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# **Measuring the health patterns of the ‘mixed/multiple’ ethnic group in Britain: Data quality problems, reporting issues, and implications for policy**

## **Abstract**

The ‘mixed’ group, officially recognised in the 2001 Census, is one of the most rapidly growing ethnic groups in Britain. Although ‘mixed’ categorisation was added to ethnic coding in NHS datasets, our knowledge of health patterns for this population is meagre. Data quality problems remain a key obstacle, including poor reproducibility of the data and constraints on reporting due to sparse data bias. The consequent minimal and indicative evidence base has focused mainly on risky health behaviours, mental health, and generic measures of self-rated health, as it has in the USA and Canada. There is negligible information on the main underlying causes of death, such as neoplasms, heart disease, and stroke. Consideration should be given to pooling data across multiple years of health and general purpose surveys to enable reporting for the four ‘mixed’ categories and adjustment for mediating factors and relevant confounders, such as measures of socio-economic status.

(149 words)

**Keywords** ‘mixed’ group, data quality, census, sparse data bias, NHS datasets, surveys

## **Introduction**

Since April 1995 when ethnic group was added to the data items in hospital episode statistics (HES) (Aspinall 1995), the National Health Service (NHS) and other statutory authorities have been collecting ethnic group data on patients. By 2014 over forty NHS datasets were ethnically coded (May 2014). Initially the 1991 Census ethnic group classification was used but this was followed by the mandatory use of the 2001 classification across government, the

first to include ‘mixed’ categorisation. New ethnic categories in the England and Wales 2011 Census - ‘Gypsy or Irish Traveller’ and ‘Arab’ - are yet to be added to NHS datasets (McCrirrick 2014). Consequently, since 2001, datasets have included the four Census ‘mixed’ categories, ‘White and Black Caribbean’, ‘White and Black African’, ‘White and Asian’, and a write-in ‘Any other mixed background’ group. The choice of these categories was not arbitrary but based on the responses of the 230,000 people who wrote in ‘mixed’ descriptions in the two free-text fields in the 1991 Census ethnic group question. Moreover, their incorporation of broad pan-ethnic labels like ‘White’, ‘Black’, and ‘Asian’ is more likely to reflect racialization processes affecting this population. Scotland and Northern Ireland 2001 and 2011 Censuses have used an open response ‘mixed’ category (though the Republic of Ireland’s 2016 Census used a write-in ‘Other, including mixed background’ option). From a perspective of health, this change has been important for a number of reasons.

Firstly, the ‘mixed’ group is one of the most rapidly growing in Britain. In the 2011 England and Wales Census 1.2 million persons were enumerated in the renamed ‘mixed/multiple’ group (2.2 per cent of the general population), up from around 670,000 (1.3 per cent) in 2001. This represents a 79% increase in a decade, only the ‘Other Black’ category growing more quickly. This growth rate was more than twice that experienced by the US multiple races population during 2000-10. Moreover, the proportion of people in England and Wales living as part of a couple who were in an inter-ethnic relationship increased from seven to nine per cent over 2001-11 (ONS, 2014a). The ‘mixed’ group is projected to continue increasing, the Oxford Centre for Population Research predicting that it will increase strongly to 2.2 million by 2031 and 4.2 million by 2054, though still smaller than the ‘Indian’ and ‘Other White’ groups (Coleman 2010), and not projected to become the largest minority ethnic group until 2071.

Secondly, our knowledge of health patterns in the country's diverse population has been based on single ethnic groups and, in some cases, on broader pan-ethnicities (such as White, Black, and Asian). Health policies have been developed around these groups and it is not known how patterns in the various 'mixed' groups might vary from single ethnic groups. Clearly, some hypotheses can be posed: that the 'mixed' groups reveal their own unique patterns; that they are intermediate between the two constituent groups; or that they more closely align with the White component, or that they are more similar to the minority ethnic component, where 'White' is part of the 'mix' as in the England and Wales Census pre-designated categories. Furthermore, such patterns may not be consistent but vary according to which particular dimension of health (for example, use of services, health behaviours, health conditions, or outcomes of treatment) is the focus. To date no systematic attempt has been made to investigate or narratively review how the growing 'mixed' population in Britain might shape health patterns and require specific health policies, though such research has been undertaken in the USA and Canada (Bratter and Mason 2016; Veenstra 2017).

