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Selective internal migration. Does it explain Glasgow's worsening mortality record?

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ABSTRACT

The mortality difference between Glasgow and the rest of Scotland has been increasing and mortality rates are higher than Glasgow's excess deprivation would suggest. One plausible explanation for this excess is selective migration. A sample of 137,073 individuals aged 15 to 64 in 1991 from the Scottish Longitudinal Study was used to test this explanation. Three geographic areas were compared: Glasgow; Aberdeen, Dundee and Edinburgh cities combined and the rest of Scotland. The impact of selective migration was assessed by calculating age and sex standardised mortality rates for 2001/03 by residence in 2001 and by residence in 1991. Glasgow experienced the greatest loss of population (–7.1%) between 1991 and 2001 but this was not strongly related to deprivation. It had the highest mortality at baseline and the difference between it and the other areas increased over the ten years. This pattern was not significantly affected by calculating death rates according to area of residence at 1991 or in 2001. Our results suggest that the increasing difference in mortality rates between Glasgow and the rest of Scotland over this period was probably not caused by selective migration.

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1. Introduction

Glasgow is recognised as one of the least healthy cities in Europe. In the period 2006/08 male life expectancy at birth was just 70.7 years, the lowest for a local government area in the UK and over ten years less than the local government area with the highest (Office for National Statistics, 2009). For women life expectancy at birth in Glasgow was also the lowest for local government areas in the UK. Glasgow's mortality record compared to rest of Scotland has also worsened over recent decades (McCarron et al., 1994; Leyland et al., 2007).

There are various potential explanations for Glasgow's comparatively poor mortality record. Perhaps most obviously Glasgow is more deprived than the rest of Scotland and has become relatively more deprived over the past twenty years (Leyland et al., 2007). The proportion of the population living in the most deprived areas (DEPCAT 7 according to the Carstairs index (Carstairs & Morris, 1991)) increased from 37% in 1981 to 41% in 1991 and 44% in 2001 compared to just 7% nationally. However, a more recent examination demonstrates that, while this deprivation explains much of Glasgow's mortality excess

compared to the rest of Scotland, it is not the entire explanation (Leyland et al., 2007).

Another possible explanation for Glasgow's particularly poor and worsening mortality record is selective migration; whereby there is a net movement of the economically better-off and healthier residents away from the relatively more deprived areas, and the residualisation of deprived and unhealthy people in more deprived areas. Although the potential contribution of migration to Glasgow's health was recognised as long ago as the early 19th Century, when a large influx of largely unskilled Irish migrants (by 1831 constituting almost 18% of the population) increased both the relative poverty and the mortality rates of the city (McRaid, 1999), relatively little attention has been given to selective migration as a possible contributor to Glasgow's more recent mortality record.

There is growing evidence that selective migration can have a significant impact on the spatial distribution of ill-health, contributing to a widening of health inequalities (Boyle, 2004; Brimblecombe et al., 1999; Norman et al., 2005; O'Reilly and Stevenson, 2003). This is often accompanied by a net decline in the number of people living in the most deprived places. One study has indicated that selective migration may have been responsible for about 50% of the increase in the socioeconomic gradient in mortality in England and Wales during the 1990s (Connolly et al., 2007). Cox et al. (2007) have also shown that differential migratory patterns lead to the residualisation of

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unhealthy individuals in deprived areas, thereby exaggerating the relationship between diabetes prevalence and material deprivation in Scotland. If selective migration does play an important role in the widening health gap this could have implications for the study of area based interventions aimed at improving health because the negative effect of selective migration may mask improvements in population health for the more permanent population (Bailey and Livingston, 2008).

Some argue that the effects of selective migration are evident only in small areas (such as electoral wards or postcode sectors), but not in larger areas due to the small relative population movement that crosses their boundaries (Brimblecombe et al., 2000). However, one study looking at changes in mortality rates and net migratory patterns around Belfast and Dublin concluded that migration from more deprived inner city areas towards the affluent hinterlands may well have had a significant influence on the spatial distribution of health within and around these cities (O'Reilly et al., 2001). An analysis of migratory patterns using 2001 Census data shows that, with the exception of London, most large British cities have been losing population through migration to other parts of the UK (Champion et al., 2007). This was most marked in cities with higher levels of deprivation, overcrowding and burglary, with out-migration rates being highest for those in the professional classes, concurring with previous research showing that the more materially disadvantaged tend to be less geographically mobile (Boyle et al., 2002; Fielding, 1997; Hughes & McCormick, 1994).

