

Review

How developing countries can derive value from the principles and practice of geodemographics, and provide fresh solutions to millennium development challenges

Adegbola OJO^{1*} and Patrick Oseloka EZEPUE²

¹Department of Geography, University of Sheffield, Sheffield S10 2TN, United Kingdom.

²Department of Computing, Sheffield Hallam University, Sheffield S1 1WB, United Kingdom.

Accepted 20 July, 2011

Geodemographic segmentation systems are area classifications that use multi-criteria and geo-statistical analytics to group places and people into clusters of similarity. The benefits of these geocomputation techniques have been largely embraced by countries in the developed world where the origins of geodemographics lie. In spite of identified value of segmentation techniques for driving efficacy in policy making in developed societies, numerous developing countries still lack these systems. At the very basic level, some of the reasons for this paucity may appear obvious; however some more pertinent issues like the misunderstanding of the significance of data infrastructure has often been overlooked. In this paper, we provide some background on the antecedents of geodemographics and focus on the challenges and benefits of spatial segmentation as an option for driving evidence-based policy making within developing countries.

Key words: Developing world, geodemographics, geographic information systems, millennium development goals, public policy.

BACKGROUND

CHRONOLOGY OF GEODEMOGRAPHICS

Different schools of thought have emerged on the definition of geodemographics. Sleight (1997) defines it as the study of people by where they live. Brown (1991) particularly stressed that geodemographics concerns itself with area-based typologies and as a result proved to be adequate discriminators of the behaviour of consumers. There is no doubt that a significant part of current application is within market area analysis and predicting consumer behaviour (Longley et al., 2001); however it must be emphasized that geodemographic theory and practice transcends commercial classification systems. In this paper, we incline ourselves to the definition of Foley (1997) which says that 'the theory of geodemographics is based on the fact that similar people tend to cluster together and households in the same postcode sector or enumeration district can be placed in

the same category' (Foley, 1997).

Due to its scope, it is impossible to comprehensively treat the arrangement of events on the geodemographic time line in this paper. Different authors have given accounts on the origins of area classifications and geodemographics. Harris et al. (2005) gave one of the most comprehensive descriptions of the subject area in their book (Geodemographics, GIS and Neighbourhood Targeting).

The social research work of Charles Booth in England during the nineteenth century is often popularly used to explain the earliest practice of geodemographic principles (Simey and Simey, 1960; O'Day and Englander, 1993; Orford et al., 2002). Booth's first survey intended to show that poverty incidence could be measured accurately. This, he expected would eventually influence the way policy was designed and ensure such policies met actual measured needs (Bales, 1991). Booth employed a team of researchers to help him conduct lengthy interviews with professionals. According to Orford et al. (2002), these researchers had expert knowledge and experience

*Corresponding author. E-mail: a.ojo@adebolaojo.co.uk. Tel: +44 (0)114 2570 739, +44 (0)786 224 4758.

of working with those residing in London at the time. Amongst these professionals, the most important for him were the school board visitors whom he strongly believed had detail knowledge of social conditions and poverty (O'Day and Englander, 1993). The information gathered from the school board visitors and notes he made during the survey were used to describe general socio-economic conditions in which people lived in form of maps¹.

Geodemographic developments in the United States were sparked by the publication of census small-scale data typically for census tracts. This enabled a statistical methodology to be used for the first time to segment social areas in Los Angeles and San Francisco (Shevky and Williams, 1949; Shevky and Bell, 1955). More research was conducted in America following the release of census data in 1960 covering more cities.

Near the mid-1980's commercial firms particularly in the United Kingdom (UK) began to understand the value of geodemographics for targeting customers and subsequently dominated the industry. To a large extent, this has overshadowed academic interests in the field of area classifications despite its academic research origins.

Blake and Openshaw (1995) were instrumental in resurrecting academic interest in contemporary geodemographics by developing a general-purpose classification system for UK enumeration districts (EDs) from the 1991 census. They adopted an unsupervised neural net technique. The methodology is based on Kohonen's self-organizing map and provides an avenue whereby the number of assumptions is reduced as much as possible and the sources of data uncertainty are incorporated (Openshaw, 1984a). The system however left a number of areas unclassified.

The research commissioned by the UK office for national statistics (ONS) in collaboration with the University of Leeds further revived the academic and research strengths of geodemographics (Vickers et al., 2005; Vickers and Rees, 2006, 2007). The research resulted in the segmentation of all UK census output areas (OAs) from 2001 census data².

