Research Report

Using routinely collected data to compare hospital admission rates by ethnic group in Scotland

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Introduction

The routine collection of ethnicity data on administrative health records is necessary for NHS Boards to monitor their duty under the Equality Act to be active in promoting equality. It is also required to support the aims of the NHSScotland Quality Strategy in 'understanding the needs of different communities, eliminating discrimination, reducing inequality, protecting human rights and building good relations by breaking down barriers that may be preventing people from accessing the care and services that they need'.

Ten years ago only a small proportion of routine hospital records captured the ethnicity of the patient. Meanwhile research projects such as the Scottish Health and Ethnicity Linkage Study (SHELS)[1] have been vital in demonstrating how ethnic groups in Scotland compare in terms of a number of health outcomes.

However, efforts by NHS Boards, ISD and the Scottish Government to improve the completeness rates have seen gradual improvement in availability of ethnicity on inpatient and outpatient hospital morbidity records. The most recently available completeness figures indicate that a valid ethnic group is now recorded for over 80% of all acute inpatient and day case records in Scotland[2].

Given this, ISD have been working with Scottish Migrant and Ethnic Health Research Strategy Group (SMEHRS) to produce the first analyses at national level in Scotland of these data. The aim of these analyses was to determine if ethnicity coding is now of sufficient quality and completeness to allow more routine publication and analysis of hospital inpatient activity in Scotland. The focus of these initial analyses has been on all-cause hospitalisation rates and on hospitalisation rates for coronary heart disease (CHD), by ethnic group. The methods and results reported allow wider dissemination of the benefits of improved coding among the health service and public.

Methodology

These analyses compared hospital admission rates in 2013 by ethnicity using hospital episodes data (SMR01). Completeness of hospital episode records for this year was 76.1% across Scotland. The remaining records were labelled missing, unknown or patient refused.

Presenting rates based on incomplete data would underestimate true admission rates and could be subject to bias in comparison across ethnic groups. However, patients can have multiple episodes of care within a single admission and multiple admissions to hospital over time with ethnicity recorded against each episode. Therefore to reduce the number of hospital admissions with unknown ethnicity, episodes from 2009 to 2015 were matched to provide a patient's hospital history. It was decided that a patient's most recently recorded ethnicity, where available, would be identified and this code was then used to populate all hospital admissions for that patient. This reduced the numbers of episodes with missing ethnicity from 24% to 15%. The remaining episodes with missing ethnicity were grouped into age and sex categories and distributed across ethnic groups in proportion to the distribution of known ethnicities within each age and sex category, using a method similar to that used for cancer rates in England[3].

