Final Report

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The spatial dynamics of homelessness in Australia 2001–11

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ACRONYMS

ABS	Australian Bureau of Statistics
AHURI	Australian Housing and Urban Research Institute Limited
AIHW	Australian Institute of Health and Welfare
ASGS	Australian Statistical Geography Standard
CHSA	Commonwealth State Housing Agreement
CD	Collection District (a unit of measurement under the previous ABS geographical system)
CRA	Commonwealth Rent Assistance
HSRG	Homeless Statistics Reference Group
NAHA	National Affordable Housing Agreement
NHSC	National Housing Supply Council
NPAH	National Partnership Agreement of Homelessness
SA3	Statistical Area Level 3 under the ASGS
SA2	Statistical Area Level 2 under the ASGS
SA4	Statistical Area Level 4 under the ASGS
SAAP	Supported Accommodation Assistance Program
SHS	Specialist Homeless Services
SHSC	Specialist Homeless Services Collection
TSP	Time Statistics Profile (ABS)

EXECUTIVE SUMMARY

Background and aims

This is the first of two reports focusing on the structural factors underlying homelessness in Australia. This first stage details the analysis undertaken with large secondary data sources to examine the spatial dynamics of homelessness from 2001 to 2011. The second stage of the project, to be presented in a Final Report, will model the role of housing and labour markets, household income, and household characteristics in shaping the spatial distribution of homelessness across Australia.

Australia has a rich bank of qualitative research that describes the circumstances, personal characteristics, and practices of people who experience homelessness. More recently research has investigated the pathways into and out of homelessness. However, to date there has been little investigation of the structural drivers of homelessness and minimal use of quantitative evidence to inform an understanding of the role that housing and labour market conditions play in shaping whether people are more or less vulnerable to homelessness. This project aims to fill this knowledge gap.

In this report we address the following research questions:

- Where is homelessness high and where is it low?
- Where is homelessness rising or falling?
- Is homelessness becoming more or less spatially concentrated?
- Are there changes in the composition of the homeless population?
- Are homelessness services well located to intervene in areas with high and rising rates of homelessness?
- And finally, are changes in the geography of homelessness associated with changes in housing and labour market conditions, household income or other household characteristics?

Following an increased national focus on homelessness, the Australian Bureau of Statistics has, for the first time, developed a statistical definition of homelessness that could be applied to multiple ABS census collections (2001, 2006, 2011), and for geographical units at different levels of aggregation. This recent development has enabled the current project to be undertaken.

Research approach

The empirical work is centered on a panel data base comprising 328 regions. Estimates of homelessness in these regions have been drawn from the ABS revised census counts in 2001, 2006 and 2011. Measures of homelessness service availability, demographic profiles and housing and labour market factors are sourced from two national data sets; the Time Series Profile dataset drawn from the Australian Bureau of Statistics Census of Population and Housing, and the Specialist Homelessness Service Collection from the Australian Institute of Health and Welfare (AIHW).

Key findings

The empirical work is based on the ABS definition of homelessness (see ABS 2012d) and employs two distinct measures of homelessness in each local region (SA3): The rate per 10 000 persons (used by the ABS as a measure of the population's vulnerability to homelessness) and the region's share of national homelessness (the percentage of the total national homelessness population).

The national picture of homelessness

Nationally the rate of homelessness per 10 000 persons has fluctuated over the decade between 2001 and 2011. In 2001 the rate was 50.8 persons per 10 000, falling to 45.2 in 2006 and then bouncing back to a little under 50 persons per 10 000 in 2011 at the tail end of the global financial crisis.

When the rates of homelessness were examined for the states and territories in 2011, the Northern Territory stood out with a homelessness rate 15 times the national average. In 2001 Western Australian and Queensland populations were also more prone to homelessness, but by 2011 their rates, while still not exactly low, had fallen below the national average. Tasmania had the lowest rates of homelessness across the decade.

Homelessness rates per head of population measure the risk of homelessness at an area level, while each state or region's share of national homelessness tells us where most homelessness is located. In terms of the national share of homelessness, New South Wales accounted for over one in four homeless persons in 2011, and its share of national homelessness increased over the decade 2001–11. Victoria had the second largest share with just over one in five (22%) homeless persons. Because of its small population the Northern Territory's 2011 share of the national homeless count was only 14.7 per cent, or less than one in seven; its share also declined over the decade.

Where is homelessness high and where is it low?

Rates of homelessness were relatively low in areas located on the coastal fringe and in urban areas. They were higher in remote rural and regional areas, and small pockets in some of our major cities. For example, the rate measure identifies the entire Northern Territory, and the northern most parts of Western Australia and Queensland as homeless hotspots in 2011. Additionally, of the hotspot regions identified using the rate measure, around half (9 out of 20) of these regions are located in inner city areas or pockets in growth corridors of state capitals, which have traditionally been poorer areas.

Where is homelessness rising or falling in Australia?

A close examination of regional rates of homelessness reveals that they have not remained static over the decade. For example, while relatively low rates of homelessness are reported for areas clustered around the coastal fringe and the urban areas of mainland capital cities, these rates have been increasing in these regions over time. Interestingly, areas where homelessness rates have fallen are more typically found in regional and remote Australia even though these areas were often identified as having high rates of homelessness at the start of the 2001–11 timeframe.

Is homelessness becoming more or less spatially concentrated in Australia?

Homelessness is highly spatially concentrated in Australia. In 2011 the top 10 per cent (33) of regions with the highest share of homelessness accounted for 42 per cent of the nation's homeless population. That is, around 4 out of 10 homeless persons in 2011 could be found in just 33 of the 328 local regions under examination. While homelessness is highly spatially concentrated, it is becoming less so over time. And this trend is occurring because homelessness has been declining in areas where it has been relatively high, but increasing where it has been relatively low.

Are homeless services well placed to intervene? Do homeless services act as a magnet attracting homelessness to a region?

There is higher service capacity in areas with higher rates of homelessness. However, we found no evidence for services acting as a magnet and attracting more homeless persons to a region. In fact we found the opposite. Those regions with more service capacity per head of population in 2001 were not more likely to experience growth in homelessness in subsequent

years. Instead, regions with less service capacity per 10 000 persons in 2001 were more likely to experience growth in homelessness over the decade.

In 2011 there was clear evidence of a mismatch between homelessness resources relative to demand. For example, in 2011 the top 10 per cent of areas in terms of national share of homelessness accounted for 42 per cent of all homelessness but their share of Specialist Homeless Service accommodation capacity was lower at 34 per cent. This was more severe in earlier years. In 2001, almost half (46%) of all homelessness is attributable to local regions in the top 10 per cent of the homelessness count distribution, but those same local regions account for only one quarter (24%) of the nation's supported accommodation capacity. Similar levels of mismatch were found in 2006.

Clearly then, over the decade between 2001 and 2011 there has been some improvement in matching homelessness resources to demand, however, mismatches remain. This suggests that inadequate supply of bed spaces may be compounded by their misallocation.

These conflicting messages pose a dilemma for policy-makers. Targeting resources at regions where homelessness rates are high and therefore populations are especially vulnerable to homelessness will not necessarily ensure that support is available where most of the homeless are located. On the other hand, targeting resources where the largest numbers of homeless are located will neglect some regions where there is a high risk of homelessness.

What role does the changing composition of the homeless play in explaining homeless hotspots?

We examined whether high or rising homelessness in an area could be explained by the composition or mix of the homeless population. In terms of composition, we looked at the six operational groups or categories of homelessness used by the ABS.

Findings suggested that the composition or mix of the homeless population explained little of the variation in both the count and rate of homelessness over time (from 2001–11). Instead, our analysis suggests that the largest amount of change was accounted for by regional effects—that is, characteristics of areas such as labour markets, housing markets, demographics or some other regionally specific feature.

What does our preliminary analysis tell us about the importance of structural factors in explaining homelessness in Australia?

Our descriptive analysis of the role that housing market, labour market and income, and demographic factors may play in explaining homelessness in Australia revealed that structural factors do seem to be important. We found that populations of regions that have lower rents, more public housing, smaller rent to income ratios, higher unemployment and a larger share of Indigenous persons are more vulnerable to homelessness.

The prominence of public housing in a region deserves particular attention because it is the only variable that our simple descriptive statistics suggest as predictive of changes in rates of homelessness. Regions with relatively high shares of public housing back in 2001 tended to experience increases in homelessness, while those with small public housing segments typically experienced falling homelessness.

Implications for policy and future research

The panel dataset created through this project, has made it possible to ask new questions about the geography of homelessness in Australia. The preliminary analysis presented is exploratory and it lays the groundwork for more in-depth and fine-grained analysis of the spatial dynamics of homelessness. While the findings are suggestive for policy, at this point in the analysis it is premature to identify specific policy recommendations. Nevertheless, some broad yet important implications are evident.

Our analysis of the alignment between homeless service capacity and demand for services showed a degree of mismatch. This mismatch should be given attention by both governments and service providers to ensure that homelessness resources are allocated to areas of high demand. However, allocation of resources must be informed by an understanding of the nature of this demand and therefore the type of resources required in given areas. Further, determination of the type of resource required will also need to be informed by an understanding of the role of structural drivers in homelessness in areas. If, for example, labour market issues are found to be key drivers then interventions would be better focused on employment rather than bed-spaces. Again, the modelling in our next report will be crucial.

Second, there are implications arising from the methods employed in the study itself. The application of economic analyses to the issue of homelessness is unique in the Australian context and provides new possibilities for the ongoing monitoring of the effectiveness of the main policy instruments on homelessness—the NAHA and NPAH. For example, additional performance indicators for these policy instruments could include:

- → Ongoing calculation of the mismatch between homeless service capacity relative to demand.
- → The number of areas with high and rising/falling rates of homelessness and the number of areas with low and increasing/declining rates of homelessness.

