

Ethnic differences in self-assessed health in Scotland: the role of socioeconomic status and migrant generation.

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Abstract

This study investigates ethnic differences in self-assessed health in Scotland and their determinants, focusing on socioeconomic status and migrant generations. We use the Scottish Health and Ethnicity Linkage study (SHELS) and apply regression analysis to data for 4.6 million people. The analysis shows that the White British, Other White, and Chinese groups reported better health than the White Scottish population, whereas Pakistani and Indian populations had worse health outcomes. For the latter two groups, this contrasts with previous findings of mortality advantage and thus highlights a morbidity-mortality paradox in these South Asian populations. Our findings imply that socioeconomic deprivation, health selection and acculturation explain health inequalities for some ethnic groups but for other groups, especially those of Pakistani origin, other mechanisms deserve further exploration.

Key words: Self-assessed health, ethnicity, socioeconomic status, immigrants, descendants, Scotland.

Introduction

Ethnic differences in health have been observed in many developed countries (Becares, 2013; Bombak & Bruce, 2012; Jylhä, Guralnik, Ferrucci, Jokela, & Heikkinen, 1998; Lindström, Sundquist, & Östergren, 2001; McDonald & Kennedy, 2004; McGee, Liao, Cao, & Cooper, 1999; Wiking, Johansson, & Sundquist, 2004; Wu & Schimmele, 2005). Minority ethnic groups are generally more likely to report poorer health than the majority population (Bombak & Bruce, 2012; Nielsen & Krasnik, 2010). In the UK context, while evidence of ethnic differences in health, measured as self-assessed health, has been growing in England and Wales in the last two decades (Becares, 2013; Darlington, Norman, Ballas, & Exeter, 2015; Evandrou, 2000; Evandrou, Falkingham, Feng, & Vlachantoni, 2016; Harding & Balarajan, 2000; Karlsen & Nazroo, 2010; Mindell et al., 2014; Neil R. Smith & Grundy, 2011; N R Smith, Kelly, & Nazroo, 2009), evidence of ethnic differences in general morbidity in Scotland is primarily based on aggregated data derived from Censuses 2001 and 2011 (Allik, Brown, Dundas, & Leyland, 2019; Scottish Government, 2004, 2015). These Scottish studies concur to suggest a persistent disadvantage in the Pakistani and Any Mixed Background origin populations and a persistent advantage in the Chinese population which aligns with some of the patterns seen in the rest of the UK.

Although providing a good overview of the self-assessed health patterns by ethnicity in Scotland, some of these studies are limited methodologically, e.g. based on comparison of percentages or with a lack of age adjustment, sex stratification, or comparison to a reference group, and, in some cases, with no support from statistical tests. Foremost, the Scottish evidence, based on aggregated data, do not explore explanations for the observed inequalities. Therefore, there is a need to go beyond the descriptive patterns by testing the theories of ethnicity and health in order to understand the mechanisms involved in shaping ethnic health patterns in Scotland.

Furthermore, the patterns and drivers of ethnic differences in health are context specific. For example, the socioeconomic experiences of ethnic minorities in Scotland differ from in England, Walsh (2017) showed that, in 2011, over 30% of Pakistani and Bangladeshi people lived in the most deprived area decile in England while this proportion was below 10% in Scotland. This suggests that there are more complex socioeconomic circumstances for ethnic minorities relative to the majority population in Scotland, contrasting with clear evidence of disadvantage from other settings including the US and England (Walsh, 2017). Moreover, recent evidence showed a mortality advantage in most minority ethnic groups compared to the majority population in Scotland (R. S.; Bhopal et al., 2018; Gruer et al., 2016). This mortality advantage in ethnic minorities persisted after socioeconomic status (SES) adjustment (R. S.; Bhopal et al., 2018). Therefore, initial evidence points to the health and socioeconomic experience of minority ethnic groups in Scotland as somewhat distinctive in the international landscape.

This study investigates ethnic differences in self-assessed health in Scotland and their determinants. It focuses on the contribution of socioeconomic status and migrant generations to ethnic inequalities in self-assessed health. The paper uses the Scottish Health and Ethnicity Linkage Study (SHELS) which holds individual level data for 4.6 million people who responded to the Scottish Census 2001 (94% of the Census respondents). Hence, SHELS provides data with sufficiently large minority ethnic groups to meet the analytical aims of the study. Many surveys suffer from the small sample size of ethnic minorities; in contrast, SHELS benefits from individual data on an almost complete enumeration of the Scottish population enabling a valuable opportunity to assess ethnic differences in self-assessed health in Scotland and to explore their underlying mechanisms.

Background

Ethnic Health Inequalities

Various theories have been proposed as potential explanations for ethnic health inequalities. The mechanisms that determine ethnic differences in health are complex, multi-dimensional, cohort/time specific, and are likely to relate to migration processes (migration effect, health selection, acculturation), social and institutional factors (socioeconomic status, racism and discrimination, access to health care), cultural factors determining health-related lifestyles, and biological/genetic factors. From the SHELS data, we can explore the influence of some of these mechanisms which include the socioeconomic determinants of health and the role of health selection and acculturation hypotheses using migrant generations.

Socioeconomic differences between ethnic groups are often put forward as a key contributor to ethnic differences in health (Crimmins, Hayward, & Seeman, 2004; Fischbacher, Cezard, Bhopal, Pearce, & Bansal, 2014; Nazroo, 2001; G. D. Smith, 2000; J. P. Smith & Kington, 1997; Williams, Priest, & Anderson, 2016). Socioeconomic deprivation is linked to worse health outcomes (Adler & Newman, 2002; Angell, 1993; Feinstein, 1993; M. Marmot & Wilkinson, 1999; Stringhini et al., 2017). If minority ethnic groups have poor health, it could be argued that it is due to their relatively worse socioeconomic profile compared to the majority population. Research on the relevance of adjusting for SES in ethnic health studies suggests the need to use more than one SES indicator to account for the multi-faceted experience of deprivation faced by minority ethnic groups (Fischbacher et al., 2014; Nazroo, 2001).

In England and Wales, observed patterns of ethnic inequalities in self-assessed health were mostly reduced when accounting for SES proxies using various combinations of educational level, occupation, social class, economic activity, income, car ownership, household tenure, household overcrowding and deprivation score (Darlington et al., 2015;

Evandrou, 2000; Evandrou et al., 2016; Harding & Balarajan, 2000; Mindell et al., 2014). However, evidence of the contribution of SES in explaining ethnic health inequalities in other settings is mixed. For example, in Sweden, accounting for education and economic resources reduced the likelihood of reporting poor health in Turkish born compared to Swedish born (Wiking et al., 2004) while SES adjustment had overall little effect on the relative likelihood of reporting poor health in other migrant groups (Lindström et al., 2001; Wiking et al., 2004). A study based on the Survey of Health, Aging and Retirement in Europe (SHARE) from 11 European countries found little change in the health of older migrants relative to non-migrants when accounting for educational level (Solé-Auró & Crimmins, 2008). This finding in the SHARE study could be due to the inability of education alone to represent the socioeconomic circumstances of older migrants. In contrast, the US literature points to socioeconomic circumstances in Blacks to be a key contributor to their health disadvantage compared to Whites (Hayward, Miles, Crimmins, & Yang, 2000).

Although evidence on the role of socioeconomic status in explaining ethnic inequalities in health in different contexts is mixed, variations in the SES effect across studies might depend on which measure(s) of SES is used. The strong evidence on a SES-health relationship would push us to expect SES as a key determinant of health inequalities for ethnic groups experiencing a socioeconomic disadvantage. To maximise our chances of understanding the complex role played by SES, we use multiple measures of SES as a proxy for socioeconomic circumstances in our exploration of ethnic health disparities in Scotland. Using a more comprehensive measure of SES, we hypothesise that lower SES in certain ethnic groups will explain their worse health outcomes or that higher SES will underlie better health outcomes.

In relation to the health of immigrants and descendants, migrant health selection and acculturation are thought to play a role (Abraído-Lanza, Chao, & Flórez, 2005; Abraído-Lanza, Dohrenwend, Ng-Mak, & Turner, 1999; Jasso, Massey, Rosenzweig, & Smith, 2004). The first theory focuses on the health status of immigrants when moving from their country of origin to a new country of residence. The so-called “*healthy migrant effect*” proposes that those who move are likely to be healthier than the ones they leave behind, as the process of migration requires a certain level of health and wealth (Jasso et al., 2004; M. G. Marmot, Adelstein, & Bulusu, 1984). The concept of the “healthy migrant” has been extended to immigrants being healthier generally and healthier than the population of the country they move to. Indeed, it can be argued that if the origin country has worse average health than the destination country and that immigrants have better health than the population born in the destination country, then immigrants have better health than those remaining in the origin country (Jasso et al., 2004). This health advantage of immigrants over both those remaining in their country of origin and the residents of the destination country has been referred to as the “true healthy migrant effect” (Wallace & Kulu, 2014b).

Initial evidence in England and Wales showed that most migrants (e.g. from Italy, Poland, the Indian subcontinent and the Caribbean) had lower mortality rates than those of their country of origin (M. G. Marmot et al., 1984). The exception was Irish migrants to the UK who had higher mortality levels than those in Ireland. Although with some exceptions, this supported a healthy migrant effect in most migrants in the UK. Since Marmot et al. (1984), a few research studies have attempted to test the “healthy migrant effect” comparing the health of migrants across origin and destination countries (Razum, Zeeb, Akgun, & Yilmaz, 1998; Rubalcava, Teruel, Thomas, & Goldman, 2008). Rubalcava et al. (2008) found weak support for the hypothesis with better health not necessarily predicting subsequent migration to the US in 15 to 29-year-old Mexican males and females. Razum et al. (1998)

found support for the “healthy migrant effect” in that the mortality of Turkish residents in Germany was low compared to that of Turkish residents in Ankara, in Turkey, and lower than that of Germans in Germany. In Belgium, immigrants from low-income countries had lower mortality than their native-born counterparts in Belgium (Brussels), despite their poorer human capital, employment status, and living arrangements (Anson, 2004). Anson (2004) proposes that the meaning of migration, from a less to more developed country is a key explanation of this mortality advantage, suggesting that (p.192): “it is this hope which may make tolerable otherwise intolerable conditions, and thus reduce the mortality risks” in migrant populations.

The *acculturation hypothesis* posits that as length of stay increases in the destination country, immigrants will increasingly adopt the health behaviours and health risk profile of the native population and thus move to experience more similar health outcomes to natives. In this context, Abraido-Lanza et al. (2005) referred to the acculturation process as “the health behaviors and acculturation hypotheses”. The process of acculturation can be associated with both positive and negative effects on health behaviours (Abraído-Lanza et al., 2005; Lara, Gamboa, Kahramanian, Morales, & Hayes Bautista, 2005). Positive effects of acculturation include an increased level of physical activity (Abraído-Lanza et al., 2005), health education, and promotion as well as an increased use of health care services (Lara et al., 2005). However, the acculturation process is often viewed in Western societies as detrimental for ethnic minorities. Indeed, if we assume an initial “healthy migrant effect” and healthy habits, it is hypothesised that, as migrants acculturate, they will tend to adopt unhealthy behaviours such as an unhealthy diet, an increased prevalence of smoking, and increased alcohol consumption. Adopting similar health behaviours to that of the majority population would in time impact on the health risk profile of minority populations. We refer

to a “convergence of health” in minority groups towards that of the majority population when their health status becomes similar to the health status of the majority.