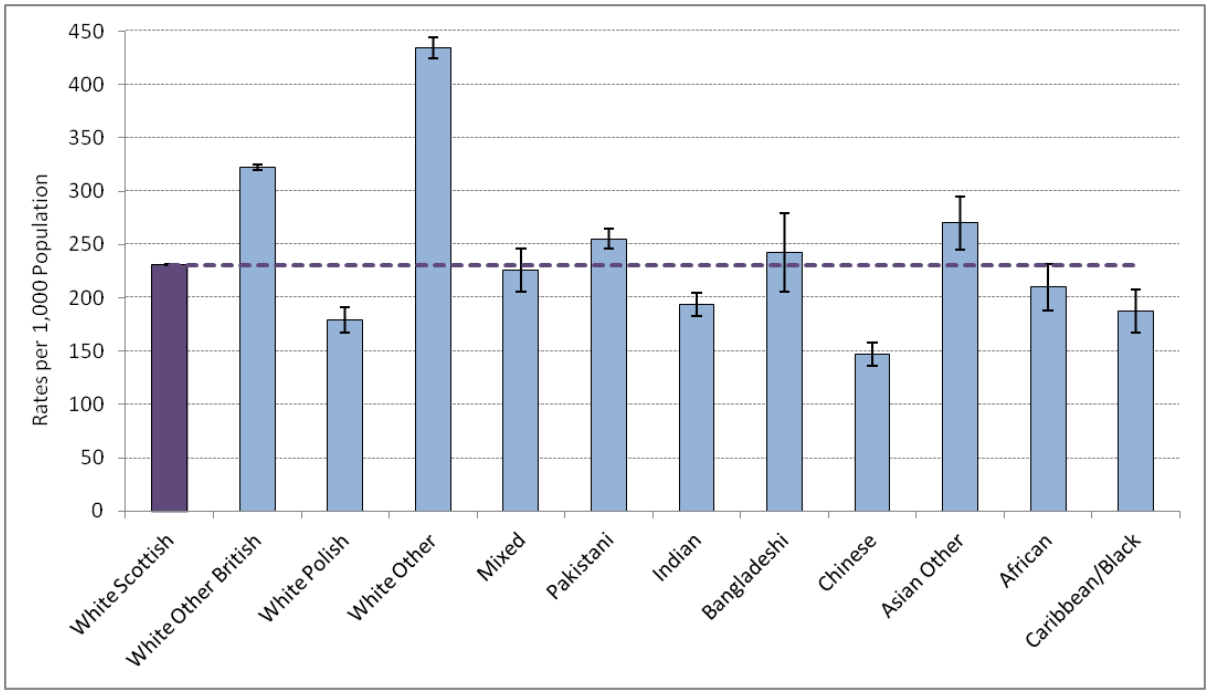
Admission rates were calculated using 2011 census populations and standardised by age using the 2013 European Standard population[4] as the reference. Ethnic groups were combined where results suggested that groups consisted of too few patients for robust comparison, in particular for the African and Black or Caribbean groups. Confidence intervals were calculated for directly standardised rates using Poisson distribution method. These do not account for variation in the method of assigning ethnicity where this is missing, but ongoing work is looking at the impact of different assumptions for this. Rate ratios were calculated to compare rates for ethnic groups relative to the majority White Scottish reference population. Subsequent examination of hospitalisation rates for coronary heart disease was also undertaken to allow comparison with previous research findings[5].

Results

All hospital admissions:

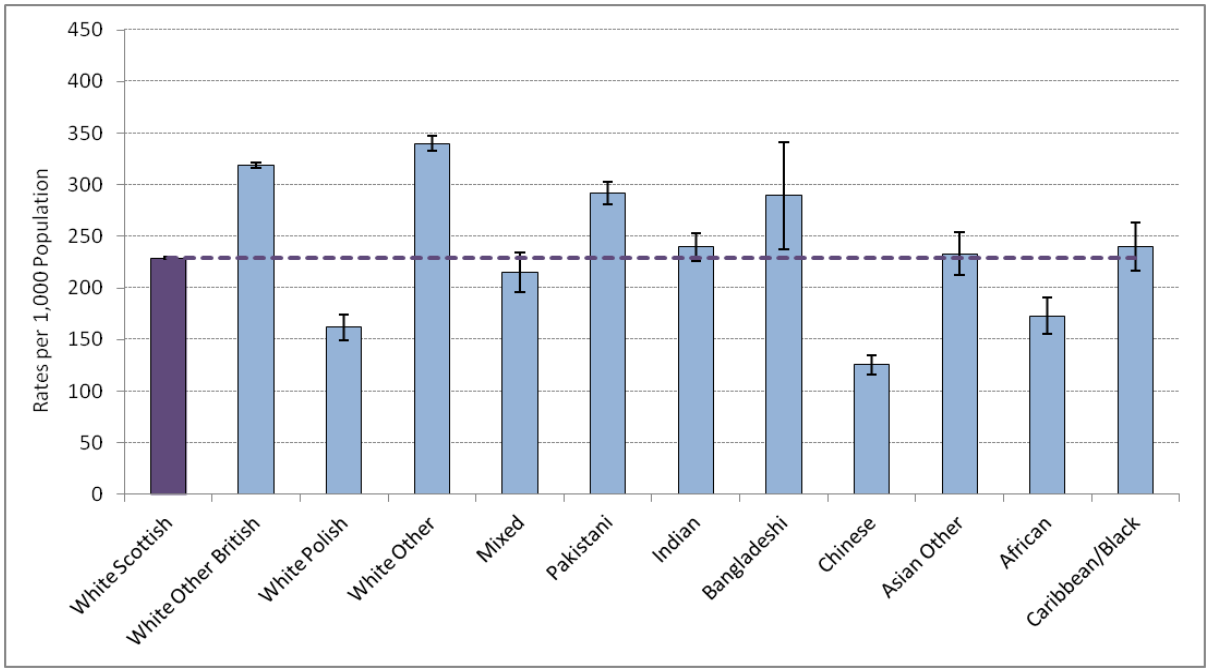
Figures 1a and 1b show the estimated hospital admission age-standardised rates per 1,000 population by ethnicity for Scottish residents, for males and females, respectively. These demonstrate significant variation across ethnic groups in admission rates.