Thirdly, there is an unfortunate historical legacy regarding discourses on the health and well-being of the 'mixed' population, the burden of which may have impeded investigations into the health of this group. The social representation of 'mixed race' people as tragic figures who experience pain and exclusion through being stranded between identities and communities is an image rooted in the twentieth-century pathologisation of 'mixed race' through terms like 'tragic mulatto' and 'marginal man' (Aspinall 2015). Further, the deleterious biological consequences of racial mixing were widely reported by geneticists and eugenicists in the first half of the century. Arguments invoking biological processes but of a different kind have also insinuated themselves over recent decades into discussions about the claimed exceptionalism of 'mixed' individuals. These invoke the genetic process of heterosis

or hybrid vigour that commentators, for example, Lewis 2010 and Ziv 2007, suggest may underpin success in meritocratic professions as well as attractiveness. However, in so far as contemporary reports and studies have focussed on the well-being of mixed couples or their offspring, these commentaries have mainly emphasised ‘deficit-type’ issues such as the high rates of lone parenthood / family breakdown and of drug treatment.

Finally, mixing and mixedness present some unique challenges. The census ‘mixed’ group is conspicuously the least residentially segregated - that is, most geographically widely spread - of all the main ethnic groups. Using the Index of Dissimilarity with 0 on the index indicating a completely even spread of the ethnic group’s population and 100 meaning complete separation, Catney (2015) showed that the 2011 score for ‘mixed’ was 32, well below that for White, Indian, Black African, Black Caribbean, Bangladeshi, and Pakistani (groups in the range 55-70), and even lower than Chinese (42) which has had consistently low levels of residential segregation over the last two decades. Moreover, the ‘mixed’ group in common with others became more dispersed between 2001 and 2011 (Catney 2015). Given the finding that ‘the type of ethnic groups captured by intervention efforts appeared to be tied to the spaces they occupied’ (Liu et al., 2012, p. 108), the diminished opportunities to participate is likely to reduce the utility of area-based health promotion programmes at, say, geographic neighbourhood or ward levels that focus on ethnically defined communities. Such approaches are further frustrated by our lack of knowledge in Britain about whether people in the different ‘mixed’ categories affiliate with the single groups that comprise their identities. Moreover, some of the strategies for populating health datasets with missing or incomplete ethnic group data are not available for the ‘mixed’ group. Algorithms that use name analysis to assign ethnic group (such as Nam Pehchan, SANGRA, and Onomap) are not applicable to individuals of mixed ethnicity and to women’s ethnicity in mixed marriages.

There is now a need for more robust research on the wider health and well-being of the ‘mixed’ population, in both Britain and the USA. Shortly after the 2000 US Census which introduced the mark one or more races’ instruction, the Chair of the US National Committee on Vital and Health Statistics’ Subcommittee on Populations wrote: ‘...important questions remain. How meaningful and predictive are the multiple race categories for health risk, health status and public health trends of these populations? Is the quality of the data derived from the multiple race tabulations equal to that for single race groups’ (Lumpkin 2001). While these questions equally apply to the British context, the response has been more muted and differences in how the ‘mixed’ group is operationalised in data collections and in the way findings are reported raise their own specific issues.

### **Data quality issues *associated with the ‘mixed/multiple’ group***

#### Category conceptualisation

The Office for National Statistics (ONS) has generally accorded importance to measures of ethnicity in the decennial census that are based on self-reported identification rather than operational measures such as parental ethnic group or more distant ancestry, although the 1991 Census referred to descent and ancestry in the question instruction. Thus, when Berthoud (1998) proposed a question for the 2001 Census asking ‘what are your family’s ethnic origins?’, with a set of predesignated categories and free-text to identify ‘your mother’s family’ and ‘your father’s family’, this was eschewed for an identity question.

These two measures - identity and (ancestral) origin - yield different populations. Some studies indicate that operational definitions of mixedness based on parentage capture a substantially larger (by a multiple of over 3) ‘mixed’ population (McFall 2012). Thus, the majority of persons who have mixed parentage identify with a single group. The Pew Research Centre reported in its 2015 survey findings that 1.4 per cent of the US adult

population self-described as two-or-more-races (Pew Research Centre 2015). However, a further 2.9 per cent were of multiracial background based on their parents and an additional 2.6 per cent were of multiracial background based on their grandparents, making 6.9 per cent in all. Only four-in-ten adults with a mixed racial background (39 per cent) said they considered themselves to be ‘mixed race or multiracial’, a similar proportion to that in the UK.