The acculturation hypothesis is generally assessed in relation to duration of residence in the destination country but also through looking at second and third generations as an extension of the potential inter-generational disappearance of the cultural buffer. Although descendants of immigrants might have inherited some of the norms and culture passed on by their ancestors, they are likely to be greatly acculturated to their country of residence. Hence, the effect of different levels of acculturation on health can be studied using *migrant generations*.

Assuming a positive health selection of immigrants and a convergence of health with greater acculturation, better health is expected in immigrants while worse health status is expected in descendants towards the health level of the majority population. However, empirical evidence in the UK and European contexts provides mixed support for such patterns. A few studies have explored migrant generation differences in the ethnic patterning of health in the UK (Harding & Balarajan, 2000; N R Smith et al., 2009). First, the health of immigrants and descendants tends to vary by ethnic group. Migrant groups do not necessarily experience an advantage in health nor descendants a health convergence towards that of the majority population. Initial research in the UK by Harding and Balarajan (2000) showed that the health disadvantage seen in first generation migrants persisted in the second generations in South Asian and Black Caribbean populations and worsened intergenerationally for Black Africans. More recent research by Smith et al. (2009) found that, despite a general upward socioeconomic mobility in second generations compared to immigrants, there were similar high odds of reporting poor/fair health between first and second generations in Black Caribbean, Indian, and Pakistani ethnic minorities.

The results are inconclusive in other countries (Dinesen, Nielsen, Mortensen, & Krasnik, 2011; Kotwal, 2010; Wengler, 2011). A study on physical and psychological health of immigrants from Turkey and their descendants in Germany showed that immigrants and their descendants had lower chronic illness levels and rated their health as better than (native) Germans at younger ages; however, this advantage declined over age among immigrants (Kotwal, 2010). In contrast, Wengler (2011) showed that immigrants from Turkey had worse health status than Germans; however, once the models adjusted for socioeconomic status and coping resources there were no differences between the two groups; interestingly, the second generation had better health than immigrants and Germans. In a study on immigrant health in Denmark, Dinesen et al. (2011) found that immigrants and their descendants reported poorer health compared to native Danes. Again, the differences decreased once the individuals' socioeconomic position was controlled for. Overall, most evidence points to descendants of immigrants having a disadvantage in health, particularly in the UK setting. The large-scale Scottish data in SHELS offer a new opportunity to research the morbidity of immigrants and their descendants which will contribute to the debates around health selection and acculturation processes as underlying mechanisms of health inequalities.

Therefore, this paper examines:

- 1- What ethnic differences in self-assessed health are evident in Scotland (in magnitude and direction) based on individual level data?
- 2- To what extent can individual/neighbourhood socioeconomic factors account for the ethnic differentials in self-assessed health in Scotland?
- 3- How patterns of ethnic differences in self-assessed health vary by whether individuals were born in or outside the UK?

Finally, identifying and understanding ethnic differences in self-assessed health in Scotland provides researchers with the opportunity to further inform discussion on the ethnic morbidity-mortality paradox that has been identified in Scotland (G. Cezard, 2020a, 2020b).

Accepted

Data and methods

Data source

The Scottish Health and Ethnicity Linkage study (SHELS) study holds data for 4.6 million people i.e. 94% of the Scottish Census 2001 respondents. SHELS is a linkage study, linking census data to hospitalisation and mortality records at the individual level (Raj Bhopal et al., 2010). Drawing on the census part of SHELS, this research provides the first analysis of census health outcomes by ethnicity at the individual level in Scotland. The data contains two self-assessed health indicators, self-declared ethnicity, country of birth, sex, age as well as individual, household and neighbourhood socioeconomic indicators.

Self-Assessed Health measures

Self-assessed health indicators are widely used and are deemed reliable measures of general health status. For example, self-assessed health has been shown to be associated with other measures of health such as physical and mental health, physician rating of health, health care usage, and mortality (Cohen, Forbes, & Garraway, 1995; Idler & Benyamini, 1997; Idler & Kasl, 1995; Larue, Bank, Jarvik, & Hetland, 1979; Miilunpalo, Vuori, Oja, Pasanen, & Urponen, 1997; Mossey & Shapiro, 1982; Wannamethee & Shaper, 1991). Despite consistent findings in general population, whether self-assessed health is associated with other measures of health equally well across subgroups is debated, with mixed findings across sexes (Assari, 2016; Benyamini, Blumstein, Lusky, & Modan, 2003; Singh-Manoux, Guéguen, et al., 2007) and SES groups (Dowd & Zajacova, 2007; McFadden et al., 2009; Singh-Manoux, Dugravot, et al., 2007). To date, evidence in the UK shows a consistent association of self-reported health with other measures of health across ethnic groups (Chandola & Jenkinson, 2000).

Two measures of self-assessed health were collected in the Scottish Census 2001: Self-Reported Health (SRH) and Limiting Long Term Illness (LLTI). The corresponding questions in the Scottish Census 2001 were as follows:

- “Over the last twelve months would you say your health has on the whole been:” with the opportunity to answer “good”, “fairly good” or “not good”.
- “Do you have any long-term illness, health problem or disability which limits your daily activities or the work you can do? Include problems which are due to old age.” With the opportunity to answer “yes” or “no”.

The worse health category was taken as the response outcome compared to the better health outcome(s) i.e. Poor health versus Good/Fairly good health and LLTI versus no LLTI. A sensitivity analysis explored the change incurred in the SRH analysis when fair and poor health were combined and compared to good health.

Ethnicity

Ethnicity is a fluid concept relating to belonging or perceptions of belonging in a social group sharing common culture, language, religion, and/or ancestry. Initial research investigating ethnic inequalities in the UK was mainly based on the use of country of birth as a proxy for ethnicity. Drawbacks of using country of birth in place of ethnicity include its inability to distinguish different ethnic origins for those who were born in the same country. This lack of discriminatory power includes, for example, the limitation of classifying descendants as native-born or British born in India as foreign-born as well as different ethnic minorities with common geographical origin as a single group. Country of birth on its own lacks specificity in accurately identifying ethnic background. In health research and especially so in the UK, there has been a move towards the use of self-reported ethnicity (R.

Bhopal, 2004). A turning point in the UK was the introduction of self-declared ethnicity in the 1991 Census (Aspinall, 2011).

However, its fluidity makes the concept of ethnicity difficult to operationalise as most administrative data sources record ethnic groups using fixed categories defined by the data collector. Due to the complexity and diversity of ethnic identities coupled with restricted ethnic categories to choose from, some individuals might not be able to identify themselves confidently into a pre-specified category. For example, 4% of the population who responded to the England and Wales Censuses 2001 and 2011 changed their recorded ethnicity between 2001 and 2011 (L. Simpson, Jivraj, & Warren, 2016). Of those who changed their ethnic classification between 2001 and 2011, Simpson et al. (2016) estimated that about a third to a half of these people did so due to an ambiguity of identity. The changeable nature of self-reporting ethnicity with context and over time questions its reliability and use as a measure of ethnic identity in health research (Senior & Bhopal, 1994). In practice, a trade-off must be found between capturing ethnic diversity and using informative and reproducible ethnic groups for public health research (Aspinall, 2011). Changes in self-reported ethnicity remain small and have little effect on the analysis of ethnic differences in health because, in order to produce meaningful and consistent results with statistical confidence, there is a need to analyse ethnic groups with large sample size. To achieve this, a balance between a fine ethnicity granularity and relatively homogeneous ethnic groups with enough sample size must be found.

Respondents to the Scottish census 2001 could self-declare their ethnicity and choose from 14 ethnic categories: White Scottish, White Irish, Other White British, Other White, Any Mixed Background, Indian, Pakistani, Bangladeshi, Other South Asian, Caribbean, African, Black Scottish or Other Black, Chinese and All Other Ethnic Group. Overall, the census ethnic categorisation aligns with fine ethnic granularity and relative homogeneity of

ethnic groups. It also has the advantage of enabling analysis of disaggregated White groups, a separate Chinese group and disaggregated South Asian groups. However, we did not report results for the “All Other Ethnic Group” due to their heterogeneity.

Migrant generations

Under the acculturation hypothesis, migrants’ health behaviours and consequently health status are expected to converge to those of the non-migrant population as they stay longer in their country of destination. Duration of residence was not available in the SHELS data but as previously explained, another way to assess processes of acculturation is to investigate the experience of immigrants and descendants.

We explained earlier that country of birth on its own lacks discriminatory power to differentiate ethnic groups. However, if it is combined with other information on origin, it can help differentiate between first and subsequent migrant generations. We combined country of birth and ethnicity to inform on migrant generations. The UK-birth variable was created as a dichotomous variable (1 if born in the UK and 0 otherwise) and used in combination with ethnicity to differentiate the risk of poorer health outcome between immigrants (white other than British and non-white minority ethnic groups who were born outside the UK) and their descendants (white other than British and non-white minority ethnic groups who were born in the UK) compared to the majority White Scottish population born in the UK.

Socioeconomic factors

We used three SES indicators as proxy measures for socioeconomic deprivation, combining information at the individual, household, and neighbourhood level: the Scottish Index of Multiple Deprivation (SIMD), household tenure, and combined individual and household education. SIMD was the best variable in relation to completeness (100%). SIMD

was added as quintiles in the analysis as a proxy for exposure to neighbourhood deprivation. A UK-based study has shown that area deprivation predicted self-rated health more strongly in White British people than in minority ethnic groups (Bécares, Nazroo, Albor, Chandola, & Stafford, 2012). However, further research has also indicated that area deprivation is a good predictor of individual deprivation in minority ethnic groups (Baker, Mitchell, & Pell, 2013). SIMD on its own is not an ideal measure of individual socioeconomic circumstances as more affluent people might live in more deprived areas and vice versa. Nevertheless, it provides a more comprehensive picture of the economic and social deprivation faced by minority ethnic groups when combined with other SES measures.

In relation to individual and household SES measures, Kelaher et al. showed that education was effective to measure SES across ethnic groups but also that it would benefit from the addition of another measure of SES such as homeownership to reliably account for SES differences between ethnic groups (Kelaher, Paul, Lambert, Ahmad, & Smith, 2009). A measure of individual highest qualification when available (for those aged 16-74 years old) complemented by the household highest qualification enabled the creation of a proxy SES measure referred to as combined individual and household education available for 95% of the SHELS cohort. The creation of this combined measure permitted the minimisation of missing data and increased the sample size in the analysis based on complete cases while avoiding any age restriction. Household tenure (own versus rent) had 1.5% missing data. Combining these three SES measures i.e. SIMD, combined education, and household tenure, provides a multi-dimensional proxy for SES incorporating measures of deprivation at the individual, household, and area levels.