Figure 1a: Male Hospital Admissions in Scotland, 2013; European Age-Standardised Rates per 1,000 population



Standardised to the 2013 European Standard Population

Figure 1b: Female Hospital Admissions in Scotland, 2013; European Age-Standardised Rates per 1,000 population



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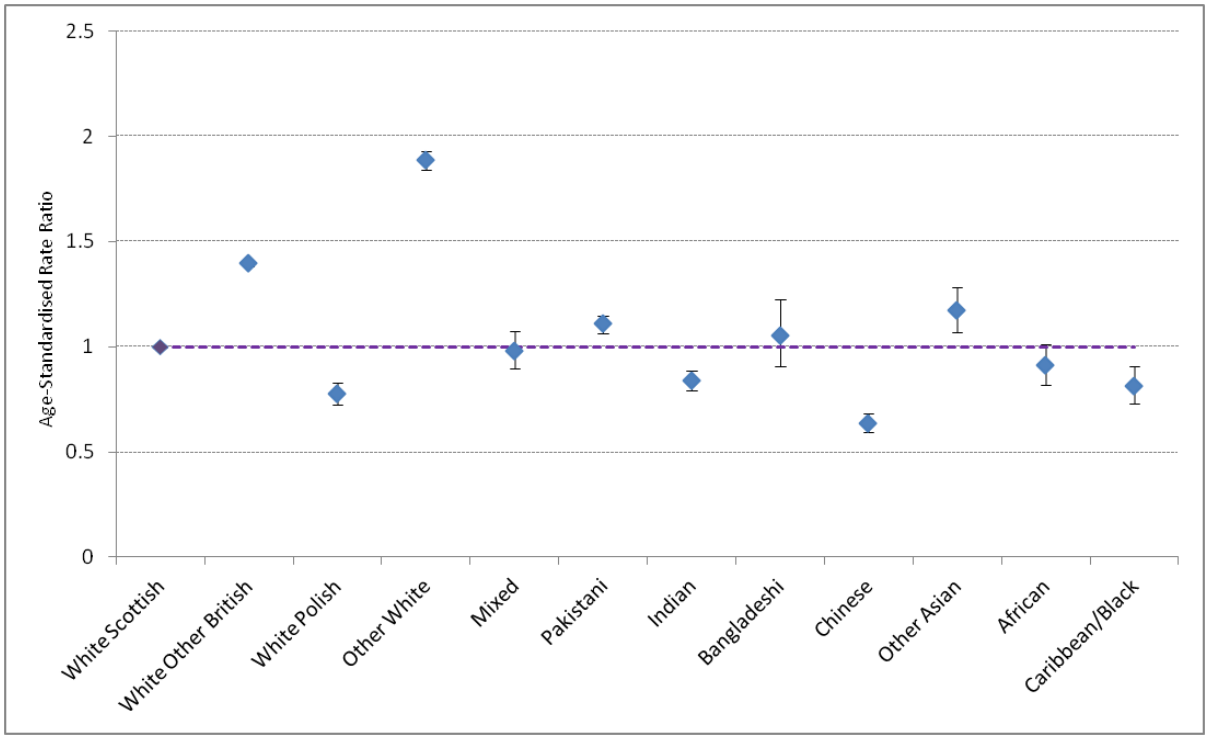
For a small number of groups, results were at odds with previous evidence, or were suggestive of inaccurate use of codes, and these are shown separately in **Appendix 1**. These include Gypsy/Traveller and Arab codes which were first introduced in the 2011 Census.

