European Journal of Public Health, 2024, 1–8

https://doi.org/10.1093/eurpub/ckae142

To what extent did mortality from COVID-19 in England and Wales differ for migrants compared to non-migrants in 2020 and 2021? A descriptive, observational study

Lucinda Hiam [1,*], Jon Minton[2], Rachel Burns[3], Martin McKee [4], Robert W. Aldridge[5]

[1]School of Geography and the Environment, University of Oxford, Oxford, United Kingdom
[2]Public Health Scotland, Edinburgh, United Kingdom
[3]Centre for Public Health Data Science, University College London, London, United Kingdom
[4]Department of Health Services Resaerch and Policy, London School of Hygiene and Tropical Medicine, London, United Kingdom
[5]Institute for Health Metrics and Evaluation, University of Washington, Seattle, WA, United States

*Corresponding author. School of Geography and the Environment, University of Oxford, South Parks Road, Oxford OX1 2EJ, United Kingdom. E-mail: Lucinda.hiam@kellogg.ox.ac.uk

Abstract

Seventeen percent of people living in the UK are migrants. In high-income countries, migrants have been shown to have better all-cause mortality but worse mortality for some specific causes such as infectious diseases. This observational study aims to quantify the extent to which mortality from coronavirus disease 2019 (COVID-19) differed between migrants and non-migrants for the population of England and Wales, 2020-2021. We use Official National Statistics data to compare mortality from COVID-19 in 2020 and 2021 by country/region of birth, expressed as the standardized mortality ratio with those born in England and Wales as the reference population. Migrants from 17 of 19 countries/regions examined had higher mortality from COVID-19 than non-migrants. The highest mortality was those born in Bangladesh (females SMR = 3.39, 95% CIs 3.09–3.71; males 4.41, 95% CIs 4.09–4.75); Pakistan (females 2.73, 95% CIs 2.59–2.89; males 3.02, 95% CIs 2.89–3.14); and the Caribbean (females 2.03, 95% CIs 1.87–2.20; males 2.48, 95% CIs 2.37–2.60). Migrants born in Antarctica and Oceania (females 0.54, 95% CI 0.42–0.40; males 0.71, 95% CI 0.51–0.88), and North and Central America (females 0.95, 95% CI 0.80–1.11; males 0.85, 95% CI 0.72–0.99) had lower mortality than non-migrants. Most migrant populations had higher mortality from COVID-19 than non-migrants in England and Wales. Policy-makers must work to integrate migration status into routine data collection to inform future research and understand the causes of the inequalities seen.

Additional content

Additional content An author video to accompany this article is available at: https://oup.cloud.panopto.eu/Panopto/Pages/Viewer.aspx?id=a7ba253d-03ff-4824-8134-b1f50181af79.

Introduction

It is now widely accepted that there were wide inequalities in outcomes of the coronavirus disease 2019 (COVID-19) pandemic. Yet, as the Pan European Commission on Health and Sustainable Development noted [1], in many European countries the scale and nature of these inequalities could only be guessed at. In particular, there was, and remains, a scarcity of information on mortality disaggregated by migration status, ethnicity, or nationality. There are two major reasons: First, the well-known definitional challenges with terminology in this area and, second, concerns regarding privacy of data sharing. Migrants may have lived in more than one country over their lifetime and include those residing in country A born in country B to parents from country A as well as those in country A born in country B where they had generations of ancestors. Furthermore, migration status is fluid and changeable, rather than a defined characteristic, and is likely to change over time, for example, in the context of asylum seekers and refugees. The related characteristics of ethnicity and nationality are similarly problematic. Ethnicity is a self-identified definition that is distinct from race and the recorded identity may, therefore, differ across data sets [2], while many people have multiple nationalities.

Privacy concerns regarding sharing of data on race, ethnicity, and migration status are often well-founded, such as in the UK where data sharing between the health and immigration services contributed to significant fears regarding accessing health care [3], as well as memories of historical abuses [4]. As a consequence, few European countries routinely disaggregate data by ethnicity, with Finland, Ireland, and the UK notable exceptions [5].

Of these three characteristics, ethnicity received most attention during the pandemic. In the UK, there were large differences in outcomes during the first year of the pandemic [6, 7], with changes noted over time and variant of the virus [8]. A meta-analysis examining associations between ethnicity and various outcomes of COVID-19 in the early phase of the pandemic found 58 studies, most from the USA, but 10 from the UK, two from Spain, and one from Italy [9] but, as noted, in many countries, any disadvantage by ethnicity is largely invisible in the data.

There is also some information on the situation that faced migrants in the initial stages of the pandemic in the UK, with substantially greater increases in mortality among those born in Africa, Asia, and the Caribbean [6]. These individuals are defined pragmatically as migrants as someone living in a country but born elsewhere, a definition that can be operationalized simply in datasets. While

ethnicity may confer disadvantage due to factors such as discrimination, migrants may face additional challenges that accumulate before, during, and after their journey to a new country [10]. During the pandemic, migrants were soon identified as experiencing a toxic interaction of risk factors for infection [6, 11–14], including type of employment [15], living conditions [16, 17] such as high population density [14], barriers to accessing healthcare [18, 19], and, eventually, vaccination status [20]. For example, migrants are more likely to be in precarious employment, often public-facing with greater exposure to the virus [21], and without access to sick pay [15]. Like many airborne infectious diseases, COVID-19 thrives in crowded places, and migrants are more likely to live in overcrowded, multi-generational homes [16, 17].