Minimal literature on the technical development of small area geodemographic classification systems is traceable to developing countries. Apart from the work of Ojo et al. (2010) which led to the creation of the first open-source African geodemographic classification system for all the Local Government Areas (LGAs) in Nigeria³, it is difficult to find similar examples. It is also noteworthy to appreciate contributions in the area of applied geodemography and qualitative analyses. Such analyses have been used to examine a number of development problems in Nigeria (Ingwe et al., 2011; Ingwe et al., 2009;

Ingwe et al., 2008).

Some researchers are put off by challenges surrounding availability and access to required datasets in developing countries. Few people are prepared to undertake the hard work of dealing with such challenges head-on. In the remainder of this paper, we aim to expound some of these challenges and discuss some of the real benefits that the majority of countries in the global south and far east can derive from area segmentations. This we hope will help drive a new impetus for embracing geodemographic techniques and practice across the developing world.

AN OVERVIEW OF PROBLEMS CONFRONTING DEVELOPING COUNTRIES

At the wake of the current millennium, world leaders gathered at the headquarters of the United Nations (UN) to demonstrate their recognition and vision for a better world (UN, 2000). Much of the deliberations focused on the need to reduce the problem of poverty and hunger, improve education, health and opportunities for women, ameliorate environmental degradation and increase global cooperation. The eight millennium development goals (MDGs) encapsulate these important issues. The UN MDGs are listed:

- Goal 1: Eradicate extreme hunger and poverty.
- Goal 2: Achieve universal primary education.
- Goal 3: Promote gender equality and empower women.
- Goal 4: Reduce child mortality.
- Goal 5: Improve maternal health.
- Goal 6: Combat HIV/AIDS, malaria and other diseases.
- Goal 7: Ensure environmental sustainability.
- Goal 8: Develop a global partnership for development.

While some of these challenges are common to developing and developed countries, it cannot be over-emphasized that less developed countries are most burdened with the depth and spread of the problems.

Due to the broad nature of the MDGs, a set of 18 related targets were identified to help facilitate the process of quantifying progress towards attaining the goals. The targets have since increased to 21. Additionally, each target can be evaluated by analyzing a number of indicators that have increased from 48 to 60 (UN, 2003).

Moreover, the eight MDGs alone do not completely address current global challenges especially those related to developing countries. In fact, they probably do not address some of the more pertinent issues like corruption, wars and conflicts and weak institutional frameworks.

Corruption in some developing countries continues to hamper pro-poor development programmes (Gray and Kaufmann, 1998). Also linked with corrupt practices is the fact that many developing countries have been plagued by instability in their systems of governance. The

¹ For more details see: <http://booth.lse.ac.uk/>

² UK Census Output Areas were built from clusters of adjacent unit postcodes and designed to have similar population sizes and be as socially homogenous as possible.

³ For more details see: <http://www.nigerianlgaclassification.com/>

challenges posed by civil unrest often lead to conflicts and wars. Typical examples are drawn from the ongoing crisis across the Middle East, Ivory Coast and recent examples from Sudan. Such unwarranted population displacement aggravates the problem of poverty. It often results in the erosion of the minimal assets or forms of livelihoods that have been amassed by the poor segments of community and replaces it with a lack of sense of dignity. The UN estimates that there are over 42 million people worldwide in displaced conditions (UN, 2008) courtesy of the conflict in Iraq and instability in Sudan.

What conflicts and displacement do is to incapacitate the productivity of people, especially the core poor. It erodes their ability to transform their aptitudes (natural and/or learning-entrenched) into meeting and sustaining their basic needs.

Unequal distribution of income, employment and welfare opportunities continue to contribute to the entrenchment of poverty in developing societies (Ravallion, 1997; Gupta et al., 2002). In many countries where governance structures are aligned along ethnic or religious lines, opportunities and wealth are often constricted in the hands of very few people. Helping the poor get out of poverty requires understanding the roots and being able to systematically identify and target pockets of the poorest segments of the population.