Modelling approach

Ethnic differences in self-assessed health were analysed using Poisson regression with robust variances. Risk Ratios (RRs), 95% Confidence Intervals (CIs), and associated p-values are reported for each ethnic group in comparison to the majority White Scottish population, used as reference (RR=1). SRH (Poor health) and LLTI were analysed in separate models. A sensitivity analysis of SRH using “Poor/Fair health” instead of “Poor health” as an outcome is also available in Appendix table 3. Analysis was stratified by sex and the age-adjusted model was presented as the base model. In subsequent models, the three SES variables or the UK-birth variable were added as categorical variables to the age-adjusted model. To explore the potential for differential relationships between each SES and health for different ethnic groups, models included each SES and its interaction with ethnicity. An interaction term of UK-birth and ethnicity was similarly added to the model adjusted for UK-birth to assess potential differential association between UK-birth and health across ethnic groups. The influence of UK-birth on ethnic inequalities in health was also pursued through the analysis of health differences by a combined ethnicity and UK-birth variable. Each set of models was based on complete cases (i.e. when there were no missing data for SES, as other variables were complete). This meant that the results included all ages and were based on 95% of the original SHELS sample.

For disclosure reasons, population counts are presented rounded to the nearest five but estimates are based on real numbers.

Results

The socio-demographic profile of ethnic groups

The White Scottish group accounted for 89% of the SHELS cohort, followed by 7% of Other White British, 1% of Other White, and 1% of White Irish. Non-white minority ethnic groups accounted for 2% of the cohort with the largest groups being the Pakistani, Chinese, and Indian populations. Non-white minority groups were on average 10 years younger than the White Scottish population while Other White British and White Irish had an older age profile.

The sociodemographic profile of the ethnic groups represented in SHELS is summarised in Appendix table 1. White Scottish and British were likely to be born in the UK (95-99%), followed by people of mixed background origin (75%), White Irish (around 60%) and people of Caribbean, Pakistani, and Indian origins (50-60%). Other White, Bangladeshi, African, and Chinese individuals were less likely to be born in the UK (25-50%). In relation to SES, Other White British and the largest non-white minority groups (Pakistani, Indian, and Chinese) were underrepresented (less than 20%) in the most deprived quintile and overrepresented in the least deprived (over 20%). In other words, these groups were more likely to live in less deprived areas. Other White British, Other White, Indian, and African populations had the highest levels of educational attainment while White Scottish and Pakistani had the lowest. The proportion of individuals living in owned household was the highest in the Pakistani, Indian, Chinese, and Other White British groups, followed by the White Scottish group.

Ethnic differences in self-assessed health

Figure 1 (and Appendix table 2) shows ethnic differences in SRH and LLTI in 2001, stratified by sex, first adjusted for age in a base model (model in red with circles) and then

adjusted for age and SES (model in blue with triangles). The top panels present the Risk Ratios (RRs) of reporting poor health versus good/fair health by ethnicity and the bottom panels, the RRs of reporting a LLTI versus none by ethnicity. RRs with their 95% Confidence Intervals are interpreted in comparison to the reference line (RR=1; dotted line) which refers to the health level of the White Scottish population. Overall, 10% of the SHELS cohort reported poor health and 20% reported a limiting long term illness.

We first focus on the age-adjusted results. Our findings show higher risks of reporting poor health in the White Irish, Any Mixed Background, and Pakistani groups and lower risks in the Other White British, Other White, and Chinese groups compared to the White Scottish, in both males and females. Risks of reporting poor health were also higher in Indian and Other South Asian females compared to White Scottish females. Pakistani females had the highest risk of reporting poor health (1.84; 95% CI [1.72, 1.96]), almost twice that of their White Scottish counterparts. Our findings using either SRH (Poor health) or LLTI as a health measure are overall consistent. LLTI results were more conservative (RR closer to the reference line). Additional differences were revealed when using LLTI as a measure of health: Indian males and African males and females had a lower risk of reporting a LLTI compared to the White Scottish population.

The sensitivity analysis of SRH using Poor/Fair health as an outcome (Appendix table 3) shows overall consistent results compared to the SRH analysis using Poor health as an outcome. RRs were closer to the reference value 1 (smaller differences). Contrasting patterns to highlight were that Chinese males and females had similar risk and Bangladeshi males had higher risk of reporting "Poor/Fair" health compared to the reference population. This means that these ethnic groups had a higher propensity to report fair health which was strong enough to change the observed ethnic patterns in SRH. These differential findings question the

meaning of fair health for these populations and the majority population and how its reporting relates to their actual health status.

The contribution of Socioeconomic Status in Self-Assessed Health patterns by ethnicity

In contrast to the differences observed in the age-adjusted model, the model adjusted for age and SES showed similar risks of reporting poor health in Other White British and Other White populations compared to the White Scottish population. The advantage in SRH previously observed in these populations is no longer visible after controlling for SES suggesting that the higher socioeconomic profile of the minority White groups in Scotland explains their better reported health compared to the White Scottish population. However, the lower risks of reporting poor health persisted in the Chinese population with a small convergence towards the reference once SES was accounted for while that of African population became even lower and significant after SES adjustment. Hence, at similar age and socioeconomic status, the Chinese and African populations report better health than the White Scottish. Furthermore, the disadvantage observed in the Any Mixed Background and Pakistani groups also persisted after adjustment for SES. The latter finding suggests that SES might not explain health inequalities in non-white minority ethnic groups. Alternatively, we might question the extent to which the three SES indicators used in this analysis are able to measure deprivation consistently across groups. Finally, findings for the Indian population stand out. The Indian population had a relatively favourable socioeconomic profile in Scotland in 2001. At similar ages, Indian males were as likely as White Scottish males to report poor health but, once their favourable SES profile was accounted for, they were more likely to report poor health than White Scottish males. In Indian females, their health disadvantage in the analysis adjusted for age increased when additionally accounting for their favourable SES profile.

The LLTI results showed that the risks of reporting a LLTI remained significantly lower in Other White populations after SES adjustment but overall, similar patterns to the SRH results were observed when SES was accounted for.

In summary, the relative advantage observed in the Other White British and Other White groups mostly disappeared after SES adjustment, and a relative disadvantage in health emerges in the Indian population after accounting for their favourable socioeconomic profile, but SES adjustment had little effect on the patterns observed in other non-white minority ethnic groups.

A complementary analysis showed that the interaction of each SES indicator with ethnicity in predicting self-assessed health was significant for specific SES indicators and specific ethnic groups (data not shown). For example, renting compared to owning was associated with a lower risk of reporting worse health (for both SRH and LLTI) in Indian, Pakistani, and Chinese populations compared to the White Scottish group. Living in deprived areas compared to less deprived areas was also associated with a lower risk of reporting worse health (for both SRH and LLTI) in the Pakistani population compared to the White Scottish population. However, there was no evidence of consistent and significant interaction between the education indicator used in this analysis and ethnicity in predicting self-assessed health. The interaction findings support some differential relevance of SES in relation to self-assessed health for specific ethnic groups and SES indicators.

The role of country of birth in understanding ethnic differences in self-assessed health

In this section, we explore the self-assessed health patterns in relation to ethnicity and UK-birth. Appendix tables 4a, 4b, 5a, and 5b show ethnic differences in self-assessed health by sex and for three sets of adjustment: adjusted for age (model 1), adjusted for age and UK-

birth (model 2), and adjusted for age, UK-birth, and the interaction between UK-birth and ethnicity (model 3).

As expected, being born outside the UK was associated with a lower risk of reporting worse health compared with being born in the UK. For example, the risks of reporting poor health were lower in those born outside the UK (0.82 [0.79;0.86] for males and 0.86 [0.83;0.90] for females) compared to those born in the UK (model 2, Appendix tables 4a and 4b).

However, adjustment for UK-birth had little influence on the ethnic patterns in self-assessed health. In both SRH and LLTI analyses, model 2 (adjusting additionally for UK-birth) showed higher risks of reporting worse health in most ethnic groups compared to model 1 (adjusting for age only). These results mean that if ethnic minorities were as likely to be born in the UK as the White Scottish, they would be more likely to report worse health. Nevertheless, the ethnic patterning of reporting an advantage or a disadvantage in self-assessed health was overall similar in model 1 and model 2.

In the last model including the interaction term between UK-birth and ethnicity (model 3), the results showed a significant interaction for many ethnic groups. For example, we find a significant interaction of UK-birth with ethnicity in predicting SRH for Other White males and females, African males, Any Mixed Background females, and Caribbean females in the direction that, for these groups, being born outside the UK compared to born in the UK was associated with an even lower risk of reporting poor health than for the White Scottish population. In other words, the effect of UK-birth in predicting poor health was stronger for these ethnic groups. For Other White British, White Irish, and Pakistani males and females as well as Indian, Black Scottish/Other Black, and Chinese females, there was a significant interaction term showing a weaker strength of the UK-birth-SRH relationship in

these populations compared to their White Scottish counterparts. Interaction findings using LLTI as an outcome led to similar patterns. These findings suggest that the worsening of health across migrant generations occurs differently for different ethnic groups.

To visualise and understand the direction of these differences in the UK-birth and self-assessed health association by ethnicity, the RRs of reporting poor health (Figure 2) and of reporting a LLTI (Figure 3) are presented by a combined ethnicity-UK-birth variable. All groups are compared to the White Scottish population who was born in the UK (RR=1). The figures differentiate ethnic groups who were born in the UK (in black) from ethnic groups who were born outside the UK (in white).

The age-adjusted results (top panels, Figure 2) show that those who were born outside the UK are less likely to report worse health compared to the White Scottish population born in the UK, for all ethnic groups with a few exceptions. The risk of reporting poor health was significantly lower in those who were born outside the UK in males and females of White Scottish, Other White British, Other White, African, and Chinese origins as well as in Indian males, Any Mixed Background females, and Caribbean females compared to the reference group. However, Pakistani males and females who were born outside the UK had higher RRs of reporting poor health compared to the reference population. For those who were born in the UK, Other White British and Chinese groups had lower risks of reporting poor health compared to the reference group. The age-adjusted RRs of reporting poor health were either similar or higher in all other ethnic groups born in the UK. Any Mixed Background males and females who were born in the UK had amongst the highest risks of reporting poor health. Findings based on LLTI (Figure 3) revealed similar patterns with RRs being closer to one.

The health advantage observed in the Other White British groups, both those who were born in and outside the UK, and in the White Scottish group born outside the UK,

disappeared after SES adjustment (bottom panels, Figures 2 and 3). As in previous analyses, risks of reporting poorer health were higher in all Indian groups once their favourable SES profile was accounted for. However, the age-adjusted patterns observed in other White and non-white minority ethnic groups who were born in or outside the UK remained similar when the analysis adjusted for SES.

