded in the 2011 census. After all these factors were accounted for, the race differences in deaths from coronavirus were reduced but were still present. The report concluded that the difference between racial groups in Covid-19 mortality is partly a result of socio-economic disadvantage and other circumstances, but a remaining part of the difference has not yet been explained. Similar observations are reviewed in Carl (May 17, 2020), who also concluded that some but not all of the ethnic differences in Covid-19 mortality can be explained by demographic and socioeconomic factors.

More recent data were published by Lucinda Platt and Ross Warwick (13 May 2020) from the London School of Economics. Like the Office of National Statistics, these authors observed ethnic disparities in rates of hospital deaths in England and Wales. Their results for the more important groups are summarized in Figure 1. The figure shows a British white mortality of 27.3 per 100,000. Mortality is lowest for Chinese at 15 per 100,000, and highest for black Caribbeans at 77.6 per 100,000. Black African and Pakistani both are at 30 per 100,000.

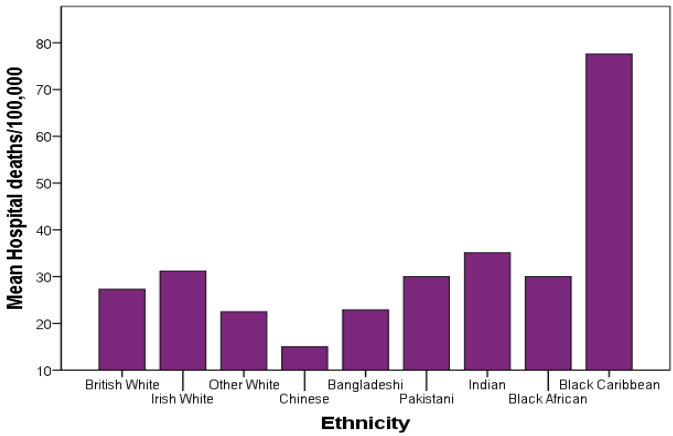

Figure 1. *Total registered hospital deaths from Covid-19 infection in England by ethnic origin.*

However, these crude death rates are of limited interest for the assessment of ethnic disparities in Covid-19 death rates because ethnic minorities in Britain have markedly different demographic characteristics. Chief among these is the age structure. According to data from the British NHS (National Health Service), the risk of dying from Covid-19 is 14 times higher in the 50-59 age bracket than in those aged 18-39 years; and for those 80 years and older the risk is 12.6 times higher than for those aged 50-59 (Williamson et al., May 7, 2020). Therefore ethnic groups with younger age structure, which in Britain include black Africans and to various extents the South Asian and "Other White" groups, are expected to have lower mortality than the British White and Caribbean Black groups, which have much older age structures.

Another demographic that is important in this context is place of residence. The spread of coronavirus has been most virulent in urban areas, with London as the most important hot spot. Most of Britain's ethnic minorities live in urban areas. For example, according to the Economic and Social Research Council (undated), Indians are 3% of the population in urban but only 0.4% in rural areas; Pakistanis, 2.4% in urban and 0.1% in rural areas; and Africans, 2.2% in urban and 0.3% in rural areas. Therefore, their mainly urban residence is expected to put all these groups at higher risk of Covid-19 infection and death than the white British population.

Table 1. *Covid-19 mortality of ethnic groups in England relative to British White. The first column includes recorded hospital deaths only, the others also includes care home deaths.*

	Deaths per 100,000	Deaths relative to British White		
		observed	predicted	observed/predicted
Black Caribbean	77.6	2.21	1.43	1.55
Black African	30.0	0.79	0.28	2.82
Bangladeshi	22.9	0.65	0.38	1.71
Pakistani	30.0	0.78	0.37	2.11
Indian	35.1	0.94	0.77	1.22
Chinese	15.0	-	-	-
Non-British White	22.5	0.67	0.55	1.22
British White	27.3	1	1	1

Platt and Warwick (2020) therefore adjusted the death rates for these demographic background factors. They also took account of care home deaths,

for which ethnicity has not been recorded. About 95% of care home residents in Britain are white British, and Platt & Warwick assumed that care home deaths reflect the ethnic composition of the inmates. The results for the more important groups are presented in Table 1. We see that predicted death rates are higher for black Caribbeans because they have a similar age structure as British Whites and more urban residence, and lower for the other groups because of their younger age structure and despite more urban residence. Relative to predictions, death rates are substantially elevated for the black and most South Asian groups, but barely so for Indians and non-British Whites.