This study therefore investigates the influence of selective migration on the relative mortality status of Glasgow. This is in a context where Glasgow has been losing population at a faster rate than other parts of Scotland – between 1981 and 2001 its population fell by 18.8% compared to 5.9% for the rest of the larger conurbation Glasgow is situated in and a growth of 0.4% for the rest of Scotland. The key research questions are: first, whether this population redistribution was selective of those with more privileged socio-economic and health characteristics and, second, whether the extent of any identified selective mobility could make a significant contribution to Glasgow's worsening mortality record during the 1990s.

2. Methods

2.1. Samples

This study used samples drawn from the Scottish Longitudinal Study (SLS), an anonymous 5.3% representative sample of the Scottish population linking 1991 and 2001 census records, health records (mortality, hospital admission and cancer registration) and other vital events data (Boyle et al., 2009a, 2009b). The estimated response rates for the 1991 and 2001 censuses in Scotland were 96 and 95%, respectively.

The main sample was closed (hereafter called the closed sample), consisting of those 137 073 men and women in the SLS aged 15 to 64 at the 1991 census who were also enumerated in the 2001 census (then aged 25 to 74). In addition to being enumerated in the 1991 and 2001 censuses they also had to have been traced in the National Health Services Central Register (NHSCR) as this tracing was needed in order to facilitate linkage of people between censuses and to mortality records (Boyle et al., 2009a, 2009b). The SLS' tracing rate to the NHSCR was very high at 98.1%. Analysis by the SLS suggests that 85.7% of those enumerated in the 1991 census in the SLS who were expected to be linked to a 2001 census return (because they were neither recorded as having died or migrated between the censuses) were actually linked to their 2001 census return (Hattersley and Boyle, 2009).

Our focus is on internal migration within Scotland and we limited our closed sample to those aged 15 or over (then aged 25 or over in 2001) to minimise the impact of temporary moves for educational studies in 2001, as college students living away from home in the 2001 census were enumerated at their term time (college) address rather than their (parental) home address as in the 1991 census. The upper age limit of 64 (then aged up to 74 in 2001) for the closed sample was chosen as previous work had found that selective migration may be especially important for the widening premature mortality gap (Connolly et al., 2007). Details of the additional sample used in the mortality analysis for 1991/93 are given in the mortality section of the methods.

2.2. Migration

In our analysis we compared Glasgow local government area (11.4% of the 2001 Scottish census population) to the next three largest cities in Scotland combined (Edinburgh, Aberdeen and Dundee local government areas – 15.4% of the 2001 population) and also to the remaining 28 local government areas combined. Local government area boundaries were chosen as these had been used in the most recent analysis of Scottish mortality trends to compare Glasgow to other areas of Scotland (Leyland et al., 2007). A migrant was defined as someone who had moved from one of the three broad areas in 1991 to another in 2001.

2.3. Demographic and socio-economic profile

To assess the impact of selective migration on the socio-economic profile of Glasgow compared to the other areas we used socio-economic characteristics captured at the 1991 census, the start of the study period. In addition to age (coded in 10 year age groups), we extracted data on a variety of socio-economic measures including housing tenure (owner occupied, private rented and social rented), car ownership and occupational social class (using the National Statistics Socio Economic Classification (NSSEC) based on present or last held occupation in the 10 years preceding the census). For those under 16, we used parents' highest social class or the head of the household's and for those 16 or over who were presently full-time students their partner's or the highest of their parents or, finally, their head of household. Similarly, for those who had never worked or who had not worked in the last 10 years we used their partner's or parents' or head of household's social class. There were a very small number of individuals classed as full-time students and slightly more as having never worked or not worked in the last ten years at the end of this process.

We created a summary individual deprivation score using our three measures from the 1991 census (housing tenure, car ownership and occupation). We coded deprivation as 1 for each measure (social rented household, no car household or routine social class or never worked / not worked in last ten years) and non deprived (all other groups) as 0. We then summed the result so that the score ranged from 0 (least deprived) to 3 (most deprived).

Finally the 1991 census asked "Does the person have any long-term illness, health problem or handicap, which limits his/her daily activities or the work he/she can do"? We compared those with a limiting long-term illness to those without.

We calculated in- and out- migration rates and net population changes (using the 1991 population as the denominator) for each age, socio-economic and limiting illness group in each area and then compared the gap between Glasgow and the other areas based on the 1991 and 2001 distribution of the characteristics in the closed sample.

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