Accepted

Discussion

This study has evidenced ethnic differences in self-assessed health in Scotland, demonstrating a reported health advantage in males and females of Other White British, Other White, and Chinese origins as well as in Indian males, compared to White Scottish. Conversely, Any Mixed Background and Pakistani males and females had a clear health disadvantage compared to the ethnic majority. Findings supported socioeconomic deprivation as an explanatory factor of ethnic health differences between the white populations of Scotland: the health advantage of these white minority ethnic groups was shown to be a result of their relatively advantaged socioeconomic profile. The Indian population showed a reported health disadvantage compared to the White Scottish population relative to their socioeconomic circumstances. SES adjustment had little effect on the patterns observed in other non-white minority ethnic groups (e.g. Pakistani, Bangladeshi, and Caribbean groups) relative to the majority population.

Overall, being born outside the UK rather than in the UK was protective against poor reported health in most ethnic groups. In other words, immigrants reported better health than their descendants and White Scottish populations. These findings supported the healthy migrant effect hypothesis as well as theories of acculturation in descendants. However, regardless of being born in or outside the UK, the Pakistani population reported worse health compared to the White Scottish population born in the UK, with the Pakistani population born outside the UK having the worst self-reported health. This empirical evidence in the Pakistani population does not fit with the healthy migrant effect as an underlying mechanism of ethnic differences in health and points to the need to distinguish the different experiences of migration, life opportunities, and health outcomes across ethnic groups.

Findings in relation to previous evidence

Our findings of self-assessed health differences by ethnicity bolster previous findings published in official Scottish reports (Scottish Government, 2004, 2015) and confirmed higher risks of reporting poor health or LLTI in the Pakistani populations and lower risks in the Chinese populations compared to the White Scottish groups. Despite different reference populations and contexts, the Scottish results echo findings in England and Wales (Becares, 2013). For example, Becares (2003) found that the Chinese group reported better health with half of the illness rates of the White British population and that the Pakistani group reported higher LLTI rates compared to the majority population in England and Wales in 2001.

Scottish findings contrast with the international literature which depicts minority ethnic groups as generally more likely to report poorer health than the majority population (Bombak & Bruce, 2012; Nielsen & Krasnik, 2010). Using a large national sample data source such as SHELS enabled us to produce a more nuanced picture of ethnic differences in reported health in Scotland than has previously been presented in the literature: only Any Mixed Background and Pakistani populations significantly reported worse health than the majority White Scottish population. Clear patterns of advantageous reported health were demonstrated in Other White British, Other White, and Chinese populations in Scotland.

Mechanisms underlying ethnic inequalities in health

Ethnic differences in health are context dependent; they vary according to the population structure in each setting and are influenced by varied exposures to risk factors for different ethnic groups. Ethnic differences in health within a country are also driven by the health status of the majority population they are compared to and that of the White Scottish majority in Scotland might play a key role in the inequality patterns observed in this paper. For example, we found amongst the lowest proportions of high educational attainment in the White Scottish group which may be in part the result of selective migration according to

education among immigrants and high motivation to achieve good educational attainment in their descendants. Taking into account SES (which in this study includes educational attainment) in attempting to unravel ethnic differences in health considers the SES disadvantage of both majority and minority alike, enabling us to understand whether a health disadvantage in the White Scottish population can be explained by their relatively lower SES. Indeed, the Other White British population showed a better SES profile than the White Scottish population and adjusting for SES, using three SES measures, fully accounted for the differences in self-assessed health observed between the Other White British and White Scottish groups. In line with previous studies in England and Wales using various combinations of SES measures (Darlington et al., 2015; Evandrou, 2000; Evandrou et al., 2016; Harding & Balarajan, 2000; Mindell et al., 2014), this finding in the white groups, persistent across different health outcomes and in stratified analysis, supported the hypothesis that ethnic health inequalities can be explained by SES.

However, the contribution of SES in explaining self-assessed health differences observed in non-white minority ethnic groups was not clear or consistent. In the Indian population, adjusting for SES showed a previously unobserved health disadvantage. This phenomenon was also found in a study of ethnic differences in health using the Health Survey for England (Darlington et al., 2015). The authors referred to an 'ethnic penalty' in the Indian population i.e. penalisation due to their ethnicity which might determine their poorer health beyond the benefits of their favourable SES profile. Furthermore, SES had little effect on reducing the observed health disadvantage in the Pakistani population, contrasting with findings from England and Wales (Mindell et al., 2014). SES adjustment also failed to explain the health advantage identified in the Chinese population. In other studies based on SHELS, adjusting for SES in the analysis of ethnic differences for specific diseases mostly reduced the differences observed between the Other White British group and the White

Scottish majority but appeared to lead to variable to no effect in the health risk of other ethnic groups in comparison to the White Scottish majority (G. I. Cezard, Bhopal, Ward, Bansal, & Bhala, 2015; Fischbacher et al., 2014; C. R. Simpson et al., 2015) which is in line with our findings.

Various reasons can be proposed for why SES fails to account for ethnic differences in health for non-white groups. First, as hinted by Nazroo (2001), it is possible that the SES proxies accounted for in this research cannot fully capture the deprivation status and social disadvantage faced by ethnic minorities. Our interaction analysis between each SES indicator and ethnicity in predicting health points to a non-equivalence of specific indicators as proxies for SES across ethnic groups. However, the lack of significant interaction of ethnicity with education as a predictor of self-assessed health supports education as a consistent and reliable predictor of health across ethnic groups.

Another possible explanation for the inability for SES adjustment to explain ethnic health inequalities might stem from capturing SES at a particular point in time instead of recognising that experience of deprivation and social disadvantage occurs over the life course. There is a need to understand the cumulative process of deprivation embodied in minority and majority ethnic groups from early life into older ages and how this process links to their health condition later in life.

Finally, the possibility that SES might not be such a strong determinant of ethnic inequalities in health in Scotland could lie in the different SES profiles of its ethnic majority and minorities in comparison to similar ethnic counterparts in England and Wales (Walsh, 2017). Comparing the socioeconomic status and health of ethnic groups between Scotland and England should help untangle how ethnic groups differ in their SES and health profile across these settings. This study shows that SES (as measured) is not necessarily capturing

processes of disadvantage for certain ethnic groups (e.g. Indian) which appear to be adversely affecting their health. This may include processes of exclusion and racialisation. In conclusion, SES is unlikely to provide the whole answer to ethnic differences in health in Scotland, especially in relation to non-white minority ethnic groups. Therefore, there is a need to direct future research into understanding the contribution of other mechanisms as drivers of ethnic differences in health in Scotland.

Our findings stratified by UK-birth provided a new empirical insight into Scottish ethnic health patterns. First, the results showed that being born outside the UK rather than born in the UK had an overall protective effect on reported health. This supports the healthy migrant effect hypothesis. Findings were also in line with acculturation processes whereby health converges (worsens) in descendants of immigrants. However, the observed general patterns did not apply to all ethnic groups. The UK-birth and reported health relationship differed by ethnic group as demonstrated by significant interactions of UK-birth and ethnicity in predicting reported health for many ethnic groups. Of note was the higher risk of reporting worse health in the Pakistani populations, for both those who were born in and outside the UK. These results align with previous findings of persistent health disadvantage across generations in the Pakistani population in England and Wales (Harding & Balarajan, 2000; N R Smith et al., 2009). Further accounting for SES did not explain the patterns of health inequalities in non-white immigrants and descendants nor the intergenerational continuities of disadvantage in the Pakistani population. In fact, the Pakistani population born outside the UK reported the worst health while their descendants were less disadvantaged, even after SES adjustment.

These findings do not support the healthy migrant effect and acculturation hypotheses as explanations for the health patterns seen in the Pakistani population. The selectivity of

immigrants might vary depending on the reason of migration and the origin of immigrants. Indeed, the health profile of labour migrants from rural areas of Pakistan in the 1970s might be different from the health profile of more highly skilled professionals from other countries. This points to the need to consider the nature (history) of immigration of different ethnic groups when researching the health of immigrants and intergenerational differences. Furthermore, we found that the worsening of health across migrant generations was stronger for specific ethnic groups (e.g. Other White, Any Mixed Background, Caribbean, and African) which suggests stronger health selection in these immigrant groups and stronger acculturation processes. This finding might also direct scholarship to understand the differential exposure to discrimination processes in different groups of descendants.

Finally, our findings stratified by UK-birth could also question the meaning of self-assessed health in the Pakistani population, how their reporting of health might match their actual health status and whether the way health is reported might be influenced differently in immigrants and descendants. Our sensitivity analysis using fair health combined with the worse health outcome pointed to the possibility of a differential meaning and reporting of “fair” health for some ethnic groups. These findings hint at a differential meaning of health and of specific categories of SRH across ethnic groups. However, previous evidence suggested that SRH is a valid measure of morbidity across ethnic groups (Chandola & Jenkinson, 2000). Further research is required to better understand the way different ethnic groups and migrant generations report their health, the differential meaning of each category offered and how it relates to the objective health status of different sub-populations.

Contrast with mortality evidence in Scotland.

Recent evidence of ethnic differences in mortality in Scotland showed a mortality advantage in most minority ethnic groups compared to the majority population in Scotland

(R. S.; Bhopal et al., 2018; Gruer et al., 2016). This mortality advantage was little affected by adjustment for SES (R. S.; Bhopal et al., 2018). This was clearly the case for the Pakistani population who had a 20-30% lower risk of mortality compared to the White Scottish population even after SES adjustment (R. S.; Bhopal et al., 2018). The mortality advantage in the Pakistani populations also persisted in both those who were born in and outside the UK (R. S.; Bhopal et al., 2018). In contrast, our study has explored ethnic differences in self-assessed health based on the same population source, the SHELS cohort, and we found that the morbidity evidence shows more mixed results with a consistent reported health disadvantage in the Pakistani population compared to the White Scottish population, after SES adjustment and across migrant generations. This extends previous findings based on the SHELS data and the contrast between health expectancy and life expectancy in Scotland that shows the highest number of years living in poor health in Pakistani populations (G. Cezard, 2020b). Therefore, morbidity and mortality findings based on the SHELS cohort point to a morbidity-mortality paradox in the Pakistani population of Scotland. Scottish findings also align to some extent with evidence from a recent England and Wales study that found worse health contrasting with lower mortality in migrants from Pakistan and Bangladesh (Wallace & Darlington-Pollock, 2020).