Where identity measures are used in health data collection, the fact that many who are mixed by parentage or more distant ancestry identify with single groups will obscure differences in the health measures used between the ‘mixed’ and other categories on wider dimensions of ethnicity. While mixedness based on parental or more distant ancestry may in some circumstances be a more appropriate or important additional measure when assessing risk and is likely to be more stable than identity measures, a major drawback is the absence of population denominator data for the calculation of rates (where the numerator is the number of cases of disease and the denominator the population at risk of disease) of the type yielded for identity by the census. As Bhopal (2014, p. 291) has noted: ‘A census or accurate population register is the essential resource for the denominator required for the calculation of rates for most population-based research’ (as exemplified by Bhopal et al., 2012). Where the population at risk is specifically recruited into the study, as in health and lifestyle surveys, the requirement for census denominators no longer applies, opening a space for the use of other measures such as ancestry. While allowing respondents in a survey question to select an ethnic group for both mother’s family and father’s family would be unsuitable for the decennial census as it creates a potentially very extensive list of possible combinations that are difficult to convert into discrete categories for tabular presentation, such analysis is clearly feasible in a research context and merits investigation.

Further, identity and origin (ancestry) are but two of a wider range of racial/ethnic dimensions, such as observed race (the race that others believe you to be), reflected race (an individual's belief of how others classify you), and phenotype (Roth 2016). In terms of official health data collection in Britain the salient attribute is self-classification of racial/ethnic identity based on census categories, though routine usage risks the objectification and reification of such categories.

### Category coverage

In deciding to include 'mixed' categorisation in the 2001 Census, ONS chose an 'exact combinations' method for three of the options and an open response 'any other mixed' for the fourth. All combinations privilege White as the first named group and the minority groups (Black Caribbean, Black African, and Asian) all invoke Britain's former colonial relationships. There is no example of mixed minority groups. These exact combinations may, by example, have led respondents utilising the open response option to identify other combinations that included White. Thus, coverage by the 'mixed/multiple' options may be constrained by defining 'mixedness' through reference to a White group and by limiting the number of combinations, thus rendering invisible those who are 'mixed minority'. Moreover, this method selects for 'mixed parentage' rather than identities involving more than two groups, estimated to comprise a fifth of the 'mixed' group (Aspinall and Song 2013). When ONS shifted the Chinese category into the 'Asian/Asian British' section in 2011, this changed the Asian component in the 'White and Asian' category from South Asian as ONS had intended in 2001 to continental Asian, including East and SE Asian.

In those areas of Britain that have seen substantial transnational in-migration from a very diverse range of countries, such as some of the inner London boroughs, there is evidence that young 'mixed' persons prefer to identify using countries of origin, which often bear no



relationship to Britain's colonial past (Aspinall and Song 2014). One consequence of this has been the burgeoning use of the free text 'any other mixed/multiple ethnic background' option in such areas.

### Category reliability

In England and Wales two types of data allow testing of response consistency: long-term stability and change between decennial population censuses; and short-term change (over a year or less), as mainly revealed by linked responses to the ethnic question in surveys and data collections. By comparing responses to the ethnic question in the 2001 and 2011 Censuses amongst the same ONS Longitudinal Study participants, a matrix of transitions can be compiled. Only modest proportions stayed in the same 'mixed' category from one census to the next: Mixed White and Black Caribbean, 76.4 per cent; Mixed White and Asian, 58.8 per cent; Mixed White and Black African, 56.8 per cent; and Other Mixed, 29.6 per cent (Simpson et al, 2016), all proportions below the White (99.2 per cent) and constituent minority ethnic groups (Bangladeshi, 96.5%, Pakistani, 91.9%, and Indian, 88.0%; Black African, 83.1%; and Black Caribbean, 81.1%). A complex set of transitions underlie this instability (Simpson et al., 2016, pp. 1036-37): '...the 'White & Asian' were more likely to move in 2011 into White British, than were 'White & Caribbean' and 'White & African'. The 'White & Caribbean' in 2001 were less likely to move into another Mixed group than were the other Mixed groups. Moreover, 'White & Caribbean' in 2011 were more likely to be added to from those who were White British in 2001 rather than to contribute to it'. The poor stability in the Other Mixed category is to be expected, given its heterogeneity, but the modest proportions in the 'White and Black African' and 'White and Asian' categories – not much over half – is a matter of concern. It is clear that the specification of exact combinations, unexpectedly, does not deliver stability, except in the 'White and Black Caribbean' category.