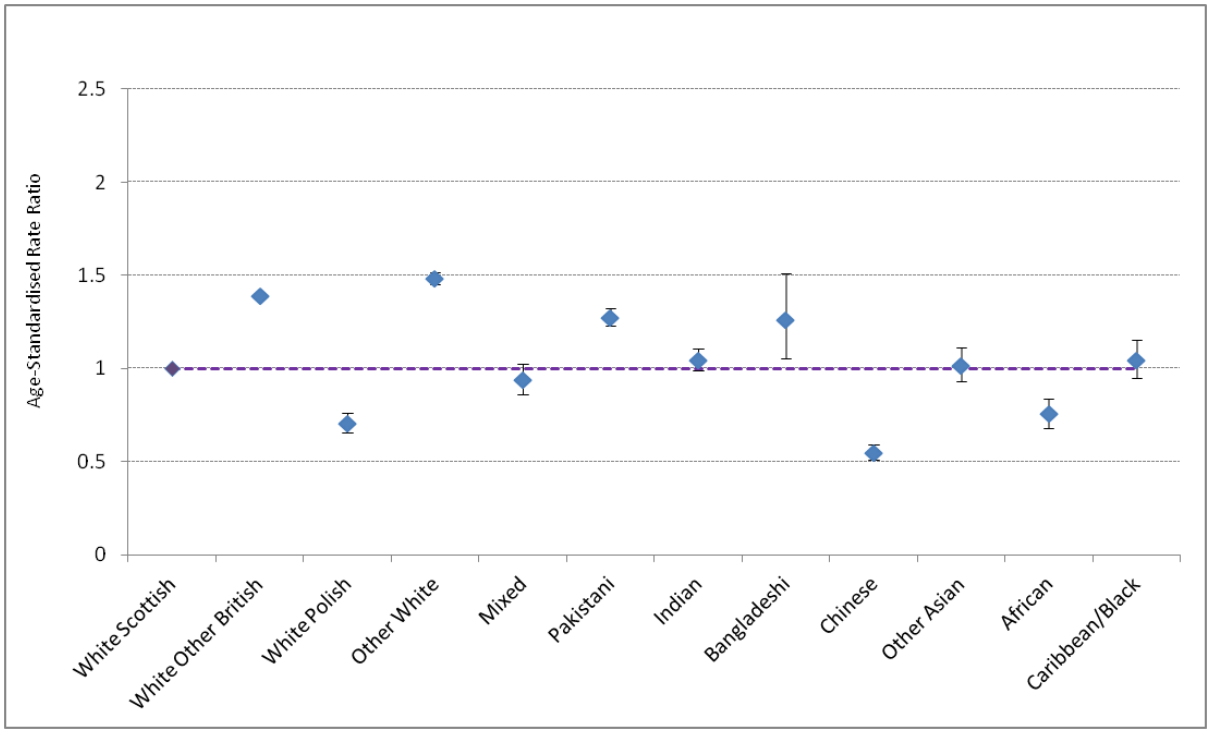
Rate ratios for admissions for each ethnic group relative to the White Scottish group are shown in Figures 2a and 2b for males and females, respectively. Lower rates were evident among White Polish and Chinese groups for both sexes relative to White Scottish, with higher rates in some Asian groups as well as White British and White Other. There were some notable differences between the sexes in rates for some ethnic groups relative to the White Scottish population.

Figure 2a: Male Hospital Admissions in Scotland, 2013: Age Standardised Rate Ratios



Standardised to the 2013 European Standard Population

Figure 2b: Female Hospital Admissions in Scotland, 2013: Age Standardised Rate Ratios