Further evidence to understand why we find contrasting morbidity and mortality in these populations is desirable. First, we could question the reliability of the morbidity data. The Pakistani population could be more likely to report poorer health which might not match with their objective health status. However, disease-specific evidence points to higher risks of diabetes, renal disease, cardiovascular disease, and some respiratory diseases but lower risk of cancer in the Pakistani population compared to the majority population of Scotland (Bansal et al., 2013; RS Bhopal, Bansal, Fischbacher, Brown, & Capewell, 2012; R. Bhopal et al., 2015; Raj S. Bhopal, Bansal, Fischbacher, Brown, & Capewell, 2011; R. S. Bhopal et

al., 2012; Forouhi et al., 2006; Sheikh et al., 2016). Hence, the level of morbidity reported by the Pakistani population seems to match with their objective morbidity based on a range of diseases. Second, we could also question the reliability of the mortality advantage observed in this population. Explanations for the migrant mortality advantage include data artefact (Arias, Eschbach, Schauman, Backlund, & Sorlie, 2010; Kibele, Scholz, & Shkolnikov, 2008; Wallace & Kulu, 2014a) and out-migration health selection such as the salmon bias, the willingness to return and die home (Pablos-Mendez, 1994). However, support for these explanations is quite limited (Wallace & Kulu, 2014a, 2018) and recent evidence points to a greater likelihood of survival in South Asian populations once diagnosed with diseases such as diabetes, renal and cardiovascular diseases (Bansal et al., 2013; Barbour, Er, Djurdjev, Karim, & Levin, 2010; Davis, Coleman, Holman, & Group, 2014; Khan et al., 2011; Mathur, Dreyer, Yaqoob, & Hull, 2018). These explanations are also unlikely to apply to Pakistani descendants, well-settled in the UK and unlikely to return to the origin country of their parents when they become older and unwell. Therefore, further research avenues should be investigated to better understand the Pakistani morbidity-mortality paradox in Scotland.

Finally, one drawback of our research is that it is based on the 2001 Scottish census part of SHELS, and inequalities and mechanisms observed might reflect 2001 patterns and not necessarily fully apply to the current situation. However, SHELS is unique and there is no other more recent data source available to researchers to date with a national level sample size at the individual level which can provide us with a fine analysis of ethnic differences in health across all age groups. For example, although a 5% sample of the Scottish Census 2011 microdata is available to researchers, preliminary analyses demonstrated limitations for analysis of ethnic differences in health with fine precision due to the small proportion of minority ethnic groups in Scotland coupled with the smaller size of Scotland's population. In contrast, thanks to the availability of individual level data from an exceptional national level

sample, we have for the first time explored ethnic differences in reported health in Scotland and some of their determinants with a fine granularity of ethnicity. The analysis has provided insight into inequalities and some of the ethnic-specific underlying processes which reinforces the need to avoid amalgamating ethnic groups. By examining the role of socioeconomic status and migrant generations, this work provides a foundation for research that can enhance understanding of migrant integration. Information on other potential mechanisms of ethnic health inequalities, such as discrimination, health behaviours, and life course circumstances, were not available in the SHELS data but deserve further attention. Future research should aim to build on emerging linkage studies, including those that can be envisaged from the future censuses, and more recent data sources with sufficiently large sample size, to deepen our understanding of the mechanisms at play in shaping ethnic differences in health in Scotland.

Acknowledgements

Authors' contributions

GC conducted the literature review, lead the study design, and carried out the statistical analysis. AM, HK and NF contributed to the study design, provided theoretical input, and interpretation of the findings at various stage of this research. GC wrote and finalised the paper. All authors commented on all versions of this manuscript and approved the final version.

Other contributions

We thank Professor Raj Bhopal and Professor Aziz Sheikh, former and current principal investigators of the SHELS study, for agreeing on giving access to the SHELS data for this research. Chris Povey and Colin Fischbacher were key co-investigators of the SHELS study who helped set-up the study and made SHELS possible.

Ethics

Approval for the SHELS study were obtained from the Multicentre Research Ethics Committee for Scotland (REC 13/SS/0225) and the Privacy Advisory Committee of NHS National Services Scotland (PAC 36/13). This research was conducted in addition to SHELS initial research plan and additional approval was sought. Further approvals were obtained from the University Teaching and Research Ethics Committee, School of Geography and Geosciences, University of St Andrews in August 2017 (reference GG13084) and from the Public Benefit and Privacy Panel for Health and Social Care (amendment to PAC 36/13) in November 2017.

Data access and sharing

Access to the SHELS data is covered by Data Access Agreements between the University of Edinburgh, National Records of Scotland (NRS), and Information Services Division (ISD) of National Health Services Scotland. The SHELS dataset used for this research was accessed from a national safe haven thanks to the Administrative Data Research Network (PROJ-208). Appropriate security clearance was required to access the data. Results were prepared following the SHELS disclosure guidance and released to researchers following disclosure reviews from data holders (ISD and NRS). Further access to the data requires applications to the data holders with appropriate security clearance and ethical approvals.

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Conflict of interest

None declared.

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Figure 1. Risk Ratios (RR) and 95% confidence intervals of ethnic differences in self-reported health (SRH) and limiting long term illness (LLTI), stratified by sex, adjusted for age (red) and adjusted for age and socioeconomic status (SES) (blue)

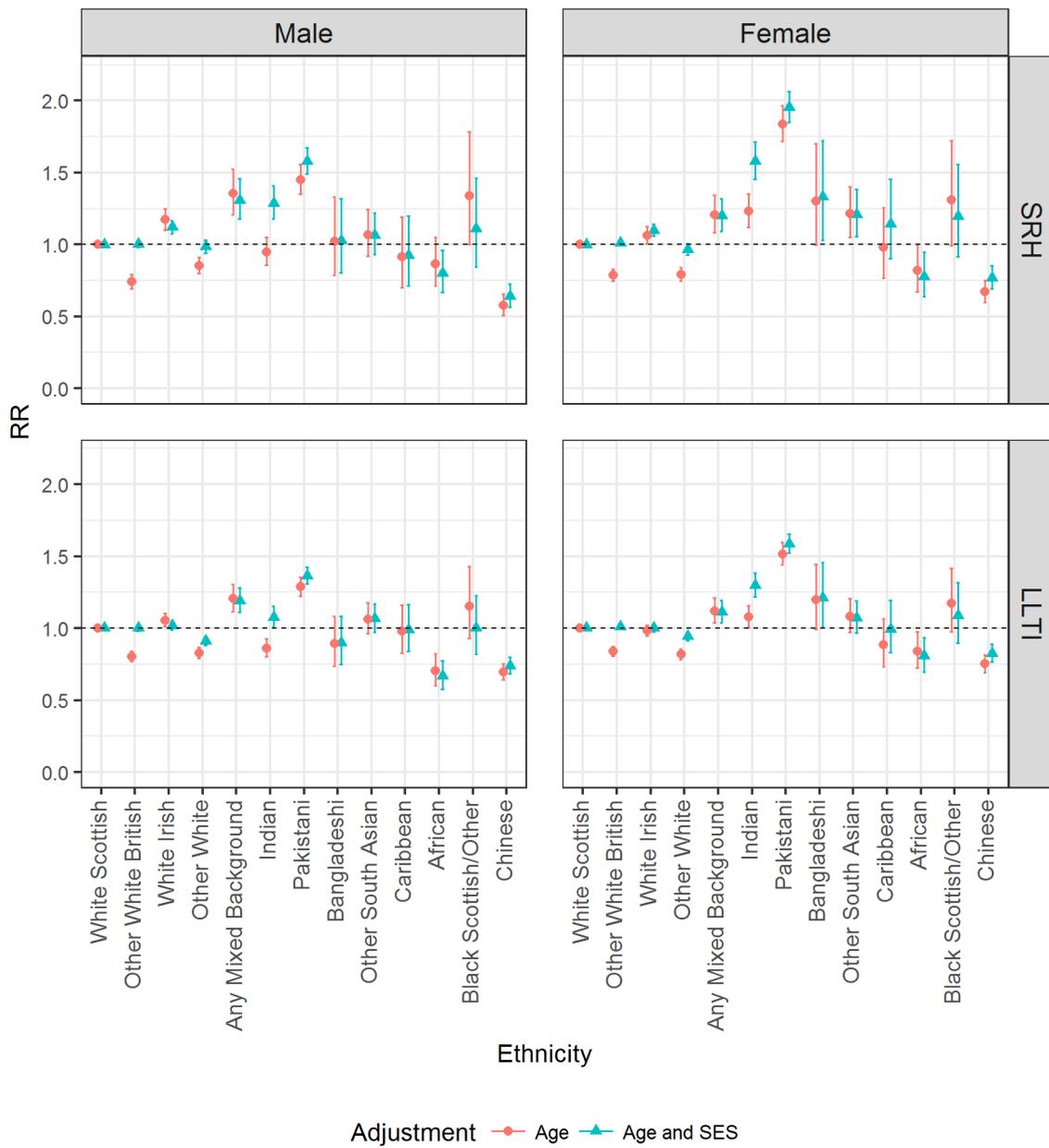


Figure 2. Risk Ratios (RR) and 95% confidence intervals of ethnicity and UK-birth differences in self-reported health (SRH), stratified by sex, adjusted for age (top) and adjusted for age and SES (bottom)

