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Size, Accessibility and Crime in Regional Australia

Carlos Carcach

Official statistics show that crime rates in non-metropolitan areas have increased faster than in metropolitan areas over the last five years. Population size and location play a role in determining the crime levels of local areas. These factors are associated with the potential of regions to attract new economic activities, adjust to economic change and generate local development.

This study shows that crime rates are highest in either highly accessible or very remote areas rather than those in between. Distance from a service centre plays a crucial role in explaining the levels of crime in small- to medium-sized localities. Small towns located relatively close to major urban centres tend to have crime rates as high as remote towns. In rural localities (that is, less than 1,000 residents), however, geographical or service isolation does not necessarily play a role in shaping crime rates. In these locations, economic change and the ability to adapt, population exodus and the strength of community ties are key factors in determining the levels of crime.

Identification of the factors that drive crime rates in regional Australia is crucial to developing strategic approaches to crime prevention and control. This paper will be followed by others that take the analysis further.

Adam Graycar
Director

The term non-metropolitan applies to regions located outside capital cities. These regions contain urban centres of varied sizes, as well as rural localities, that differ along many demographic, social and economic dimensions.

Rural communities may be experiencing, or may have already gone through, processes of structural adjustment derived from changes in economic activity, negative growth and out-migration. Little is known about the impact that these changes and associated processes have on the level of crime of non-metropolitan localities. Non-metropolitan crime, in particular rural crime, is a neglected topic in the Australian literature, and only a few studies have been published (Cunneen and Robb 1987; O'Connor and Gray 1989).

Small localities seem to be less equipped to cope with forces of change than large ones, and they may experience difficulties when trying to adjust to new conditions. This may heighten the levels of social and economic stress among residents, which can result in rising crime rates (see, for instance, Weatherburn and Lind 1997). Accessibility to basic services affects the socioeconomic wellbeing of residents and may influence local crime rates (Kposowa, Breault and Harrison 1995; Kovandzic, Vieraitis and Yiesley 1998).

Population size and accessibility may be associated with other factors that are, in turn, causally related to crime. Measures of social and economic disadvantage would certainly explain much of the variation in crime rates across types of localities and any effects of population size and accessibility might drop from the analysis.

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Broad sets of economic opportunities accrue to a place by virtue of its size and its access to larger economies, therefore these factors have a significant effect on its development (Ghelfi and Parker 1997). Because these two dimensions are related with a broader set of local processes besides those resulting in socioeconomic disadvantage, it is important to understand their impact on crime rates before taking into consideration other "causally" related factors.

Understanding the role that size and accessibility play in explaining regional variations in crime is important from a policy perspective. Understanding the way in which crime rates vary across different types of localities, in particular rural ones, is an important first step in the process of developing strategic approaches to crime prevention and control.

Using data for LGAs in the mainland states except for South Australia, this paper discusses the role of population and accessibility in explaining regional variation in crime rates. The results indicate that both size and accessibility have significant effects on crime rates but that no single pattern describes the relationship between these factors and local crime rates. This suggests that the economic and social processes influencing local crime may operate in different ways depending on the geographic context of areas. The role of socioeconomic disadvantage and other factors related to crime will be examined in a forthcoming paper.

Conceptualising Non-Metropolitan Areas

In Australia, non-metropolitan areas have been classified in terms of an accessibility index into the categories of urban, rural and remote areas (Department of Primary Industries and Energy (DPIE) and Department of Human Services and Health (DHSH) 1994). This classificatory scheme has been criticised on the grounds that it does not make a clear distinction between the urban-rural dichotomy and the concept of accessibility. Hugo (1999) argues that a centre can be both urban and remote. An index known as the Accessibility/Remoteness Index of Australia (ARIA) was developed in an attempt to separate the concept of urban-rural and accessibility. ARIA is a measure of accessibility and it has been used to construct indicators for several dimensions of isolation (for example, local, professional and service isolation) (Department of Health and Aged Care (DHAC) and National Key Research Centre for Social Applications of Geographical Information Systems (GISCA) 1999).

Localities with low population density are often classified as rural. According to the Australian Bureau of Statistics (ABS), a rural area is one whose population does not exceed 1,000 persons. The latest census showed that 15 per cent of the Australian population lives in rural areas (ABS 1997).