There is also the potential to monitor the impact of investment in homelessness resources on levels of homelessness in regions, across states and nationally over time.

Finally, preliminary analysis of the role of structural drivers in understanding homelessness suggests that the characteristics of regions themselves are important. Our second and Final Report for this project will tease out the role of structural factors in the distribution of homelessness. In addition to the variables examined in the present report, additional data will be included to assess the role of the supply of affordable rental housing in understanding homelessness. This will be of key interest to policy-makers and will relate directly to the key elements of the main policy instruments on homelessness. Our review of the international literature showed that weather was an important factor in explaining variations in the rate of homelessness across regions. With additional data from the Bureau of Meteorology this variable will also be included in the modelling for our next report.

1 INTRODUCTION

This is the first of two reports focusing on the structural factors underlying homelessness in Australia. This first stage details the analysis undertaken with large secondary data sources to examine the spatial dynamics of homelessness from 2001 to 2011. The second stage of the project, to be presented in a Final Report, will model the role of housing and labour markets, household income, and household characteristics in shaping the spatial distribution of homelessness across Australia.

1.1 Context and background

In 2008, homelessness became a key priority for the Commonwealth Government with the release of the White paper on homelessness: *The road home: a national approach to reducing homelessness* (2008a). The *road home* outlined the Rudd Labor Government's approach to addressing homelessness, focusing on early intervention and prevention; expanding and improving services; and the provision of specialist care for those with long-term histories of homelessness.

The National Affordable Housing Agreement (NAHA) commenced in January 2009 and superseded the long standing Commonwealth State Housing Agreement (CHSA). The NAHA was supplemented by three National Partnerships Agreements between state and commonwealth governments, one focusing on social housing, one on remote Indigenous housing, and one on homelessness (the National Partnership agreement on Homelessness, or NPAH). Together the NAHA and NPAH provided the funding mechanism to implement the White Paper vision.

Both the White Paper and the NAHA recognise the structural and individual level causes of homelessness and defined homelessness, in part, as a housing problem. The White Paper and the NAHA also acknowledge that employment is critical in ensuring that those who become homeless do not continue to be so. While the relationship between housing and employment was recognised, there was and is currently a dearth of quality large-scale quantitative evidence on the way that housing and labour markets, along with household characteristics, impact on homelessness in Australia. The current research project directly addresses this evidence gap.

Previously, the only large-scale estimates of homelessness using the census were compiled by researchers Chamberlain and McKenzie (2008). Their work began in 1996, with the methodology being further developed and refined in successive census counts. As a result of the increased national focus on homelessness, the ABS reviewed the methodology employed by Chamberlain and McKenzie to derive homeless estimates with the aim of developing a consistent methodology that could be applied over time. As part of this process, the ABS for the first time also developed a statistical definition of homelessness that could be applied to multiple ABS collections. This review and subsequent analysis resulted in the release of homeless estimates at multiple geographical levels and across consistently defined spatial units for the last three census periods (2001, 2006, 2011). This recent development has enabled the current project to be undertaken.

Significantly, this project will for the first time provide an evidence base that describes and analyses the spatial dynamics of homelessness in Australia. Understanding the spatial dynamics of homelessness in Australia will give important insights into where homelessness 'hotspots' are and where specialist homelessness services are most needed to address and prevent homelessness.

Moreover, in a subsequent Final Report this project describes and analyses the way structural factors influence rates of homelessness. In doing so, it provides the evidence necessary to address key policy and program issues such as the geography of affordable rental housing and its relationship to homelessness. These findings potentially assist policy-makers to determine

the most appropriate policy levers for reducing rates of homelessness (i.e. employment initiatives, location of affordable housing initiatives or direct homelessness service provision). The Final Report also provides an estimate of the impact of structural drivers on particular sub-populations, assisting policy-makers to predict future demand for homelessness services, and therefore inform the development of targeted, cost effective preventative responses.

1.2 Aims

There are two stages to this research project; both make use of the latest ABS homelessness data.

Stage 1, detailed in this report examines the spatial dynamics of homelessness across Australia from 2001–11. Specific research questions include:

- Where is homelessness high and where is it low?
- Where is homelessness rising or falling?
- Is homelessness becoming more or less spatially concentrated?
- Are there changes in the composition of the homeless population?
- Are homelessness services well located to intervene in areas with high and rising rates of homelessness?
- And finally, are changes in the geography of homelessness associated with changes in housing and labour market conditions, household income or other household characteristics?

Stage two of the project, presented in a Final Report, uses modelling to explore the way that housing, labour market, household income, and household characteristics shape the spatial distribution of homelessness in Australia. It investigates the following research questions:

1. What role do housing market factors play in shaping the rate of homelessness across Australia over time? If housing markets play a role in shaping the rate of homelessness, is it because:
    - there is a shortage of low cost rental properties for those on low incomes (the housing shortage hypothesis)? or
    - people experiencing homelessness gravitate to areas where there is more affordable housing (the sorting hypothesis)?
2. What role do household income and labour market factors (unemployment and polarised regional development profiles) play in shaping the rate of homelessness across Australia and over time (the poverty hypothesis)?
3. Does the location of homelessness services influence the rate of homelessness across Australia and over time? And finally,
4. How do these processes affect Indigenous and lone-person households?

1.3 Research approach

The empirical work is centered on a panel data base comprising 328 regions. Estimates of homelessness in these regions have been drawn from the ABS revised census counts in 2001, 2006 and 2011. Measures of homelessness service availability, demographic profiles and housing and labour market factors are sourced from the following two national data sets:

- The Australian Bureau of Statistics Census of Population and Housing:
    - The Time Series Profile dataset (2011b)
    - Estimating homelessness

→ Specialist Homelessness Service Collection from the Australian Institute of Health and Welfare (AIHW) (2011–12)[1].

These data sources are used to profile the spatial dynamics of homelessness over the 2001–11 decade. They are also used to identify 'hot spots' where homelessness is relatively high and rising, and to gauge whether the spatial pattern of homelessness is becoming more or less polarised. By relating measures of the structural drivers of homelessness to the spatial pattern of homelessness the key aims of the project are met.

In this first report the findings of a descriptive analysis are presented. The second report presents and interprets the results of modelling exercises that aim to uncover causal relationships between homelessness and housing and labour market variables.

1.4 Structure of report

This report is presented in six chapters including this introductory Chapter 1.

Chapter 2 presents a comprehensive review of the literature. The review begins with some Australian context for international readers and then moves on to describe key international and Australian research studies that examine the structural drivers of homelessness, and in particular the role of housing and labour market factors.

Chapter 3 describes the data sources and the definitions of variables including the ABS measure of homelessness. Measurement issues are also addressed with particular attention to the imputation methods employed to tackle missing data issues. We describe the construction and design of the data set, provide sample numbers and standard descriptive measures of key variables and outline data limitations.

Chapters 4, 5 and 6 present the results from the statistical analysis. In the first of these chapters we describe the geography of homelessness, while the next considers whether homeless services are well placed and whether they act as a magnet attracting more homelessness to an area. Chapter 6 then examines the association between structural drivers and the spatial distribution of homelessness.

Chapter 7 concludes the report with a discussion of the key findings, their policy implications and the next steps in the program of research.

[1] The data we obtained from the AIHW was a customised report

2 LITERATURE REVIEW

Much of the research on homelessness in Australia and elsewhere references a key debate in the field about the role of structural versus individual level causes of homelessness. This literature review situates the current research within this debate noting the near total absence of work directly investigating structural drivers of homelessness in Australia.

First, the review provides some background on the Australian context, outlining housing market features, housing assistance, homeless service provision and welfare provision. A brief overview of homelessness in Australia is also provided. Second, evidence from Australian Housing market research is presented which highlights affordability problems for those on low incomes and difficulties in purchasing and sustaining home ownership. These trends may impact on overall homeless rates.

Third, the review presents what is known about the relationship between homelessness and the labour market in Australia and, on the basis of the evidence, identifies two key ways that the labour market may impact on aggregate rates of homelessness.

Fourth, the international evidence is examined. In contrast to Australia, numerous US academics and policy analysts have examined the relationships between spatial variations in homelessness, housing markets, labour markets and other structural factors. Finally, key applied and theoretical research is summarised with key methodological approaches, drawing out key insights.

2.1 The structural drivers of homelessness

Views about the causes of homelessness can be grouped into three 'camps'. One 'camp' emphasises structural causes that are beyond an individual's control—such as the interplay of housing and labour markets and broader social and economic problems (Neale 1997). Another camp emphasise individual circumstances and agency , including; poor decision-making, deviance, addiction, severe mental illness or other forms of disability requiring ongoing support (Neale 1997). More recently, many have asserted that homelessness is caused by the interaction of *both* structural and individual factors (Fitzpatrick & Christian 2006).

Arguably there is now a loose consensus in the field around this view. Accordingly, individual factors such as mental ill-health, substance abuse, and a history of contact with institutions place particular people at heightened risk of homelessness. Then when structural factors such as a shortage of affordable housing become acute, or labour markets weaken, those most at risk become homeless. O'Flaherty (2004) refers to this as a conjunction of unfortunate circumstances. Others have referred to this view as the new consensus (Pleace 2000) and the new homelessness (Lee et al. 2010).