Migrants, even when from the same country, are, however, an extremely heterogeneous group, reflecting factors including their age and social status at the time they left their country of birth, the conditions they experienced previously, their reasons for leaving, and their migration status. Thus, an economic migrant is likely to experience different health challenges from a refugee or asylum seeker. Nonetheless, migrants overall are often healthier than the host population in high income countries (HICs), a phenomenon known as the 'healthy migrant effect' [22], with 'atypically healthy' individuals more likely to leave their countries of birth [23]. This varies by factors including the country of origin, destination, reason for migration, and type of disease [22]. A systematic review found that while there was an overall mortality advantage among international migrants to HICs relative to their native-born counterparts, the opposite was seen with the infectious diseases and 'external causes' categories within the international classification of diseases version 10 (ICD-10) [24, 25]. The higher mortality from infectious diseases has been linked to several factors, including exposure to diseases like tuberculosis in the country of origin [26], as well experiences during the migration process and in the host country, such as barriers to accessing healthcare [10].

The countries of the UK had some of the worst outcomes in Europe in the first part of the pandemic and an ongoing official inquiry has revealed a severe lack of preparedness [27], exacerbated by sustained disinvestment in social safety nets [28]. We complement the existing literature from the UK [6, 29] with a study that analyses mortality from COVID-19 during 2020 and 2021 in England and Wales by country/region of birth using a unique dataset assembled by the Office for National Statistics (ONS) (health data systems are separate in the four countries of the UK). For context, at the 2021 Census, ten million people living in England and Wales were born outside of the UK, or 16.8% of the total population [30]. Our study is descriptive and thus we do not seek to explain these differences but hope that our findings will encourage others to do so.

Methods

Study design and setting

A descriptive, observational study of the population of England and Wales (E&W) between 2020 and 2021 was carried out. The exposure was country/region of birth, as identified on the death certificate, and the outcome was mortality from COVID-19 (ICD-10 codes U071, U072, U109) during the two-year period of 2020 and 2021.

Data sources

Two data sources were used. First, as part of a larger project, data were requested from the ONS for number of deaths by country/region of birth, 5-year age band, sex, and ICD-10 chapter from 2007 to 2021 for the population of E&W. Data on mortality from COVID-19 were available for 2020 and 2021, and for the analysis we summed the deaths over both calendar years as the pandemic did not begin on 1 January, and the acute phases of the pandemic occurred in waves across the two years. Because we are exploring and comparing the impact of COVID-19 on different migrant populations, we assert our estimates are not affected by summing the two years' data. These data are subject to disclosure control and therefore not publicly available, but reported within the ONS guidance. Second, for the total population, we used a custom dataset from the ONS providing the population of E&W by age, sex, and country/region of birth at the 2021 census (available online). Due to reference limitations, links to relevant sources and references for the data and methods are given in Supplementary Appendix II.

Inclusion and exclusion criteria

The countries/regions of birth included were based on (i) the available data from the ONS and (ii) 'matching' across the deaths and total population datasets (outlined below). Two countries/regions of birth were excluded due to low counts ('Africa NOS' and 'Asia NOS') that would have breached disclosure controls. Inconsistencies in data were reconciled where necessary. For example, we were not able to disaggregate 'new EU' (i.e. those countries that joined after 2004) from total EU (i.e. all EU countries, including those that joined after 2004) in all datasets and thus 'new EU' was incorporated within the larger EU category. Where appropriate, we made a very few other adjustments. For example, we treated the Irish Republic as a category separate from the rest of the EU as previous research has demonstrated a mortality disadvantage for migrants coming from Ireland [31]. We also included Scotland and Northern Ireland as distinct categories for the same reason. Supplementary Appendix I lists the countries included where a region is specified. All age groups were included and standardized to the European Standard population, as outlined below.

Analysis

Data preparation and analyses were carried out using the statistical programming language R. First, the sum of deaths from COVID-19 by each country/region of birth for all sexes and age groups for 2020 and 2021 were totalled and plotted alongside the sum of population from the 2021 Census for the corresponding country/region. Second, the crude death rates for the two-year period were calculated as a proportion of the sum of deaths divided by the population of E&W at the 2021 Census, presented as a percentage.

$$\text{Crude death rates} = \frac{\text{sum of deaths by country/region of birth in E\&W from COVID} - 19\ 2020 + 2021}{\text{total population for country/region of birth in E\&W at 2021 Census}}$$

Next, we calculated the Standardized Mortality Ratios (SMRs) of European Age Standardized Rates (EASRS), by sex and country/regions of birth (total = 19), as compared to the reference population of the corresponding sex, namely persons born in E&W (non-migrants). We used the 2013 European Age Standardized Population (EASP) to calculate EASRs for each sex/country-of-birth subgroup, and used Byar's method, implemented using R's PHEIndicatormethods package, to produce 95% uncertainty intervals for each EASR calculated. We converted EASRs into SMRs by simply dividing the EASR point and uncertainty estimates by the EASR point estimate for the reference population (those born in E&W), separately for both males and females.

Ethical approval

Ethical approval was not sought as the data are aggregate and anonymized. Data were handled subject to the disclosure agreement with ONS.

Results

Descriptive analysis

At the 2021 Census, 81.6% of the population of E&W were native born (non-migrants). Figure 1 shows the remaining population, that is, those born outside E&W and termed here 'migrants', with population size in millions (black dots) and number of deaths from COVID-19 in 2020 and 2021 (red triangles) for each country/region of birth. The largest groups were those born in the EU (minus the Irish Republic), India, and Eastern and Southern Africa. Deaths from COVID-19 do not follow the same pattern, with India, Pakistan, the Caribbean and some other countries/regions clear outliers. Supplementary Fig. S1 shows that crude deaths from COVID-19 as a proportion of the population are higher than among those born in E&W for migrants from the Indian sub-continent and other parts of the UK, but lower among those from elsewhere. Supplementary Fig. S1 is reported for completeness only as the figures are unadjusted for age.