The concept of rural has social and economic connotations that are difficult to disentangle. Both the diversity and complexity of the features of rural places are implicit in any attempt to divide non-metropolitan areas. Therefore, it is important to keep in mind that in exploring rural crime, one must recognise that there is no single standard definition of rural and that rural areas are incredibly diverse.

This paper uses the more general term of non-metropolitan areas to refer to the heterogenous set of regions located outside metropolitan Australia. Rural areas are obviously a part of non-metropolitan Australia.

On the Concept of Non-Metropolitan Crime

The comparative study of non-metropolitan and metropolitan crime requires that the concept of non-metropolitan crime, more specifically rural crime, be precisely defined and operationalised. Donnermeyer (1995) argues that one of the least understood topics in the fields of criminology and criminal justice today is that of rural crime. Features of rural areas such as informal social control among citizens, and a reluctance to share internal problems, may result in failure to report a crime out of the belief that it is a private matter (Weisheit, Falcone and Wells 1994). This will obviously affect reporting of crimes to the police, their recording by police, and finally the magnitude of the crime rates in the official statistics.

The term rural crime may refer to behaviours and incidents that can only occur in rural areas. Victimisation surveys of farms and ranches conducted in the United States (Donnermeyer 1987; Voth and Farmer 1988; Cleland 1990 and Saltiel et al. 1992) indicate that the most frequent agricultural crimes are vandalism, stolen farm supplies and tools, and burglary. It is rare to find incidents of violent crime occurring among the farm population, and most of these incidents take place at off-farm/ranch sites. In addition, personal crimes of theft are relatively rare on agricultural operations, but can occur to the farm and ranch population at other locations (Donnermeyer 1995).

Official crime statistics do not provide enough details to classify crimes as strictly rural or urban. Therefore, it is not possible to focus on what might be defined as pure rural crime. Given this limitation, this paper uses the term rural crime to refer to any incident of crime recorded by police within an area that is classified as non-metropolitan.

Crime is unevenly distributed along social and geographic lines. Each act takes place in a particular local context, and, as a consequence, crime rates vary widely across communities. Reasons for this local variation are many and complex: income and everything associated with it; housing; quality of schools; and family organisation, are certainly factors. Crime is tolerated in some communities more than in others. Some communities have stronger normative structures and mechanisms of social control

than others. Some communities are well organised and capable of community action that is aimed at greater self-determination; others simply are acted on by external social and economic forces (Hobbs 1995). Generalisations about rural areas, other than small size of towns and low population density, are problematic.

A Comparative Analysis of Rural and Urban Crime

This section discusses the results of a comparative analysis of crime levels in rural and urban areas using data for LGAs in the states of New South Wales, Victoria, Queensland and Western Australia. Areas were classified according to the following criteria:

- *Population size*. This is the criterion used by the ABS and according to it, a local area is rural if its total population is less than 1,000. The classification used in this paper is as follows:
  - (a) metropolitan Centre (100,000 residents and over);
  - (b) major urban (50,000 to 100,000 residents);
  - (c) minor urban (20,000 to 50,000 residents);
  - (d) major town (4,000 to 20,000 residents);
  - (e) minor town (1,000 to 4,000 residents); and
  - (f) rural locality (less than 1,000 residents).
- *Accessibility* (DHAC and GISCA, 2000). This criterion measures access along a road network from 11,340 populated localities to 4 categories of service centres[1]. Localities are classified into 5 groups according to the values of the ARIA Index:
  - (a) highly accessible (ARIA score from 0 to 1.84);
  - (b) accessible (ARIA score greater than 1.84 to 3.51);
  - (c) moderately accessible (ARIA score greater than 3.51 to 5.80);
  - (d) remote (ARIA score greater than 5.80 to 9.08); and
  - (e) very remote (ARIA score greater than 9.08 to 12).

The ARIA indices used in this study were calculated as averages of the ARIA indices for the localities contained within each LGA. Due to this process, the ARIA index for LGAs containing service centres within their boundaries was not exactly equal to 0. To correct for this situation, the first group was divided into two groups designated as Highly Accessible-A (ARIA less than 0.10) and Highly Accessible-B (ARIA greater than 0.1 but less than 1.84).

In general, rural LGAs are more likely to fall in the remote and very remote categories than other types of LGAs, but this is not always the case. Forty-five per cent of the LGAs classified as rural were also classified as either accessible or moderately accessible. Both major and minor towns tend to distribute across the accessibility categories.

