Modelling Changing Hospital Service Accessibility in Ireland 1999-2006

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1. Introduction

On the island of Ireland, there are two distinct and separate jurisdictions, namely the Republic of Ireland and Northern Ireland. Both were founded in 1922 with the former developing into an independent state while the latter still remains a part of the United Kingdom. The Irish Republic operates a primarily state-funded health care system, but an increasing input from private health insurance has arguably created a two-tier public-private system (Wren 2003). Northern Ireland's health care system is primarily based on the UK's National Health System (NHS) with some place-based variation (Jordan et. al. 2006). With the recent peace in Northern Ireland and the success of the 'Celtic Tiger' economy of the South, both governments are exploring joining up the economic and social structures across the whole island. Modelling access to health is one of the areas, which are currently being explored. Informally, there has been cross-border movement in the utilisation of health care for decades but there has been no strategic approach to modeling the implications of those flows. The need to plan in a cross-border setting is also explicitly stated in the new Republic of Ireland National Development Plan (NDP) for the period 2007-2013.

With both governments being engaged in the restructuring of health care services, the Departments of Health in both countries were keen to explore the spatial dimension. As a result the potential of a GIS-based approach was identified as worthy of exploration. The National Centre for GeoComputation (NCG) at NUI Maynooth were approached and asked to develop an initial modelling of access to hospitals on an All-Ireland basis. A number of problems needed to be addressed related to the compatibility of spatial data, data merging in a cross-border environment and reliability issues. However each of these issues were likely to be an issue affecting the quality of the GIS analysis. The combined datasets were then used to examine the potential impact of policy-driven change both north and south of the border.

2. Methodology

There is a long and rich literature in health geographies around the spatial modelling of access to hospital and other health services (Kalogirou and Foley, 2006, Charlton,

Fotheringham and Brunsdon, 2001). Issues of physical distance, travel time and transport networks were recurring themes in the literature (Brabyn and Skelly, 2006, Luo and Wang, 2003, Schuurman et. al, 2006). Based on this literature a set of core datasets were identified through data audit as being essential for the project. These included demographic data at the smallest available units, electoral divisions (ED) in the south and output area (OA) in the north. Demographic data used related to age, gender, health status, deprivation and other variables, which were predictors of health service demand. A second set of data related to the health care facilities in the form of point datasets for individual hospitals with associated data on size and status, both current and future. A third set of data related to road networks in both countries. Clearly a number of issues were also problematic in relation to spatial scale, classification compatibilities and data access and collation. These include MAUP issue, which was overcome by taking a raster route. Additionally the harmonization of both digital and census data from both jurisdictions presented a number of challenges in relation to attribute definitions but these were overcome through data mining.

3. Data Issues

Using GIS, a number of different modeling scenarios were explored. Three different time periods were chosen including the late 1990's to identify a past model, a mid 2000's period as an indicator of the present and a model based on the mid 2010's incorporating current proposed service changes. The broadness of the dates was influenced by the currency and timing of the available datasets which varied in both jurisdictions. A number of technical issues related to the topological joining of road networks and the up-scaling of OAs in the north to broadly match the larger ED units in the south. The individual accessibility models for the three different time periods helped to identify a consistent urban-rich and rural-poor pattern of accessibility. Of even more interest was the overlay and subtraction of the different layers to identify accessibility 'winners' and 'losers' between the 1990s and the current period and even more usefully, the potential impacts of new policy-driven service changes planned for the next decade.

4. Findings and Conclusions

While the full implementation of an All-Ireland hospital service may be a lengthy and problematic process, this research has identified, within a GIS modeling framework, some of the barriers and opportunities associated with such approaches. Ongoing technical problems relate to cross-border issues of areal unit size, service overlaps, aspatial political issues and the structure and organization of two separate health systems. By identifying these barriers more clearly using GIS, ways forward are clarified for policy makers in both jurisdictions. While Northern Ireland has a better level of spatial detail in the form of OAs and additionally can use postcodes to collect utilisation data, current practice on the collection of spatial data in the south is considerably hampered by the absence of small area data due to confidentiality issues, political sensitivity over health data access and the statistical unreliability of the very heterogeneous ED as an areal unit.

By modelling hospital accessibility in this way, the use of GIS as an effective modelling foundation for future All-Ireland health policy has been demonstrated. If the two jurisdictions are going to effectively cooperate in the area of spatial planning into the future, then the outcomes of research like this has two primary benefits: a) to emphasise the value of quantitative modelling to elucidate the impact of policy decisions across borders and b) to provide a form of spatial data audit in identifying the barriers that currently impinge on such a process. Such thinking might also be usefully employed in wider thinking around spatial data infrastructures within both countries and more broadly from an EU INSPIRE perspective.

5. Acknowledgements

6. References

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