Broadly similar findings have been reported for studies that capture short-term reliability. Evidence from the Labour Force Survey whose panel structure permits comparisons within less than a year found the combined ‘mixed or multiple’ groups had a stability of 57.2% (38,100 of 66,600), less than all but one (‘Other’) of the eight other ethnic categories (Milburn 2013) and the 68.6% for the 10-year inter-census period. Further, in the 2011 Census Quality Survey (CQS) (ONS 2014b) which repeated the census questions amongst 9,651 individuals using face-to-face interviews 2 to 5 months after the census enumeration, around only two-thirds who chose ‘Mixed’ in the 2011 Census did so in the CQS. Moreover, the CQS doubled the number of mixed ethnicity responses.

Linkage of records from different sources also yields substantial instability. A study that compared ethnicity recording for the same children (6.7 million matched records) linked recorded ethnicity in the 2011 Census and the 2011 English School Census (ONS 2014c). The stability levels were 62 per cent for ‘White and Black Caribbean’, 55 per cent ‘White and Black African’, 54 per cent for ‘White and Asian’, and 47 per cent for ‘Other Mixed’. Amongst the discrepancies 12 per cent of records that held a ‘White and Black Caribbean background’ ethnic classification on the 2011 Census were recorded as ‘Any other mixed background’ on the English School Census. These stability levels were worse than White British (95 per cent) and the constituent minority ethnic groups.

Further evidence of instability is provided by Hospital Episode Statistics (HES), one of England’s largest health-related data warehouses. Amongst 561,602 linked patients in the Clinical Practice Research Datalink (CPRD) and HES, individuals coded as ‘Mixed’ in CPRD were most commonly White (30.9%) in HES (Mathur et al, 2013). Most individuals coded as ‘Mixed’ in HES were coded Black (56.0%) in CPRD. Agreed coding as ‘Mixed’ was just 15.5% and 4.5%, respectively. HES-recorded ethnicity, when linked with self-assigned ethnicity in an NHS patient survey, was found to be discordant for 74.9 per cent of

records for the 'Mixed' group overall, varying from 69.4 per cent in 'White and Black Caribbean' to 80.5 per cent in 'White and Black African', 84.4 per cent in 'White and Asian', and 87.8 per cent in 'Any Other Mixed'. (Saunders et al, 2013). The poor quality of HES data is further indicated by an analysis of patients with more than one hospital spell over the period 2003/04-2005/06: Mixed 'White and Black African' patients had only a 70% chance that a following admission would be coded in the same way, compared with 95% for the 'White British' group (Georghiou and Thorlby 2007).

### Category reporting

As the official category of 'mixed' and its constituent exact combinations are relatively new, spanning just two decennial censuses, there may have been some reluctance initially to report this data in surveys. For example, while the ethnically-enhanced 2004 Health Survey for England (HSE) included mixed categorisation, it was omitted in the published findings and very few subsequent annual survey reports have included it.

However, a more important and consistent data quality issue has been the reporting of findings for a single 'mixed' group rather than for each of the four constituent census categories. For example, inequalities for the 'mixed' group are available for only 10 of the 18 indicators in the Public Health Outcomes Framework but the type of mix is given for only three of these (all for children) (Public Health England 2017). Clearly, this practice matters less where measures of risk or the utilisation of services across the subcategories is similar. However, the limited health-related data that has been produced for the four 'mixed' categories shows substantial variability. Thus, reports and tables for a single 'mixed' group may not be representative of any of the exact combinations but a meaningless statistical average. This is a problem that affects other census categories and shows a worrying trend towards collapsing the detailed census tick options into the five section headings or pan-

ethnicities (White, Mixed, Asian, Black, and Other) or sometimes an even smaller set. For example, reports from the 2014 HSE have followed this practice for the ‘mixed/multiple’ and other sections, as have the What About Youth (WAY) survey reports, these surveys representing two of the most important sources of information on ethnicity and health. Where pan-ethnic groups have been chosen as the analytic category, there are some instances of the ‘mixed’ group being excluded on the grounds that its four constituent categories represent an unacceptable level of heterogeneity.

