PUBLIC HEALTH BRIEFING

THE SCOTTISH HEALTH AND ETHNICITY LINKAGE STUDY (SHELS): HELPING TO IMPROVE SCOTLAND'S HEALTH

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April 2016

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BACKGROUND

Tackling health inequalities, including by ethnic group, is one of the key points of Scottish, UK and European health strategy.[1;2] Differences in health care utilisation, health status and mortality are often large when examined by ethnic group[3]. Such an examination points to the potential for interventions to improve the health of the population. SHELS provides an analysis by ethnicity to quantify these inequalities. The Scottish census contains, as in many other countries, a question on ethnicity.[3] It is based on a self-classification by the person completing the census form or by individuals in the household, as currently recommended. By linking the census records of individuals to health databases, we examined the relationship between ethnicity and a series of diseases and other outcomes for the population of Scotland.

THE STUDY: APPROVALS AND SCOPE

The Scottish Health and Ethnicity Linkage Study (SHELS) obtained the approvals of the Multicentre Research Ethic Committee for Scotland and the Privacy Advisory Committee of NHS National Services Scotland to link the 2001 census to hospital discharge, cancer, births, deaths and other health registers.[4;5] Figure 1 summarises the linkage process, which has been described in detail before[4;5]. We used computerised, probability matching methods using personal identifiers available in both the census and the Community Health Index (CHI). Once linkage was achieved the personal identifiers were removed leaving encrypted CHI and census numbers that were then used to link to, and extract data from, health and census databases, respectively.

SHELS has analysed ethnic variations in cardiovascular diseases, cancer, breast cancer screening, mother and child health, mental health, gastrointestinal diseases and respiratory diseases on approximately 90% of the estimated 2001 Scottish population. In addition a feasibility study linking general practice records of 10 practices in Glasgow and Edinburgh has been done. SHELS is currently assessing ethnic variations for all cause-mortality, all-cause hospitalisation, injuries, accidents and poisoning, infectious and parasitic diseases (including HIV and hepatitis B and C) and uptake of bowel cancer screening.

The analysis examined differences in rates and relative risks of various health outcomes by ethnic group. In this briefing we only refer to risk ratios (RRs) as calculated using a method known as Poisson regression with robust variance. RRs are a way to express one population's risk of the outcome compared to a reference population. The reference was the White Scottish population (RR = 1). We multiplied the RRs by 100 to interpret them as a percentage: thus if a group has an RR more than 100 it is at higher risk for this event than the White Scottish population.

To help examine the role of chance, we calculated 95% confidence intervals (CI) around the RRs. This means that the true RR is estimated as likely (95% chance) to be within the interval. Therefore, if the interval excludes the reference value 100, the RR can be interpreted with 95% confidence as being different from the reference White Scottish population's value. Of course, it is still possible that the difference is just chance (5% or less). We focused on results where the 95% confidence interval excluded 100 (reference value) because of the concern that other differences might result from chance. Because we had access to the census data, we were able to adjust the RRs for socioeconomic factors such as educational qualifications, car ownership and household tenure, Scottish Index of Multiple Deprivation (SIMD) and country of birth (COB).[6] This kind of adjustment allows differences in such background characteristics to be taken into account when interpreting the findings.

SELECTED KEY FINDINGS

Cardiovascular: chest pain, angina, heart failure, heart attack (MI) and stroke[5;7-10]

We found substantial ethnic variations in the risk of first hospitalisation or death from heart disease and stroke. The Pakistani population had the highest risk of having a cardiovascular event (e.g. myocardial infarction, angina, heart failure and stroke). In contrast, Other White British and Chinese had lower risks for these diseases than the White Scottish population. Differences were diminished by adjustment for socioeconomic factors (education) in the case of White subgroups compared to White Scottish but this was not so for the non-White groups. Figure 2 (a) provides an example of these variations for angina.

Cancer, breast cancer screening and place of death[11-13]

In contrast to cardiovascular results, non-White ethnic groups were less likely to develop cancer: Indian, Pakistani, Other South Asian, African, and Chinese groups had lower risks of hospitalisation or death from cancer, adjusted for age and country of birth. This was mostly true for each of the cancers we examined i.e. lung, colorectal, breast and prostate.