SOME SHORTCOMINGS OF APPROACHES USED BY INTERNATIONAL DEVELOPMENT PARTNERS

Much of the work of the UN and other partner agencies tend to be focused on issues of development economics. As such, interests are often directed at pursuing economic growth or an “unclear development.” We argue in this paper that the MDGs to some extent risk simplifying the meaning of the concept of development because of the difficulty in measuring many key aspects of development. Within the MDG framework, too much attention is concentrated on macro-level economic development that does not necessarily always contribute positively to pro-poor growth (Cornia, 2006). This does not necessarily help address the more pertinent issues of relative inequalities of opportunities or circumstances of different social groups within countries.

Another inadequacy of the MDGs is that many of the targets are rigid. The problem-solving approach often deployed especially at country level fails to address the need for flexibility in the priorities of countries. For instance, the MDG on education is particularly interested in a full course of primary level schooling but fails to address any issues on secondary and post-secondary education.

Many of the MDG-related global reports fail to critically underscore between-country differences in definitions of some fundamental issues. A clear example is the issue of advancing basic education. Different countries have

different primary school age enrolment systems. One of the MDG indicators examines the proportion of pupils starting grade 1 who reach the last grade of primary school. The age at last grade for different countries varies (World Bank, 2003) and this influences performance metrics when undertaking inter-country comparisons.

Another issue with the inter-country comparison is that since different definitions of the indicators are used in the different countries, some of the data gathering and aggregation techniques would be slightly different. Unfortunately, most government statistical agencies especially in developing countries are not as transparent with these issues.

THE PROBLEM WITH FOCUSING ANALYTICS ON HIGHER LEVELS OF GEOGRAPHY

The failure of the UN and partner agencies to use their influence as a veritable mechanism for driving the advancement of problem solving at the local level is a major limitation of their approach (Dernbach, 2002). It is also one of the key debates to which this paper provides a suggested solution for researchers and policy makers.

Having reviewed different MDG country reports, we discovered that these reports only tend to highlight within-country disparities. The reports reflect analysis conducted at regional levels or provide rural/urban indices on progress towards meeting the targets of the MDGs. There is often little or nothing mentioned about what goes on at local geographic scales.

At higher levels of geographical aggregation, it is easier to uncover disparities related to profound policy issues like poverty and well-being, ill health and illiteracy (Dorling and Ballas, 2008). At the local scale, these issues are relatively difficult to track-down. However, it is at these local scales that the problems can quickly become endemic if not adequately monitored (Dernbach, 2002).

Neighbourhood and community ties are often stronger at the local scales of geography. It is at the local or neighbourhood scale that the populace feel the implications of policies designed for them. While the impacts of strategies and policies targeted towards reducing inequalities may not quickly become apparent at the local level, they often turn out on the long run to be more effective and sustaining. This is why there is a fundamental need for a radical shift in the way the UN and partner agencies evaluate progress towards meeting the MDGs. Country reports and analysis done at regional, state or country levels often cloud variations at the local levels.

WHY DEVELOPING COUNTRIES LACK GEODEMOGRAPHIC SYSTEMS

A literature review of the reasons accounting for paucity

of geodemographic systems in developing countries reveal a number of interlinked problems that we have summarized under three main headings. The first is a misunderstanding of the importance of data and intelligence in driving the provision of physical and other infrastructure. Secondly, there are evident challenges on the data side. For decades, there have been calls for developing countries to strengthen their data gathering mechanisms, however lack of access to available datasets continue to deter well-meaning researchers from fully exploiting the potential of data inventory (Odotola, 2003). A final reason we discuss is the problem of lack of local expertise.

A MISCONCEPTION OF WHAT CONSTITUTES INFRASTRUCTURE

Due to the level of poverty and other related challenges in many developing countries, the focus of infrastructural development has been mainly directed at physical infrastructure like roads, water supply and electricity supply. There is no doubt that these things are vital however, we argue in this paper that infrastructure transcends the provision of such physical developments.

The emphasis placed on physical infrastructure has all too often clouded the importance of developing efficient data infrastructure in developing countries. Ironically, policy decisions on the provision of some of these physical infrastructures for instance, should ideally be based on evidence sourced from timely and informative datasets. Unfortunately, it appears to be a case of putting the cart before the horse, where policy makers make decisions based on sentiments and subsequently seek information to back up their policies.

Even in situations where a decision maker is transparent and committed to doing the right thing, the absence of the required raw materials and evidence base often weakens the decision-making process. For instance, many public health authorities in developing countries only exist as physical building structures. The lack of adequate data and information systems especially at detailed spatial granularity means that they are unable to adequately monitor health care and provide intervening strategies (Gething et al., 2006; Odotola, 2003).