Folding the ‘mixed’ category into another pan-ethnic group, while a common reporting practice before its official recognition in 2001, is now less common. However, examples have been found of NHS data reported for ‘White British’, ‘White Other’, ‘Black/Black British’, ‘Asian/Asian British’, and ‘mixed, multiple, and other’, the last a residual category much too heterogeneous to be meaningful. The NHS/ONS Adult Psychiatric Morbidity Survey combines the ‘mixed/multiple’ and ‘other’ ethnic groups (McManus et al., 2016). There is a more informed process of such lumping in some US health surveys, such as the National Health Interview Survey (NHIS) and the Behavioural Risk Factor Surveillance System (BRFSS) that prompt multiracial respondents to select one race that ‘best describes’ their identity, thus enabling multiracial respondents to be transferred to the relevant monoracial group. Such questions (which have their origin in the bridging between the pre-2000 and 2000 US census categories for the purposes of administering civil rights legislation) have not been asked in an official UK context and only in research studies.

Only exceptionally have findings been reported for ‘mixed’ categorisation more detailed than the census. In an investigation of behavioural problems amongst children in the Millennium Cohort Study, Zilanawala et al (2016) constructed seven ‘mixed’ ethnic categories using mother’s reports of the cohort child’s ethnicity facilitated by father’s ethnicity.

## Demographic constraints

As the ‘mixed/multiple’ group is still a relatively youthful population, this means that (given its small overall size), only small numbers of adults are achieved in national health surveys designed to capture a representative sample of the country’s population. Data from the 2011 HSE illustrates the small numbers problem (or sparse data bias) under the usual sample design without ethnic boosts (Health and Social Care Information Centre 2013). The raw numbers for all aged 16+ in the four mixed categories varied from 10 to 32, totalling 99 (of a total 16+ sample of 8,570), while those in the 0-15 age group varied from 16 to 41 (or 114 in all, of a total of 2002). By contrast the 2014 WAY Survey of 15 year olds achieved a ‘mixed’ response of 4,535 from an achieved sample of 120,115. These data indicate that either very large sample sizes are needed to achieve a usable ‘mixed’ sample or pooling across a number of survey years.

An analysis of differences in health between the Black, White and mixed Black and White groups in Canada (Veenstra 2017) required pooled data from ten cycles (2001-2013) of the Canadian Community Health Survey, yielding an unweighted sample of 675 mixed Black and White respondents. Even with this extensive pooling, small numbers meant that some health indicators (asthma, diabetes, cancer, and heart disease) could not be examined, leaving the cases of hypertension, self-rated health, and self-rated mental health in the analysis; limited the list of potential confounders that could be controlled for; and prevented the examination of racial health inequalities for the included conditions by gender.

These problems with data quality have no doubt contributed to the paucity of research on the health of the ‘mixed’ group. While scope exists for pooling data from annual health and general purpose surveys to accrue a usable sample, this has only been undertaken for smoking and some other health behaviours. Consequently, very few health-related datasets

yield information for the ‘mixed’ group and scarcely any on the constituent four mixed background categories.

### **The limitations of the evidence base on the health of the ‘mixed’ group in Britain**

There is negligible information on the main underlying causes of death, notably, neoplasms, heart disease, and stroke. The sparse reporting of the health of the ‘mixed’ group tends to focus on risky health behaviours, generic measures of self-rated health from the census and surveys, and mental health, as it does in the USA and Canada. However, even in these areas, an understanding of health patterns in the ‘mixed’ group is substantially constrained by methodological limitations in data collection and reporting. The emerging evidence base is critically reviewed with respect to these limitations.

#### Health behaviours

While there has been increased reporting of smoking prevalence by ethnic group, the use of a single ‘mixed’ group is a major drawback. For example, using pooled data for England from the Smoking Toolkit Study (2014-16, n=53,922), Beard et al. (2017) show that the mixed/multiple group had a greater adjusted risk of smoking (RR 0.96, 95% CI, 0.83-1.11) than the Asian (0.41, 0.38-0.45) or Black (0.40, 0.35-0.46) groups, compared to the White reference group. According to ONS’ UK analysis of the 2014 Integrated Household Survey, current smoking rates in the mixed/multiple group were 29.4% for males and 19.2% for females, higher than for any other ethnic group (only Asians being broken down into their 2011 census categories) (ONS 2015). 2014 findings from the What About Youth Survey (Health and Wellbeing of 15 year olds in England) shows that around 9% of the White and

Mixed groups were occasional or regular smokers, substantially higher than for Black, Asian, or Other youths.

These aggregate figures for the 'mixed' group conceal substantial heterogeneity. In a study of smoking habits by ethnic category using the Integrated Household Survey (3 years pooled) and GP Patient Survey (GPPS) (Aspinall and Mitton 2014), 'mixed' rates were high in both surveys, exceeding 30% amongst males and females in the 'White and Black Caribbean' group, and were also high amongst 'White and Black African' males (28-34%) and females (25%). Rates were lower in the 'White and Asian' group (23% amongst males and 16% amongst females in the GPPS).