We observed differences between the White populations: White Scottish had higher age and country of birth adjusted risks of any first cancer diagnosis, lung cancer and colorectal cancer than the Other White British. This was not so for breast cancer and prostate cancer Figure 2 (b) gives an example of these variations for all cancer.

Women from non-White ethnic groups were less likely to attend for breast cancer screening than White Scottish women (aged adjusted RR for Pakistani women 181.7, and for African women 162.2).

Differences in place of death by ethnic group were small, with hospital being the commonest place of death, notwithstanding policies against this, and in favour of death in either the home or hospice.

Maternal and child health: age at first birth, birthweight, smoking and breast feeding[14]

The oldest mothers at the time of first birth were White Irish (31.2 years) and the youngest were Pakistani (26.7 years), while the White Scottish (27.3 years) were the second youngest group. Compared to White Scottish, all non-White groups (any Mixed background, Indian, Pakistani, Other South Asian, African and Chinese) had a lower mean birth weight (even when adjusted for maternal age, gestational age, smoking and education). For example, in White Scottish the birthweight was 3356g and in Indian babies 3134g. Smoking and lack of breast feeding were higher in White Scottish mothers compared to most other ethnic groups.

Mental health:[15]

There were a few large differences by ethnic group in the risk of first hospitalisation/death for any psychiatric disorder but these variations were diminished by adjusting for indicators of socioeconomic status (car ownership and house tenure). However, Chinese men and women

remained at lower risk than the White Scottish even after adjustment. Figure 2 (c) illustrates these variations across ethnic group for the risk of any psychiatric disorder.

For first psychotic disorder, however, RRs were high for African (230.8), and any Mixed background (200.6). This was also so for Pakistani women (RR = 227.3). Compulsory detention was more likely in non-White groups e.g. RR for compulsory treatment order in Chinese people was 181.4, in Africans 486.6 and in any Mixed background 263.10. We interpreted the results as indicating both under–utilisation and late presentation to mental health services in the community by non-White groups.

Gastrointestinal: five upper and five lower bowel disorders, liver disease and alcohol related liver disease

We have examined a wide range of outcomes including upper gastrointestinal, lower intestinal and liver disorders. These data have been published.[16;17]. Our analysis of liver and alcohol-related hospitalisations and deaths will be published shortly. We found ethnic variations in the risk of gastrointestinal diseases. White populations, for example, were more likely to have a gastrointestinal event than ethnic minorities, in particular for diverticular disease or appendicitis but with the exception of inflammatory bowel disease where Pakistani were at increased risk. Figure 2 (d) gives an example for the risk of appendicitis.

Respiratory: all, chronic obstructive airways disease, asthma and respiratory infection

We have examined a wide range of outcomes including asthma, chronic bronchitis and respiratory infections. These data have been published. [18-20] We found interesting variations in most outcomes.

Indian and Pakistani populations were, for example, at increased risk of asthma compared to White Scottish and to White populations in general. Figure 2 (e) illustrates ethnic differences for asthma.

General Practice data

In a feasibility study we assessed whether we could extract, link and use general practice data. We have published our results.[21] About 100,000 records were extracted from 10 general

practices in Glasgow and Edinburgh, and about 50,000 records were linked to the Census. Data analysis has indicated the feasibility and the potential value of both morbidity and risk factor data, the latter for exploring the causes of the ethnic variations demonstrated in hospitalisation and mortality data.

Current work underway

Work to be completed by Autumn 2016 is on:

all cause mortality,

all cause hospitalisations,

blood borne viruses (HIV, hepatitis B and C),

hospitalisations/deaths for infections,

hospitalisations/deaths for unintentional injuries and poisoning

and bowel cancer screening uptake.

Other projects in development include calculation of life expectancy by ethnic group and examining avoidable mortality and hospitalisation.

We intend to do further public health briefings on gastrointestinal, respiratory, general practice findings and this new work in 2017.