Possible role of intelligence

It has been shown in a number of studies that groups and individuals with high intelligence have low average death rates. In an early geographic study, Maller (1933) showed an almost perfectly linear negative association between the mean IQ in the populations of 310 districts of New York City and total death rates (i.e., all-cause mortality). In possibly the first study of individuals, O'Toole, Adena & Jones (1988) reported data for a cohort of Australian men who had been intelligence tested at the age of 18 and subsequently served in Vietnam. At the age of 33, there was a significant association between their IQs and being alive. In a later study, Batty, Deary & Gottfredson (2007) published a systematic review of nine studies in all of which there was a significant inverse relation between IQ in early life and mortality. In some but not all of these nine studies, some or all of the effect of IQ, measured earlier in life, was mediated by adult socioeconomic status (SES). Thus it appears that some of the protective effect of higher IQ results from access to resources. Part of it, however, is thought to be more directly related to higher intelligence, such as knowledge of healthy lifestyles and belief in science-based medicine. Generally, more intelligent people appear to be more competent than the less intelligent at looking after their health.

In view of these studies, it would be expected that the coronavirus epidemic that spread throughout the world in early 2020 would produce greater mortality in countries with lower average IQs — in particular, those with lower IQs of their politicians, administrators, and medical professionals. At this time (May 2020) it is too early to assess whether this prediction is true. In addition, we expect that in countries in which different ethnic groups differ noticeably in their average intelligence, groups with lower average intelligence have higher death rates than those with higher average intelligence. There is preliminary evidence from the United States supporting this expectation. Reyes et al. (2020) reported that in Chicago 68% of the city's deaths have been African Americans, who make up only approximately 30% of the population; and that in Michigan African Americans

accounted for 40% of the deaths, though they make up only 14% of the population. It is well established that African Americans have a lower average IQ than whites by approximately 15 points (Jensen, 1998), and their higher mortality from coronavirus is therefore consistent with the possibility that the difference in intelligence may contribute to their higher mortality. Causal effectiveness is difficult to demonstrate however, because African Americans have higher rates of a number of other conditions including obesity and poverty that could be responsible for their higher mortality.

The perhaps best source for intelligence differences between ethnic and racial groups in Britain is the 2009-10 British standardization of the Cognitive Abilities Test (2012), based on a representative sample of 175,380 children with an average age of 11 years. The non-verbal IQ from this test is used because it is less affected by linguistic background and schooling than the verbal and quantitative IQs, which are also measured by this test. The results are shown in Table 2. The first data column shows again the observed/expected death rates, and the second column shows the IQs. We see that there is an excellent correspondence between IQs and death rates. Also the high IQ of the Chinese accords well with their low death rate shown in Table 1.

Table 2. *Cognitive correlates of observed/predicted Covid-19 death rates* (Deaths) *in England.*

	Deaths	IQ	A levels %
Black Caribbean	1.55	94.6	52
Black African	2.82	94.1	74
Bangladeshi	1.71	97.3	44
Pakistani	2.11	94.5	50
Indian	1.22	100.2	71
Chinese	-	112.0	85
Non-British White	1.22	101.8	71
British White	1	101.3	52

One possibility is that measured IQ serves as a proxy of education, which tends to be highly correlated with IQ in adult samples in Western countries. Therefore, the percentage of adults having at least A levels in 2009-2012 (as reported in Fisher & Nandi, 2015) is included in Table 2. We see that the

relationship between educational attainment and measured IQ is tenuous when ethnic groups in Britain are compared, and that Covid-19 death rates parallel IQ rather than education. For example, black Africans have high educational attainment, but also low IQ and the greatest excess mortality from Covid-19; and Pakistanis have almost the same percentage of A levels but lower IQ and twice the mortality of British Whites.

Socio-economic conditions

There are three different ways in which cognitive abilities that are tapped by this test can potentially affect infection rates and death rates from coronavirus infection: (1) through socio-economic conditions that affect the risk of infection and death; (2) through lifestyles and behaviors that directly affect the rate of infection, such as compliance with social distancing rules; and (3) through chronic health problems that raise the risk of death for infected individuals. Here we can only query a few of the more important hypothetical mechanisms linking intelligence and Covid-19 mortality.