Only 34 per cent of LGAs classified as very remote and 24 per cent of LGAs classified as remote were rural. Note that 20 per cent of moderately accessible LGAs were also classified as rural.

Data

The study included the property offences of residential break and enter, non-residential break and enter, and motor vehicle theft, as well as the violent offences of

Figure 1: *New South Wales, Victoria, Queensland and Western Australia, 1994–98. Rates of Property Crime—Local Government Areas. Population Size and Accessibility Group*

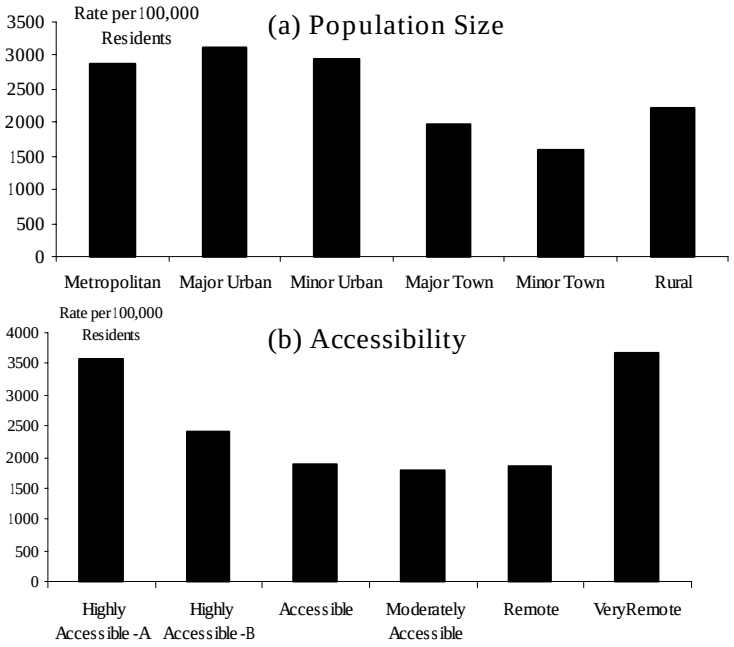
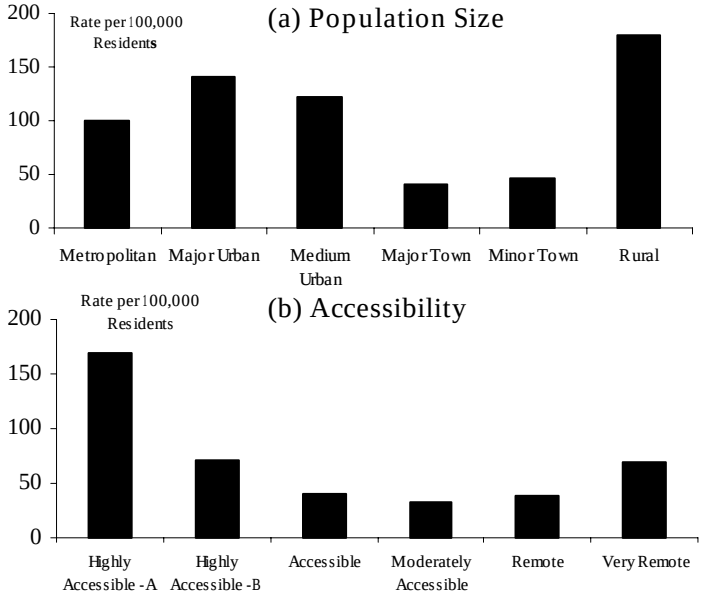


Figure 2: *New South Wales, Victoria, Queensland and Western Australia, 1994–98. Rates of Violent Crime—Local Government Areas. Population Size and Accessibility Group*



Source for Figures 1a and 2a: The Australian 1996 Census Data, Census 96 Explorer.
Source for Figures 1b and 2b: Access / Remoteness Index of Australia (ARIA).

armed and unarmed robbery. Incidents were classified into the major groups of property and violent offences.

Figures 1 and 2 show the distribution of LGA rates of property and violent crime for groups of LGAs defined according to population size and accessibility. The rates used to prepare the graphs in the referred figures were calculated from the number of crimes recorded by police and the population size within each of the groups of LGAs.

