



**Investigating the impact of
the spatial distribution of
deprivation on health
outcomes**

 SUMMARY

- High levels of ‘excess’ mortality have been shown for Glasgow compared with the equally deprived cities of Liverpool and Manchester.
- Many hypotheses have been proposed to explain this: one is that the ‘excess’ may be influenced by different spatial patterning of deprivation across the cities, given previous research showing that mortality is associated not only with levels of deprivation in neighbourhoods, but also with levels of deprivation in neighbouring areas.
- This was investigated using a range of Geographic Information System (GIS) and statistical analyses. These found potentially important differences in the spatial patterning of deprivation between the cities; however, those differences did not appear to impact on mortality levels in the neighbourhoods.
- The differences in the patterning of deprivation in Glasgow compared with the English cities are of interest and could be the focus for further research on their potential influence on health- and wellbeing-related aspects in the cities. However, in seeking explanations for Glasgow’s ‘excess’ mortality, other avenues need to be explored.

INTRODUCTION

'Excess' mortality

Research has highlighted the high levels of 'excess' mortality – that is, higher mortality over and above that explained by differences in deprivation – seen in Scotland, and especially in Glasgow, compared with other parts of the UK.

Recently this research has focused on the three cities of Glasgow, Liverpool and Manchester. Research published in 2010 showed that despite almost identical socioeconomic profiles, Glasgow's mortality profile was quite different to that of the two English cities: premature deaths were found to be more than 30% higher, with all deaths almost 15% higher. The 'excess' has been shown to be widening since the mid- to late 1970s.

A number of hypotheses have been proposed to explain this disparity. One such hypothesis was that the health of the population of Glasgow may be affected by a different spatial patterning of deprivation to that in the two English cities: that is, the way in which deprived and affluent areas are distributed across the city may be different in Glasgow than in Liverpool and Manchester, and may, through particular causal pathways, adversely affect the health of Glasgow's population.

Patterning of deprivation

There is a large body of research on the effects of 'place' (e.g. the neighbourhood one lives in) on individuals' health. In seeking to understand this, the role of poverty and deprivation is crucial. Deprivation causes poor health through a variety of different causal pathways, and thus poorer areas generally exhibit worse health than less deprived localities. However, there is an emerging body of evidence which suggests that the health of an area is influenced not just by its own level of deprivation, but also by the levels of deprivation in neighbouring areas.

In relation to this, two possible, but opposing, mechanisms have been suggested as potentially influential. The first is that increasing segregation of the poorest into the most deprived neighbourhoods is damaging to the health of those resident in these areas. A deprived neighbourhood which is surrounded by a concentration of other deprived neighbourhoods might have different health behaviours and outcomes than one which is surrounded by, or adjacent to, more affluent neighbourhoods. Thus, it is argued that there are potential negative effects of the *concentration* of deprivation. However, an alternative hypothesis suggests negative effects of more mixed levels of deprivation and affluence. This focuses on the work of Wilkinson and others which propose that high levels of inequality and social comparisons lead to poorer health and social outcomes. In other words people feel the effects of poverty most where differences are greatest, and less where economic differences are smaller: thus the problems of stress associated with social status are likely to be lower in homogeneous areas.

In different ways, therefore, the spatial patterning of deprivation may influence health; and there is increasing evidence of this from a number of published studies. This project sought to see if this was the case in comparisons of Glasgow with Liverpool and Manchester.

 AIMS & PURPOSE

The specific research questions were:

- Is the spatial patterning of deprivation in Glasgow different to that found in Liverpool and Manchester?
- Does the distribution of deprivation in the three cities have an impact on all-cause mortality, premature mortality, and disease-specific mortality?
- Does the addition of neighbourhood contextual variables impact on all-cause mortality and influence the relationship between the neighbourhood and the surrounding areas?
- At what scale, if any, are these effects observed?
- To what extent are differences in the distribution of deprivation responsible for differences in health outcomes in the three cities?

APPROACHES & METHODS

To answer the research questions, levels of deprivation across neighbourhoods were mapped using Geographic Information System (GIS) software and examined for differences in patterning across the three cities. Statistical modelling was undertaken to formally test observed differences, and to assess the impact of any differences in the geographical distribution of deprivation on mortality.