In Australia, the consensus view of homelessness is reflected in both state and federal responses to homelessness (Department of Human Services 2010; Commonwealth of Australia\, 2008a), as well as the advocacy of the homelessness service sector. The most commonly cited version suggests that a shortage of low-cost private rental displaces 'at risk' low-income groups into homelessness. Once homeless, these households find it difficult to resolve their homelessness in private housing markets (e.g. see Council to Homeless Persons 2014, p.12. and Homelessness Australia 2013). But despite widespread agreement, there is a paucity of empirical evidence investigating the effect of possible structural factors on homelessness. Our research project addresses this evidence gap.

2.2 The Australian context

Australia has a market-based housing system with a strong focus on home ownership. Two-thirds (67%) of households are owner occupiers (AIHW 2013) and a quarter of households (25%) rent from a private landlord. There is a residual social rented sector (5%) which is highly

targeted and managed by state governments or not-for-profit housing providers. Australia does not have rent controls and has limited security of tenure regulation, key features that contrast with housing systems in the UK and Europe.

Australia has a range of housing assistance measures in place for both home purchasers and renters. First home purchasers can access a grant program, stamp duty exemptions and tax privileged first home saver accounts. Though not commonly thought of as housing assistance measures, the federal and state governments also extend generous tax subsidies to Australian home owners, as well as asset test concessions governing eligibility to income support programs. Private renters can be eligible for a means tested rent subsidy known as the Commonwealth Rent Assistance (CRA). States and territories have also introduced programs targeted to very low income tenants; they typically make funds available to cover the costs of moving or low cost bond loans to bridge the upfront costs incurred on securing private rental housing.

In Australia, homelessness services are funded jointly by federal, state and territory governments. These governments contract not-for-profit agencies to deliver services which include crisis accommodation centres (referred to sometimes as shelters and refuges), as well as outreach and support programs for those experiencing, or at risk of, homelessness. The Specialist Homeless Services Program is the main vehicle for the delivery of homelessness services in Australia. In addition, many not-for-profit agencies also provide emergency relief and material aid to the homeless.

Australia has a liberal welfare system with income support payments tightly targeted to those with low incomes and limited universal provision of welfare services (Matznetter & Mundt 2012). Consequently Australia's welfare spending accounts for a lower share of GDP than in most OECD countries (AIHW 2011). However, it has the highest proportion of public transfers going to those in the lowest income quintile and in this quintile low-income persons pay a lower share of their income in direct taxes than in all other OECD countries (Commonwealth of Australia 2008b).

2.3 Homelessness in Australia

Homelessness is a significant problem in Australia. Data from the 2011 Australian Census of Population and Housing shows that on census night, 105 000 people, or 49 in every 10 000 people, experience homelessness (ABS 2012d). Around 20 per cent of these people were staying in supported accommodation for the homeless (commonly referred to as shelters). Seventeen per cent were staying temporarily with other households (e.g. friends and family), and a further 17 per cent were living in boarding houses without the security of tenure offered by a lease. Many (39%) were living in severely overcrowded housing, while 6 per cent were in improvised dwellings or 'sleeping rough'. Data on the lifetime incidence of homelessness suggests that 7 per cent of the Australian population have been homeless at some point in the past 10 years, but are not currently homeless (ABS 2012b).

Many Australians experiencing homelessness are young. Of those estimated in the 2011 Census to be homeless 42 per cent were under the age of 25, and over half were male (56%) (ABS 2012d). However, of those receiving support from specialist homeless services in 2011, 59 per cent were female (AIHW 2012b).

Indigenous people are over-represented among those accessing homelessness services and the homeless population in general. In the financial year 2011–12, 22 per cent of clients receiving specialist homelessness services identified as Aboriginal and/or Torres Strait Islander, yet they made up only 2.5 per cent of the national population (AIHW 2012a). Further, the homeless estimates based on the census showed that 25 per cent of all people experiencing homelessness on census night identified as Aboriginal and/or Torres Strait islander (ABS 2012d). Single-person households also seem to be over represented among

persons receiving assistance from homelessness services, accounting for 67 per cent of clients in the 2011–12 financial year.

Across Australia, homelessness services collect routine data for the Specialist Homeless Services Collection. This data collection includes clients' responses to questions about the reasons they are seeking assistance. In the 2011–12 financial year, 39 per cent reported that they experienced financial difficulties, 32.1 per cent reported domestic and family violence, 24.1 per cent reported family or relationship breakdown, 21.9 per cent reported inadequate dwelling conditions and 17.7 per cent reported housing affordability stress (AIHW 2012b).

2.4 Homelessness research in Australia

Homelessness research has been largely conducted in isolation from housing and labour market research in Australia. This in part reflects historical policy divisions in Australia. As a policy problem, homelessness has been seen primarily as a welfare issue rather than as a result of the operation of the housing system, or labour market mechanisms. Further, the focus of service delivery agencies and advocates has been on describing the experience of homelessness, in an effort to bring the issue to mainstream public and policy attention.

Australian homelessness research has tended to focus on documenting particular sub-populations or client groups, describing their experiences (e.g. Kolar 2004; Baker et al. 2011; Kelly 2004; Mendes et al. 2010), and evaluating programs and interventions (see e.g. Rayner et al. 2005; Grace et al. 2006; Johnson et al. 2012). While Australian homelessness research has acknowledged structural factors, it has not (with one exception) directly investigated them. While numerous studies have argued that an increased supply of affordable housing is critical to addressing homelessness, the relationships between homelessness and housing markets has not generally been formally modelled. The analysis we do have has been largely based on case studies (see e.g. Westmore & Mallett 2011).

The exception in the Australian literature is Batterham (2012). This work influenced the development of the approach employed in this project and for this reason is described in-depth here. Using a cross-sectional research design, Batterham (2012) modelled the relationships between area-based (Statistical Subdivision) rates of homelessness, and structural factors across Victoria at the time of the 2006 census. Specifically, she examined the effect of housing market conditions (as measured by median rents, households in public housing or private rental as a per cent of all households), unemployment, household income, presence of homeless services and demographic factors (single parent households, persons under 25, lone person households and Indigenous households).

The descriptive statistical analysis presented in Batterham (2012) suggested that, in Victoria, homelessness is concentrated in areas with relatively high proportions of private rental stock, lower median rents and relatively low household incomes. That is, homelessness was concentrated in poorer areas with cheaper and more abundant private rental housing. These areas also tended to have higher shares of the population housed in public housing. Demographic factors play a role with concentrations of lone person and Indigenous households associated with relatively high rates of homelessness. The number of homelessness services and the unemployment rate did not seem to affect rates of homelessness.

Regression analysis revealed that household income was particularly important in understanding spatial variation in homelessness rates. An area's median household income had a strong moderating effect on the relationship between rates of homelessness and median rents. Further, the relationship between homeless rates and the per cent of Indigenous persons was mediated by household income. That is, once household income was taken into account, the relationship between the per cent of Indigenous persons in an area and the rate of homelessness became insignificant. These findings suggest that low income is important in understanding homelessness among the Indigenous population, and the way housing costs affect the chances of homelessness in a region.

Batterham (2012) interpreted these findings in relation to three key hypotheses—the sorting hypothesis, the shortage hypothesis and the poverty hypothesis.

The sorting hypothesis accepts that tight housing markets, where rents and prices are high, might precipitate homelessness. Accordingly, people attempt to resolve their homelessness by moving to areas with low rents and more affordable housing. This hypothesis is supported by findings reported in Wulff and Reynolds (2010), a study that examined the relationship between household mobility and spatial polarisation in Melbourne. They found that households with lower incomes tended to move to areas with lower house sale prices and lower rents (areas where they could afford housing given their incomes). In contrast, higher income households tended to move to higher cost housing areas. Over time these processes have led to increasing spatial polarisation of household income and housing costs (Wulff & Reynolds 2010). If accompanied by growing divergence in house prices and rents, spatial polarisation also results in increasingly limited housing options for low-income households.

Yates and Wood (2005) describe a similar process concerning gentrification and the increasing concentration of low cost rental stock in poorer areas in Metropolitan Sydney. They argue that rising land values accompanying gentrification encourage landlords to increase the quality of a dwelling (through improvement and renovation), and rents rise to reflect the improvement in quality. Thus rental dwellings in 'gentrified' areas 'filter up' and out of the low-cost pool of housing. Conversely, neighbourhood decline has the opposite effect; rental dwellings filter down into the low-rent stock as landlords neglect maintenance and fail to renovate as obsolescence sets in. With lower quality, market rents decline. Yates and Wood's (2005) empirical analysis supported their hypothesis. They found that areas with higher proportions of low-rent stock were more likely to keep or increase low-rent stock over time—whereas areas with less low-rent stock were likely to lose low-rent stock over time. The authors argued that these processes offer one important reason why low-rent housing is becoming more spatially concentrated in areas of relative disadvantage.

However, moving to areas with a more abundant supply of lower cost housing does not guarantee access to that housing. Access is only guaranteed when there is adequate supply of affordable housing. Wulff et al. (2011) found that there was an absolute shortfall—by some 138 000 dwellings—in the number of low-cost properties available to accommodate low-income households. However, this shortfall worsened because a number of the properties (over 70 000) that were affordable to the lowest income quintile were actually occupied by higher income households. This true shortfall has worsened over time, and is called the '*shortage hypothesis*' in Batterham (2012).

An alternative explanation—*the poverty hypothesis*—is that homelessness is precipitated by poverty/low income and lack of job opportunities, and so areas where incomes are low and unemployment rates high tend to have higher rates of homelessness. Since low income tends to be associated with low rents and residence in rental housing, these areas also tend to have relatively more rental housing and lower rents. This explanation was consistent with the findings of some US-based research that finds homelessness to be most severe in those areas blighted by poverty or low income (Early 2005; Quigley et al. 2001).