COVID-19 mortality relative risk by country/region of birth

The EASRs by sex for each country/region of birth are reported in Supplementary Appendix II (Supplementary Fig. S2). Here, in Fig. 2, we report the SMRs with 95% confidence intervals (CI), for females and males (for tabulated results see Supplementary Table S1). Figure 2 shows that, for both female and male migrants, only two

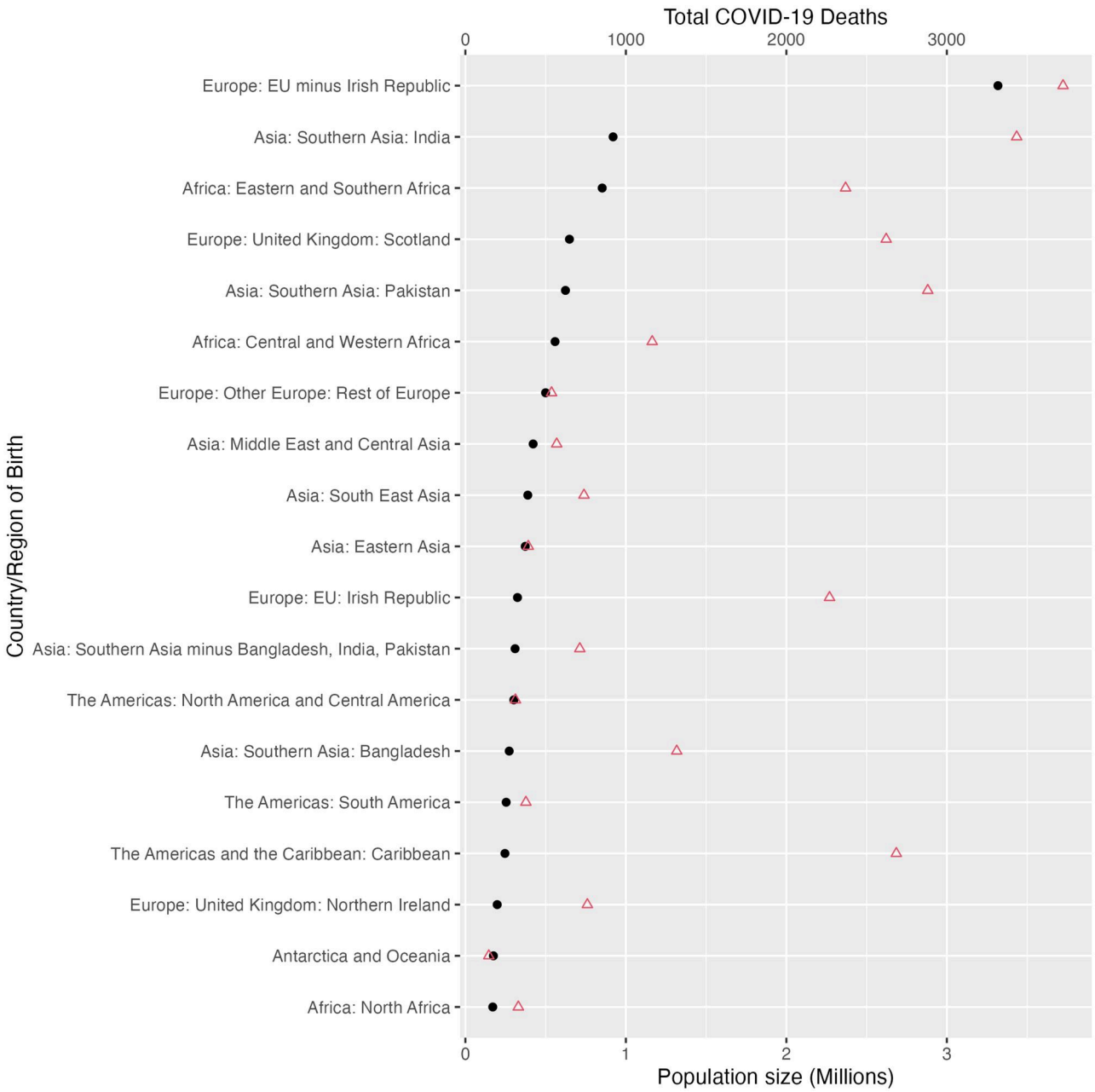

Figure 1. Population of migrants in England and Wales in millions, in descending order from highest to lower number (total persons, bottom axis, denoted by black dot) and deaths from COVID-19 (total persons, top axis, denoted by red triangle) by country/region of birth, excluding those born in England and Wales, 2020–2021.