The rates of property and violent crimes follow an S-shaped pattern, with highest property crime rates observed for rural LGAs and LGAs with populations between 20,000 and 50,000 residents (major and minor urban areas). On the other hand, minima are observed for LGAs with populations over 100,000 residents (metropolitan) and towns, both minor and minor.

Crime rates follow a U-shaped pattern when related to the measure of accessibility. LGAs at both ends of the accessibility scale experience the highest rates for both property and violent offences. Note that property offences are more prevalent in highly accessible LGAs. For rates of violent offences, there is no difference between highly accessible and very remote LGAs.

Differences in crime patterns according to degree of rurality and the index of accessibility of LGAs reflect the fact that areas are exposed to the influence of many factors. In the United States, researchers have documented increasing levels of personal and family stress in rural areas, especially among younger families (for example, Bellah et al. 1986; Gallaher 1980; Schmuck and Schmuck 1992). In addition, residents' social and economic ties to their communities have been weakened as rural America has increasingly become incorporated into a mass society. Both conditions have been associated with increasing levels of substance abuse and violence in rural areas (Hobbs 1995).

In Australia, Weatherburn and Lind (1997) investigated the role of child neglect and abuse in mediating the relationship between the level of social and economic stress and the level of juvenile participation in crime in New South Wales. Rates of juvenile crime and child neglect and abuse were high in areas with high levels of socio-economic stress, particularly rural areas. In urban areas, poverty, single parent families and crowded dwellings influence the level of juvenile participation in crime, via an increase in the rate of child neglect.

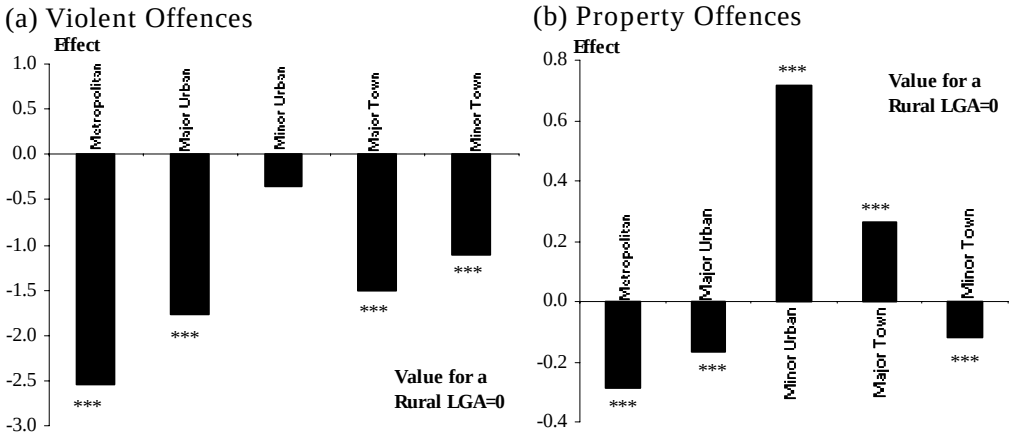
Areas differ markedly in their pattern of population growth. According to Hugo (2000), centres with relatively rapid growth cluster around the largest cities and tend to concentrate along the eastern and southwestern coasts. On the other hand, urban areas related to the wheat and sheep industries are experiencing decline. More remote areas have both growing and declining centres. Patterns of population are intrinsically linked to social and economic factors such as urbanisation, residential mobility, demographic trends, economic conditions and industrial structure. These are among the many factors that are also associated with variations in regional crime rates (Carcach 2000).

The previous results indicate that levels of both rurality and accessibility seem to affect regional crime rates in a complex manner. This section aims to investigate the issue in more detail. The basic hypothesis is that the level of accessibility of an LGA modifies the way in which its level of rurality affects the crime rate.