It has also been suggested that people experiencing homelessness gravitate to areas where homelessness services are located, a view colloquially known as the *Magnet Theory* (Corbett 1991; Loveland 1991). In the United States there is a related and long standing theory about the spatial distribution of services and household income called the Tiebout thesis (Stiglitz 2000). The Tiebout thesis is based on the proposition that households 'vote with their feet'—higher income households tend to move to areas with lower taxation and lower service provision whereas lower income people tend to move to areas with greater service provision and higher taxation, as they desire and are more dependent on support from services.

These ideas have emerged from the United States where property taxes are a more important source of revenue for local governments, and local governments are responsible for a wider range of service provision than in Australia. Regardless of these differences, both the Magnet theory and the Tiebout thesis hold that poorer people (including those experiencing homelessness) will gravitate to areas where there are more services available to assist them—including specialist homeless services. Batterham's (2012) findings did not support this hypothesis. However, these dynamic processes could not be fully investigated using a cross sectional research design.

While Batterham (2012) found that regional unemployment rates and a region's percentage of persons not in the labour force were unrelated to the rate of homelessness, the importance of household income in explaining rates of homelessness suggests that labour market factors may well be at work.

Batterham's (2012) findings are of significance but are limited in that the study only employed a cross sectional design, and was focused on one state. Some of the key hypotheses could not be tested within this design. The current project builds on Batterham (2012) by designing a panel data set that allows investigators to explore the kind of dynamic relationships that underpin the magnet theory.

2.5 Relevant Australian housing market research

Recent Australian housing market research has documented increasing affordability problems in rental housing, and growing accessibility problems for low-income and younger households trying to enter and sustain home ownership. While not directly investigating homelessness, these trends are part of the structural picture of housing markets that may be impacting on homelessness in Australia and so deserve some attention.

Yates et al. (2007) found that 16 per cent of Australian households are paying more than 30 per cent of their income on housing costs and that a vast majority of these are low-income—that is, in the bottom two quintiles of income. They show that housing stress within Australia is borne first and foremost by low-income renters, with 65 per cent of low-income renters experiencing housing stress, and then by low-income purchasers (49% in housing stress) (Yates 2008; Yates et al. 2007).

The National Housing Supply Council (2008) has highlighted a decrease in home ownership rates, including mortgagees and outright owners, in younger age brackets (25 to 39-year-olds) and over the past 20 years. It argues that increased affordability problems are leading households to rent for longer, delaying home purchase and creating a squeeze in the private rental sector.

Recent research has also documented an increasing number of households falling out of home ownership. Wood et al. (2013) examined differences between those who sustained owner occupation, those who left owner occupation, and those who left and did not return within a 10-year period. The numbers leaving owner occupation were higher than expected. Those who left owner occupation and did not return most commonly ended up in the private rental sector, and were particularly disadvantaged. They tended to have lower incomes, lower educational qualifications, less housing wealth and were prone to financial stress. Being younger and single increased the risk of losing owner status.

2.6 Homelessness and the labour market in Australia

There are at least two reasons why we think labour market factors will have a bearing on the overall rate of homelessness. First, payments for housing cannot be readily adjusted in the short run. An abrupt and unexpected loss of employment precipitates a sharp drop in income that can threaten housing security if households have no savings or other sources of support to fall back on. Some analysts argue that because contemporary labour markets offer increasingly precarious forms of employment sudden plunges in personal/household earnings

are now more common (Campbell et al. 2013). The unskilled and semi-skilled are more prone to unemployment and underemployment, and so economic downturns generally have a disproportionate impact in those housing submarkets where rents and house prices are relatively low. This reasoning underpins the hypothesis that high and rising unemployment (as well as underemployment) will pose its biggest threat to housing security in the more affordable segments of the housing market.

Second, labour market conditions vary across regions due to the uneven distribution of industry across locations, as well as segmentation in housing markets that concentrates low-income unskilled workers in areas where housing is typically more affordable (Yates et al. 2006; Nygaard et al. 2005).

Recent research does indeed confirm that people who have experienced or who are experiencing homelessness are more likely to be unemployed or outside the labour force than the general population (ABS 2012d; AIHW 2012a). When they are employed, they tend to work fewer hours than the general population (ABS 2012d).

When in work, people experiencing homelessness tend to be clustered into specific occupations such as; labourers, technicians and trade workers, community and personal service workers (ABS 2012d); and in industries such as accommodation and food services (Hospitality) and Retail (Grace et al. 2006; Perkins 2005) that employ relatively high numbers of the semi-skilled and unskilled. These occupational groups and industries also have higher rates of casualisation (ABS 2009). Further, people experiencing underemployment (that is, working less than full time hours and looking to work more hours) are also clustered in these occupations and industries (ABS 2013a). Some of these particular occupations and industries have also been found to be more acutely affected by spatial polarisation of housing and labour markets (Yates et al. 2006).

As a result, people who have experienced homelessness tend to have lower incomes than those who have never been homeless(ABS 2012d), are five times more likely to report multiple cash flow problems, and are also more likely to live in disadvantaged neighbourhoods when compared with those who have never been homeless (ABS 2012b).

In a nutshell, people who have experienced homelessness seem to be clustered in more precarious forms of employment, where they are more liable to experience part-time work, casual work, periods of unemployment and low wages. These statistical associations with low income and employment insecurity are plausible because they impact on a household's capacity to obtain and sustain housing; low income and employment insecurity will leave people vulnerable to homelessness.

While there is some evidence of the role that labour market factors play in shaping the chances of homelessness in the Australian population, we have little or no idea about how this pans out geographically. But the overseas studies outlined below offer insights that might have relevance in Australia.

2.7 Spatial variations in homelessness and structural factors—International studies

2.7.1 Applied research

The United States is by far the greatest source of studies into the geography of homelessness and the role of structural factors. Research can be classified into two groups—cross section and panel investigations. The first take a sample of regions at a point in time and try to statistically detect relationships between regional measures of the rate of homelessness and structural variables (e.g. Florida et al. 2012). In assessing this research there are a number of relevant points to bear in mind:

- Typically homelessness is measured as a rate per 10 000 (or 100 000) of the population. This variable captures spatial variations in homelessness, identifying whether a region's population is more or less prone to homelessness. Researchers have adopted this approach, preferring to avoid actual or estimated count measures which do not account for the number of homeless persons relative to the population size of a region.
- The usual approach to examining the interaction between homelessness rates and structural factors is to model the relationships using regression analysis. The typical measures used as explanatory variables (i.e. to explain variation in homelessness rates) include housing cost, income, unemployment and educational attainment measures. To counter the effect of other potentially mitigating factors that might impact on homelessness rates in these analyses, analysts typically add controls for the prevalence of different household types, age groups, drug and alcohol abuse, mental illness as well as winter temperatures.
- The approach is prone to generate biased estimates because of unmeasured variables that are correlated with included variables. Typically this arises because regressions with cities or regions as their units of observation will place too much emphasis on housing and labour market variables, and too little on personal characteristics (e.g. drug and alcohol abuse) that are either imprecisely measured or not measured at all with this unit of observation (O'Flaherty 2004).

The second approach using panel data is much less common (see Quigley & Raphael 2001; Kemp et al. 2001). These panel models estimate the relationship between structural factors and rate variation in a panel of regions over time; each region has multiple observations of homelessness rates corresponding to different points in time over a common timeframe of analysis.

Panel data offer particular advantages over cross section analyses. With panel data it is possible to examine the dynamics of homelessness rates over time and in particular it allows identification of leads and lags in relationships between particular structural factors (e.g. housing market downturn in an area) and rates of homelessness. Moreover, unmeasured variables that do not change over the study-timeframe (e.g. average winter daytime temperatures) will not affect intra-region variations in homelessness. By focusing statistical analysis on intra-region variations we can safely ignore unmeasured variables, provided they remain fixed over time. Panel models are therefore less prone to bias resulting from omitted variables.

Table 1 below summarises the key approaches and findings from a sample of five cross section studies, and two panel studies published between 1990 and 2012.

Table 1: Summary of findings from key cross sectional and panel studies published internationally between 1990 and 2012

Study	Cross sectional unit	Homeless measures	Explanatory variables	Key findings
Bohanon (1991)	60 Rand McNally Commercial Marketing Areas (RMA)—60 differently sized metropolitan areas in the US [2]	Housing and Urban Development (HUD) 1984 homeless estimates as a percentage of the poor in an area	Median rent, unemployment, Average Social Security Payments, mean January temperature and precipitation, Deinstitutionalisation of mental hospitals, household size and rent control	Higher median rents and higher unemployment related to higher homelessness. Larger household size and higher per cent of population in mental institutions related to higher homelessness
Elliott and Krivo (1991)	60 Rand McNally Commercial Marketing Areas (RMA)—60 differently sized metropolitan areas in the US	HUD 1984 homeless estimates—as a percentage of the local population	Availability of low cost housing, poverty, economic conditions (weak labour markets), available mental health care and demographic composition	Lower amounts of low-cost housing and lower expenditure on mental health were both related to higher homelessness. The higher the number of unskilled jobs and the higher the percentage of female-headed households the higher the rate of homelessness
Honig and Filer (1993)	60 Rand McNally Commercial Marketing Areas (RMA)—60 differently sized metropolitan areas in the US	HUD 1984 homeless estimates—per 100 000 head of population	Tight housing markets, slack labour markets, reductions in public assistance, tightening of eligibility for public assistance and deinstitutionalisation of the mentally ill	When the lowest 10 per cent of rents was relatively high, there was likely to be increased rates of homelessness in that city Growth in local labour markets (i.e. a recent growth in the number of jobs in the private sector) was negatively related to homelessness
Lee, Price-Spratlen and Kanan (2003)	335 metropolitan areas in the US	1990 Census S-Night data homeless enumeration—per 10 000 head of population	Housing market conditions; economic conditions (specifically weak labour markets); demographic factors such as race, age and single-person households; the extent of local welfare provision; climate; and transience of the local population	Higher rents and higher percentage of single person households was associated with higher homelessness. Lower precipitation also played a role. Authors suggest the number of low paid jobs may be important, though they did not have statistically significant findings to this effect