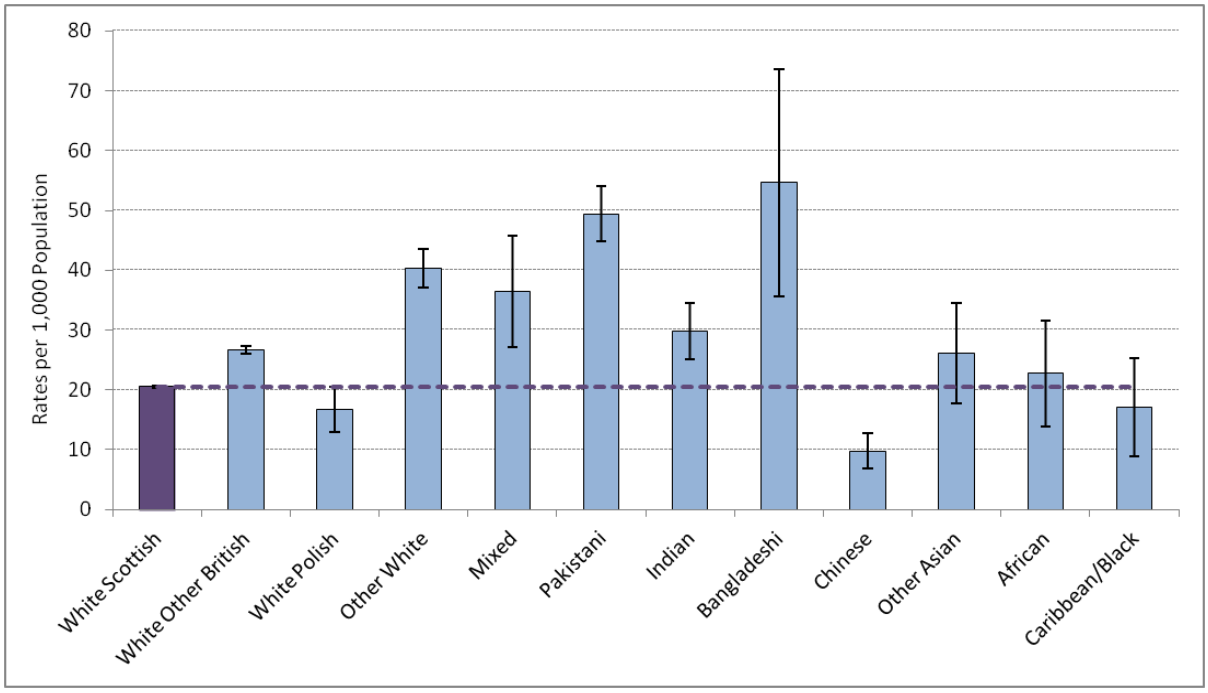


Standardised to the 2013 European Standard Population

Hospital admissions for Coronary Heart Disease:

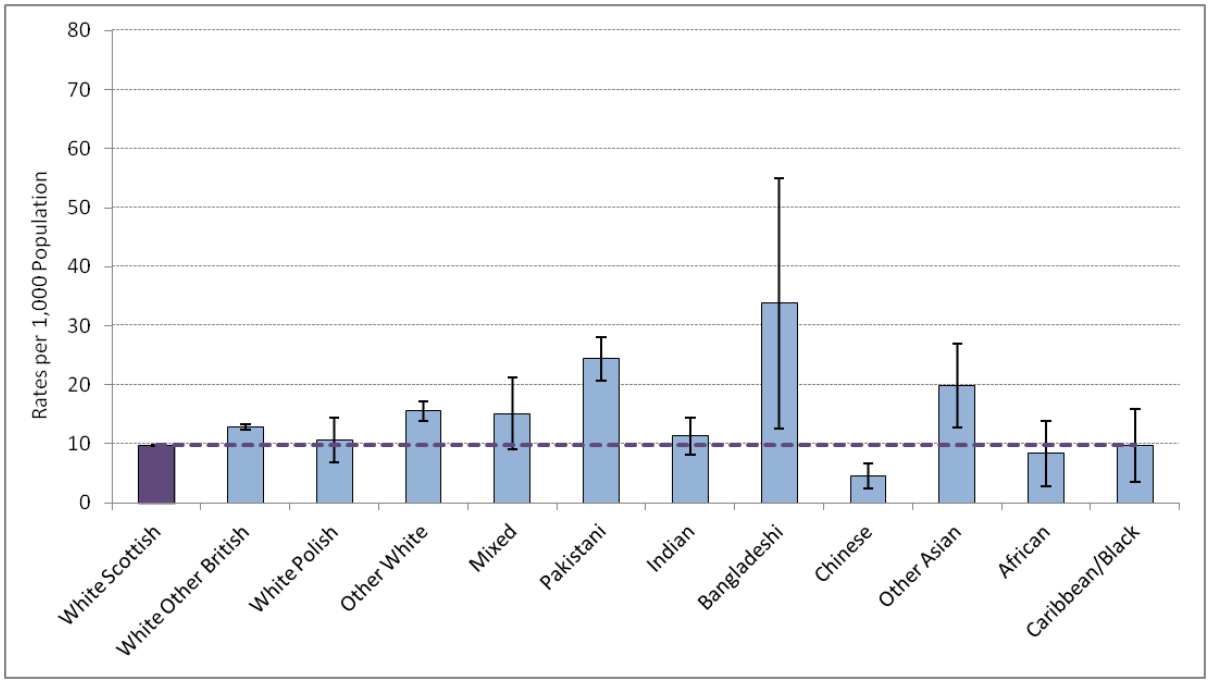
Figures 3a, 3b, 4a and 4b show similar rates for males and females; and rate ratios for males and females, specifically for admission for coronary heart disease (CHD). Higher rates of CHD were seen among Pakistani and Bangladeshi groups, and lower rates among the Chinese population; these are consistent with previous results produced as part of the SHELS project[5].