LACK OF ACCESS TO AVAILABLE DATASETS

Another major impediment to geodemographics development in developing countries is the problem of access to available datasets. In some countries, data is systematically constricted by the same sources from which they should be derived.

One of the contributory factors to the difficulty in accessing spatial statistics is the fact that many of these countries dwell on outdated legal frameworks for the

release of information (See and Gibson, 2006). In some countries, the dissemination of digital or electronic data is frowned upon. Often government agencies hide under the cover of disclosure controls.

In some other cases, the young establishment of democratic systems of governance does not encourage the freedom and access to information. Few democratically governed developing countries have a freedom of information bill signed into law (Darch and Underwood, 2010). Such continued secrecy greatly hampers the ease with which researchers can gain access to required information for unbiased analysis.

It is important for public office holders to recognize that publicly sourced information like censuses and surveys constitute a public good because members of the public are also stakeholders in the derivation of the datasets. Additionally, making information available for the public good is a pointer to transparency and accountability (Darch and Underwood, 2010). It also allows for the creation of an enabling social space for constructive debate and discussion amongst academics and the public stakeholders.

DEARTH OF TECHNICAL EXPERTISE

Although not often admitted by developing country statistical bodies, many require strengthening in technical depth required for the creation, storage, manipulation and management of geographically referenced statistics (See and Gibson, 2006).

Support is sometimes received from international donor groups to provide training to members of staff. However, this sometimes results in within-country brain drain from public to private sector organizations due in part to better working conditions and increased pay (Snyder and Osland, 1996; Ashcroft et al., 2007).

The problem of data accessibility is also linked to shortage in technical expertise. Many government agencies claim they do not want to disclose confidential information. However, the key problem is that there is a skills shortage problem in techniques for data anonymization.

Many developing countries are too comfortable with providing data in analogue formats. Apart from the problem of keeping pace with the development of geostatistical methods, there is also the need for the expansion of training on how to use specialized software packages. Although there is evidence of a slowly narrowing digital divide (Weeks, 2003) the problem is still persistent in developing countries.

DATA QUALITY ISSUES IN CREATING GEODEMOGRAPHIC SYSTEMS

Geodemographic classifications systems have a number

of application areas which cut across different disciplines. Gordon (1999) suggests two key purposes of any classifications scheme. The first being data simplification and the second prediction.

Choosing input variables that can sustain the longevity of the classification system is important. One key theoretical principle that should be considered during the choice of variables is the sensitivity of each variable. The rate at which the values of variables change over time can have implications on the reliability of the system (Vickers and Rees, 2006). Variables that will sustain the classification over its life course are those that do not have the potential of yielding to large changes across areas.

Census variables have a benefit of wide geographic coverage but face the problem of updatability. In Nigeria for example, the national census should ideally hold every 10 years. However this has not been the case over time. Long years of political instability have contributed to inconsistency in the conduct of census. The most recent census was in 2006. Prior to that, the census was in 1991.

This underscores the importance of national surveys in developing countries. Many of the widely used classifications in the developed world supplement census statistics with data derived from life-style surveys (Harris et al., 2005). The argument is that such surveys are conducted more frequently, utilise the same geography as the census and ask more direct questions beyond population demographics and housing.

This argument therefore presents a valid consideration especially in developing countries where acquisition of government data inventories can present significant challenges when undertaking data-intensive research (Okonjo-Iweala, 2007). However when combining data from different sources, care must be taken to ensure that they are derived from comparable geography and that appropriate methods of interpolation or extrapolation is used (Goodchild et al., 1993; Fotheringham and Rogerson, 1993).

WHAT CAN GEODEMOGRAPHICS OFFER?

We firmly believe that developing countries can benefit tremendously from geodemographics in the policy-making arena. Geodemographic segmentations offer alternative solutions on a number of fronts from both strategic and operational perspectives. They can serve as useful analytical tools for drilling down to local analytical scales; they can help eliminate bias in the geographical disbursement of national resources; there is strong evidence of their potent power as tools for targeting policies and monitoring impacts of national policies and they can be used to drive national social marketing agenda. We aim to expound these potential uses of developing world geodemographics.