Similarly, most ethnically-coded data on alcohol consumption is at the pan-ethnic group level. The 2014 HSE's odds ratio for increasing risk or higher risk drinking in the mixed/multiple group (based on pooled 2012-14 data) were below the White reference category for men and women but higher than for the Asian (statistically significantly so) and Black groups (Fuller 2015). Similar findings were reported for high risk drinking status using the Alcohol Toolkit Studies, the 'Mixed/multiple' group having a relative risk compared with the White group of 0.87; the Asian (0.08), Black (0.25), and Other (0.42) groups were all statistically significantly at lower risk (Beard et al., 2017).

Based on height and weight measures for the 16+ population, the prevalence of increased or high risk of diabetes was reported by pan-ethnic group (White, Black, Asian, and Mixed/multiple) in the 2014 HSE. Black men and women were most at risk of diabetes, followed by Asian men and women, Mixed/multiple men and women having similar rates to the White group (Scantlebury and Moody 2015). However, children at ages 4-5 and 10-11 in the 'White and Black Caribbean' and 'White and Black African' groups have high levels of

excess weight, while those in the 'White and Asian' group have amongst the lowest level of excess weight (Public Health England 2017).

These findings are part of a pattern of more risky health behaviours amongst the 'mixed/multiple' group, though analyses are more extensive for young people. The WAY Survey 2014 shows that the proportion of young people from a Mixed ethnic background who had ever been offered cannabis was higher (36%) than the proportion for all other ethnicities that had ever been offered it (e.g. 11% in the Asian group) (Health and Social Care Information Centre and Ipsos MORI, 2015). Young people from a Mixed ethnic background were more likely than young people from all other ethnicities to have last used cannabis in the last month, last year, or more than a year ago (7%, 14%, and 3% respectively compared with 5%, 9% and 2% overall). The proportion of young people from a White or Mixed ethnic background who had ever tried other drugs (3%) was higher than the proportion for other ethnicities, notably, 1% from an Asian or Black ethnic background. Young people from a White background (18%) and from a Mixed ethnic background (15%) were more likely to have engaged in three or more risky behaviours than participants from Black (6%) and Asian (3%) backgrounds. Among those who had ever had an alcoholic drink, young people from Mixed (25%) and White (24%) ethnic backgrounds were more likely than those from an Asian (15%) and Black (16%) background to report having been drunk in the last 4 weeks.

There are a number of major data gaps. While the National Drug Treatment Monitoring System (NDTMS) collects data using the Census categories (including the four mixed categories), the annually reported substance misuse statistics provide only counts by ethnicity of all clients in treatment for opiate, non-opiate only, non-opiate and alcohol, and alcohol, and the percentage they comprise of total clients (Public Health England 2016). This is also the case for substance abuse amongst young people. Clearly, these data offer scope for



secondary data analysis, though the derivation of rates would require the use of estimated population denominators from the Census.

#### Generic health status

The 2011 England and Wales Census asked respondents if their day-to-day activities were limited because of a health problem or disability which has lasted, or is expected to last, at least 12 months, with a prompt to include problems related to old age (a similar question being asked in the 2001 Census). The advantage of this data is that it is available for the four 'mixed' subcategories and across two censuses. In 2011 the lowest illness ratios (compared with the England and Wales population) were found in the mixed White and Asian category (0.82 and 0.83 for females and males, respectively) and the highest in the mixed White and Black Caribbean category (1.04 and 1.14, respectively) (Bécares 2013). These positionings were also found in the 2001 Census. The relationship of these ratios to those of their constituent categories varies. For example, in 2001 among men, the Mixed White-Black Caribbean group has a high ratio similar to that of the Black Caribbean group. In 2011 amongst women, the Mixed White-Black African group has a ratio closer to the White than Black African groups.

In Wales in 2011 the overall 'mixed/multiple' ethnic group had the highest age-standardised rate (26.0) of those limited a little or a lot of any pan-ethnic group, above 'White British or Irish' (23.6), these groups also having the highest percentages in the under 65 population (Public Health Wales Observatory 2015).

#### Mental health

Only limited quality information is available on the mental health of the 'mixed/multiple' group. The 2014 Adult Psychiatric Morbidity Survey collected a wealth of ethnically-coded

information on: common mental disorders, post-traumatic stress disorder, psychotic disorder, hazardous and dependent drinkers, illicit drug use, and signs of drug dependence. However, the use for reporting of a 'mixed, multiple, or other' group, combined with its small base count (57 men and 94 women) substantially diminishes its utility (McManus et al, 2014).

