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Original Research

Is 'excess' mortality in Glasgow an artefact of measurement?☆

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ABSTRACT

Objectives: A previous investigation of Glasgow's excess mortality showed that the (income) deprivation profiles for Glasgow, Liverpool and Manchester were nearly identical. Despite this, premature deaths in Glasgow were found to be more than 30% higher, and all deaths 15% higher, than in the English cities.

This study aimed to explore the extent to which Glasgow's higher mortality could be explained by the use of a potentially more sensitive measure of deprivation employed at a suitably small and consistent geographical spatial unit.

Study Design: Analyses of mortality based on the creation of a three-city index of deprivation using rates of 'car/van ownership' deprivation for small areas (average population size: 1600) in Glasgow, Liverpool and Manchester derived from the census.

Methods: Rates of 'car/van ownership deprivation were calculated for small areas in Glasgow, Liverpool and Manchester. All-cause and cause-specific standardized mortality ratios were calculated for Glasgow relative to Liverpool and Manchester, standardizing for age, gender and deprivation decile.

Results: The overall levels of car/van ownership based deprivation in Glasgow, Liverpool and Manchester, in 2001, differed. Glasgow had a higher percentage of its population who did not have access to a car compared with Liverpool and Manchester.

All-cause mortality, after adjustment for age, sex and this measure of deprivation, for deaths <65 years were 15% higher and 8% higher for all deaths for males and females respectively. However, this was lower than the excess observed in the previous study. 'Excess' mortality was greatest in the working age groups of 15–44 years and 45–64 years, where it was 23% and 15% higher respectively.

For deaths at all ages after adjustment, analysis by deprivation decile showed that excess mortality in Glasgow was seen in half the deciles, including four of the five most deprived deciles. However, the greatest excess was seen in comparison of the least deprived neighbourhoods. For premature mortality (deaths under 65 years), the excess was mainly driven by higher mortality in the five most deprived deciles (6–10); again, however, a high excess was seen in comparisons of the least deprived areas.

Conclusions: The higher mortality in Glasgow compared to equally income-deprived Liverpool and Manchester cannot be fully explained by a deprivation index based on lack of

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access to a car or van, but this index does explain more of the excess than income deprivation. Further work to establish better measures of deprivation and to explain this excess are required.

Introduction

The higher mortality experienced by the Scottish population in comparison to England and Wales, over and above that explained by deprivation, has been much documented, and speculatively referred to as a 'Scottish Effect'.[1–3] Further analyses identified that while this excess mortality was present in all areas of Scotland and at all levels of deprivation, it was more evident in the most deprived postindustrial region of West Central Scotland, with Glasgow at its centre.[3]

A previous investigation of Glasgow's excess mortality was based on comparisons with Liverpool and Manchester: this was on the basis that all three cities share similar histories of industrialization and deindustrialization, as well as exhibiting high levels of mortality associated with deprivation.[5–8] Results from those analyses showed that the (income) deprivation profiles for Glasgow, Liverpool and Manchester were nearly identical.[10] Despite this, premature deaths in Glasgow were found to be more than 30% higher, and all deaths 15% higher, than in the English cities.[10] This excess was observed across the whole population of Glasgow: males and females, those living in the least and most deprived areas, and all ages except the very young.[10] In the case of premature mortality, the SMRs were higher in Glasgow's most deprived areas compared to the most deprived areas in Liverpool and Manchester, and this was particularly apparent amongst males.[10] The authors concluded that while it is well established that deprivation is a 'fundamental determinant of health', as currently measured it did not appear to fully explain the higher mortality levels of Glasgow compared with Liverpool and Manchester, and further investigation was required.[10]

However, there are a number of weaknesses associated with the measure of income deprivation employed in the above research. In the absence of any available small-area estimates of absolute income, it is instead based on uptake of (rather than eligibility for) low income related social security benefits, thereby presenting only a limited picture of poverty, and no indication of relative affluence. Earlier work carried out by Reid, based on comparisons of mortality and deprivation across UK cities, suggested that car ownership (as a proxy for low income, and other aspects of deprivation) explained a much greater proportion of the excess mortality in Glasgow[6] (and more so than the Carstairs & Morris index of deprivation[1] of which car ownership is a component). However, this work was limited by the large size and variability of the geographical units used in the analysis.[6] The work carried out by Reid, as well as the previous work by Hanlon et al.,[3] used postcode sectors and electoral wards for their analyses. The three-city (Glasgow, Liverpool and Manchester) work carried out by Walsh et al. used a much smaller, and more consistently sized, geographical unit.[10]

The present study utilized the same smaller spatial units for Glasgow, Liverpool and Manchester created by Walsh et al. to analyse mortality data alongside car/van ownership, the latter as a proxy for income. The aim was to explore the extent to which Glasgow's higher mortality could be explained by the use of a potentially more sensitive measure of deprivation employed at a suitably small and consistent geographical spatial unit.[6,10]

Methods

Geographical unit

The same, comparably sized, geographical units of analysis used in the earlier study of income deprivation and mortality in the three cities were used.[10] For Liverpool and Manchester this was the Lower Super Output Area (LSOA),[15] and for Glasgow this was merged pairs of 'datazones' (DZs). The average population size of these areas was approximately 1600 in Glasgow, 1500 in Liverpool, and 1700 in Manchester. Further details are reported elsewhere.[11,12]

Data sources

Car/van ownership data (the percentage of all people aged 16–74 years in private households who had no access to a car or van) from the 2001 census was obtained from the 'Casweb' website[13] at DZ (Glasgow) and Output Area (Liverpool and Manchester) level. These data were then aggregated to English LSOAs and the merged Glasgow datazones.

Creation of three-city index

Using the car ownership data for the merged DZs and LSOAs, a three-city index was created. This was based on the percentage of the population aged 16–74 years in each small area without access to a car or van. From these data a combined three-city small-area-based deprivation index was created, from which population-weighted deprivation deciles were derived.