INSIGHTS INTO VARIATIONS WITHIN SUB-NATIONAL POPULATIONS

A key limitation of spatial analysis done in most developing countries is the difficulty of generating insight into local level disparities in the characteristics of populations. The macro-level approach to embarking on inquiry is often the norm of research enquiry even within some academic communities in developing countries. Most of the profound issues like poverty and well-being are analysed and reported at regional or at best state levels of spatial aggregation. The patterns of inequality within sub-national populations are often overlooked.

We firmly believe intelligence gathering at local geographical scales is crucial for accelerating development progress in developing countries. However, we recognize it is difficult to embark on these analyses and generate reliable results especially in scenarios where data availability and access are problematic.

Geodemographic segmentations present an option for the investigation of local level inequalities especially within data-scarce countries of the developing world. A segmentation system developed with national or near national coverage dataset for small or local areas can be used to evaluate people and area types. By plugging a survey of respondents from different locations within a country into the area segmentation, it is possible to generate initial insight into the fundamental characteristics of respondents to survey. Results can then be extrapolated nationally (Harris et al., 2005) on the basis of the assumption that people who are more similar in their geodemographic make-ups will most likely reside in the same locality and those locality-types will be spread across the country. Many of the MDGs are assessed based on national surveys (UN, 2003). However to date, local level country reports and analysis are almost impossible to come by. A geodemographic option therefore not only offers technocrats an alternative way of investigating local level inequalities but also affords individuals from non-technical backgrounds the ability to quickly and easily assimilate patterns of population disparities at the local scale of geography, a good example is the Nigerian LGA Geodemographic Classification System and Profiler (NIGECS), which has been developed for Nigerian LGAs and is accessible online at www.nigerianlgaclassification.com.

INFORMED DECISION MAKING AND RESOURCE ALLOCATION

For developing countries, the judicious allocation of resources is important in many respects. First, these countries harbour the largest population groups of the world (UNFPA, 2007). Secondly, the economic resources required to sustain the teeming population is limited and foreign aid is often required as a supplement. Thirdly,

because of political instabilities and tensions (usually linked to distrust amongst ethnic and religious groups) most governments are often under pressure to favour some group of people over others. Unfortunately, over time this problem has been compounded by the menace of deliberate falsification of national statistics to favour different groups (Holz, 2002). Solving this problem would of course require political will.

While geodemographics cannot be used as a substitute for political will, one area where its potential can be exploited is in its ability to provide decision makers with much more holistic information. Public sector agencies within developing countries are sometimes too comfortable with anchoring their decisions on unidirectional analysis where they look at the traditional age-sex variables alone. In many instances however, a fusion of multiple indicators can have the ability to provide a more robust picture and reveal something new. A very useful feature of geodemographic systems is the underlying textual and graphical explanations that accompany the results of analysis from which they are developed (Ojo et al., 2010; Vickers and Rees, 2007; Harris et al., 2005). These descriptions are often referred to as profiles and are used to summarize the predominant attributes of the population groups. Geodemographic profiling helps elucidate (in qualitative terms) information inherent in complex quantitative analysis. It therefore means that when ancillary datasets are linked with geodemographic typologies, decision makers are not only informed about the direct relationships of indicators but they are also provided with potential likely or unlikely solutions.

THE TARGETING OF INTERVENTIONS

The targeting of workable and preventive strategies is important for any government that seeks to reduce cost on the long run (Walker, 2003). The process of targeting interventions requires mechanisms for identifying special populations or sometimes-vulnerable population groups. Identifying such groups requires unveiling their attributes and locating their distribution across geographical space.

For instance if it is identified within 'region A' that certain geodemographic types have high incidence of a particular type of communicable disease; by evaluating the geodemographic features and lifestyle characteristics of the residential population within 'region B', it may be possible to predict the likely hot-spots for such disease (Abbas et al., 2009). This may be useful in helping health agencies deploy their scarce resources and information communication strategies intelligently and ultimately forestalling future problems.

MONITORING NATIONAL POLICIES

It is not just enough to make policies for people; more

importantly, it is vital for the effectiveness of such policies to be evaluated (Ballas et al., 2005). Such monitoring and evaluation process allows for the generation of input-feed back mechanisms and helps enhance the effectiveness of policymaking.

Geodemographic analysis allows users to benchmark population groups and characteristics (Abbas et al., 2009). This ensures that the performance of a neighbourhood type can be evaluated relative to others and relative to a national performance benchmark. Monitoring can also be done by comparing the relative performances of the neighbourhood types based on the chosen indicator over time.

