

Measuring segregation and its impact: advancing our understanding of social change

- AQMeN research has developed new ways of measuring segregation and revealed significant changes in the spatial patterns of poverty and religion
- Religious segregation in Belfast has fallen and this holds true even when we control for random variation in the data
- There has been a significant shift in income segregation in all major UK cities due to an influx of affluent households into inner city areas
- We also find that the type of segregation matters: sharp differences in the ethnic make-up of neighbouring communities appears to be associated with higher rates of crime
- The innovative methods we have developed are now being applied to Chinese cities in collaboration with government officials in Hebei Province to analyse the impact of air pollution on 74 million people who live there

Summary of research evidence

Researchers from the Applied Quantitative Methods Network (AQMeN) have developed new methods for analysing the geography of segregation and inequality, and its impacts. **The research has revealed significant changes in the patterns of poverty relative to affluence in major UK cities. This has potentially important implications for how welfare is delivered, how vulnerable households are supported and for various social outcomes such as crime patterns.**

We find that, relative to the location of affluent households, urban poverty has decentralised. For example, measures of how concentrated benefit claimants are around the city centre (compared to non-claimants) show large reductions in relative centralisation. This is true both in English and Scottish cities.

Because traditional measures of social segregation can give misleading results due to random variation in the data, we developed new methods for controlling for this effect. We find that the results of relative decentralisation of poverty hold true even when the effect of random variation is taken into account.

We also applied these new methods to measuring changes in religious segregation in Belfast and wider Northern Ireland. After controlling for potentially spurious random variation in the data, we found small but statistically significant falls in religious segregation

both for Belfast and for Northern Ireland.

We also pioneered new ways of thinking about segregation. Rather than focusing on the average spread of particular ethnic or social groups across space, we developed a way of identifying “social frontiers” – places of sharp difference in social/ethnic characteristics between neighbouring communities. Our novel method for identifying social frontiers allows the boundaries to be ‘open’ rather than ‘closed’. This is important because sharp social/ethnic differences are often limited to particular segments of the neighbourhood perimeter, leading to open frontiers.

We applied our approach to Sheffield and found clear evidence of ‘open’ frontiers in both ethnic segregation and in the pattern of UK vs. non-UK born residents. We also found that crime rates were significantly higher in neighbourhoods connected by a social frontier.

Our findings suggest that social frontiers may be an important indicator of social tensions between two communities. Frontier zones are also likely to be places of deviant behaviour, not just inter-group conflict: residents near to social frontiers live at the periphery of their community where processes of social control are least potent. However, our analysis so far is based on cross sectional data so we need to be cautious about assuming causality.

Impact of our research so far

We have been working with policy makers both in the UK and overseas to help them make use of our novel measures of segregation and its impacts. Over the past two years, we have established a collaboration with Hebei Institute of Statistical Sciences (HISS) with a view to providing the government of Hebei Province with detailed analysis of the spatial dynamics of segregation, poverty, pollution and health in Hebei. **These measures will be used to shape economic and social policy to reduce inequalities and help restructure the economy of Hebei towards more sustainable strategies for growth.** Our collaboration is timely due to the recent declaration of “war on pollution” by the Chinese Premier, and renewed commitment announced by the government to eradicate extreme poverty.

Further funding has been secured from the ESRC Global Challenges Research Fund to take forward these plans for policy impact, utilising and extending our new methods, including the prize winning innovations by Dr Guanpeng Dong. **We believe the potential for impact is exceptional due to: (a) the scale and importance of the problem we are seeking to address, and (b) access to senior policy makers made possible through our collaboration with the Hebei Institute of Statistical Sciences.** Hebei province has some of the most polluted cities in the world. A key priority for the 74 million people who live there is to find ways of reducing air pollution and to address the associated social and health inequalities. As such, **our work has the potential to improve the health and wellbeing of millions of Hebei citizens.**

Next steps

Our collaboration with Hebei has already led to significant improvements to data infrastructure. Such improvements are needed to provide the government with a clear picture of how pollution, health and social deprivation are related, which is vital if we are to provide evidence-based policy recommendations.

Our researchers have also been developing links with the Chinese Academy of Social Science, a think tank within the Chinese government that provides data and analysis to senior policy makers. We successfully bid for an ESRC/Newton fund project to provide training in the new AQMeN methods to Chinese government researchers.

In the summer of 2017 we will be running a one day conference and a 4 day summer school providing training that will help pave the way for our AQMeN methods to be used by government researchers in Beijing.

We have also been working with local authorities and regional governments in the UK. In 2016 we were invited to present our innovative work on social frontiers to the Department of Communities and Local Government. As a result of this event, policy makers in Rotherham Council have invited us to work with them to apply our new methods to provide a more rigorous and nuanced understanding of the nature of segregation and inequality in Rotherham. Similar discussions are underway with the Scottish Government and Improvement Service (IS) about ways to improve analysis of segregation and inequality in Scottish local authorities.

Find out more about the AQMeN research on Urban Segregation and Inequality:

Lee, D., Minton, J, and Pryce, G. (2015) “Bayesian inference for the Dissimilarity Index”, *Spatial Statistics*, 81-85
<http://dx.doi.org/10.1016/j.spasta.2014.12.001>

Kavanagh, L., Lee, D. and Pryce, G. (2016) Is Poverty Decentralising? *Annals of the American Association of Geographers* <http://dx.doi.org/10.1080/24694452.2016.1213156?needAccess=true>

Dean, Dong, Piekut and Pryce: Boundaries in Residential Segregation: Do Social Frontiers Cause Crime? Working Paper available from g.pryce@sheffield.ac.uk. Summary available [here](#).

For more information or to contact our researchers, please visit www.aqmen.ac.uk or email info@aqmen.ac.uk