Modelling

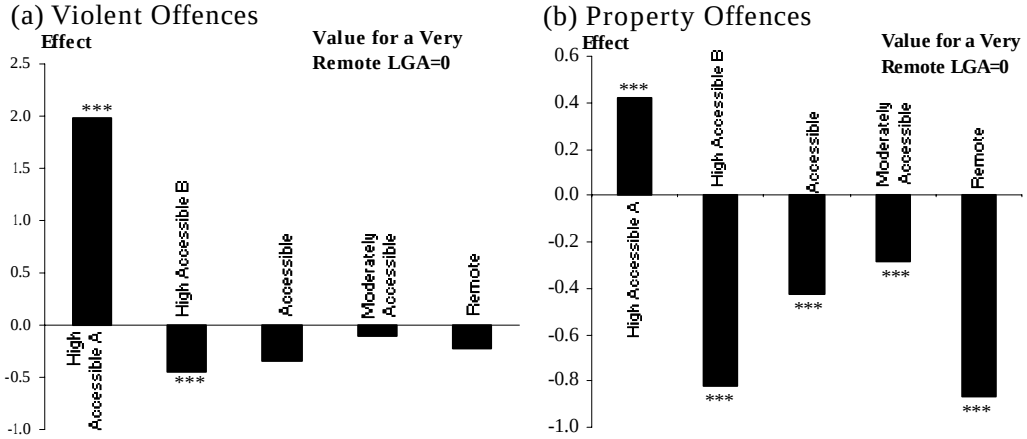
A technique known as poisson regression was used to fit a model where the outcome variable was the crime count within

Figure 3: *New South Wales, Victoria, Queensland and Western Australia, 1994–98. Net Effect of Population Size on Crime Rates*



*** (p<0.01)

Figure 4: *New South Wales, Victoria, Queensland and Western Australia, 1994–98. Net Effect of Accessibility on Crime Rates*



*** (p<0.01)

each LGA [2]. The groups, defined according to population size and the values of the ARIA index, entered as (explanatory) factors in the model. The variable of interest was the LGA crime rate [3] and the analysis aimed to assess the effect of rurality and accessibility on the crime rate, relative to a reference LGA. In most cases, the reference LGA was either a rural LGA or a very remote LGA, but there were instances when the reference LGA was different. These cases are discussed separately.

The regression coefficients shown in Figure 3a indicate that after taking account of the effect due to accessibility, rural LGAs tend to have significantly higher rates of violent crime than all the other types of LGA, except for those classified in the minor urban group (20,000–50,000 residents).

The regression coefficients shown in Figure 3b indicate that rural LGAs tend to have a significantly lower prevalence of property crime than LGAs classified as major towns (4,000–20,000 residents) and minor urban centres (20,000–50,000 residents). On the other hand, rates of property crime for rural LGAs are significantly higher than the rates for minor towns (1,000–4,000 residents) and LGAs with more than 50,000 residents (major urban and metropolitan centres).

Figure 4a shows that rates of violent crime in very remote areas are not significantly different from those for other types of LGAs, except for those classified as highly accessible. Violent crime is more prevalent in LGAs in the Highly Accessible-A group than in rural areas, whereas it is less prevalent in LGAs that belong to the Highly Accessible-B group.

As shown by Figure 4b, LGAs classified into the Highly Accessible-A group have significantly higher property crime rates than rural LGAs, whereas all the other types of LGAs had rates of property crime that were lower than for rural LGAs.

The Joint Effect of Size and Accessibility in Regional Crime Rates

The regression model was expanded to include the interaction between rurality and accessibility. Table 1 summarises the results together with their interpretation.

The results indicate that the joint effects that rurality and accessibility have on crime rates are not uniform either across regions or across types of offence. Such heterogeneity may arise from demographic, social or economic differentials among regions located along different levels of the urban-rural and accessible-remote scales.

Conclusion

The level of crime rates in rural LGAs (areas with fewer than 1,000 residents) is independent of accessibility to services. Note that accessibility has an effect, either positive or negative, on the level of crime in areas with over 1,000 residents. If geographical or service isolation has no role to play in shaping crime rates in rural LGAs, then one must look for alternative explanations.

The reasons underlying the levels of crime in rural areas may be different to those that prevail in small to medium sized LGAs and in localities with large populations. In the United States, increasing economic marginalisation of families in rural communities translate into personal and interpersonal stress and that the effort these families expend to earn a living leaves little time for community, school, and social activities (Hobbs 1995).

Economic and technological changes may also affect the economic and social role of rural towns. Improved transportation networks make it easier for rural residents to go to localities beyond the closest small town to satisfy their needs, thus reducing the frequency of interactions among locals as well as participation in local activities. This may weaken communities' ability to regulate social norms and behaviour of residents (Gallaher 1980).