In contrast the Mental Health and Learning Disabilities Dataset (MHLDDS) - superseded by the Mental Health Services Dataset (MHSDS) on 1 January 2016 - yields significant disaggregated data for the four 'mixed' categories (NHS Digital 2016). This is largely as a result of the significant number of people in contact with services across the 2001 Census 16 ethnic categories. This included 21,862 in the 'mixed' group, yielding adequate numbers in each of the 4 categories (7,483 White and Black Caribbeans; 2,392 White and Black Africans; 3,511 White and Asians, and 8,476 Any Other Mixed Background).

The 2015-16 Annual Report provides a number of ethnicity tables. Crude rates of access to NHS funded adult secondary mental health and learning disability services per 100,000 population were lower in the 'mixed' than the Black/Black British and White categories but generally higher than the Asian/Asian British categories. Data show higher proportions of people in contact with these services were admitted to hospital in the mixed categories than in the White or Asian/Asian British categories but not as high as in the Black/Black British categories. Mental Health Act detentions per 100 people hospitalised in these services were higher for the 'mixed' categories than those for the White categories but lower than those for the Black/Black British and Asian/Asian British categories. Only numbers were reported for uses of short-term detention orders under Part II of the Mental Health Act 1983 in these services. The percentage on the Care Programme Approach in the mixed categories was higher than in the White and Asian/Asian British categories but lower than in the Black/Black British categories. In the White categories, the number of Care Clusters assigned at the end of the year by Psychotic superclass were lower than for each of Non-Psychotic and Organic

superclasses. In the Mixed, Asian/Asian British, and Black/Black British categories the numbers in the Psychotic superclass were greater than those in each of the Non-Psychotic and Organic superclasses. Although there was some variability in rates and proportions across the four 'mixed' categories, this variability was generally less than that between these categories and those comprising the Asian/Asian British and Black/Black British categories. This suggests that the state of mixedness, in itself, is contributing to shared experiences in the way mental health and learning disability services are utilised.

Other NHS datasets indicate that the mixed group or its constituent categories may confer greater risk. Six annual one-day snapshot Count me in censuses conducted between 2005-10 were designed to support the Department of Health's five-year action plan, Delivering Race Equality in Mental Health Care, for improving mental health services for minority ethnic communities in England. Between 31,020 and 33,785 mental health patients were counted at each census, yielding adequate counts for the 'mixed' categories (255 to 418 White and Black Caribbeans, 71 to 139 White and Black Africans, 91 to 141 White and Asians, and 167 to 213 Other Mixed) (Care Quality Commission 2011). Overall, the findings show little change over the years. Inpatient admission rates were higher than average among Black and White/Black Mixed groups. Rates of detention under the Mental Health Act were higher than average among the Black, White/Black Caribbean Mixed, and Other White groups. Although subject to fluctuations, seclusion rates were generally higher than average for the Black, White/Black Mixed, and Other White groups.

The Improving Access to Psychological Therapies (IAPT) programme began in 2008. In the 2013/14 dataset, there were 15,796 IAPT service users who were coded as 'mixed', though 26.9% of all service users (n=933,547) had unknown ethnic group (NHS Digital 2014). The 'mixed' pan-ethnic group had the highest crude rate per 100,000 population of referrals to

this service and the ‘Any other mixed background’ and ‘White and Black Caribbean’ categories the highest and third highest across the 16 census ethnic group categories.

#### Other health conditions

There is negligible information on the main underlying causes of death, such as neoplasms, heart disease, and stroke. The Scottish Health and Ethnicity Linkage Study (SHELs) – a cohort profile matching 4.65 million people in the 2001 Census and national health datasets – provides some findings as the 2001 Scotland Census included a write-in ‘Any Mixed background’ option. For lung cancer the directly age standardised rates and ratios for any mixed background men were high (174.5) with the White Scottish population as reference (value 100) (Bhopal, Bansal, Steiner et al, 2012). The consistently high smoking rates that have been reported for the ‘mixed’ group may help to explain this finding. A recent study of lifetime risk of being diagnosed with, or dying from, prostate cancer by ethnic group in England did not report on the ‘mixed’ category: ‘...this study does not provide any information on men of mixed ethnicity since the minor ethnic groups within the major ethnic group ‘Mixed’ include a wide range of mixed ethnicities, making it difficult to attribute any potential differences in risk to one particular ethnicity’ (Lloyd, Hounsome, Mehay et al, 2015).