Figure 3a: Male CHD Hospital Admissions in Scotland 2011-13; European Age Standardised Rates per 1,000 population



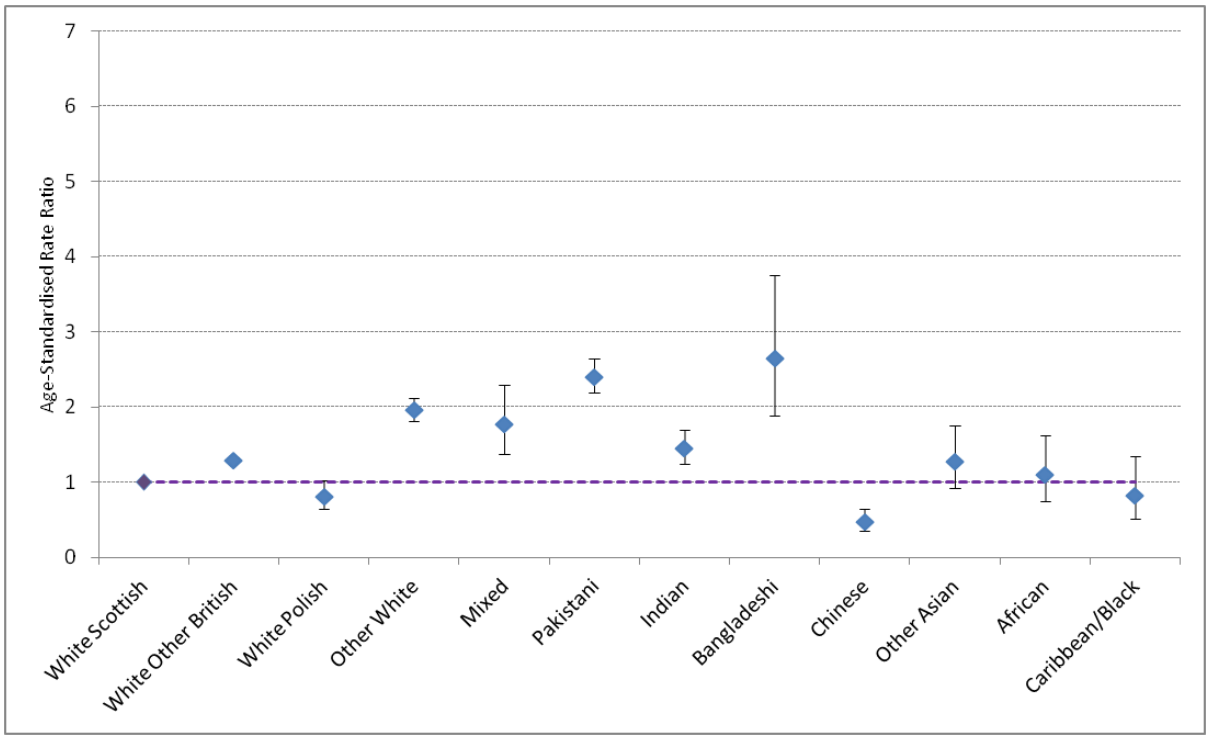
Standardised to the 2013 European Standard Population

