



## The estimation of mortality for ethnic groups at local scale within the United Kingdom<sup>☆</sup>

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### ABSTRACT

As an input to projections of sub-national populations by ethnicity, this paper develops the first estimates of the mortality risks experienced by the UK ethnic groups. Two estimates were developed using alternative methods. In the first, UK 2001 Census data on limiting long-term illness to predict mortality levels and regression equations between local Standardized Illness and Mortality Ratios for all ethnicities are assumed to apply to individual ethnic groups. In the second, the geographical distribution of ethnic groups by local areas is combined with local mortality for all ethnicities to estimate national mortality rates by ethnicity, which are then employed to estimate local ethnic mortality. A comparison of the two estimates indicates that the method based on illness rates produces more plausible outcomes. The local SMRs produced for each ethnic group were used to generate ethnic group life tables for 432 UK local authority areas in 2001, which included estimates of survivorship probabilities by single year of age, gender and ethnic group for each local area for use in a projection model.

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### Introduction

Two dominant trends affected the UK population in the period since the Second World War. The first was continued population ageing, as a result of declining and low fertility and steady improvement in life expectancy, especially at older ages in recent decades (Dunnell, 2008). Population ageing was delayed and reduced by the baby boom of 1945–1970 but when these cohorts reach old age over the next quarter century ageing will be enhanced. During the 1950s and 1960s, when the smaller cohorts of 1925–1945 entered the work force, labour shortages led to immigration from both other European and extra-European countries. After a hiatus in the 1970s and 1980s, net immigration grew steadily in 1990–2008. The main demographic consequence of

sustained international migration into a country is the growth of the population of immigrants and their descendants. If the native population is growing slowly, the ethnic composition of the population will change. This, in turn, leads to changes in national identity and culture. Coleman (2006a, 2006b) has labelled this sequence of events the ‘Third Demographic Transition’.

Countries need to have a view of the future ethnic composition of the national population, which is likely to change substantially over the next 50 years. What demographers normally do to explore the future is to carry out projections of the population. These projections take into account the age and sex structure of the population and its spatial distribution at country, region and local levels (ONS, 2008a; ONS & GAD, 2006). Projections of the England and Wales population by ethnicity have been carried out (reviewed later) but are not currently included in the official projection series.

Why might we want to project the population of the UK’s ethnic groups? The first reason is that if demographic intensities (rates or probabilities) vary across population sub-groups, then that heterogeneity (for evidence see ONS 2004) needs to be built into projections. The second reason is so that we can monitor equality of opportunity across ethnic groups, assess future labour supply in terms of size and skills and ensure schooling and other public services are adapted to a multi-ethnic population. In health care applications then, if ethnic groups experience different levels of health and are susceptible to different conditions, knowledge of these will inform the provision of local services (see Simpson, 2009 for a discussion). Since ethnic groups vary in their demographic

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behaviour (Penn, 2000) within a generally ageing population, different groups will be ageing at different rates. This has implications for the provision of formal and informal care, especially as different ethnic groups may have different cultural traditions on living arrangements and care of the sick and elderly. In health research contexts, estimates of populations to date and projections of future populations by age, sex and ethnic group provide denominators in morbidity and mortality rates so that inequalities can be assessed.

There are a number of challenges involved in ethnic population projection. These include the definition of ethnicity, the degree to which ethnic groups can be projected separately and how the fertility, mortality and international and sub-national migration assumptions should be prepared. One missing ingredient from previous projections of the UK population by ethnicity is knowledge about ethnic group mortality. The principal aim of this paper is to fill that gap by developing a method for estimating ethnic mortality.

The organization of the paper is as follows. The second section of the paper reviews work on projecting ethnic group populations in the UK and elsewhere and work on the ability of self-reported health to predict mortality for individuals and for geographical populations. The third section of the paper describes the data sets used in the current study. The fourth section outlines the method for ethnic mortality estimation that uses information on limiting long-term illness. The fifth section describes a method which re-weights local area mortality by the ethnic composition of the local population. After a comparison of the two methods, the sixth section selects a preferred method, the illness–mortality method and describes the principal results. The final section summarizes and evaluates the findings of the paper.

**Background**

*Are ethnic-specific mortality rates used in population projections?*

Many national statistical agencies carry out population projections for the racial/ethnic groups that compose their national populations. The US routinely computes projections by race and Hispanic origin (US Census Bureau, 2008) and publishes life

expectancies by race (NCHS, 2007). These reveal considerable differences: Black Americans had 5.5 fewer years of expected life than White Americans in 2003, for example, while the difference between Pakeha (European origin) and Maori life expectancies was 8.5 years (Statistics New Zealand, 2008). Coleman (2006b) reports that European countries mostly use nationality or country of birth based groups and use group specific mortality data. So, best international practice is to collect mortality data by race/ethnicity directly on the death records and to incorporate ethnic-specific mortality into ethnic group projections.