Poverty is a possible bridge between measured intelligence and Covid-19 deaths. In Britain, there is a moderate relationship between measured intelligence and income. In the British Cohort Study, for example, the correlation between intelligence, calculated from 15-16 tests that had been administered at various times early in life, with (log-transformed) monthly take-home pay at age 38 is .347 (N = 1677; raw data available from UK Data Service at https://ukdataservice.ac.uk/). Table 3 shows official data about weekly household income (UK Government, 2019a). Median rather than mean income is shown because it is a better measure for typical incomes of average people. Some of the results are unexpected. However, median income can deviate from mean income. For example, Bangladeshis have a slightly higher median income than white British. However, the reason for this is that 27% of Bangladeshis but only 14% of British Whites are in the GBP600-800 bracket. Because 26% of British Whites but only 20% of Bangladeshis are in the >1000 category, mean income of Whites is higher than mean income of Bangladeshis. There is some relationship of median income with Covid-19 deaths, especially in the case of the black groups, but overall, the relationship is less clear-cut than the relationship between Covid-19 deaths and IQ.

Economic conditions are affected not only by weekly household income but also by household size and housing cost. Therefore, Fisher and Nandi (2015) reported an index of relative poverty which more accurately reflects the prevalence of economic deprivation. Table 3 shows that according to this measure, economic deprivation is greatest among the Pakistani, black African

and Bangladeshi groups, which also have high rates of Covid-19 mortality. Relative poverty appears to be a better predictor of excess Covid-19 mortality than median household income.

Table 3. *Socio-economic correlates of observed/predicted Covid-19 death rates* (Deaths) *in England.*

	Deaths	Median income	Relative poverty %	Mean household size	% of households		Care Professions %
					Crowding	1-person	
Black Caribbean	1.55	540	23.7	2.45	8	38.1	11.6
Black African	2.82		32.6	3.40	15	25.4	21.2
Bangladeshi	1.71	627	29.6	4.45	30	10.4	4.7
Pakistani	2.11	600	39.8	4.70	16	11.6	7.2
Indian	1.22	885	18.8	3.60	7	16.0	11.4
Chinese	-	640	12.5		-	28.4	-
Non-British White	1.22	690	12.2	2.75	4-7	24.8 - 39.7	6.5
British White	1	605	15.5	2.55	2	31.1	7.5

While there are many possible ways in which poverty can lead to higher Covid-19 mortality, one especially likely path is by exposure to crowded living quarters in which the virus is easily transmitted. Table 3 presents data about mean household size in 2009-2012 reported in Fisher and Nandi (2015). Data on overcrowded households, defined as those that "had fewer bedrooms than they needed to avoid undesirable sharing", have been published by the UK government (2020 update) based on the English Housing Survey (Ministry of Housing, 2020). Some of the results are reproduced in Table 3. Another relevant measure is the proportion of one-person households, because living in a one-person household eliminates the risk of contracting the disease by within-household transmission. Data from the UK government (2019b) about the percentage of one-person households (pensioner and non-pensioner combined) are included in Table 3. We can see that all ethnic minorities are more likely than British Whites to live in crowded living conditions, and most are less likely than the natives to live in one-person households. The former can be attributed to urban residence, the latter reflects in part the proportion of single pensioners, and both are related to mean family size. Thus it is plausible that living conditions contribute to ethnic differences in Covid-19 infections and death rates.

Working in health and social care is another risk factor of infection with SARS-Cov2 and therefore of death from Covid-19. Platt and Warwick (May 17,

2020) provide data about the percentage of various ethnic groups working in health and social care, which are included in Table 3. It is evident that black Africans and to a lesser extent Indians and black Caribbeans (but not Pakistanis and Bangladeshis) are overrepresented in these high-risk occupations. This is likely to make some contribution to higher Covid-19 death rates of blacks and Indians.

Chronic health conditions

A central tenet of cognitive epidemiology is that low intelligence can lead to ignorance or neglect of health-promoting routines such as healthy eating, abstaining from recreational poisons, consulting a physician, and taking one's medications. This causes or aggravates chronic health conditions such as obesity, hypertension, diabetes and atherosclerosis, which in turn lead to early death. Because pre-existing medical conditions like those mentioned are thought to reduce survival chances of patients with SARS-Cov2 infection, intelligence can plausibly reduce mortality from Covid-19 by reducing the prevalence of these lifestyle-dependent medical conditions. Therefore, we will briefly look at some of these chronic medical conditions.

Chronic lung conditions are thought to aggravate the course of Covid-19 infection and increase mortality risk because this is, after all, a viral pneumonia that can cause death by respiratory failure. Ethnic inequalities in chronic lung diseases are known to exist in Britain. For example, the incidence of tuberculosis is more than 10 times greater in Indian (132/100,000) and Pakistani (114/100,000) ethnic groups compared with the UK average (12.3/100,000), as reported by Offer, Lee and Humphreys (2016). However, these prevalence rates are too low to account for a substantial fraction of the elevated Covid-19 mortality in these ethnic groups.