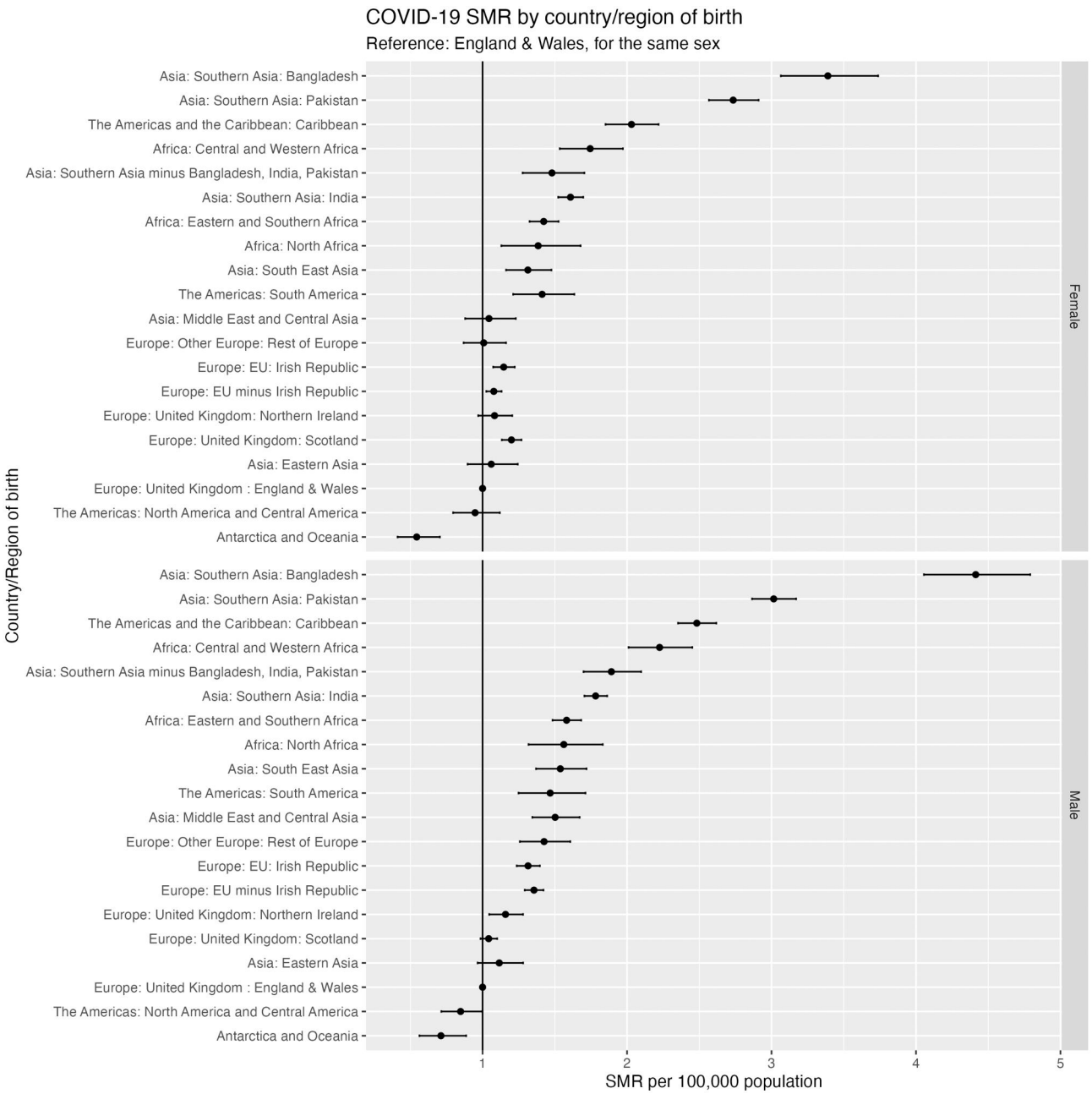

Figure 2. Forest plot showing SMR for COVID-19, population of England and and Wales, 2020–2021, by country/region of birth (top panel females, bottom panel males) with 95% confidence intervals. The vertical black line shows the SMR for female reference population is females born in England and Wales (SMR = 1); and male reference population is males born in England and Wales (SMR = 1).

countries/regions of birth (out of 19 total) had a lower risk of mortality from COVID-19 in 2020 and 2021 than the respective female and male E&W born reference population: Those born in Antarctica and Oceania (0.54, 95% CI 0.42–0.40 for females; 0.71, 95% CI 0.51–0.88 for males), and North and Central America (0.95, 95% CI 0.80–1.11 for females; 0.85, 95% CI 0.72–0.99 for males), noting for females born in Antarctica and Oceania the CIs include 1 so mortality is likely to be similar to the reference population (this is the name of a standard category used for many purposes in official statistics but no-one is actually born in Antarctica). Female migrants born in all other regions (17 of the 19) have a higher SMR than E&W born, with 95% CIs that included 1 for: those born in Northern Ireland, Eastern Asia, Middle East and Central Asia, and 'Rest of Europe' (non-EU countries). Similarly, male migrants born in all other countries/regions (17/19) have a higher SMR than non-migrant males, with 95% CIs that include 1 for two regions—Eastern Asia and Scotland.

For both female and male migrants, the countries/regions of birth with the highest SMRs were Bangladesh (3.39, 95% CIs 3.09–3.71 for females; 4.41, 95% CIs 4.09–4.75 for males); Pakistan (2.73, 95% CIs 2.59–2.89 for females; 3.02, 95% CIs 2.89–3.14 for males); and the Caribbean (2.03, 95% CIs 1.87–2.20 for females; 2.48, 95% CIs 2.37–2.60 for males).

The ranking of countries/regions of birth for SMR is similar for both sexes, but male migrants have higher relative mortality than female migrants except those born in Scotland where females had a higher SMR than males (1.20, 95% CIs 1.14–1.26 for females; 1.04, 95% CIs 0.99–1.09 for males), and North and Central America as listed above.

Choropleth of standardized mortality ratio results

Finally, we present two choropleths of mortality hazard from COVID-19 of the population of E&W for each sex and all ages between 2020 and 2021, where red shaded countries/regions indicate