FINDINGS & CONCLUSIONS

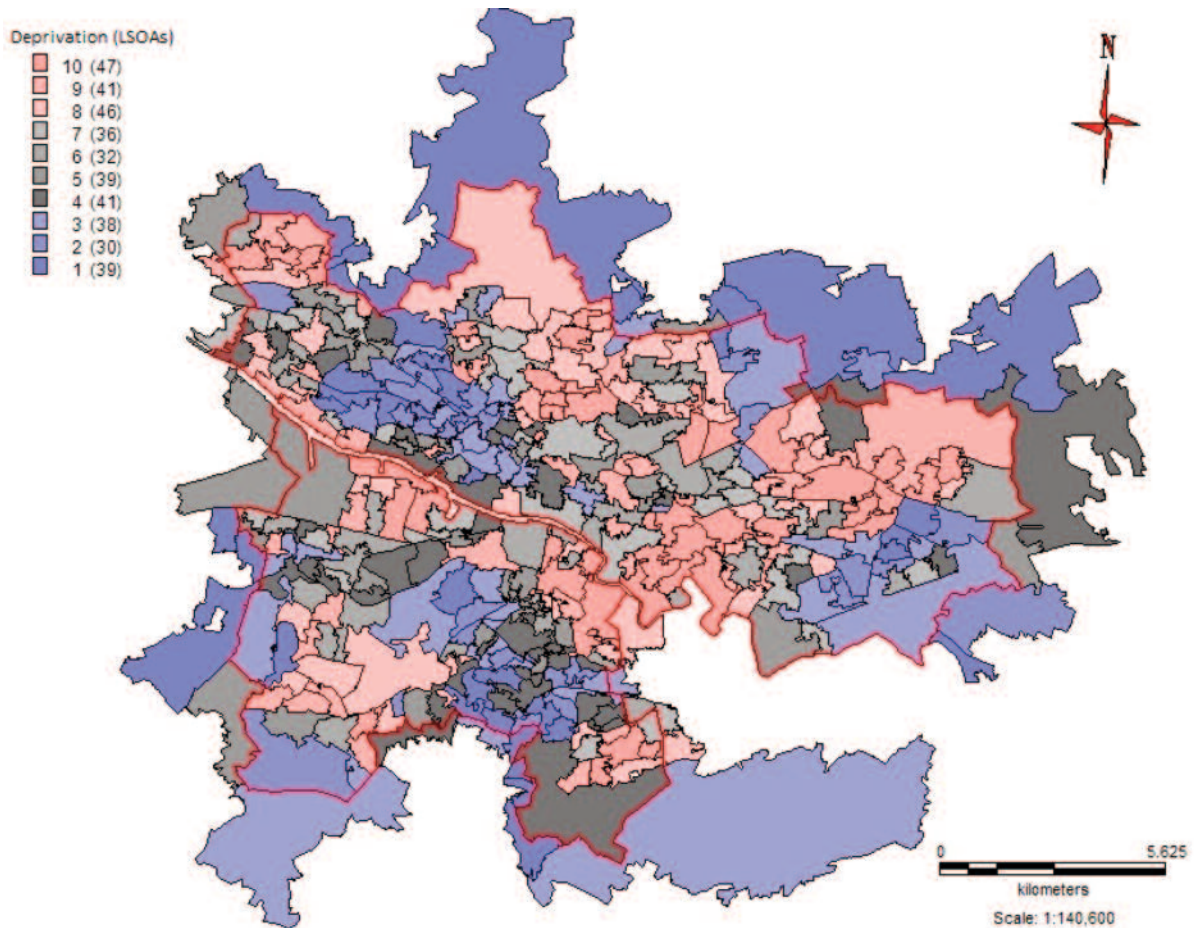
The GIS mapping and statistical testing for differences in patterning showed that while deprived neighbourhoods in all cities were likely to be close to similarly deprived areas, Glasgow's neighbourhoods were more dispersed than Liverpool and Manchester. Another difference was that deprived neighbourhoods in Liverpool and Manchester were more likely to be situated nearer to the city centre than was the case in Glasgow. Examples of some of the mapping undertaken are shown in Figures 1 and 2.