[2] See Elliot and Krivo (1991) for an explanation of this data source

Study	Cross sectional unit	Homeless measures	Explanatory variables	Key findings
Florida, Mellander, Witte (2012)	97 metropolitan areas in the US	Continua of Care homeless assistance figures reported for HUD for 2011—rate per 10 000 persons	Income and wage levels, unemployment, poverty, inequality, race, regional size and density, housing type and costs, climate temperature, excessive drinking, imprisonment, mental health, and AIDS incidence and others	Warmer areas, areas with higher housing costs, and with more people sharing a room had higher rates of homelessness Correlations showed that higher wages and higher unemployment were also related to higher homelessness—though this was not significant in modelling
Quigley and Raphael (2001); Quigley, Raphael and Smolensky (2001)	269 MSAs for the 1990 Census, 119 cities for the Burt data across the US. Fifty California Counties for the 1993 official estimates in California and 522 county-years for the Californian Homeless Assistance Program counts	The 1990, Census S night enumeration, the 1986 Burt Survey of homeless services, 1993 Continuum of homeless counts, 1980–1996—Californian Homeless Assistance program counts *(this last a panel data set)***.** All counts expressed as a rate of homelessness per 10 000 persons	Housing markets, insufficient income, rent to income ratios and slack labour markets, January (winter) temperature, numbers receiving disability payments	Higher vacancy rates tended to mean lower rates of homelessness, similarly, lower median rents and lower housing cost to income ratios tended to mean lower rates of homelessness. Colder weather was predictive of lower levels of homelessness
Kemp, Lynch and MacKay (2001)	56–32 local authority areas in Scotland	Number of applications to and acceptances by Scottish local authorities for accommodation under the homeless category—expressed as a rate per 10 000 persons	The housing market (including vacancy rates, overcrowding); unemployment, affordability and deinstitutionalisation (the number of psychiatric inpatients discharged and prison releases)	Homelessness was higher when affordability was lower, when vacancy rates were higher, when unemployment was higher and when deinstitutionalisation was higher. The time series analysis suggests movements in homelessness are related to movements in other key structural variables (co-integration)

The critical importance of the housing market—be it median rents, vacancy rates, rents for the lowest cost housing, or housing cost to income ratios—in understanding spatial variations in rates of homelessness is the consistent finding from these five key cross sectional studies. These studies suggest that areas/regions/cities with high housing costs and a lack of affordable rental housing have relatively high homelessness rates. Contrary to this, the one Australian study which takes a similar research approach (Batterham 2012) finds that regions with low rents and relatively healthy supplies of affordable housing (as proxied by public housing supply) have high rates of homelessness.

Climate was also found to be important in three of these five studies—be it average winter temperatures or precipitation. Inclement weather conditions are more difficult to survive and so homelessness is found to be relatively low in such areas. Another three studies confirm that the labour market plays a role—and as expected weak labour markets are associated with a higher rate of homelessness.

All of these studies use measures of homelessness which include a count of street-based homelessness (what in Australia would be called rough sleeping) as well as persons staying in shelters for the homeless, or receiving support from some homelessness program. This is a narrower definition of homelessness than is used in Australia, as it includes only two of the six operational groups that comprise the ABS definition. Further, these studies examine homelessness at a particular point in time and do not examine changes over time. Two studies—one study from Scotland and one from the US—overcome this second problem using panel data.

In Scotland, Kemp, Lynch and Mackay (2001) sought to examine whether structural factors could explain variations in rates of homelessness over a 19-year time frame across local authority areas in Scotland. This study looked at four key structural explanations: the housing market (including vacancy rates, overcrowding, house sales); unemployment (including rate of unemployment, those in receipt of a government payment for unemployment); affordability (the number of people in rent arrears) and what they called deinstitutionalisation (the number of psychiatric inpatients discharged and prison releases). Based on these four key structural explanations these authors specified a structural model of homelessness. The number of applications to and acceptances by Scottish local authorities for accommodation under the homeless category was used as the measure of homelessness.

Three types of analyses were conducted—a series of cross section regression analyses (one for each year of the sample time frame), an (unbalanced) panel model , and time series regression modelling of the national rate of homelessness over a 19-year period. The cross-sectional analysis found that areas with higher unemployment, higher house prices and more persons in mortgage arrears had higher homelessness. This was supported by the pooled cross sectional modelling.

While not all of the variables were available or could be tested over the full 19-year period, the time series analysis yielded similar results to the earlier cross sectional analyses. Using the national rate of homelessness, the time series analysis revealed long run relationships between the unemployment rate, employment in manufacturing, housing market, housing affordability and crime (which the authors used as a proxy for prison release/deinstitutionalisation in the time series analysis).

To circumvent the absence of consistently collected data on homelessness over time in the US, Quigley and Raphael (2001) gathered measures of homelessness from four sources—three of them cross sectional (the 1990 census count, 1989 shelter bed counts and 1993 official estimates) and one panel (1989–1996—administrative records) and created a pooled sample and applied panel modelling techniques.

Housing market variables—the vacancy rate, median rents and rent to income ratios—were all strongly and significantly related to homelessness across the four specifications.

Homelessness was higher when vacancy rates were lower, when median rents were higher, and when rent to income ratios were higher. Homelessness was also higher in areas with higher January temperatures. Unemployment did not seem to be related to the level of homelessness.

2.7.2 Theoretical approaches

The applied research that we have summarised is accompanied by a parallel literature that is theoretical in approach. There are three key contributions by economists.

O'Flaherty (1996) provides the most influential economic foray into homelessness studies. In *Making room: the economics of homelessness*, O'Flaherty (1996) argues that homelessness is a consequence of housing market processes interacting with changes in the income distribution. He argues that the middle of the income distribution has been hollowed out and as a result the distribution of income is polarised. This has led to a decrease in the production of middle quality housing usually produced for this group. Over time, this stock usually filters down into the low cost pool. The reduction in middle quality stock therefore creates a supply shock in the low cost market because dwellings do not filter down. Competition for low cost dwellings intensifies as poor people offer higher prices (rents) to induce houses to move down the quality range, thereby pushing up rents and prices and squeezing out those with the lowest incomes. But building regulations prevent the expansion of low cost rental to accommodate those displaced, and homelessness results.

There are possible parallels with the Australian work of Yates and Wulff (2005) and Wulff et al. (2011) who detect a growing shortage of rental housing affordable to low-income households. In O'Flaherty's terms, the growing shortage might be explained by a prior decrease in the production of middle income housing which, overtime, filters down to become low cost rental housing. This creates a supply shock that is responsible for the observed shortage in low cost rental housing over the time period studied by Wulff et al. (2011).

A different approach based on general equilibrium modelling is reported in Mansur, Quigley, Raphael and Smolensky (2002). General equilibrium models are technically sophisticated mathematical representations of market economies that identify a set of (equilibrium) relative prices which simultaneously bring demand and supply into balance in all markets, given income distributions and the 'tastes and preferences' of consumers. Mansur et al. (2002) conduct simulations by altering the income distribution and then solving the model for a new set of equilibrium prices at which supply equals demand. When those in the middle of the income range suffer a reduction in incomes, the new equilibrium features rents that are higher in what was previously housing affordable to those on low incomes. Even without regulatory restrictions on the supply side of the housing market, some low-income households are displaced from this segment of the housing market, and become homeless. This simulation was motivated by O'Flaherty's observations on the consequences of changes in the US distribution of income; and Mansur et al. (2002) offer robust support.

A third approach grounded in economic theory is proposed by Glomm and John (2002) They assume people's choices are underpinned by rational decision-making geared to maximise self-interest or satisfaction. Individuals (or households) make consumption decisions that maximise satisfaction, subject to their budget position which is typically defined as a constraint preventing a 'spend' exceeding income. The supply side of the market is assumed to be subject to technology or regulatory restrictions (e.g. minimum housing standards) such that housing is not available below some level; if income falls to very low levels the household is unable to afford the minimum bundle of housing services. Homelessness results and causes skills to deteriorate (because of adverse health effects), and so wage income falls in future periods. The homeless are then caught in a homelessness trap. One important empirical implication is that a change in current housing availability affects homelessness in future periods.

2.8 In summary

This literature review began by situating the current research within the debate about structural versus individual causes of homelessness. After some background on the Australia context, and a brief overview of homelessness in Australia, this review highlighted the dearth of empirical work in Australia examining the role of structural factors in driving aggregate rates of homelessness. Findings from the only Australian study were discussed along with key explanations for these findings. The review then discussed key Australian housing market research, highlighting trends that could be influencing aggregate rates of homelessness. The intersection between homelessness and the labour market was then discussed drawing out two key ways that the labour market may impact on aggregate rates of homelessness. Finally, international evidence—both applied and theoretical—was examined. This international evidence has directly investigated the relationship between homelessness in metropolitan areas and housing markets, labour markets and demographic factors. From this literature we drew out useful methodological approaches and insights for the present study to consider.

3 METHODS

This chapter outlines the key methods used in this report. We begin by outlining the definition of homelessness used, and describe the spatial unit of analysis in the present study, before describing our three data sources and the measurement and definition of key variables. We discuss imputation methods used to address missing values, and list caveats due to the limitations of our data set.

In summary, we draw on three datasets:

1. Homeless estimates from the ABS Census of Population and Housing
2. Time Series Profile data set from the ABS
3. Specialist Homeless Services Collection (special request) from the AIHW.