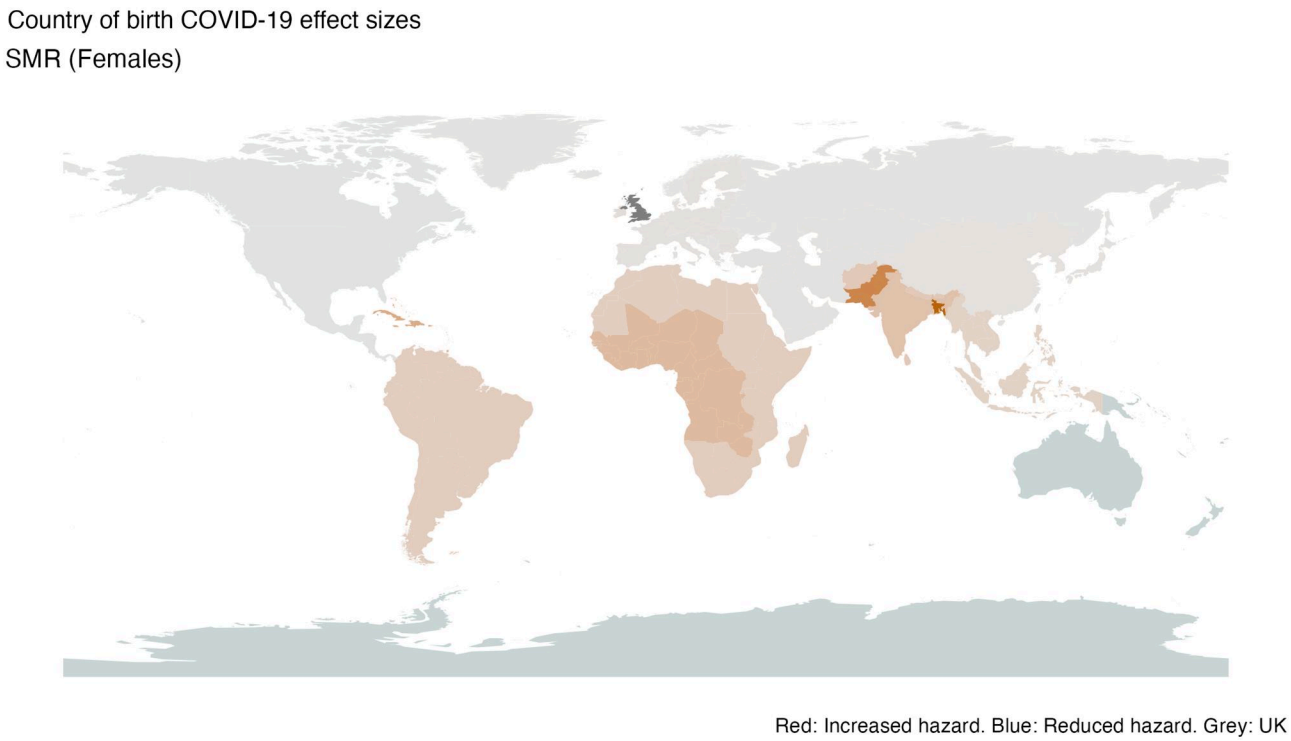

Figure 3. Choropleths showing SMR from COVID-19 for resident population of England and Wales from COVID-19, 2020–2021, by country or region of birth, for all ages for females. Countries/regions shaded red have higher SMRs than the reference population, and blue lower SMRs than the reference population. The darkness of the shade indicates how much higher (reds) or lower (blues) the SMRs are from the reference population, with darker shades indicating greater differences. The UK is combined for the purposes of the visualization and shaded grey as the reference population.

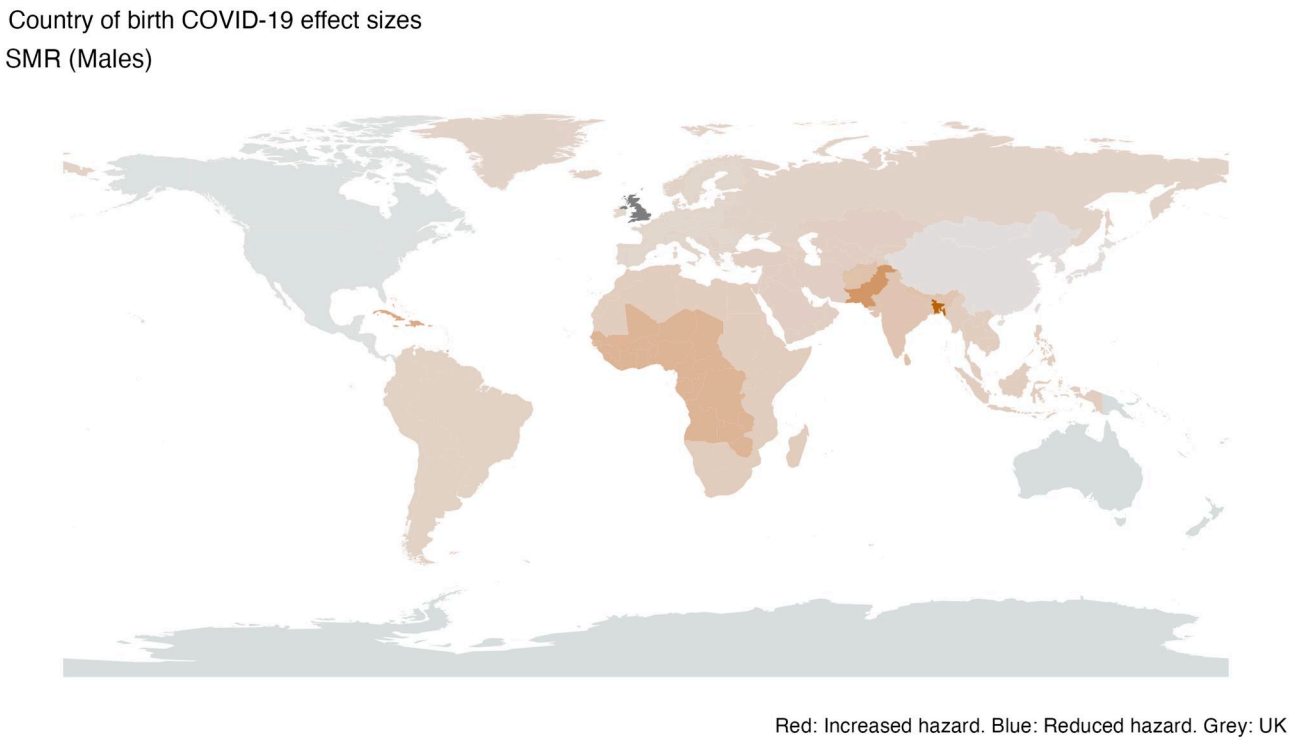

Figure 4. Choropleths showing SMR from COVID-19 for resident population of England and Wales from COVID-19, 2020–2021, by country or region of birth, for all ages for males. Countries/regions shaded red have higher SMRs than the reference population, and blue lower SMRs than the reference population. The darkness of the shade indicates how much higher (reds) or lower (blues) the SMRs are from the reference population, with darker shades indicating greater differences. The UK is combined for the purposes of the visualization and shaded grey as the reference population.