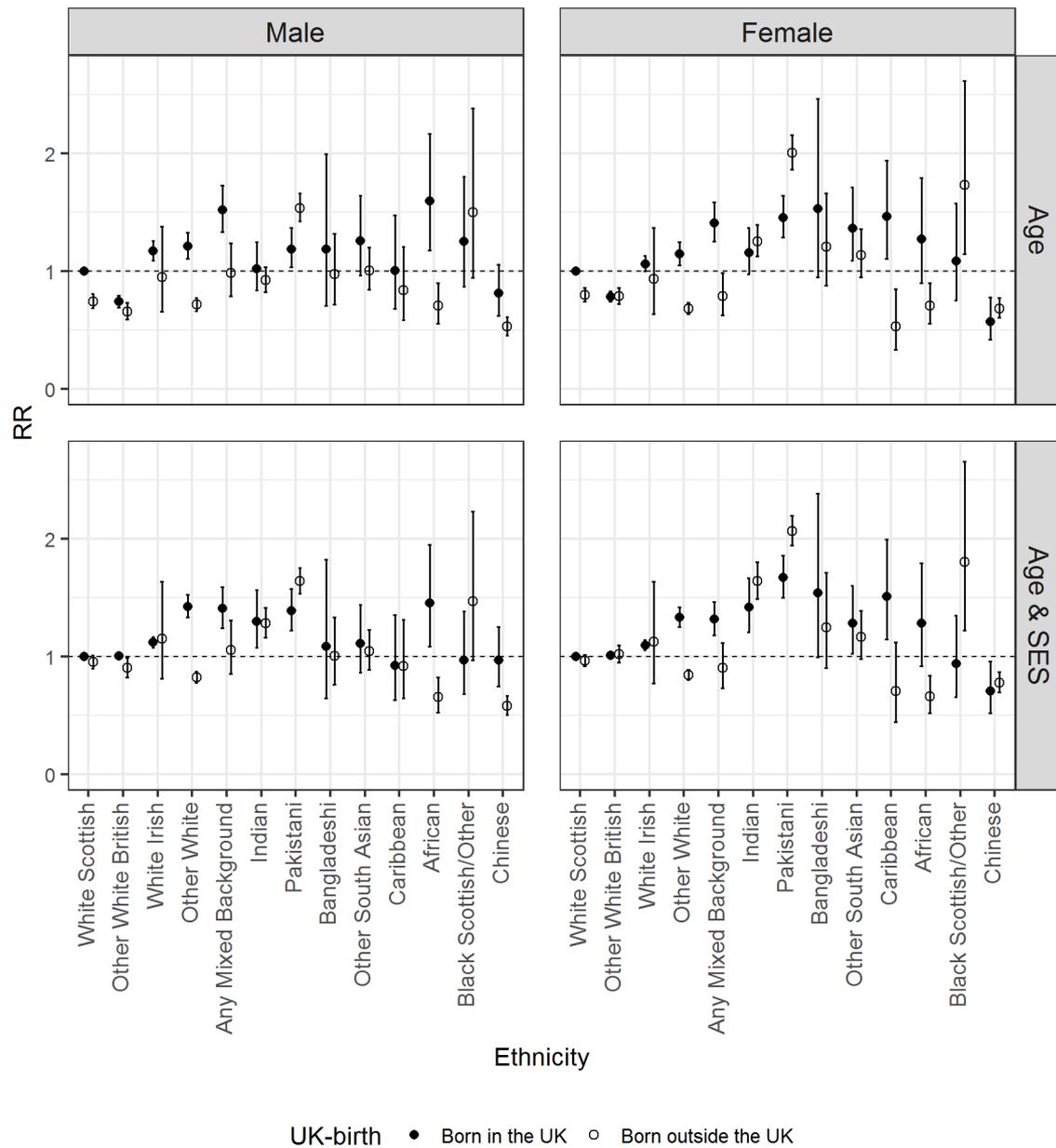
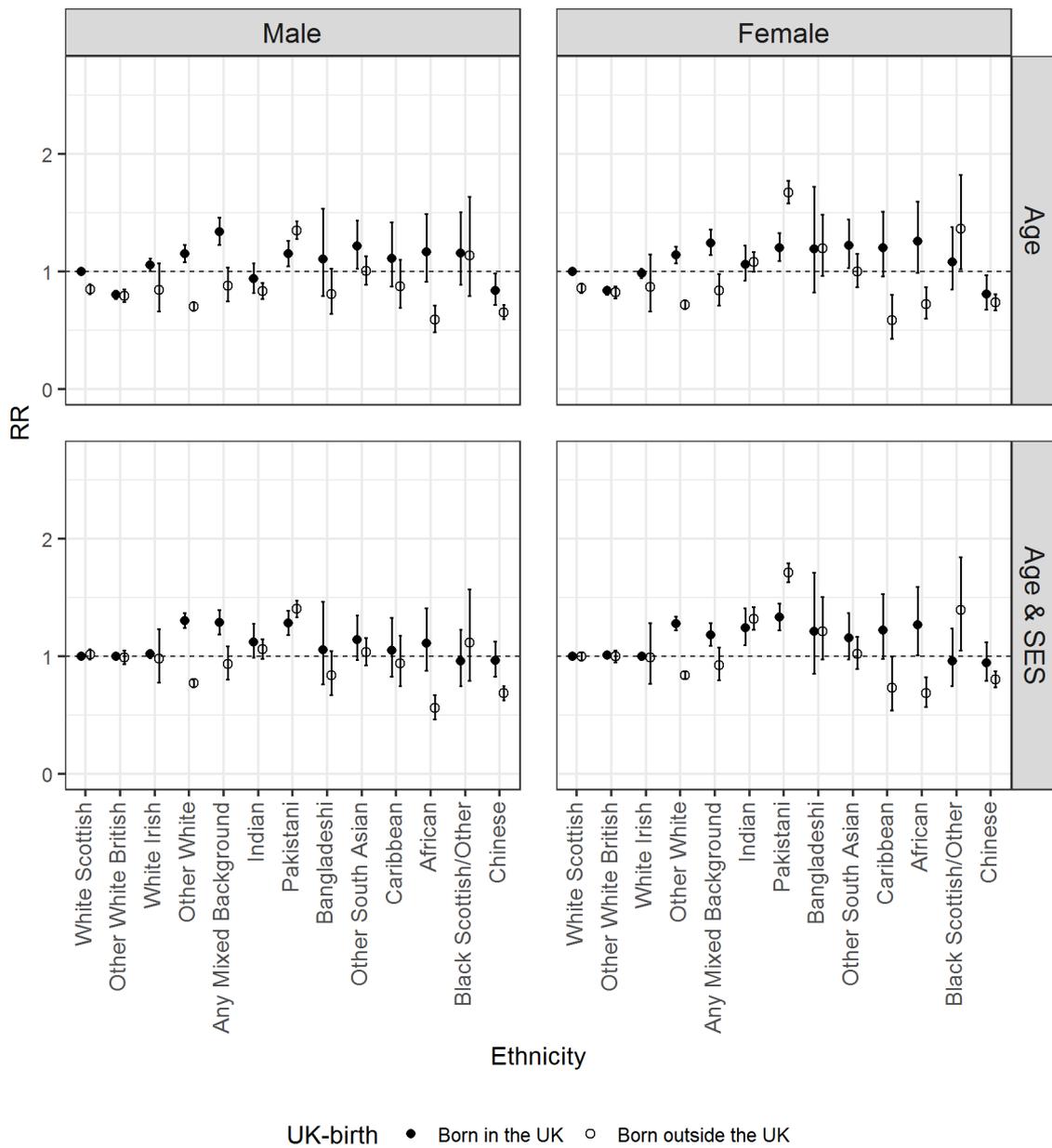


Figure 3. Risk Ratios (RR) and 95% confidence intervals of ethnicity and UK-birth differences in limiting long term illness (LLTI), stratified by sex, adjusted for age (top) and adjusted for age and SES (bottom)



Appendix table 1. Socio-demographic profile of the SHELs population by sex and ethnic groups

Sex and ethnic groups	N	Country of Birth		SIMD		Highest Qualification (individual)	Household tenure
		UK born (%)	Most Deprived (%)	Least Deprived (%)	High (%)	Own (%)	
MALES							
White Scottish	1949480	99.1	20.1	19.8	24.4	68.6	
Other White British	160235	95.2	8.0	29.6	48.4	72.3	
White Irish	20340	63.7	22.2	21.7	36.8	65.4	
Other White	29945	30.3	12.4	32.6	49.2	56.6	
Any Mixed Background	5310	75.7	19.7	26.1	36.8	57.1	
Indian	6450	48.4	9.7	38.5	50.9	72.2	
Pakistani	12930	58.0	15.8	24.8	26.5	76.2	
Bangladeshi	860	42.4	21.5	25.6	39.5	55.8	
Other South Asian	2685	37.6	25.1	29.1	48.8	53.1	
Caribbean	710	59.9	19.0	23.9	36.0	56.3	
African	2105	25.7	29.7	23.0	61.2	38.0	
Black Scottish/Other	460	72.8	30.4	17.4	33.9	46.7	
Chinese	6530	38.4	13.4	38.5	31.8	69.8	
All other ethnic groups	3552	19.2	20.4	31.4	55.1	43.8	
FEMALES							
White Scottish	2138640	99.0	21.3	19.2	23.8	65.2	
Other White British	174750	94.9	8.2	28.9	40.8	69.5	
White Irish	23160	54.7	20.1	22.8	38.0	64.1	
Other White	35710	26.3	10.8	33.4	51.3	58.7	
Any Mixed Background	5800	74.4	18.7	27.3	37.8	55.8	
Indian	5890	51.0	9.6	39.0	40.7	73.6	
Pakistani	12700	60.5	15.4	24.6	22.8	75.9	
Bangladeshi	705	46.1	19.9	26.2	31.5	58.2	
Other South Asian	2255	44.1	22.8	29.7	38.3	53.4	
Caribbean	775	58.1	17.4	27.1	42.6	60.0	
African	1800	27.2	31.4	24.7	51.7	37.5	
Black Scottish/Other	480	71.9	29.2	19.8	29.2	49.0	
Chinese	6670	33.9	12.1	39.1	33.3	70.1	
All other ethnic groups	4160	15.9	16.1	33.5	44.4	49.6	

Appendix table 2. RRs (95% CI) of reporting Poor health or a LLTI in 2001 by ethnicity, stratified by sex. Models are adjusted for age and for age and SES

Sex and ethnic groups	N	SRH (Poor health)					LLTI				
		Reported poor health	Adjusted for Age		Adjusted for Age and SES		Reported a LLTI	Adjusted for Age		Adjusted for Age and SES	
			RR (95% CI)	p-value	RR (95% CI)	p-value		RR (95% CI)	p-value	RR (95% CI)	p-value
MALES											
White Scottish	1887415	170395	1		1		343095	1		1	
Other White British	153805	11645	0.74 (0.69, 0.79)	<.0001	1.00 (0.98, 1.03)	0.7164	24685	0.81 (0.77, 0.84)	<.0001	1.00 (0.98, 1.02)	0.8087
White Irish	19465	2565	1.17 (1.10, 1.25)	<.0001	1.12 (1.08, 1.17)	<.0001	4580	1.06 (1.01, 1.10)	0.0143	1.02 (0.99, 1.05)	0.2267
Other White	28835	1980	0.85 (0.80, 0.91)	<.0001	0.98 (0.94, 1.03)	0.4980	3800	0.83 (0.79, 0.87)	<.0001	0.91 (0.88, 0.95)	<.0001
Any Mixed Background	5260	310	1.36 (1.21, 1.52)	<.0001	1.31 (1.18, 1.46)	<.0001	615	1.21 (1.12, 1.31)	<.0001	1.19 (1.11, 1.28)	<.0001
Indian	6425	425	0.95 (0.86, 1.05)	0.3136	1.29 (1.18, 1.41)	<.0001	770	0.86 (0.80, 0.93)	<.0001	1.08 (1.01, 1.15)	0.0264
Pakistani	12905	1080	1.45 (1.35, 1.56)	<.0001	1.58 (1.49, 1.67)	<.0001	1980	1.29 (1.22, 1.36)	<.0001	1.37 (1.31, 1.43)	<.0001
Bangladeshi	860	50	1.02 (0.79, 1.33)	0.8699	1.03 (0.80, 1.32)	0.8263	90	0.89 (0.74, 1.08)	0.2441	0.90 (0.75, 1.08)	0.2646
Other South Asian	2670	180	1.07 (0.92, 1.24)	0.3939	1.07 (0.93, 1.22)	0.3634	355	1.06 (0.96, 1.18)	0.2226	1.07 (0.97, 1.17)	0.1714
Caribbean	700	50	0.92 (0.70, 1.19)	0.5093	0.93 (0.71, 1.20)	0.5541	100	0.98 (0.83, 1.16)	0.8181	0.99 (0.84, 1.17)	0.9124
African	2100	105	0.86 (0.71, 1.05)	0.1433	0.80 (0.67, 0.96)	0.0154	165	0.70 (0.60, 0.82)	<.0001	0.67 (0.58, 0.78)	<.0001
Black Scottish/Other	445	40	1.34 (1.00, 1.79)	0.0476	1.11 (0.84, 1.46)	0.4570	65	1.15 (0.93, 1.43)	0.1885	1.00 (0.82, 1.23)	0.9808
Chinese	6500	240	0.58 (0.51, 0.66)	<.0001	0.64 (0.57, 0.73)	<.0001	580	0.70 (0.64, 0.75)	<.0001	0.74 (0.69, 0.80)	<.0001
FEMALES											
White Scottish	1995375	197200	1		1		372375	1		1	
Other White British	162370	13690	0.79 (0.75, 0.83)	<.0001	1.01 (0.99, 1.03)	0.2714	26795	0.84 (0.81, 0.87)	<.0001	1.01 (1.00, 1.03)	0.1630
White Irish	21170	2835	1.06 (1.01, 1.12)	0.0268	1.10 (1.06, 1.14)	<.0001	5015	0.99 (0.95, 1.02)	0.4355	1.00 (0.98, 1.03)	0.8963
Other White	34200	2390	0.79 (0.75, 0.84)	<.0001	0.96 (0.93, 1.01)	0.0815	4460	0.82 (0.78, 0.86)	<.0001	0.95 (0.92, 0.98)	0.0004
Any Mixed Background	5675	345	1.21 (1.08, 1.34)	0.0006	1.20 (1.09, 1.32)	0.0002	605	1.12 (1.04, 1.21)	0.0041	1.11 (1.04, 1.19)	0.0030
Indian	5855	505	1.23 (1.12, 1.35)	<.0001	1.58 (1.45, 1.72)	<.0001	790	1.08 (1.00, 1.16)	0.0371	1.30 (1.22, 1.38)	<.0001
Pakistani	12690	1345	1.84 (1.72, 1.96)	<.0001	1.95 (1.85, 2.06)	<.0001	2005	1.52 (1.44, 1.60)	<.0001	1.59 (1.52, 1.66)	<.0001
Bangladeshi	700	50	1.30 (1.00, 1.70)	0.0524	1.33 (1.03, 1.72)	0.0295	85	1.20 (0.99, 1.45)	0.0606	1.21 (1.01, 1.46)	0.0411
Other South Asian	2205	175	1.21 (1.05, 1.40)	0.0078	1.21 (1.05, 1.39)	0.0068	280	1.08 (0.97, 1.21)	0.1540	1.07 (0.97, 1.19)	0.1909
Caribbean	755	60	0.98 (0.77, 1.26)	0.8836	1.14 (0.90, 1.45)	0.2700	95	0.89 (0.74, 1.07)	0.1981	1.00 (0.83, 1.19)	0.9528
African	1795	90	0.82 (0.67, 1.00)	0.0527	0.78 (0.64, 0.95)	0.0120	155	0.84 (0.73, 0.98)	0.0236	0.81 (0.70, 0.94)	0.0043
Black Scottish/Other	460	45	1.31 (0.99, 1.72)	0.0562	1.20 (0.92, 1.56)	0.1898	75	1.18 (0.97, 1.42)	0.0915	1.09 (0.90, 1.32)	0.3872
Chinese	6600	310	0.67 (0.60, 0.75)	<.0001	0.77 (0.69, 0.85)	<.0001	615	0.75 (0.69, 0.82)	<.0001	0.82 (0.76, 0.89)	<.0001