CONCLUSIONS

This briefing highlights that there are interesting patterns across all health areas analysed by SHELS to date. These patterns are important in public health. The findings potentially permit the NHS to refine strategies and services to incorporate the ethnic dimension. The analysis shows that the patterns of high and low risk vary by outcome studied. There are opportunities for each ethnic group to benefit from each other by learning from this comparative approach. We observed many differences among White subgroups and between the White and the non-White populations. Pakistanis were likely to have a worse level of health than White Scottish populations. In fact, except for cancer e.g. where they had lower risk, and lower smoking in pregnancy and higher breastfeeding rates, they were at increased risk for many health outcomes (e.g. cardiovascular diseases, psychotic disorder, inflammatory bowel disease, asthma

and lower mean birthweight). In contrast, Chinese had better health than White Scottish with lower risks in many health outcomes (e.g. cardiovascular disease, all cancer (men), lung cancer (men), any psychiatric disorder, asthma).

We also observed differences among the White population, often a lower risk for Other White British and Other White compared to the Scottish reference population. The White Scottish and White Irish had similar risk in many health areas, in particular in cardiovascular and mental health.

IMPLICATION FOR POLICY AND RESEARCH

SHELS demonstrates both important ethnic inequalities and similarities across Scotland, sometimes in favour of White populations and sometimes not so. These results, providing nation-wide quantitative data on the Scottish population, contribute to national and European efforts to tackle health inequalities[1;2].

a) Health policy

SHELS highlights differences in the risk of health outcomes even when the risk is adjusted for indicators of socioeconomic status.[6] Health policy and strategy needs to take these findings into account. The health inequalities field would benefit from strategies considering the disease experiences of each ethnic group.

b) Service strategy /planning

Health services can utilise data from SHELS although we only provide data at Scotland level. Health Boards would need to assume the findings apply at local level-this seems reasonable. Prevention campaigns could be targeted more carefully. For example, because Pakistanis have an increased risk of coronary heart disease, general practitioners should be aware of this and so be more proactive in the control of heart risk factors. The same would apply to breast cancer screening. By contrast, for colorectal cancer (higher in White Scottish) and breast feeding, the data point to targeting the White Scottish populations.

c) Clinical care

With the rise of chronic diseases that are caused by behaviours and lifestyles, clinical care and treatments must become more personalised. Taking into account ethnicity in health care can be a part of this personalisation. NHS records and information systems are, increasingly, recording ethnic group so clinicians can use our findings to deliver better care to individuals whose ethnic group is known to them via clinical records.

d) Epidemiology / public health surveillance

SHELS gives a secure method that should help other countries to assess ethnicity as an interesting and important cause of health variation. For Scotland, it would also be very interesting to see how ethnic variations evolve over time. Indeed, linkage to the 2011 Census would be valuable.

e) Research on disease causation

Our findings should stimulate research to explore the reasons for ethnic variations. This requires development and refinement of hypotheses. Then, data are required on potential confounding, modifying and causal factors. While such studies will be new, if data linkage of risk factors e.g. through primary and community care records, proves feasible on a national scale, it may be possible to do causal work within SHELS without undertaking expensive, new risk factor surveys.

Final message

This work based on national data contributes evidence to help improve the health of everyone in Scotland, and may have implications for other countries with similar populations.

Figure 1: Overview of Record Linkage Process (CHI and census numbers were encrypted). The figure is based on that published in an open access publication.[5]