a higher mortality hazard than the corresponding non-migrant reference population, and blue shaded countries/regions denote a lower mortality hazard (Figs 3 and 4). For the purposes of the visualization, we have included Greenland with Denmark (EU country), although acknowledge that Greenland left the EU in 1985. Comparing the two figures, the lower mortality for female migrants compared to male migrants is clear due to the darker shading in Fig. 4. For female migrants, the choropleth mirrors a map showing the Global North/Global South to some extent, but this is not the same for males with darker shading for Europe (though the decreased mortality for North and Central America is more pronounced for male migrants). The combination of some countries into one aggregate category could be distorting underlying inequities between countries. The limitations of this approach are explored further in the discussion.

Discussion

We compare mortality from COVID-19 between 2020 and 2021 in the migrant and native born population of E&W, disaggregated by sex. Migrants of both sexes had a higher mortality in 17 of the 19 countries/regions of birth examined, while female migrants from 13 countries/regions and male migrants from 15 countries/regions had higher mortality than their native born counterparts. Notably, these include migrants from Scotland, Northern Ireland, the Irish Republic, and the rest of the EU, who have moved from countries/regions that are very similar to E&W. Migrants from only two countries/regions had lower mortality—Antarctica and Oceania, and North and Central America.

Among both sexes, migrants born in Bangladesh, Pakistan, and the Caribbean had the greatest excess risk of mortality than non-migrants. Male migrants had a higher mortality than female migrants, except those from Scotland. Finally, the rank order of SMRs in each country/region of birth was similar for men and women. These findings are consistent with previous findings of a disproportionate increase in excess mortality among migrants, compared to non-migrants, in the first few months of the pandemic using 2014–2018 as the baseline [6]. Our findings expand upon this work with greater disaggregation by countries/regions of birth and over a two-year time period.

These findings contrast with the situation prior to the pandemic where the mortality advantage of migrants, particularly in HICs [22, 25], has actually contributed positively to population health measures such as life expectancy, seen in the USA and Nordic countries, and, potentially, in the UK [32–34]. Our findings are, however, consistent with the conclusions of a review by the OECD that identified many factors that increased the risks migrants faced in the pandemic, including of contracting the virus and dying [35].

Our study has certain limitations. The first relates to the categorizations of the countries and regions. For example, India, Pakistan, and Bangladesh are presented as single countries, while other large regions with diverse populations such as Central and Western Africa are combined. This prevents us from identifying intra-regional and inter-national differences. For example, the Antarctica and Oceania group is dominated by those from Australia and New Zealand who are likely to have much better outcomes than the much smaller numbers from Pacific Islands, given their experience when living in New Zealand [36]. Also, the various datasets are not always directly comparable. Thus, combining the "New EU" i.e. those countries with accession after 2004, with "Old EU" will have masked potentially important differences in the health status of more recent migrants from, for example, Romania and Bulgaria [37].

It is beyond the scope of this descriptive analysis to explain these findings. Rather, we report them to encourage others to probe the role of the multiple known risk factors that we could not account for, including social determinants of health such as housing and employment, and individual factors such as co-morbidities and vaccination status. In addition, by aggregating the two-year period (instead of looking by specific waves of infection), we cannot assess how the mortality rate changed over time, nor the effect of vaccination, specific communication campaigns, and other public health interventions. Thus, we could not detect phenomena such as the change in mortality by ethnicity with the Omicron variant reported by the ONS in 2023 [8].

We can, however, speculate that some reasons lie in the barriers many migrants face in accessing health care, poor living conditions, precarious employment, and low vaccination uptake. The precise mix is likely to vary given 'migrants' encompasses groups as diverse as those from Scotland and from Bangladesh, and includes some people whose situation places them at extremely low risk.

One particular issue that is affecting all groups other than those from the other parts of the UK and Ireland is the British government's 'hostile environment' for migrants, including the introduction of charging to access the National Health Service (NHS) for so-called 'overseas visitors' [38]. The hostile environment is a suite of policies introduced under Conservative Home Secretary Theresa May to make life as 'hostile' as possible for 'illegal immigrants' in the UK, to encourage them to leave, including restricting access to healthcare. Again, the most privileged may find this simply an inconvenience but, for many, it creates a fear of public services [39]. This may be exacerbated by structural and institutional racism [40].

Our findings support recommendations by Burns et al., based on their assessment of the UK's COVID-19 response [41]. These include action on the structural barriers and acknowledgement of intersectionality of other marginalized groups; improved data collection to include disaggregation by migration status; participatory approaches to public health campaigns, including co-design to with migrant communities; and universal access to healthcare for all people in the UK, regardless of migration status, with a legally enshrined firewall between immigration and health services.

Looking beyond the UK, our findings highlight the importance of monitoring health outcomes by migration status in other countries. The differences we have revealed add to the arguments set out in a recent review that confronts the excuses used for not doing so and provides a detailed agenda to implement the necessary systems, which must go beyond mortality data to include health information systems more generally [4]. This involves integrating refugee and migrant health data into national health information systems by establishing systems that can routinely collect, analyse, and share migrant health data while protecting data privacy, developing and using innovative privacy-preserving data linkage strategies, and enhancing and systematically using diversity-sensitive data collection strategies, including multilingual health surveys. Finally, all of this must take a participatory approach, engaging migrants in governance, data collection, analysis, and dissemination processes.