The United Kingdom has a history of ethnic population projections (Rees & Wohland, 2008; Storkey 2002a, 2002b, chap. 1, Table 1). In the 1970s the Office of Population Censuses and Surveys carried out projections of the population born in the New Commonwealth and Pakistan (OPCS, 1977a, 1977b, 1979). This was extended to five broad ethnic groups using 1981 Census data (OPCS, 1986a, 1986b). No official projections have been implemented using 1991 and 2001 Census data on ethnicity, but detailed estimates for 2001–2007 for local authorities in England have been made using 16 ethnic groups in the 2001 Census (Large & Ghosh, 2006a, 2006b). Many projections for individual local authorities have been produced using 1991 Census data (Bradford, 1999, 2000) or the 2001 Census (Danielis, 2007; Simpson & Gavalas, 2005). Local projections have also been made for the Boroughs of Greater London building on work by Storkey (2002a), using the 1991 Census for base populations (Hollis & Bains, 2002) and 2001 Census populations (Bains & Klodawski, 2006, 2007). A UK level projection for four broad ethnic groups incorporating innovative features (e.g. probabilistic forecasts) has been implemented by Coleman and Scherbov (2005). Finally, projections using five summary ethnic groups for 13 UK regions were produced by Rees and Parsons (2006). However, none of the UK projections so far carried out employ ethnic specific mortality rates.

*The measurement of ethnic mortality in the UK*

Why should this be? The fundamental reason is that, to date, ethnic status has not been recorded in the UK's death registers. A start has been made. Infant mortality rates for 2005 have been computed by ONS by matching birth and infant death registration

**Table 1**  
Ethnic groups and populations, 2001 Census, UK.

| Ethnic groups in the 2001 Census                        | Population in 2001 |         |                |         | Ethnic groups in the 2001 Census       | Population in 2001 |         |
|---|--------------------|---------|----------------|---------|--|--------------------|---------|
|   | England in 1000s   | (%)     | Wales in 1000s | (%)     |  | Scotland In 1000s  | (%)     |
| England and Wales                                       |                    |         |                |         | Scotland                               |                    |         |
| White: British (WBR)                                    | 42,747.1           | (86.99) | 2786.6         | (95.99) | White (WHI)                            | 4960.3             | (97.99) |
| White: Irish (WIR)                                      | 624.1              | (1.27)  | 17.7           | (0.61)  | Indian (IND)                           | 15.0               | (0.30)  |
| White: Other White (OWH)                                | 1308.1             | (2.66)  | 37.2           | (1.28)  | Pakistani and other South Asians (PAS) | 40.0               | (0.79)  |
| Mixed: White and Black Caribbean (WBC)                  | 231.4              | (0.47)  | 6.0            | (0.21)  | Chinese (CHI)                          | 16.3               | (0.32)  |
| Mixed: White and Black African (WBA)                    | 76.5               | (0.16)  | 2.4            | (0.08)  | Others (OTH)                           | 30.4               | (0.60)  |
| Mixed: White and Asian (WAS)                            | 184.0              | (0.37)  | 5.0            | (0.17)  | Total                                  | 5062.0             | (100)   |
| Mixed: Other Mixed (OMI)                                | 151.4              | (0.31)  | 4.3            | (0.15)  | <i>Northern Ireland</i>                |                    |         |
| Asian or Asian British: Indian (IND)                    | 1028.5             | (2.09)  | 8.3            | (0.28)  | White (WHI)                            | 1671.5             | (99.15) |
| Asian or Asian British: Pakistani (PAK)                 | 706.5              | (1.44)  | 8.3            | (0.29)  | Irish Travelers (ITR)                  | 1.2                | (0.10)  |
| Asian or Asian British: Bangladeshi (BAN)               | 275.4              | (0.56)  | 5.4            | (0.19)  | Mixed (MIX)                            | 3.3                | (0.20)  |
| Asian or Asian British: Other Asian (OAS)               | 237.8              | (0.48)  | 3.5            | (0.12)  | Indian (IND)                           | 1.6                | (0.09)  |
| Black or Black British: Black Caribbean (BCA)           | 561.2              | (1.14)  | 2.6            | (0.09)  | Pakistani (PAK)                        | 0.7                | (0.04)  |
| Black or Black British: Black African (BAF)             | 475.9              | (0.97)  | 3.7            | (0.13)  | Bangladeshi (BAN)                      | 0.3                | (0.01)  |
| Black or Black British: Other Black (OBL)               | 95.3               | (0.19)  | 0.7            | (0.03)  | Other Asians (OAS)                     | 0.2                | (0.01)  |
| Chinese or Other Ethnic Group: Chinese (CHI)            | 220.7              | (0.45)  | 6.3            | (0.22)  | Black Caribbean (BCA)                  | 0.3                | (0.02)  |
| Chinese or Other Ethnic Group: Other Ethnic Group (OET) | 214.6              | (0.44)  | 5.1            | (0.18)  | Black African (BAF)                    | 0.5                | (0.03)  |
| Total   | 49,238.8           | (100)   | 2903.1         | (100)   | Other Black (OBL)                      | 0.4                | (0.02)  |
| Source: UK Census 2001, Office for National Statistics  |                    |         |                |         | Chinese (CHI)                          | 4.1                | (0.25)  |
|   |                    |         |                |         | Others (OTH)                           | 1.3                | (0.08)  |
|   |                    |         |                |         | Total                                  | 1685.3             | (100)   |

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