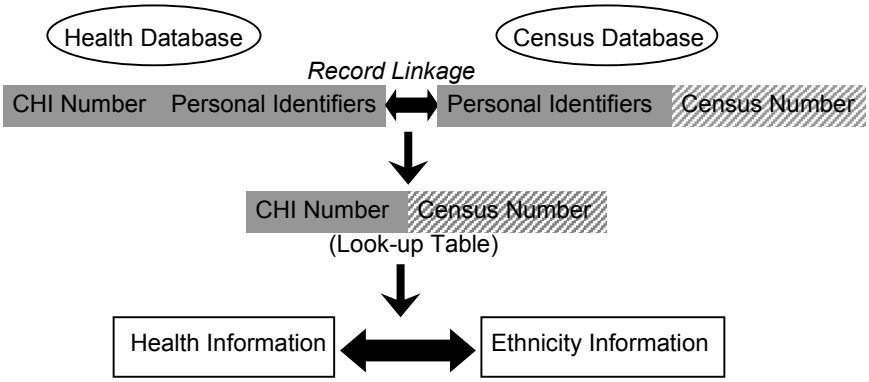
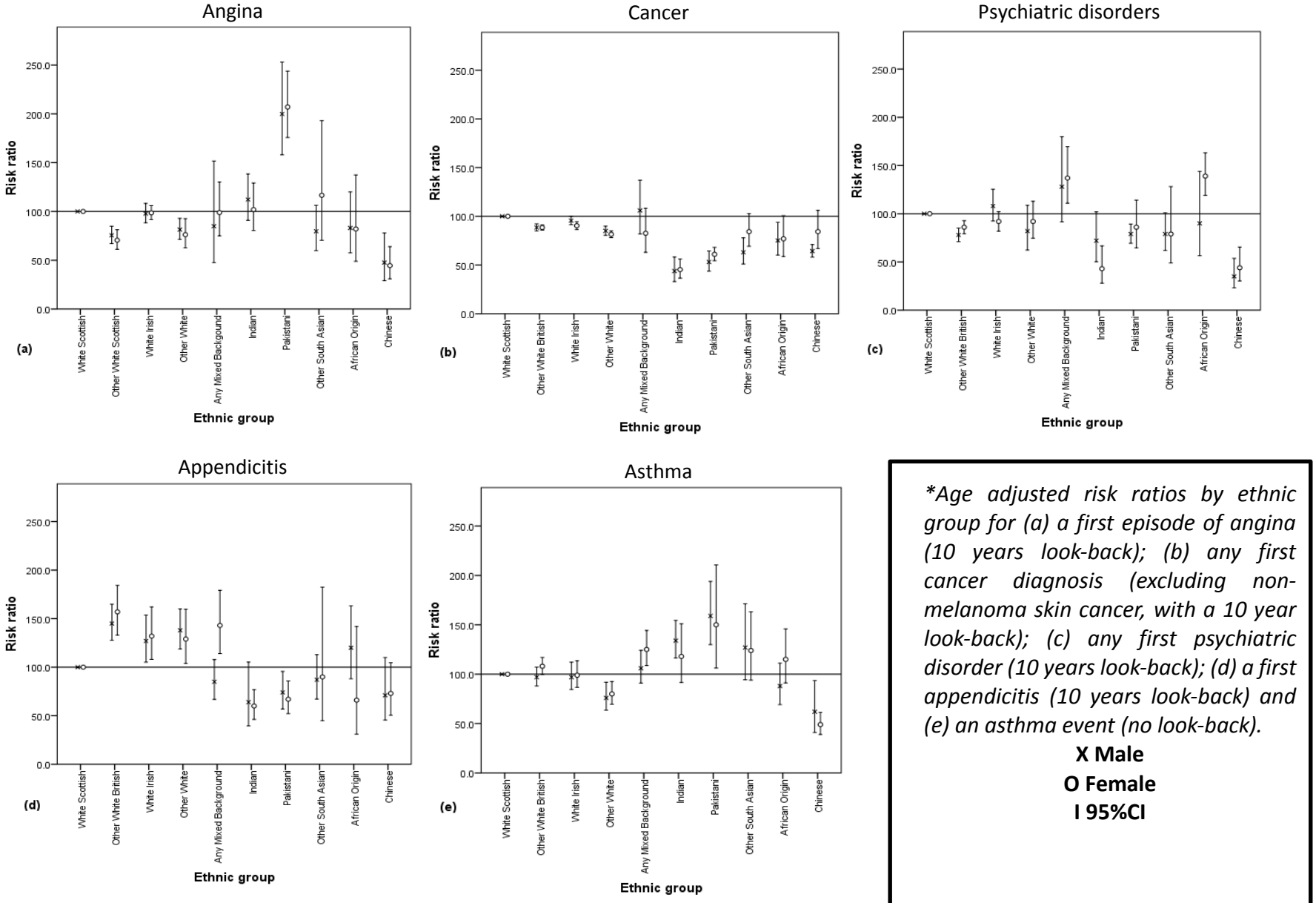


Figure 2. Illustrative examples of ethnic variations in five outcomes*



**Age adjusted risk ratios by ethnic group for (a) a first episode of angina (10 years look-back); (b) any first cancer diagnosis (excluding non-melanoma skin cancer, with a 10 year look-back); (c) any first psychiatric disorder (10 years look-back); (d) a first appendicitis (10 years look-back) and (e) an asthma event (no look-back).*

X Male

O Female

I 95%CI

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