The limitations of our analysis point to areas for further research. One is to ask whether some of the social determinants of health, such as housing arrangements including multi-generational living, and associated mutual support, may be advantageous in 'normal' times but become disadvantageous during a pandemic [7]. Second, the considerable heterogeneity even among migrants from the same country invites more nuanced studies. Third, future research may explore the impacts of public health interventions such as vaccination on comparative mortality by migration status. In addition, further research in this area may help advance understanding of the 'healthy migrant effect'—an effect that was absent for most during the COVID-19 pandemic.

While this article may raise as many questions as it answers, without it, it is difficult to see how these further questions would ever be asked.

Acknowledgements

We are extremely grateful to the team at the ONS who were generous with their time and support in providing the required datasets.

Author contributions

L.H. conceived the idea for the article. J.M. carried out and is guarantor for the analyses, with review from L.H., R.B., and R.W.A. L.H. drafted the manuscript with significant input from J.M., R.B., M.M., and R.W.A. All authors approved the final draft.

Supplementary data

Supplementary data are available at *EURPUB* online.

Conflict of interest: None declared.

Funding

R.W.A. was supported by a Wellcome Trust Clinical Research Career Development Fellowship (206602) which funded the data used in this analysis.

Data availability

The data underlying this article cannot be shared publicly due to being subject to disclosure control. The code use will be shared on request to the corresponding author.

Key points

- In some high-income countries, migrants have been shown to have worse morbidity and mortality from COVID-19 than non-migrants, despite better all-cause mortality outcomes.
- We explored mortality from COVID-19 over a two-year period of 2020 and 2021 for 19 country/regions of birth compared to those born in England and Wales and found migrants born in 17 out of the 19 country/regions of birth had higher mortality from COVID-19 than non-migrants.
- This study adds to existing evidence to demonstrate that urgent action is needed by policymakers to ensure all people in the UK have access to healthcare, address disinformation campaigns regarding migrants, provide migrant-sensitive and migrant-inclusive public health campaigns, and improve data disaggregated by migration status across Europe to ensure a better understanding of these issues.

References

1 European Observatory on Health Systems and Policies, McKee M. *Drawing Light from the Pandemic: A New Strategy for Health and Sustainable Development: A Review of the Evidence*. World Health Organization. Regional Office for Europe, 2021.

2 Kósa K, Adány R. Studying vulnerable populations: lessons from the Roma minority. *Epidemiology* 2007;**18**:290–9.

3 Hiam L, Steele S, McKee M. Creating a 'hostile environment for migrants': the British government's use of health service data to restrict immigration is a very bad idea. *Health Econ Policy Law* 2018;**13**:107–17.

4 Bozorgmehr K, McKee M, Azzopardi-Muscat N *et al.* Integration of migrant and refugee data in health information systems in Europe: advancing evidence, policy and practice. *Lancet Reg Health Eur* 2023;**34**:100744.

5 van Apeldoorn JAN, Agyemang C, Moll van Charante EP. Use of ethnic identifiers to narrow health inequality gaps. *Lancet Reg Health Eur* 2022;**18**:100411.

6 Public Health England. *Disparities in the Risks and Outcomes of COVID-19*, London, UK, 2020. https://assets.publishing.service.gov.uk/media/5f328354d3bf7f1b12a7023a/Disparities_in_the_risk_and_outcomes_of_COVID_August_2020_update.pdf

7 Office for National Statistics. *Updating Ethnic Contrasts in Deaths Involving the Coronavirus (COVID-19), England and Wales: Deaths Occurring 2 March to 28 July 2020*. 2020. https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/articles/updatingethniccontrastsindeathsinvolvingthecoronaviruscovid19englandandwales/deathsoccurring2marchto28july2020#risk-of-death-involving-covid-19-between-ethnic-groups-among-people-living-in-private-households-in-england (6 September 2024, date last accessed).

8 Office for National Statistics. *Updating Ethnic and Religious Contrasts in Deaths Involving the Coronavirus (COVID-19), England*. Office for National Statistics, 2023. https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/articles/updatingethniccontrastsindeathsinvolvingthecoronaviruscovid19englandandwales/24january2020to23november2022 (6 September 2024, date last accessed).

9 Agyemang C, Richters A, Jolani S *et al.* Ethnic minority status as social determinant for COVID-19 infection, hospitalisation, severity, ICU admission and deaths in the early phase of the pandemic: A meta-analysis. *BMJ Glob Health* 2021;**6**:e007433

10 World Health Organisation. *World report on the health of refugees and migrants*. Geneva: World Health Organization 2022.

11 Hayward SE, Deal A, Cheng C; ESCMID Study Group for Infections in Travellers and Migrants (ESGITM) *et al.* Clinical outcomes and risk factors for COVID-19 among migrant populations in high-income countries: a systematic review. *J Migr Health* 2021;**3**:100041.

12 Fong WLE, Nguyen VG, Burns R *et al.* The incidence of COVID-19-related hospitalisation in migrants in the UK: findings from the Virus Watch prospective community cohort study. *J Migr Health* 2024;**9**:100218.

13 Mathur R, Rentsch CT, Morton CE; OpenSAFELY Collaborative *et al.* Ethnic differences in SARS-CoV-2 infection and COVID-19-related hospitalisation, intensive care unit admission, and death in 17 million adults in England: an observational cohort study using the OpenSAFELY platform. *Lancet* 2021;**397**:1711–24.

14 Bell M, Hergens M-P, Fors S *et al.* Individual and neighborhood risk factors of hospital admission and death during the COVID-19 pandemic: a population-based cohort study. *BMC Med* 2023;**21**:1.

15 Patel P, Beale S, Nguyen V *et al.* Inequalities in access to paid sick leave among workers in England and Wales. *Int J Health Plann Manage* 2023;**38**:1864–76.