Also smoking is sometimes considered a risk factor of Covid-19 death. However, surprisingly, Williamson et al. (2020) find that smoking is virtually unrelated to Covid-19 mortality risk. There is also a suspicion — but apparently no evidence — that chronic obstructive pulmonary disease (COPD) may be a risk factor of Covid-19 mortality. According to one major survey, however, the prevalence of COPD in Britain has been reported as 1.55% for the white group, 0.58% for "black or black British", and 0.78% for "Asian or Asian British". These results were obtained from a cohort of 358,614 patients in 47 general practices in England with a mean age of 35-37 years, of which 47.6% were white, 20% black, and 5% Asian (Gilkes et al., 2016). Therefore ethnic differences in COPD, which is one of the most prevalent serious chronic lung diseases, cannot explain the observed ethnic Covid-19 mortality disparities in England.

Asthma is another chronic lung disease that is common and is an apparent risk factor for death from Covid-19. According to a study conducted by the British NHS (National Health Service), patients with a history of severe asthma and a recent history of corticosteroid treatment had a 27% elevated risk of dying from Covid-19 (Williamson et al., May 7, 2020; Wise, May 11, 2020). In the United Kingdom, prevalence rates of asthma were reported to be 10.6% for whites, 15.0% for blacks, and 7.6% for South Asians (Netuveli, Hurwitz % Sheikh, 2005; summarized in Davidson, Liu & Sheikh, 2010). These differences could play a modest role in explaining elevated Covid-19 death rates of blacks, but also predict lower rates of South Asians.

Chronic heart disease is considered another risk factor for death from Covid-19. The hazard ratio of Covid-19 death in England has been estimated as 1.27 for those with chronic heart disease, meaning a 27% elevated risk (Williamson et al., May 7, 2020). Standardized mortality ratios (death rate of listed group / death rate of total population) for ischemic heart disease (IHD) in Table 4 are from Wild et al. (2007) and are given by country of birth. We see that IHD is more common in British minorities originating from Bangladesh, Pakistan and to some extent India, but results for those of African origin are inconsistent (Wild et al., 2007). Thus pre-existing ischemic heart disease is a possible contributor to high Covid-19 mortality in the South Asian groups, but its role for the black groups remains uncertain.

Obesity is a more important risk factor of dying from Covid-19, with death rates increased by a factor of 2.27 for those with a body mass index above 40, relative to a "normal" BMI of 20-25 (Williamson et al., May 7, 2020; Wise, May 11, 2020). Obesity rates relative to the British White group are shown in the last column of Table 4. We see that this risk factor is substantially elevated in the black groups but not the others. These data are from Smith, Kelly and Nazroo (2012).

Uncontrolled diabetes is another established risk factor for dying from Covid-19. In England, the hazard ratio has been estimated as 2.36, meaning that patients with uncontrolled diabetes (defined as a hemoglobin A_{1c} level of 5.8% or higher) are more than twice as likely as the non-diabetic to die of Covid-19 (Williamson et al., May 7, 2020). Table 4 reproduces data from Ojo (2013) about the prevalence of diagnosed diabetes in those aged 55 years and older in England. The vast majority of this is type 2 diabetes, which is attributed in part to poor eating habits, obesity, and lack of exercise. We see that diabetes prevalence is elevated in the South Asian and black Caribbean groups. One caveat is that these figures underestimate true diabetes prevalence because many cases go undiagnosed for many years. Meeks et al. (2016) review the results of many other studies in European countries that converge on the conclusion that rates of type

2 diabetes are elevated in people of South Asian and African descent in these countries relative to native Europeans. These observations suggest that diabetes prevalence, in addition to obesity, can explain some of the ethnic disparities in Covid-19 mortality.

Contrary to widespread belief, hypertension does not seem to be a risk factor for Covid-19 mortality. According to NHS data, the hazard ratio for those with "high blood pressure or diagnosed hypertension" is 0.95 when adjustments are made for other risk factors (Williamson et al., May 7, 2020).

Table 4. *Medical conditions in British ethnic groups. IHD (ischemic heart disease) is by country of birth, prevalence of diabetes and obesity by ethnic identity. All data are male-female averages.*

	IHD mortality ratio*	Diabetes %	Obesity
Caribbean	84.5	9.2	1.52
West African	71.0	3.55	1.80
East African	135.5		
Bangladeshi	174	6.7	0.66
Pakistani	168	7.95	1.15
Indian	140	8.0	0.85
Irish		2.95	0.85
British	96.5	4.1	1

* relative to a total population rate of 100.