Appendix table 3- Risk Ratios (RR) and 95% confidence intervals (CI) of reporting Poor/Fair health in 2001 by ethnicity, stratified by sex. Models are adjusted for age and adjusted for age and SES

Sex and ethnic groups	N	Reported poor/fair health	Adjusted for Age		Adjusted for Age and SES	
			RR (95% CI)	p-value	RR (95% CI)	p-value
MALES						
White Scottish	1887415	531000	1		1	
Other White British	153805	39655	0.84 (0.81, 0.87)	<.0001	1.00 (0.98, 1.01)	0.4434
White Irish	19465	6770	1.04 (1.01, 1.08)	0.0113	1.03 (1.01, 1.06)	0.0017
Other White	28835	6710	0.89 (0.86, 0.92)	<.0001	0.97 (0.95, 0.99)	0.0110
Any Mixed Background	5260	1060	1.16 (1.10, 1.23)	<.0001	1.17 (1.11, 1.23)	<.0001
Indian	6425	1570	1.04 (0.99, 1.09)	0.1658	1.24 (1.18, 1.29)	<.0001
Pakistani	12905	3770	1.41 (1.36, 1.46)	<.0001	1.46 (1.42, 1.50)	<.0001
Bangladeshi	860	255	1.40 (1.27, 1.54)	<.0001	1.41 (1.28, 1.55)	<.0001
Other South Asian	2670	625	1.05 (0.98, 1.13)	0.1483	1.07 (1.00, 1.14)	0.0615
Caribbean	700	155	0.88 (0.77, 1.01)	0.0587	0.89 (0.78, 1.01)	0.0757
African	2100	380	0.85 (0.77, 0.94)	0.0014	0.83 (0.76, 0.91)	<.0001
Black Scottish/Other	445	115	1.19 (1.02, 1.37)	0.0240	1.08 (0.93, 1.24)	0.3209
Chinese	6500	1460	1.01 (0.96, 1.06)	0.8014	1.07 (1.02, 1.12)	0.0049
FEMALES						
White Scottish	1995375	652820	1		1	
Other White British	162370	49385	0.87 (0.85, 0.90)	<.0001	1.01 (1.00, 1.02)	0.0917
White Irish	21170	7995	0.96 (0.93, 0.99)	0.0072	0.99 (0.97, 1.01)	0.4559
Other White	34200	9095	0.86 (0.84, 0.89)	<.0001	0.98 (0.95, 1.00)	0.0209
Any Mixed Background	5675	1295	1.09 (1.03, 1.15)	0.0036	1.11 (1.06, 1.16)	<.0001
Indian	5855	1765	1.14 (1.09, 1.20)	<.0001	1.32 (1.27, 1.38)	<.0001
Pakistani	12690	4275	1.45 (1.40, 1.51)	<.0001	1.50 (1.46, 1.53)	<.0001
Bangladeshi	700	240	1.51 (1.36, 1.67)	<.0001	1.52 (1.37, 1.68)	<.0001
Other South Asian	2205	610	1.10 (1.03, 1.18)	0.0065	1.11 (1.04, 1.19)	0.0017
Caribbean	755	220	1.00 (0.90, 1.12)	0.9697	1.09 (0.98, 1.21)	0.1046
African	1795	370	0.86 (0.78, 0.94)	0.0008	0.84 (0.77, 0.92)	0.0001
Black Scottish/Other	460	135	1.09 (0.96, 1.25)	0.1889	1.04 (0.91, 1.18)	0.5495
Chinese	6600	1685	0.97 (0.92, 1.02)	0.1796	1.05 (1.00, 1.09)	0.0327

Appendix table 4a- Risk Ratios (RR) and 95% confidence intervals (CI) of reporting poor health in 2001 by ethnicity, for males. Models are adjusted for age (model 1), for age and UK-birth (model 2) and for age, UK-birth and the interaction between UK-birth and ethnicity (model 3)

	N	Reported poor health	Model 1		Model 2		Model 3	
			Adjusted for Age		Adjusted for Age and UK-birth		Adjusted for Age, UK-birth and ethnicity*UK-birth	
			RR (95% CI)	p-value	RR (95% CI)	p-value	RR (95% CI)	p-value
White Scottish	1887415	170395	1		1		1	
Other White British	153805	11645	0.74 (0.69, 0.79)	<.0001	0.74 (0.70, 0.79)	<.0001	0.74 (0.69, 0.79)	<.0001
White Irish	19465	2565	1.17 (1.10, 1.25)	<.0001	1.27 (1.19, 1.35)	<.0001	1.15 (1.06, 1.24)	0.0005
Other White	28835	1980	0.85 (0.80, 0.91)	<.0001	0.98 (0.92, 1.05)	0.5629	1.21 (1.11, 1.33)	<.0001
Any Mixed Background	5260	310	1.36 (1.21, 1.52)	<.0001	1.44 (1.28, 1.61)	<.0001	1.52 (1.34, 1.73)	<.0001
Indian	6425	425	0.95 (0.86, 1.05)	0.3136	1.10 (0.99, 1.22)	0.0682	1.02 (0.84, 1.25)	0.8223
Pakistani	12905	1080	1.45 (1.35, 1.56)	<.0001	1.67 (1.55, 1.79)	<.0001	1.19 (1.04, 1.37)	0.0140
Bangladeshi	860	50	1.02 (0.79, 1.33)	0.8699	1.19 (0.91, 1.55)	0.2013	1.19 (0.71, 2.00)	0.5094
Other South Asian	2670	180	1.07 (0.92, 1.24)	0.3939	1.24 (1.06, 1.44)	0.0059	1.26 (0.97, 1.65)	0.0886
Caribbean	700	50	0.92 (0.70, 1.19)	0.5093	1.02 (0.78, 1.32)	0.9090	1.01 (0.68, 1.48)	0.9803
African	2100	105	0.86 (0.71, 1.05)	0.1433	1.01 (0.83, 1.23)	0.8999	1.60 (1.18, 2.17)	0.0024
Black Scottish/Other	445	40	1.34 (1.00, 1.79)	0.0476	1.42 (1.07, 1.90)	0.0168	1.27 (0.89, 1.83)	0.1927
Chinese	6500	240	0.58 (0.51, 0.66)	<.0001	0.68 (0.59, 0.77)	<.0001	0.81 (0.62, 1.06)	0.1277
Born outside UK vs UK-born					0.82 (0.79, 0.86)	0.0001	0.76 (0.70, 0.82)	<.0001
White Scottish*Born outside UK							1	
Other White British*Born outside UK							1.18 (1.03, 1.36)	0.0145
White Irish*Born outside UK							1.38 (1.21, 1.57)	<.0001
Other White*Born outside UK							0.78 (0.69, 0.89)	0.0002
Any Mixed Background*Born outside UK							0.86 (0.66, 1.12)	0.2672
Indian*Born outside UK							1.19 (0.94, 1.51)	0.1452
Pakistani*Born outside UK							1.70 (1.44, 2.01)	<.0001
Bangladeshi*Born outside UK							1.08 (0.59, 1.97)	0.8097
Other South Asian*Born outside UK							1.05 (0.76, 1.45)	0.7629
Caribbean*Born outside UK							1.10 (0.65, 1.88)	0.7175
African*Born outside UK							0.58 (0.40, 0.86)	0.0062
Black Scottish/Other*Born outside UK							1.51 (0.83, 2.73)	0.1743
Chinese*Born outside UK							0.86 (0.63, 1.17)	0.3253

Appendix table 4b- Risk Ratios (RR) and 95% confidence intervals (CI) of reporting poor health in 2001 by ethnicity, for females. Models are adjusted for age (model 1), for age and UK-birth and for age (model 2), UK-birth and the interaction between UK-birth and ethnicity (model 3)