#### **Discussion and implications for health policy**

Guidelines should be implemented for improving data quality for the ‘mixed’ group at both data collection and reporting. Where it is feasible to do so, data should be presented for the four ‘mixed’ categories. In the case of small numbers (or sparse data bias), consideration should be given to pooling data across multiple years where this is possible. Given the heterogeneity of the ‘mixed’ group, reporting data only at the level of ‘mixed/multiple’ lacks utility for the assessment of health risks. Even more unsatisfactory is the use of a combined

‘mixed, multiple, and other ethnic group’ category (as used, for example, in the Adult Psychiatric Morbidity Survey). 2011 England and Wales Census data shows that the Other ethnic group (comprising Arab and Any other ethnic group) added to the mixed/multiple category of 1,224,400 a further 563,696 persons, an increase of 46%, thereby undermining its integrity as a measure of mixedness.

Any departure from the use of census categorisation in the routine collection of health data is problematic as census counts are required as denominators for the construction of rates and ratios. While additional measures of ‘mixedness’ may be desirable in certain health contexts, such as measures based on ancestry, including parentage and more distant ancestry (Bratter and Mason, 2016, recommend self-identified race, parents’ races, and physicians’ sense of the race of their patients, in a US context), to argue that additional measures should be extended in a UK context to routine data collections underestimates the complexity of such processes and their bureaucratic inertia. Even adding new (2011 Census) ethnic categories to NHS datasets is proving an intractable challenge.

To date only limited findings have been reported on the health patterns of the mixed/multiple ethnic group in Britain. Analyses of a range of different datasets have consistently reported high smoking rates in the ‘mixed’ group. The high male lung cancer rates in the ‘mixed’ group in Scotland probably reflect high exposure to smoking in this group. It is worthy of note that the two-or-more-races population in the USA has a higher proportion of current smokers than single races, with the exception of the American Indian or Alaska Native race (CDC 2016).

There is also some evidence of greater use of illicit drugs amongst the ‘mixed’ population, although key sources like the NDTMS annual reports give only numbers rather than population rates. Again, analyses of young people in the USA have yielded similar findings.

For example, lifetime illicit drug use amongst persons aged 18 to 25 was 64.3% in the two-or-more-races group, only American Indians or Alaska Natives having a higher rate (Substance Abuse and Mental Health Services Administration 2015).

No clear picture emerges with respect to mental health services, the ‘mixed’ group frequently occupying an intermediate position. However, access to psychological therapies is a notable exception, ‘mixed’ categories having amongst the highest referral rates. Veenstra (2017) found that respondents who identified as both Black and White were more likely than White and Black respondents to report fair or poor mental health, while some US research indicates that multiracial youth have higher levels of mental health issues (Fisher et al, 2014).

These findings for Britain provide only indicative evidence of the association between mixedness and health outcomes. Scope exists for secondary data analysis using, for example, multiple years of the HSE, and further investigation of routine NHS data collections such as the MHSDS and the NDTMS. Moreover, studies are needed that adjust for measures of socio-economic status as mediating factors and relevant confounders. Only such robust studies and related qualitative research can provide the foundation for the development of explanatory hypotheses for disparities in the health of the ‘mixed’ population. In the past there has been a tendency to invoke concepts of ‘in-betweenness’, marginality, and identity confusion to account for inequalities, especially those in mental health and high risk health behaviours. In reality a range of processes may be at work, including racism and the fear of racism, a lack of accordance between personal racial/ethnic identities and the perceptions of the wider society, and the role of ‘mixed race’ stereotypes in healthcare settings.

Finally, data that is of quality is a prerequisite for the formulation of health policy. For example, services might be more effective if they targeted culturally appropriate interventions on ethnic/racial groups with elevated risks. While there is no assurance that the availability of

such data will result in policy makers acting on it, the revival of interest in ethnic/racial disparities in health and more widely, including a Cabinet Office (2016) audit of such disparities, provides a more propitious climate. Moreover, the availability of correction factors for misclassification errors in self-reported race/ethnicity in administrative records (Saunders et al, 2013) (one source of instability for the ‘mixed’ group), the promotion of spatial analysis as a tool for public health programme design, and the use of online surveys and web-based panels for accessing dispersed populations are addressing some of the unique challenges of the ‘mixed’ group.

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