Conclusions

It is self-evident that death rates from Covid-19 are an outcome that defies a simple explanation. Too many factors are involved both in infection rates and in the likelihood that infection leads to death. All we can hope for is to identify those circumstances that (1) have an effect on the risk of infection or the likelihood of dying from the infection when and if infection has occurred; and (2) have differential impact on different racial and ethnic groups. For example, commenting on a recent study on 5,683 NIH-recorded hospital deaths attributed to Covid-19, Jacqui Wise (May 11, 2020) concluded that the increased risk of Asian and African ethnicities "can only be partly explained by comorbidity, deprivation, or other risk factors, according to data from the largest study to date." This NIH study (Williamson et al., May 7, 2020) found that people whose race/ethnicity was

recorded as black had 2.17 times the risk of dying from Covid-19 compared to those classified as white. This ratio (the hazard ratio) was still 1.71 "after adjusting for deprivation and clinical risk factors".

Adverse socio-economic conditions are related to Covid-19 mortality. Williamson et al. used an Index of Multiple Deprivation (IMD) that was derived from the patient's postcode. Even by this crude measure, those in the highest quintile of this index were 75% more likely than those in the lowest quintile to die of Covid-19. The best socio-economic correlate of ethnic disparities in Covid-19 mortality appears to be the index of relative poverty used by Fisher and Nandi (2015), which we included in Table 3.

The unique contribution of the present investigation is the observation that differences in Covid-19 mortality between ethnic groups in Britain follow ethnic differences in measured intelligence quite closely, but not differences in educational credentials. This does not prove a causal link between intelligence and Covid-19 mortality, but causality is nevertheless plausible. Recognizing and responding to non-obvious danger is presumed to be one of the reasons for the evolution of higher intelligence in humans. This function, of evading imminent danger to life, becomes important when people are exposed to a pandemic although, interestingly, avoidance of infectious disease is not a likely reason why higher intelligence evolved in our species. Intelligence evolved for responses to "non-standard" threats for which instinctive responses are unavailable in the behavioural repertoire of the species (Kanazawa, 2004), but our ancestors had not reached a point where intelligence could be used for avoidance of infectious disease risks without any knowledge of germs and disease transmission. Today, however, knowledge and understanding of risks, combined with effective ways of evading the risks, is key to the avoidance of infection. This argument had been made before by Rindermann and Meisenberg (2009) for the case of HIV/AIDS, and applies equally to SARS-Cov2/Covid-19.

At this point further research into the relationship of intelligence with risk of SARS-Cov2 infection and mortality — two outcomes that should be investigated separately — are needed. There is so far no information about the role of intelligence for these outcomes at the individual-differences level. Only if such relationships are found to exist at the individual level, and there is evidence for causality, is it plausible that intelligence plays a causal role for infection risk and/or mortality when ethnic and racial groups living in the same country are compared. This is based on the assumption that the same causes that produce unequal outcomes among individuals also produce unequal outcomes among ethnic, racial, and other groups.

Intelligence is hypothesized to reduce the infection risk both directly, by better

avoidance of infection, and indirectly by enabling people to avoid conditions of poverty. It may also reduce the mortality risk of infected patients by reducing chronic health conditions such as obesity and diabetes which are favored by unintelligent habits and lifestyles and can lead to fatal complications in the course of SARS-Cov2 infection. However, intelligence and economic deprivation may not be the whole story. For example, non-whites comprise 21% of the overall NHS workforce and 44% of the NHS medical workforce, but 63% of 106 NHS staff who had died of Covid-19 up to 22 April were non-white; and of the 19 NHS doctors and dentists who had died, 18 were non-white (Carl, May 17, 2020). It is not plausible that low intelligence or poverty were the causes for the excess mortality of non-whites among these medical professionals.

Survival of infected individuals is also likely to depend on genetic differences between individuals, particularly those related to the immune system and to common fatal complications such as thrombosis, heart failure and pulmonary edema. Therefore, the search for (human) genetic polymorphisms affecting Covid-19 mortality is under way (Murray et al., 2020). It remains to be seen whether such genetic polymorphisms can be found, whether their frequencies differ appreciably in different ethnic and racial groups, and whether this can explain some of the observed differentials in mortality, unrelated to intelligence, poverty, and other factors that we can investigate now.

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