All data was requested or sourced at the SA3 level for the years 2001, 2006 and 2011. This spatial unit was selected as it was the smallest spatial unit at which homeless estimates were reliably available for all of Australia.

3.1 Definition of homelessness

For the present study, homelessness has been defined using the statistical definition developed by the ABS. This definition emphasises the 'home' in homelessness; home encompasses a sense of security, stability, privacy, safety and the ability to control one's living space (Mallett 2004). Homelessness is a loss of one or more of these elements and not just about 'rooflessness'.

The ABS (2012e) defines someone as homeless if they do not have suitable alternative accommodation and their current living arrangement:

- is in a dwelling that is inadequate, or
- has no tenure or their initial tenure is short and not extendable, [3] or
- does not allow them to have control of, and access to space for social relations.

In order to estimate those persons experiencing homelessness in the census, the ABS has operationalised this definition by flagging six key groups based on their living situation:[4] [5]

- People in improvised dwellings, tents or sleeping out (rough sleeping).
- People in supported accommodation (includes shelters) for the homeless, or in transitional housing.
- People staying temporarily with other households (including with friends and family).
- People staying in boarding houses.
- People in other temporary lodging.
- People living in severely overcrowded conditions (according to the Canadian National Occupancy Standard).[6]

[3] Here tenure means legal right to occupy a dwelling—such as holding the title or having a lease. It also includes familial security of tenure such as children living with their parents.

[4] People who live with the constant threat of violence (i.e. family violence) or in dwellings with major structural problems are also considered homeless, but cannot be enumerated with census data.

[5] People who are living long-term in caravan parks and those who are in crowded but not severely overcrowded dwellings are considered to be marginally housed and at risk of homelessness, but are not considered homeless under the statistical definition.

[6] The Canadian National Occupancy Standard specifies that no more than two persons should share a room—is with specific clauses about the age and gender of the occupants and couples. Under the standard a dwelling is

3.2 Unit of analysis

The spatial unit of analysis is the Statistical Area Level 3 which is a spatial unit under the main structure of the Australian Statistical Geography Standard (ASGS). This geography was developed by the ABS and introduced in 2011 with the aim of reporting all future statistics within this framework. The ASGS works from small mesh blocks (similar to collection districts) which aggregate to SA1s, then SA2s through SA3s, SA4s to states and territories, and then to all of Australia.

There are 351 SA3s in Australia, with populations ranging from 30 000 to 130 000 (ABS 2011a). In urban areas, SA3s closely align to an area serviced by a major transport and commercial hub. In regional areas, they represent the areas serviced by regional cities with populations over 20 000 persons and in outer regional and remote areas, SA3s are areas recognised as having a distinct identity or similar social and economic characteristics (ABS nd1). Finally, some SA3s have no population as they are national parks or large marine areas. Following the ABS, we refer to SA3s as local regions throughout the report. However, for the sake of brevity through the method section when specifying variables we use the term SA3.

We excluded some local regions (SA3s) in our analysis, specifically; offshore, shipping and migratory areas and areas with populations under 100. This left a sample of 328 local regions (SA3s) for analysis.

3.3 Data sources

3.3.1 Homeless estimates

Homelessness estimates for Australia were obtained via special request to the ABS as the data for all three years were not publically available when the project commenced. These estimates are based on an estimation strategy applied to the five yearly Census of Population and Housing, and provide a point in time count. The Australian homeless estimates have recently undergone a methodological review which has seen the methodology for estimation updated and, for the first time, applied consistently across the last three census periods (for detailed information on the estimation strategy see: ABS 2012d). During this review the ABS also adopted a definition of homelessness for use across all of its relevant collections (for detailed information on this definition see: ABS 2012e).

Homelessness is inferred from responses to multiple questions on the census form. ABS staff worked with state and territory organisations to correctly identify accommodation and sites where homeless persons are likely to be found. Persons experiencing homelessness were also asked for information on areas where others experiencing homelessness might be staying. Some staff working at homelessness services as well as people experiencing homelessness themselves were recruited and trained by the ABS to use a shortened census form in order to collect census information (ABS 2012g, 2012f). Additionally, staff at homelessness services explained to clients that they needed to specify their usual address as 'none' on the census form because this is a key way that homeless people are identified in estimation methods.

Under-estimation was addressed through the review and updating of the methodology for estimating homelessness by the ABS. This process saw the initial release of a discussion paper, and public consultation in the form of public meetings and submissions followed. This process led to the formation of the Homeless Statistics Reference Group (HSRG) and the release of a positioning paper outlining the process for the review. The HSRG comprised academics with specialist knowledge in homelessness, researchers, peak bodies, key personnel from state and federal government departments, homeless service providers and others with specialist knowledge of homelessness. Together, those on the reference group,

considered severely overcrowded if four or more bedrooms are needed to accommodate the residents. (See ABS 2012d, p.92 for more detailed information.)

and the information gathered, has shaped the revised methodology for estimating homelessness.

The specific strategy for estimating those sleeping rough uses a number of variables collected in the census. First, a sample is selected from those who were staying in accommodation that was recorded by the census collector as an 'improvised dwelling, tent or sleepers out', and who reported either having no usual address or being at home on census night. A number of people in these circumstances should not be considered homeless—for example, owner builders living in a shed on their property while they build or construction workers in temporary housing. In order to exclude those not homeless from this category, income, rent and mortgage payment details and employment details are used. Census collectors also make additional notes at some sites which help identify the circumstances of those in this dwelling type (see pp.26–29, ABS 2012f for more detailed information).

Homeless estimates for 2001 and 2006 had been collected under an older geographical system. In response to our request, the ABS brought forward its plans to update its homeless estimates to its new geographical structure (the ASGS), so that homeless estimates would be available with both a consistent methodology and in consistent spatial units over time.

Homeless estimates were obtained at the SA3 (local region) level but also at the SA4, state and territory and national levels. Homeless estimates were provided as raw number estimates for the total estimated homeless population for each year, and for each operational group for each year at each geographical level. These items are summarised below in Table 2.

Table 2: Homeless variables and their definitions by data sources and unit of measurement

	Variable	**Definition**	**Data source**	**Unit of measurement**
Count of people experiencing homelessness	Overall total of homeless persons	Total number of persons experiencing homelessness within SA3 *i* in year *X*	ABS Census counts, 2001, 2006 and 2011	Count
	Total homeless persons within Operational group 1	Number of persons within SA3 *i* who are in improvised dwellings, tents or sleeping out in year *X*	ABS Census counts, 2001, 2006 and 2011	Count
	Total homeless persons within Operational group 2	Number of persons within SA3 *i* in supported accommodation for the homeless in year *X*	ABS Census counts, 2001, 2006 and 2011	Count
	Total homeless persons within Operational group 3	Number of persons within SA3 *i* staying temporarily with other households in year *X*	ABS Census counts, 2001, 2006 and 2011	Count
	Total homeless persons within Operational group 4	Number of persons within SA3 *i* staying in boarding houses in year *X*	ABS Census counts, 2001, 2006 and 2011	Count
	Total homeless persons within Operational group 5	Number of persons within SA3 *i* in other temporary lodging in year *X*	ABS Census counts, 2001, 2006 and 2011	Count
	Total homeless persons within Operational group 6	Number of persons within SA3 *i* living in 'severely' crowded dwellings in year *X*	ABS Census counts, 2001, 2006 and 2011	Count

However, some operational group totals were suppressed at the local region (SA3) level for confidentiality reasons. Further, estimates for persons staying in supported accommodation for the homeless (operational group 2) were not available for 2001 and needed to be imputed (see Section 3.4).

We use the totals for Operational group 2—persons staying in supported accommodation for the homeless—to generate a measure of service capacity for each year. This is discussed further in Section 3.3 together with the measures generated using special request data from the Specialist Homeless Services Collection (SHSC).

Descriptive statistics for non-derived variables listed throughout this section are presented in Appendix 1.

Key homeless measures

Using the homeless estimates from the ABS, we created two key measures of homelessness:

- The rate of homelessness per 10 000 persons in each local region (SA3).
- Each local region's share of the national homeless count.

The rate of homelessness per 10 000 persons is the local region's (SA3) homeless count in a census year divided by its total population in that same year, then multiplied by 10 000. This variable is a rate measure and indicates the likelihood of being homeless at a point in time (the census date).

Each local region's (SA3s) share of the national total is simply calculated by dividing each local region's homeless count by the national homeless count and multiplying by 100 to give a percentage. It is a useful variable to help guide the allocation of support services. But it might be argued that neither the rate nor national share measures should be used on their own as a signal for the allocation of resource support to the homeless. The rate indicates where the risk of homelessness is high or low, and the share measure indicates where resources should be placed if they are to target where the homeless are located. The two measures will be correlated, but not perfectly.[7]

Changes in regions' rates of homelessness are an important aspect of the dynamics of homelessness as they shape the shifting geography of homelessness. The study uses the percentage change in the rate of homeless (per 10 000) between census dates in order to explore spatial dynamics.

The homelessness variables used in the present study are summarised in Table 3 below. Descriptive statistics are presented in Appendix 1.