Neighbourhood deprivation was found to be the most important independent variable in explaining variations in mortality rates between neighbourhoods. Deprivation in the surrounding neighbourhoods had only a small influence on mortality rates, and this relationship was similar in all three cities: this, therefore, is not an explanation for Glasgow's 'excess' mortality compared with the English cities.

The relationship between neighbourhood deprivation and mortality was different in all three cities, with mortality still significantly higher in Glasgow compared with Liverpool and Manchester after all statistical adjustments. Models which examined premature mortality (<65 years) had similar results, with neighbourhood deprivation the most significant single variable in explaining differences between neighbourhood mortality rates. Again surrounding deprivation only had a small effect on neighbourhood mortality rates. In all the models tested, the 'excess' mortality (or gap) between Glasgow and the other cities widened as deprivation levels increased, showing that differences between the cities are at their greatest at the highest levels of deprivation.

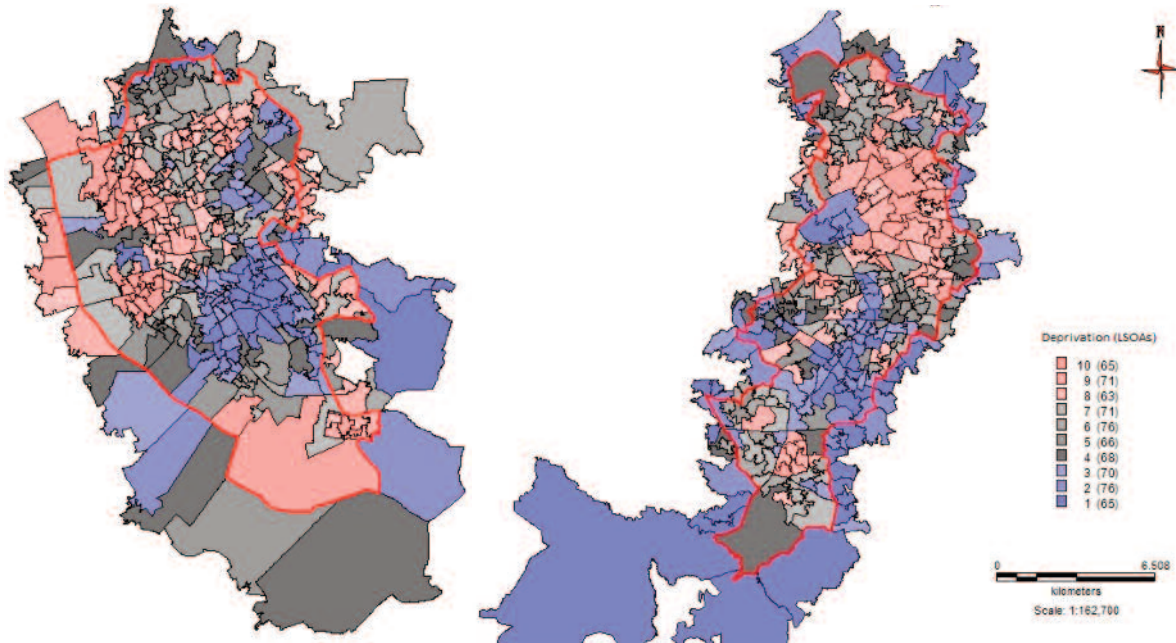
The statistically proven and significant differences in the patterning of deprivation in Glasgow compared with the English cities are of interest and could be the focus for further research on their potential influence on health- and wellbeing-related aspects in the cities. However, in seeking explanations for Glasgow's 'excess' mortality, it seems that other avenues need to be explored.

Figure 1: Income deprivation in Glasgow (ranked within three cities).



Notes: The City Council boundary is represented by the red line. Decile 10 is the most deprived decile and decile 1 is the least deprived. Maps are based on data provided with the support of the ESRC use boundary material which is copyright of the Crown, Post Office and the EDLINE consortium.

Figure 2: Income deprivation Liverpool (left) and Manchester (right) [ranked within three cities].



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