Figure 3b: Female CHD Hospital Admissions in Scotland, 2011-13; European Age Standardised Rates per 1,000 population



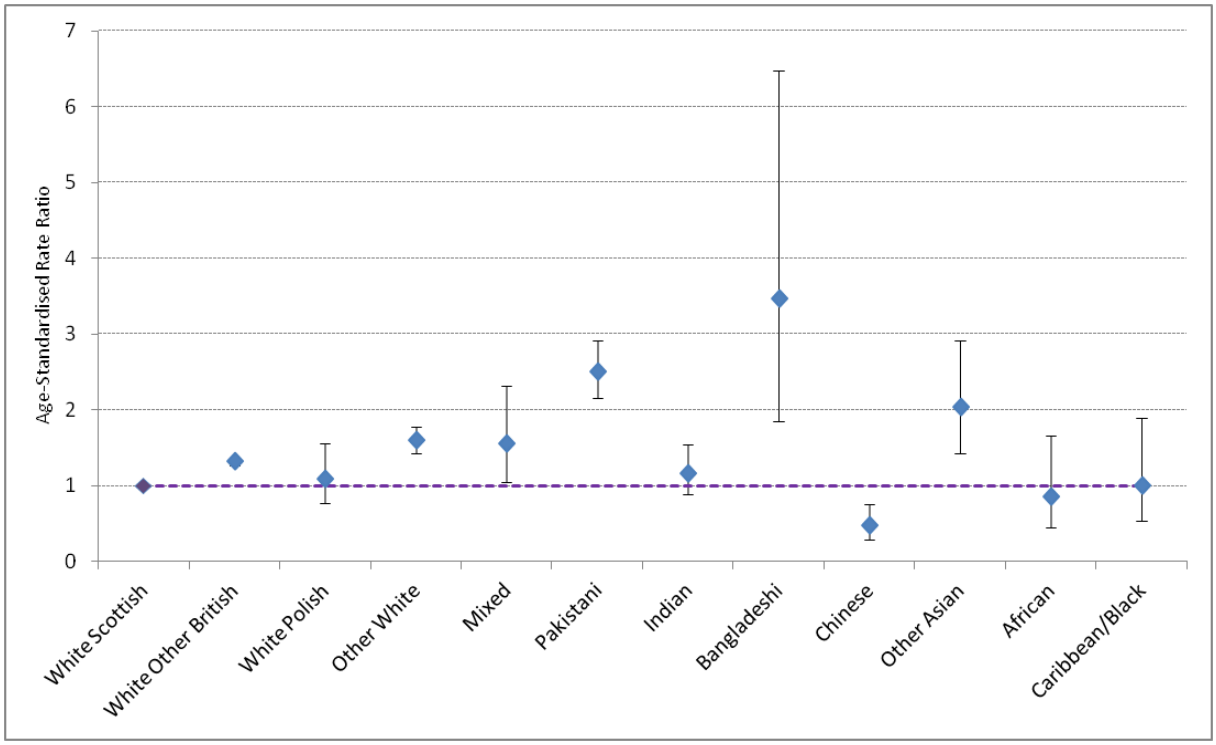
Standardised to the 2013 European Standard Population

Figure 4a: Male CHD Hospital Admissions in Scotland, 2011-13; Age Standardised Rate Ratios



Standardised to the 2013 European Standard Population

Figure 4b: Female CHD Hospital Admissions in Scotland, 2011-13; Age Standardised Rate Ratios



Standardised to the 2013 European Standard Population

Conclusion

Completeness of ethnicity coding on hospital episode records has continued to rise in recent years. While some Boards still have improvements to make, nationally across Scotland over 80% of inpatient records now have a valid ethnic group recorded. Methods of matching patient records have improved completeness for around another 10% of records that were incomplete. These methods, together with assumptions around the distribution of the remaining incomplete records have allowed calculation of hospital admission rates by ethnic group across Scotland for the first time using routine data sources. This includes information on ethnic groups newly introduced in the 2011 census such as White Polish. Significant variation in hospital admission rates was apparent between ethnic groups. While results were broadly comparable with what is already known about variation in hospital admission rates, in particular for CHD [5], some differences were evident, for example, higher rates among Other White British.