[7] The rate of homelessness per 10 000 measure and the share of national homelessness have a Pearson Correlation Coefficient of $r = .727$ in 2001, $r = .777$ in 2006 and $r = .748$ in 2011. All are significant at 1%, or $p < 0.01$

Table 3: Key derived homeless measures and their definition by data source and unit of measurement

Variable	Definition	Data source	Unit of measurement
Rate of homelessness	Rate of homelessness per 10 000 within SA3 *i* in years 2001, 2006 and 2011 (year *X*)	Derived variable (DV) based on ABS Census counts and population estimates from the ABS Census of Population and Housing: Time Series Profile (TSP), 2001, 2006 and 2011	Rate per 10 000 persons
Share of homelessness	SA3 *i*'s national share of homelessness in year *X*	DV based on ABS census counts, 2001, 2006 and 2011	Ratio
Change in homelessness	Percentage change in the homelessness rate or share in SA3 *i* between years 2001–11	Derived variable (DV) based on ABS Census counts and TSP population estimates, 2001, 2006 and 2011	Per cent

3.3.2 Census of population and housing: Time Series Profile data

Measures of housing and labour market variables as well as demographics are drawn from the ABS Time Series Profile (TSP) dataset which is publicly available, and provides suitable measures at the SA3 (local region) level across Australia. We combine the homelessness and TSP data into a panel that allows us to track the profile of area-based structural indicators as well as those of comparable area-based homelessness rates at the local region (SA3) level. These demographic, housing and labour market characteristics include percentage of lone person households, percentage of Indigenous persons, household size, median rent, per cent of private dwellings rented through real estate agents, per cent of public housing, rent to income ratios, unemployment rate and median household income. Table 3 provides detailed definitions. The variables in Table 3 are commonly used in US studies of the geography of homelessness, hence their inclusion. There are variables such as poverty rates and winter temperatures that we would ideally wish to use, as they have proved significant in previous studies, but had not been sourced by the time we conducted the descriptive analysis in this report. We are endeavouring to obtain these measures for the second stage of the project.

Table 4: Structural indicator variables and their definitions by data sources and unit of measurement

Variable	Definition	Data source	Unit of measurement
Demographic indicators			
Indigenous people	Percentage of total Indigenous persons enumerated within SA3 *i* on Census night in Year *X*	ABS Census of Population and Housing: TSP, 2001, 2006 and 2011	Per cent
Lone-person households	Percentage of lone-person households enumerated within SA3 *i* on Census night in Year *X*	DV based on ABS Census of Population and Housing: TSP, 2001, 2006 and 2011	Per cent
Household size	Mean household size for households enumerated within SA3 *i* on Census night in Year *X*	ABS Census of Population and Housing: TSP, 2001, 2006 and 2011	Mean count
Housing market indicators			
Median rent	Median weekly household rent for households enumerated in SA3 *i* on Census night in Year *X*	ABS Census of Population and Housing: TSP, 2001, 2006 and 2011	Dollars per week
Public housing	Percentage of total occupied private dwellings within SA3 *i* on Census night renting from a State Housing Authority in Year *X*	DV based on ABS Census of Population and Housing: TSP, 2001, 2006 and 2011	Per cent
Dwellings being rented by real estate agents	Percentage of total occupied private dwellings within SA3 *i* on Census night renting from a Real Estate Agent in Year *X*	DV based on ABS Census of Population and Housing: TSP, 2001, 2006 and 2011	Per cent
Rent to income ratio	Ratio of median weekly household rent to median total household income weekly, by Year *X*	DV based on ABS Census of Population and Housing: TSP, 2001, 2006 and 2011	Ratio
Labour market indicators			
Unemployment rate	Percentage of total persons enumerated within SA3 *i* on Census night that were unemployed in Year *X*	ABS Census of Population and Housing: TSP, 2001, 2006 and 2011	Per cent
Median household income	Median total household weekly income for households enumerated within SA3 *i* on Census night in Year *X*	ABS Census of Population and Housing: TSP, 2001, 2006 and 2011	Dollars per week

3.3.3 Specialist Homelessness Services (SHS) and the SHS Collection (SHSC)

Support and accommodation services were important to measure as we wished to gauge the match between the geography of service delivery and the homeless. They may also play a role as a determinant of the geographical pattern of homelessness if the homeless migrate to where services are located.

In Australia, Specialist Homeless Services provide support and accommodation services to people who are homeless or who are at imminent risk of homelessness—including women and children escaping family violence. Both homeless and at risk clients receive support services. These can include a wide variety of services such as: case management, material aid, general counselling, health and medical services, drug and alcohol or mental health support, employment assistance, legal and court support, advice and information on accommodation, assistance with applications to public and community housing, and referral on to other specialist services. For a full list of services see AIHW (2012b).

In addition to this support, clients may also receive accommodation. This includes crisis accommodation and refuges (which typically, though not exclusively, have stays of between six weeks and three months), and medium term accommodation such as the transitional housing program in Victoria (which provides tenancy agreements in three-monthly blocks). Sometimes emergency relief funds are used to purchase short stays in cheap hotels, motels or caravan parks as a form of overflow crisis accommodation. All Specialist Homeless Services receive funding under the NAHA and NPAH and are required to provide data on use of services as part of the Specialist Homelessness Services Collection (SHSC).

This data provides key information on specialist homelessness services and their clients over a financial year and includes information on the number of people assisted (and the number of episodes of support provided), the type of services provided and requested, basic client demographics and client outcomes. Data is reported on a monthly basis to the AIHW. Data is collected based on episodes of support but can also be reported on a client basis.

We made a special request to the AIHW for four data items from the SHSC. Each item was made available to us at the local region (SA3) level of the new ASGS geography (see Table 5 for details):

- Number of persons (including children) within each local region who received some form of assistance (other than accommodation) from a specialist homelessness agency during the 2011–12 financial year.
- Number of persons who were accommodated by a homelessness agency in 2011–12.
- Number of specialist homelessness agencies located within each local region in 2011–12,
- Of these, the number of agencies within each local region that provide homelessness services from more than one location.

The distinction between support provided and accommodation provided is important for a number of reasons:

- People who are homeless may receive outreach support until some form of accommodation (including crisis accommodation) can be found for them.
- People may not wish to stay in short term accommodation such as refuges or crisis accommodation and instead prefer to receive other forms of support such as counselling and material aid until public housing, community housing or private rental housing can be arranged.

It was therefore important to collect (as we have sought to do) measures that cover the full range of services delivered. Unfortunately, the four data items we requested are only available in one (2011–12) year, and we were therefore obliged to use the ABS census count of number of homeless persons in supported accommodation as our measure of service provision in earlier census years (2001 and 2006).[8] The 2006 ABS measure is available for each local

[8] We assume that all available accommodation is used when the census count is undertaken, so that the number housed in supported accommodation is an accurate measure of available capacity (see Chapter 5 for further discussion).

region, but as pointed out earlier only at the state and territory level in 2001. We have imputed 2001 local region measures using methods described in Section 3.4.below.

Table 5: Service availability variables and their definitions by data sources and unit of measurement

Variable	Definition	Data source	Unit of measurement
Homelessness service agencies	Number and (national) share of specialist homelessness service agencies located within SA3 *i* in Year 2011	AIHW special request data, 2011	Count; rate per 10 000; and national share
Homelessness service agencies with multiple delivery points	Number of specialist homelessness service agencies located within SA3 *i* that operated from more than one location in Year 2011	AIHW special request data, 2011	Count; rate per 10 000; and national share
Clients supported by homelessness service agencies	Number and (national) share of homeless persons who received some form of assistance (other than accommodation) from specialist homelessness service agencies located within SA3 *i* in Year 2011	AIHW special request data, 2011	Count; rate per 10 000; and national share
Clients accommodated by homelessness service agencies	Number and (national) share of homeless persons who were accommodated by specialist homelessness service agencies located within SA3 *i* in Year 2011	AIHW special request data, 2011	Count; rate per 10 000; and national share

The raw count data on the service delivery variables in Table 5, as well as the ABS measure of numbers in supported accommodation, have been transformed into two variants that allow direct comparison with our homelessness indicators. First, each has been calculated into a per 10 000 person rate/incidence measure using population estimates from the TSP dataset for the relevant year (i.e. 2001, 2006 or 2011). This allows direct comparison of service delivery with contemporaneous rates/incidence measures of homelessness in the same regions and again on a per 10 000 person basis. The ABS measure is available in all census years, thus permitting calculation of the percentage change is numbers in supported accommodation (per 10 000 persons) across the study timeframe. Second, each has been calculated as a share of the national service support measure. For example, in the case of the SHS accommodation capacity, we have added each region's accommodation capacity to arrive at the national total. Each region's share is simply the number of persons accommodated by homeless services divided by the national total. These calculations allow us to compare measures of the geographical pattern of service provision (e.g. concentration in a few regions) with the geographical pattern of homelessness.

Note we have not used the number of SHS agencies per local region (SA3) nor the number of multiple delivery sites per local region (SA3) as indicators of service capacity in this report as they were a more crude measure of service capacity compared to the other data items that were available. Table 6 summarises for each of these derived variables.

Table 6: Measures of service capacity and their definitions by data source and unit of measurement

Variable	Definition	Data source	Unit of measurement
2011–12 SHS Support Capacity	Number of clients supported by SHS in the 2011–12 financial year located in SA3 *i* in 2011 per 10 000 persons	Derived variable (DV) based on AIHW special request data and population estimates from the ABS Census of Population and Housing: Time Series Profile (TSP) for 2011	Rate per 10 000 persons; and national share
2011–12 SHS Accommodation Capacity	Number of clients accommodated by SHS in the 2011–12 financial year located in SA3 *i* in 2011 per 10 000 persons	Derived variable (DV) based on AIHW special request data and population estimates from the ABS Census of Population and Housing: Time Series Profile (TSP) for 2011	Rate per 10 000 persons; and national share
ABS Homeless Service accommodation capacity	Number of persons per 10 000 within SA3 *i* staying in supported accommodation for the homeless on census night in year *X*	Derived variable (DV) based on ABS Census counts and TSP population estimates, 2001, 2006 and 2011	Rate per 10 000 persons; and national share
Per cent change in homelessness service accommodation capacity	Percentage change in the homelessness service accommodation capacity per 10 000 persons in SA3 *i* between years 2001–11	Derived variable (DV) based on ABS Census counts and TSP population estimates, 2001, 2006 and 2011	Per cent

We use three measures of service capacity as each measure has some limitations. These are detailed later in the section on limitations.