	N	Reported poor health	Model 1		Model 2		Model 3	
			RR (95% CI)	p-value	RR (95% CI)	p-value	RR (95% CI)	p-value
White Scottish	1995375	197200	1		1		1	
Other White British	162370	13690	0.79 (0.75, 0.83)	<.0001	0.79 (0.75, 0.83)	<.0001	0.79 (0.74, 0.83)	<.0001
White Irish	21170	2835	1.06 (1.01, 1.12)	0.0268	1.14 (1.08, 1.21)	<.0001	1.10 (1.02, 1.18)	0.0081
Other White	34200	2390	0.79 (0.75, 0.84)	<.0001	0.89 (0.83, 0.94)	<.0001	1.14 (1.05, 1.24)	0.0023
Any Mixed Background	5675	345	1.21 (1.08, 1.34)	0.0006	1.26 (1.14, 1.41)	<.0001	1.41 (1.25, 1.59)	<.0001
Indian	5855	505	1.23 (1.12, 1.35)	<.0001	1.37 (1.24, 1.50)	<.0001	1.16 (0.98, 1.38)	0.0850
Pakistani	12690	1345	1.84 (1.72, 1.96)	<.0001	2.03 (1.90, 2.17)	<.0001	1.46 (1.29, 1.65)	<.0001
Bangladeshi	700	50	1.30 (1.00, 1.70)	0.0524	1.45 (1.11, 1.89)	0.0068	1.53 (0.95, 2.47)	0.0796
Other South Asian	2205	175	1.21 (1.05, 1.40)	0.0078	1.34 (1.16, 1.54)	<.0001	1.37 (1.09, 1.71)	0.0064
Caribbean	755	60	0.98 (0.77, 1.26)	0.8836	1.06 (0.83, 1.35)	0.6582	1.47 (1.11, 1.95)	0.0071
African	1795	90	0.82 (0.67, 1.00)	0.0527	0.92 (0.75, 1.13)	0.4262	1.28 (0.90, 1.80)	0.1667
Black Scottish/Other	460	45	1.31 (0.99, 1.72)	0.0562	1.37 (1.04, 1.81)	0.0248	1.10 (0.76, 1.59)	0.6218
Chinese	6600	310	0.67 (0.60, 0.75)	<.0001	0.76 (0.68, 0.85)	<.0001	0.57 (0.42, 0.78)	0.0005
Born outside UK vs UK-born					0.86 (0.83, 0.90)	<.0001	0.81 (0.76, 0.87)	<.0001
White Scottish*Born outside UK							1	
Other White British*Born outside UK							1.24 (1.11, 1.38)	0.0002
White Irish*Born outside UK							1.15 (1.03, 1.29)	0.0138
Other White*Born outside UK							0.74 (0.66, 0.83)	<.0001
Any Mixed Background*Born outside UK							0.69 (0.53, 0.90)	0.0055
Indian*Born outside UK							1.32 (1.08, 1.63)	0.0078
Pakistani*Born outside UK							1.69 (1.46, 1.96)	<.0001
Bangladeshi*Born outside UK							0.97 (0.55, 1.73)	0.9192
Other South Asian*Born outside UK							1.02 (0.76, 1.37)	0.8845
Caribbean*Born outside UK							0.45 (0.26, 0.77)	0.0037
African*Born outside UK							0.68 (0.45, 1.04)	0.0754
Black Scottish/Other*Born outside UK							1.92 (1.10, 3.34)	0.0219
Chinese*Born outside UK							1.47 (1.05, 2.06)	0.0254

Appendix table 5a. Risk Ratios (RR) and 95% confidence intervals (CI) of reporting a Limiting Long Term Illness (LLTI) in 2001 by ethnicity, stratified by sex, for males. Models are adjusted for age (model 1), for age and UK-birth and for age (model 2), UK-birth and the interaction between UK-birth and ethnicity (model 3)

	N	Reported a LLTI	Model 1		Model 2		Model 3	
			RR (95% CI)	p-value	RR (95% CI)	p-value	RR (95% CI)	p-value
			Adjusted for Age		Adjusted for Age and UK-birth		Adjusted for Age, UK-birth, ethnicity*UK-birth	
White Scottish	1887415	343095	1		1		1	
Other White British	153805	24685	0.81 (0.77, 0.84)	<.0001	0.81 (0.77, 0.85)	<.0001	0.80 (0.77, 0.84)	<.0001
White Irish	19465	4580	1.06 (1.01, 1.10)	0.0143	1.12 (1.08, 1.17)	<.0001	1.06 (1.01, 1.13)	0.0274
Other White	28835	3800	0.83 (0.79, 0.87)	<.0001	0.92 (0.88, 0.96)	0.0002	1.15 (1.08, 1.23)	<.0001
Any Mixed Background	5260	615	1.21 (1.12, 1.31)	<.0001	1.26 (1.16, 1.36)	<.0001	1.34 (1.23, 1.46)	<.0001
Indian	6425	770	0.86 (0.80, 0.93)	<.0001	0.96 (0.89, 1.03)	0.2276	0.94 (0.82, 1.07)	0.3522
Pakistani	12905	1980	1.29 (1.22, 1.36)	<.0001	1.42 (1.35, 1.49)	<.0001	1.15 (1.05, 1.26)	0.0041
Bangladeshi	860	90	0.89 (0.74, 1.08)	0.2441	0.99 (0.82, 1.20)	0.9170	1.11 (0.80, 1.54)	0.5442
Other South Asian	2670	355	1.06 (0.96, 1.18)	0.2226	1.18 (1.07, 1.30)	0.0010	1.21 (1.02, 1.43)	0.0296
Caribbean	700	100	0.98 (0.83, 1.16)	0.8181	1.06 (0.90, 1.26)	0.4919	1.11 (0.87, 1.42)	0.3836
African	2100	165	0.70 (0.60, 0.82)	<.0001	0.79 (0.68, 0.92)	0.0029	1.17 (0.92, 1.50)	0.2002
Black Scottish/Other	445	65	1.15 (0.93, 1.43)	0.1885	1.21 (0.97, 1.49)	0.0882	1.18 (0.91, 1.53)	0.2198
Chinese	6500	580	0.70 (0.64, 0.75)	<.0001	0.78 (0.72, 0.84)	<.0001	0.84 (0.72, 0.99)	0.0367
Born outside UK vs UK-born					0.86 (0.84, 0.89)	<.0001	0.86 (0.81, 0.90)	<.0001
White Scottish*Born outside UK							1	
Other White British*Born outside UK							1.16 (1.06, 1.26)	0.0007
White Irish*Born outside UK							1.14 (1.05, 1.25)	0.0025
Other White*Born outside UK							0.71 (0.65, 0.78)	<.0001
Any Mixed Background*Born outside UK							0.77 (0.64, 0.92)	0.0048
Indian*Born outside UK							1.04 (0.88, 1.22)	0.6689
Pakistani*Born outside UK							1.37 (1.23, 1.54)	<.0001
Bangladeshi*Born outside UK							0.85 (0.57, 1.28)	0.4445
Other South Asian*Born outside UK							0.98 (0.79, 1.20)	0.8164
Caribbean*Born outside UK							0.92 (0.65, 1.28)	0.6111
African*Born outside UK							0.59 (0.43, 0.80)	0.0007
Black Scottish/Other*Born outside UK							1.09 (0.70, 1.71)	0.7065
Chinese*Born outside UK							0.91 (0.75, 1.09)	0.3037

Appendix table 5b. Risk Ratios (RR) and 95% confidence intervals (CI) of reporting a Limiting Long Term Illness (LLTI) in 2001 by ethnicity, stratified by sex, for females. Models are adjusted for age (model 1), for age and UK-birth and for age (model 2), UK-birth and the interaction between UK-birth and ethnicity (model 3)

	N	Reported a LLTI	Model 1		Model 2		Model 3	
			RR (95% CI)	p-value	RR (95% CI)	p-value	RR (95% CI)	p-value
			Adjusted for Age		Adjusted for Age and UK-birth		Adjusted for Age, UK-birth and ethnicity*UK-birth	
White Scottish	1995375	372375	1		1		1	
Other White British	162370	26795	0.84 (0.81, 0.87)	<.0001	0.84 (0.81, 0.88)	<.0001	0.84 (0.81, 0.87)	<.0001
White Irish	21170	5015	0.99 (0.95, 1.02)	0.4355	1.05 (1.01, 1.09)	0.0098	1.02 (0.97, 1.07)	0.5014
Other White	34200	4460	0.82 (0.78, 0.86)	<.0001	0.90 (0.86, 0.94)	<.0001	1.14 (1.07, 1.21)	<.0001
Any Mixed Background	5675	605	1.12 (1.04, 1.21)	0.0041	1.17 (1.08, 1.26)	0.0001	1.25 (1.15, 1.36)	<.0001
Indian	5855	790	1.08 (1.00, 1.16)	0.0371	1.18 (1.10, 1.27)	<.0001	1.06 (0.93, 1.22)	0.3780
Pakistani	12690	2005	1.52 (1.44, 1.60)	<.0001	1.65 (1.56, 1.74)	<.0001	1.21 (1.10, 1.33)	0.0001
Bangladeshi	700	85	1.20 (0.99, 1.45)	0.0606	1.31 (1.08, 1.58)	0.0058	1.19 (0.83, 1.73)	0.3479
Other South Asian	2205	280	1.08 (0.97, 1.21)	0.1540	1.17 (1.05, 1.31)	0.0042	1.22 (1.03, 1.45)	0.0203
Caribbean	755	95	0.89 (0.74, 1.07)	0.1981	0.94 (0.78, 1.14)	0.5395	1.21 (0.96, 1.52)	0.1024
African	1795	155	0.84 (0.73, 0.98)	0.0236	0.93 (0.80, 1.08)	0.3319	1.26 (1.00, 1.60)	0.0537
Black Scottish/Other	460	75	1.18 (0.97, 1.42)	0.0915	1.22 (1.01, 1.48)	0.0363	1.09 (0.86, 1.39)	0.4719
Chinese	6600	615	0.75 (0.69, 0.82)	<.0001	0.84 (0.77, 0.91)	<.0001	0.81 (0.68, 0.97)	0.0226
Born outside UK vs UK-born					0.88 (0.86, 0.90)	<.0001	0.87 (0.83, 0.91)	<.0001
White Scottish*Born outside UK							1	
Other White British*Born outside UK							1.13 (1.04, 1.22)	0.0025
White Irish*Born outside UK							1.08 (1.00, 1.17)	0.0445
Other White*Born outside UK							0.73 (0.67, 0.79)	<.0001
Any Mixed Background*Born outside UK							0.77 (0.65, 0.93)	0.0055
Indian*Born outside UK							1.17 (1.00, 1.38)	0.0522
Pakistani*Born outside UK							1.60 (1.43, 1.79)	<.0001
Bangladeshi*Born outside UK							1.16 (0.76, 1.77)	0.5018
Other South Asian*Born outside UK							0.95 (0.76, 1.18)	0.6365
Caribbean*Born outside UK							0.56 (0.38, 0.83)	0.0033
African*Born outside UK							0.66 (0.49, 0.89)	0.0069
Black Scottish/Other*Born outside UK							1.42 (0.97, 2.07)	0.0717
Chinese*Born outside UK							1.05 (0.86, 1.29)	0.6306