Although a relatively large ethnic group according to census data, the results for White Irish suggest that this group may be under-recorded on hospital admission records. Two other new ethnic groups that were introduced in the 2011 census were the Gypsy/Traveller and Arab groups, and results suggest that, while recording is taking place, coding may not yet be fully complete enough for robust comparison of

rates. Further work is required to look at the quality of the coding over time in addition to the completeness rates.

Initial results suggest that, with careful interpretation and awareness of the effect of incomplete coding, quality of routine ethnicity coding is of sufficient quality for wider use and publication.

References

1 – Bhopal R et al (2011). Cohort profile: Scottish Health and Ethnicity Linkage Study of 4.65 million people exploring ethnic variations in disease in Scotland. Int J Epidemiol; 40:1168-75

2 - ISD ethnicity pages at http://www.isdscotland.org/Health-Topics/Equality-and-Diversity/Publications/data-tables.asp?id=1362#1362

3 - National Cancer Intelligence Network, Cancer Research UK (2009). Cancer Incidence and Survival By Major Ethnic Group, England, 2002-2006 http://www.ncin.org.uk/publications/reports/reports_archive

4 – European Standard Population (2013) http://ec.europa.eu/eurostat/en/web/products-manuals-and-guidelines/-/KS-RA-13-028

5 – Millard A, Guthrie C, Fischbacher C and Jamieson J (2012) Pilot ethnic analysis of routine hospital admissions data and comparison with census linked data: CHD rates remain high in Pakistanis. Ethnicity and Inequalities in Health and Social Care; 5: 98-107

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Appendix 1 – Background Information

Table 1: Hospital Admissions in Scotland, 2013; European Age-Standardised Rates per 1,000 population with 95% Confidence Limits

Ethnicity	Gender	European Age-Standardised Rates	Lower Confidence Limit	Upper Confidence Limit
White Scottish	Female	229.2	228.5	229.8
White Scottish	Male	230.8	230.1	231.5
White Other British	Female	318.7	316.2	321.1
White Other British	Male	322.0	319.4	324.5
White Irish	**Female**	**76.7**	**73.4**	**80.1**
White Irish	**Male**	**83.2**	**79.4**	**86.9**
White Gypsy	**Female**	**44.6**	**32.1**	**57.1**
White Gypsy	**Male**	**31.7**	**21.4**	**41.9**
White Polish	Female	162.0	149.5	174.6
White Polish	Male	179.2	167.2	191.1
Other White	Female	340.0	332.6	347.5
Other White	Male	434.7	424.7	444.7
Mixed	Female	215.2	196.3	234.0
Mixed	Male	226.1	205.7	246.5
Pakistani	Female	292.2	281.1	303.3
Pakistani	Male	255.4	245.8	265.0
Indian	Female	239.7	226.5	252.9
Indian	Male	193.6	182.7	204.5
Bangladeshi	Female	289.5	237.2	341.7
Bangladeshi	Male	242.9	206.1	279.6
Chinese	Female	125.6	116.4	134.8
Chinese	Male	146.9	136.3	157.4
Other Asian	Female	233.3	212.7	253.9
Other Asian	Male	270.1	245.2	295.0
African	Female	173.2	155.1	191.3
African	Male	210.0	188.2	231.8
Caribbean/Black	Female	239.7	216.5	263.0
Caribbean/Black	Male	187.8	167.3	208.2
Arab	**Female**	**47.6**	**35.9**	**59.4**
Arab	**Male**	**66.9**	**53.0**	**80.9**
Other Ethnic Group	**Female**	**691.8**	**636.7**	**747.0**
Other Ethnic Group	**Male**	**579.2**	**531.5**	**627.0**

The four ethnic groups in Table 1 highlighted in bold have been excluded from the main charts due to the figures being lower/higher than expected. Other Ethnic Group has very high rates, and a couple of theories regarding this high rate are that Other Ethnic Group may be getting used as a dump code, or that the Other Ethnic Group's population is much greater than stated in the 2011 Census.