Rural people travel regularly to larger towns and small cities for employment, shopping, health care, entertainment, and other activities, all of which takes

Table 1: *New South Wales, Victoria, Queensland and Western Australia, 1994–98. Effect of Accessibility on Crime Rates by Population Size of LGAs*

Accessibility	Violent Crime		Property Crime	
	Effect	Interpretation	Effect	Interpretation
Metropolitan LGS (100,000 residents and over)				
Highly Accessible-A	0	Prevalence increases with distance from main service centres.	0	Prevalence increases with distance from main service centres.
Highly Accessible-B	+		+	
Accessible	+		+	
Major Urban LGAs (50,000– 100,000 residents)				
Highly Accessible-A	-	LGAs classified as Highly Accessible-A have lower prevalence of violent crime than moderately accessible LGAs, whereas Highly Accessible-B or Accessible LGAs have a higher prevalence of violent crime than moderately accessible LGAs.	+	Relative to moderately accessible LGAs, LGAs classified as Highly Accessible-A, Highly Accessible-B or Accessible have a higher prevalence of property crime.
Highly Accessible-B	+		+	
Accessible	+		+	
Moderately Accessible	0		0	
Minor Urban LGAs (20,000– 50,000 residents)				
Highly Accessible-A	-	Very Remote LGAs have a higher rate of violent crime than other types of LGA.	-	Very Remote LGAs have a higher rate of property crime than Highly Accessible-A&B, Accessible and Moderately Accessible LGAs, but they have a lower rate of property crime than remote LGAs.
Highly Accessible-B	-		-	
Accessible	-		-	
Moderately	-		-	
Remote	-		+	
Very Remote	0		0	
Major Towns (4,000 – 20,000 residents)				
Highly Accessible-A	0	Highly Accessible-A&B and Very Remote LGAs have similar rates of violent crime. In these three types of LGA violent crime is more prevalent than in Accessible, Moderately Accessible and Remote LGAs.	0	Highly Accessible-A&B and Very Remote LGAs have similar rates of property crime. In these three types of LGA property crime is more prevalent than in Accessible and Moderately Accessible LGAs, but is lower than in Remote LGAs.
Highly Accessible-B	0		0	
Accessible	-		-	
Moderately	-		-	
Remote	-		+	
Very Remote	0		0	
Minor Towns (1,000– 4,000 residents)				
Highly Accessible-A	-	Very Remote LGAs have higher rates of violent crime than other types of LGA.	+	Very Remote LGAs have higher rates of violent crime than Accessible and Moderately Accessible LGAs, but lower than Highly Accessible-A&B LGAs.
Highly Accessible-B	-		+	
Accessible	-		-	
Moderately	-		-	
Remote	-		+	
Very Remote	0		0	
Rural LGAs (Less than 1,000 residents)				
Accessible	0	The level of accessibility of an LGA has no effect on its rate of violent crime.	0	The level of accessibility of an LGA has no effect on its rate of property crime.
Moderately Accessible	0		0	
Remote	0		0	
Very Remote	0		0	

Note: The ***shading*** indicates that the effect was ***significant***. A value of 0 identifies the reference category or the absence of an effect on crime rates.

time, loyalty and identity away from the localities where they live (Aldrich, Beale and Kassel 1997). Larger towns do not foster the same degree of social interaction as small towns, so in this respect rural residents are as likely to interact with strangers as urban people with the corresponding weakening of community ties for rural residents (Hobbs 1995).

Structural change may result in out-migration of more highly educated young adults with potentially devastating long-term effects. Many rural communities have a disproportionately large population of older people. This may contribute to create a cultural gap between younger and older people within a same community (Brendtro, Brokenleg and Van Backim 1990).

Little is known in Australia about the impact that changes as those observed in the United States may have on rural crime. Rural communities and small towns are going through complex processes of economic change whose consequences are yet to be explored. Crime is only one of the many aspects that can be associated with quality of life. However, if crime is not prevented and controlled, it can become a problem by itself rather than remaining a symptom. Prevention and control of rural crime requires an understanding of its causes, dynamics and consequences. More research is needed. The role that socioeconomic factors might play in explaining local variations in crime rates will be the subject of a forthcoming paper.

Notes

[1] Category A: More than 250,000 persons, category B: from 48,000 to 249,999 persons, category C: from 18,000 to 47,999 persons, and category D: from 5,000 to 17,999 persons.

[2] The number of residents in the LGA entered all models and its coefficient was held fixed to a value of one. Terms that have their regression coefficients restricted to take a certain value are named an offset in the literature on generalised linear models (McCullagh and Nelder 1989).

[3] Details on the process of model development and fitting are available from the author on request.

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