PUBLIC SECTOR SOCIAL MARKETING

In the world of business and commerce, it is fundamental for the right product or service to be communicated to the appropriate person for a sale to be made. If the product or service fails to reach the final consumer then we can safely assume that the cycle of production is incomplete.

The same way commercial organizations seek to market their products with the aim of profiting; public sector organizations are also interested in ensuring that their products and services like adequate health care, education and poverty alleviation programmes are directed at the appropriate target groups. The volume, form and spatial disaggregation of these public sector commodities are vital for the satisfaction of the consumers who are the public.

The idea of introducing strategic and dynamic targeting techniques which take cognizance of the types and levels of variations in the characteristics of the target population is what is known as social marketing (Andreasen, 1995). In the United Kingdom, geodemographics has been used extensively as a veritable tool for public sector social marketing especially in the health sector (Powell et al., 2007).

Geodemographics provides a unique option for the public sector because it enables service providers to know who their service users are, what they do and their attitudes. It can help uncover segments of the population that have been hard to reach in the past. It also has the benefit of allowing service providers to vary their communication channels and set differing objectives based on the dynamics of target population groups.

ACADEMIC POTENTIAL

The idea of geodemographics has spread rapidly across a number of developed countries (Ojo et al., 2010; Harris et al., 2005). Apart from promoting the use of geodemographic systems within the public sector, openly created geodemographic systems such as the Nigerian and UK examples (Ojo et al., 2010; Vickers and Rees,

2007), which are ratified by the academic community can also increase the research potential of these techniques. Similar to the UK, geodemographics can be introduced into geography, urban and regional studies university curricula within developing countries. This will also help bridge the academic literature divide on the subject.

ACKNOWLEDGING SOME SHORTCOMINGS OF GEODEMOGRAPHICS

In spite of its potential, geodemographics has attracted some measure of criticisms. Most of these centre on theoretical and methodological issues of the ecological fallacy and the modifiable areal unit problem (MAUP).

The ecological fallacy derives from a situation where members of a group are ascribed with the characteristics when only the overall characteristics of the group are known (de Smith, 2006). It is based on the probability that analysis based on area level data may give rise to conclusions different from unit level data (Steel and Holt, 1996). All forms of geographically oriented analyses experience the imprint of the ecological fallacy (Vickers and Rees, 2006). Steel and Holt (1996) have suggested that the key to analyzing data from grouped populations is the development of statistical models for the individuals, the groups and the interactions between them.

When embarking on any research, the spatial unit of the enquiry is important. Many of these spatial units or objects are 'modifiable', implying that larger areal units are adopted in order to define a measure of spatial association between component units (Openshaw, 1984b).

To help understand what the modifiable areal unit problem (MAUP) is all about, Taylor et al. (2003) cited an illustration with the United Kingdom (UK) census data:

'The UK census collects individual household level data and then aggregates up to a variety of larger zones, such as the Enumeration District, Ward or Local Authority. However, these zones determined for ease of enumeration may bear little resemblance to the social geography of the people they contain. Consequently, the analysis of such data in different zones, or levels, may alter the resulting pattern of aggregated observations' (Taylor et al., 2003).

While some authors have regarded the MAUP in practice as 'not as big an issue as it might appear' (de Smith, 2006), some others (Openshaw, 1984b) have stressed the severity of the problem.

CONCLUSIONS

We have illustrated in this paper that developing countries

are confronted by multifaceted challenges. The MDGs is just one response by world leaders to the problems in developing societies. While the MDGs and other important policy programmes try to engage the development process within these countries, we have argued that there is increasing need for a paradigm shift towards revisiting approaches that will promote accountability and transparency, surmount institutional limitations, enhance equity, practice all-encompassing urban development, promote pro-poor growth and strongly encourage the understanding and intelligent targeting of local level policy initiatives.

This paper has proposed the geodemographic option as a veritable means for bridging the gap between regional and local level investigation of progress towards meeting the MDGs and other important policy initiatives in developing countries. Not only can geodemographics help address some of these problems with the simplicity often requested by less technical audience of policy makers; more importantly, it also helps underscore the need for differentiating approaches to policy making as opposed to enforcing one size fits all approaches.

ACKNOWLEDGEMENT

This work was supported by the University of Sheffield, United Kingdom [Grant number GAB 77772006].

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