16 Boukari Y, Beale S, Nguyen V *et al.* SARS-CoV-2 infections in migrants and the role of household overcrowding: a causal mediation analysis of Virus Watch data. *J Epidemiol Community Health* 2023;**77**:649–55. https://doi.org/10.1136/jech-2022-220251

17 Shannon H *et al. Web Annex A. Report of the Systematic Review on the Effect of Household Crowding on Health*. 2018. https://apps.who.int/iris/bitstream/handle/10665/275838/WHO-CED-PHE-18.02-eng.pdf?sequence=1&isAllowed=y (6 September 2024, date last accessed).

18 Zhang CX, Boukari Y, Pathak N *et al.* Migrants' primary care utilisation before and during the COVID-19 pandemic in England: an interrupted time series analysis. *Lancet Reg Health Eur* 2022;**20**:100455.

19 Nezafat Maldonado BM, Collins J, Blundell HJ *et al.* Engaging the vulnerable: a rapid review of public health communication aimed at migrants during the COVID-19 pandemic in Europe. *J Migr Health* 2020;**1**:100004.

20 Burns R, Campos-Matos I, Harron K *et al.* COVID-19 vaccination uptake for half a million non-EU migrants and refugees in England: a linked retrospective population-based cohort study. *Lancet* 2022;**400**:S5.

21 Miles S, Renedo A, Kühlbrandt C *et al.* Health risks at work mean risks at home: spatial aspects of COVID-19 among migrant workers in precarious jobs in England. *Sociol Health Illn* 2023;**46**:381–98. https://doi.org/10.1111/1467-9566.13711

22 Shor E, Roelfs D. A global meta-analysis of the immigrant mortality advantage. *Int Mig Rev* 2021;**55**:999–1028.

23 Wallace M, Khlat M, Guillot M. Mortality advantage among migrants according to duration of stay in France, 2004–2014. *BMC Public Health* 2019;**19**:327.

24 World Health Organisation,. *ICD-10 Version*, 2016. https://icd.who.int/browse10/2016/en (6 September 2024, date last accessed).

25 Aldridge RW, Nellums LB, Bartlett S *et al.* Global patterns of mortality in international migrants: A systematic review and meta-analysis. *Lancet* 2018;**392**:2553–66.

26 Aldridge RW, Zenner D, White PJ *et al.* Tuberculosis in migrants moving from high-incidence to low-incidence countries: a population-based cohort study of 519955 migrants screened before entry to England, Wales, and Northern Ireland. *Lancet* 2016;**388**:2510–8.

27 UK COVID-19 Inquiry. *Inquiry Module Reports. UK Covid-19 Inquiry*. 2024. https://covid19.public-inquiry.uk/reports/ (6 September 2024, date last accessed).

28 McKee M, Williams SN. How austerity made the UK more vulnerable to COVID. *The Conversation*. 2023. http://theconversation.com/how-austerity-made-the-uk-more-vulnerable-to-covid-208240 (6 September 2024, date last accessed).

29 Fong WLE *et al.* The incidence of COVID-19-related hospitalisation in migrants in the UK: findings from the Virus Watch prospective community cohort study, 2023.01.06.22283653, https://doi.org/10.1101/2023.01.06.22283653, 2023, preprint: not peer reviewed.

30 Office for National Statistics. *Census 2021 Demography and International Migration Statistics for Wales*. 2022. https://www.ons.gov.uk/news/news/census2021demographyandinternationalmigrationstatisticsforwales (6 September 2024, date last accessed).

31 Wallace M, Kulu H. Mortality among immigrants in England and Wales by major causes of death, 1971–2012: A longitudinal analysis of register-based data. *Soc Sci Med* 2015;**147**:209–21.

32 Hiam L, Zhang CX, Burns R *et al.* What can the UK learn from the impact of migrant populations on national life expectancy? *J Public Health (Oxf)* 2022;**44**:724. https://doi.org/10.1093/pubmed/fdac013

33 Wallace M, Thomas MJ, Aburto JM *et al.* Immigration, mortality, and national life expectancy in the Nordic region, 1990–2019. *SSM Popul Health* 2022;**19**:101177.

34 Hendi AS, Ho JY. Immigration and improvements in American life expectancy. *SSM Popul Health* 2021;**15**:100914.

35 Organisation for Economic Co-operation and Development. *What is the Impact of the COVID-19 Pandemic on Immigrants and Their Children?* OECD, 2020. https://www.oecd.org/coronavirus/policy-responses/what-is-the-impact-of-the-covid-19-pandemic-onimmigrants-and-their-children-e7cbb7de/ (6 September 2024, date last accessed).

36 Steyn N, Binny RN, Hannah K *et al.* Māori and Pacific people in New Zealand have a higher risk of hospitalisation for COVID-19. *N Z Med J* 2021;**134**: 28–43.

37 McKee M, Balabanova D, Steriu A. A new year, a new era: Romania and Bulgaria join the European Union. *Eur J Public Health* 2007;**17**:119–20.

38 Rassa N, McCarthy M, Casalotti S *et al.* The impact of NHS charging regulations on healthcare access and utilisation among migrants in England: a systematic review. *BMC Public Health* 2023;**23**:403.

39 Weller SJ, Crosby LJ, Turnbull ER *et al.* The negative health effects of hostile environment policies on migrants: a cross-sectional service evaluation of humanitarian healthcare provision in the UK. *Wellcome Open Res* 2019;**4**:109.

40 Devakumar D, Selvarajah S, Abubakar I *et al.* Racism, xenophobia, discrimination, and the determination of health. *Lancet* 2022;**400**:2097–108.

41 Burns R, Stevenson K, Miller A *et al.* Migrant-inclusive healthcare delivery in the UK: lessons learned from the COVID-19 Pandemic. *Lancet Reg Health Eur* 2022; **21**:100505.

European Journal of Public Health, 2024, 00, 1–8
https://doi.org/10.1093/eurpub/ckae142
Original Manuscript