3.4 Imputation of missing values and transformations

A limitation of the homelessness dataset was that 2001 estimates for the number of homeless persons staying in supported accommodation (operational group 2) were not available at the local region (SA3) level. However, they were available at the state/territory level. To impute the 2001 operational group 2 values for each local region we utilised the state-level totals and calculated the state-level percentage change between years 2001 to 2006 for operational group 2. We assume that the percentage change for operational group 2 at local region level occurs proportionately with the state level changes between years 2001–06. For example, if the number of persons in operational group 2 in Victoria increased by 4 per cent between years 2001 and 2006, we used the 2006 operational group 2 estimates for all local regions within Victoria and deflated it by 4 per cent to arrive at an estimate of the operational group 2 count for 2001. We repeated this method for each state and territory.[9]

[9] Nationally, there were 156 SA3s (out of 328) with suppressed counts for 2006. In order to impute these values, we first calculated the difference between the state totals for operational group 1 and the total count for 2001 operational group 2 already assigned by our imputation strategy. We then distributed those numbers evenly across those SA3s for whom we had no 2006 data to impute values for each state/territory. For example, there were three SA3s in the Australian Capital Territory who had suppressed counts in 2006 for operational group 2. There were a

3.4.1 Transformations

Non-normally distributed measures

Many of the homeless variables were severely non-normally distributed as is evident from inspection of a series of histograms reported for key variables in Appendix A2. This created a problem when using Pearson correlation coefficients to judge the strength of statistical associations between pairs of variables.[10] Natural log transformations of our variables produce distributions that were closer to the desired bell shaped normal distribution. Only logged variables were used in all Pearson correlations reported throughout this report.

Dealing with negative values in log transformations

Negative values were common among percentage change calculations (e.g. percentage change 2001–11 in homelessness per 10 000 persons). As it was not possible to log-transform negative values, we followed Kennickle-Woodburn's (1999, cited in Galizzi & Zagorsky 2009) approach by first estimating the absolute rate of per cent change for each of the homelessness and services measures; this meant adjusting all values to a non-negative value. We then calculated the natural log of the absolute per cent change and re-inserted initial sign to indicate the direction of the change.

3.5 Creation of dataset

To carry out the descriptive analysis, we created a wide file combining the ABS's homelessness data with demographic information obtained from the Census as well as homelessness services data obtained from AIHW. Variables were merged on the SA3 (local region) region code—a unique identifier across the three data sources—and was merged contemporaneously for years 2001, 2006 and 2011. The final dataset therefore included for each SA3 its corresponding demographic profile, homelessness count and homelessness service availability for each of the three Census years.[11]

3.6 Limitations

As this research relied on data from secondary sources, our research was vulnerable to any shortcomings with these secondary sources. The most significant limitation of our dataset relates to concordance routines used to implement the new ASGS that defines spatial units (as of 2011 Census) differently from those used in previous census counts. Different issues exist for both the ABS homeless estimates and the AIHW special request data. They are addressed in turn below.[12]

3.6.1 Allocation of records to local regions (SA3s)

ABS homeless estimates

As already mentioned, the ABS used concordances to align the 2001 and 2006 data to the new ASGS at our request for this project. This means that the enumeration was repeated based on the new ASGS classification but rather a new set of rules were used to reallocate the data to a slightly different geography. They describe the process as follows:

The method used to align the supplied 2001 and 2006 homelessness datasets to the 2011 ASGS classification can be summarised as a 'best fit' allocation table constructed using a

total of 88 persons not yet accounted for in that territory for 2001. So we divided 88 by 3 and distributed 29.263 persons to those three SA3s for whom we had not yet imputed 2001 values.

[10] See Field, (2005) for a discussion on the effect of non-normally distributed data on correlations and parametric statistics in general.

[11] Data obtained from AIHW on homelessness service availability is an exception here and is only available for financial year 2011–12.

[12] This description is taken directly from email correspondence between the authors (Deb Batterham) and the ABS (Adam Pursey and Ben Dorber) on 10 December 2013 and is used with permission.

Census weighted population methodology and applied at the unit record level. Note that this method was chosen to achieve maximum comparability with Census Time Series Profiles, which were also aligned to the ASGS using this method.

In this method, an allocation table is first created in which each Collection District (CD) is allocated to a unique Statistical Area 2 (SA2). Because CDs are smaller than SA2s, in general a number of CDs were allocated to each SA2. Note that while an SA2 may have multiple CDs allocated to it, a CD cannot itself be allocated to more than one SA2. In the simplest case where the boundaries of a CD fall entirely within the boundaries of an SA2, the CD is allocated to that SA2. In the more complex case where the boundaries of a CD overlap multiple SA2s, the CD is allocated to only one of these SA2s—determined using a 'best fit' methodology.

This 'best fit' is calculated using the weighting methodology described in the correspondences section of the information paper noted above, specifically in this case a Census weighted population methodology. The results of this weighting methodology are used to determine which SA2 contains the greatest proportion of the CD's population, and the data for all records from this CD are then allocated to this SA2. Note that this differs to the way these proportions are used when aligning aggregate data (as described in the information paper), where data from the original area is donated to multiple new areas in accordance with the calculated proportions.

Note that due to CDs being a significantly smaller unit of geography than SA2s, the 'best fit' method is used for less than 10 per cent of CDs. The vast majority of CDs are contained entirely within one SA2, and so have a 100 per cent match between the aligned data and the real data.

After this allocation table has been created and each CD has been allocated to a unique SA2, the data from each record is then allocated to an SA2 based on its original CD. Aggregate data is then produced at the SA2 level. SA2s then aggregate uniformly to SA3 spatial units.

SHSC special request data

The SHSC data is collected at state and territory level but was made available to the team at a smaller spatial unit by AIHW who drew on various ABS correspondences to reassign the homeless service availability data from state and territory-level to SA3-level. Address details of homelessness service providers were a key component for reassigning homeless service providers from one geographical unit to another. In particular, locational information such as the suburb, postcode and state of each homelessness service agency were utilised to first reassign each agency from state to SA2-level, and then from SA2 to SA3-level.

Where a post code or suburb is covered by two or more SA2s, the locality has been allocated to the SA2 where most of that locality's locational addresses lie. The addresses are sourced from the May 2011 edition of the Geocoded National Address file sourced from PSMA Australia Ltd. Localities that are covered by more than one Postcode (e.g. Melbourne) are included as duplicate records. Each record being associated with the postcodes involved.

A significant caveat of the data is the use of agency address to allocate data to SA3s because a number of agencies have multiple service delivery points. An agency with multiple delivery points provides services to clients outside of the suburb/locality they have indicated as their actual street address. This includes agencies that have multiple fixed physical addresses and also agencies that are mobile; for example those that operate an outreach van.

In total there are 1478 SHS agencies in Australia. Of these 1478 agencies, 12 could not be allocated to an SA3 because of inadequate address information. 544 of these agencies have multiple service delivery points (or 36.8%).

Most commonly, agencies with multiple delivery points are located in capital city centres or in large regional cities.

3.6.2 Other limitations with measures of service capacity

SHS support and accommodation capacity per 10 000 persons

Both the number of people supported and the number of people accommodated by SHSs in a financial year period provide an indicator of service capacity. However, both of these measures have caveats or limitations. The SHS measures estimate use of services over the financial year rather than a point in time (as with the ABS estimate), and is only available in one year (2011–12). The SHS accommodation capacity estimate could be a misleading estimate of the supply of bed spaces because it is in fact a measure of the number of persons that have received supported accommodation over the financial year—wit, some people staying in the same 'bed-space' consecutively.

The ABS service capacity measure

The ABS measure has the advantage of availability over the three most recent census years and more precisely assigns supported accommodation to local regions (SA3s). Moreover, it is an accurate accommodation capacity measure on the assumption that all available beds are occupied on census night. However, it captures just one of the services (supported accommodation) offered by support agencies, and is not reported when numbers in this operational group or another group are so small as to raise confidentiality issues. This occurred in 156 local regions in 2006 and 78 local regions in 2011 and data for this category in 2001 were imputed.

4 A GEOGRAPHICAL ANALYSIS OF HOMELESSNESS IN AUSTRALIA

This chapter, the first of three describing our results, details the findings from a descriptive analysis of the geography of homelessness between 2001–11. First, the national and state pictures are outlined before identifying regions where homelessness is especially high or low. Second, we identify trends in homelessness at the local regional (SA3) level; interrogating whether changes in homelessness are uniformly experienced across the nation. We also examine whether these changes are resulting in a more or less spatially concentrated pattern of homelessness.

Chapter 5 focuses on homeless services. Two different but related issues are examined—the alignment of homeless service capacity with the distribution of homeless persons across regions; and whether the location of homeless services acts as a magnet attracting homeless persons to regions with greater service capacity (the magnet hypothesis).

The final results chapter (Chapter 6) reports on our preliminary analysis of the strength (or otherwise) of statistical associations between measures of homelessness and the potential structural drivers of spatial variations in homelessness.

Across the three results chapters, the analysis was enriched by the use of two different measures to gauge the geographical distribution of the homeless—the incidence and share of homelessness. The chances of becoming homeless in a region was captured by an incidence (rate) measure that calculated the number of homeless in a region per 10 000 population. All the studies we have reviewed use this prevalence calculation to judge whether a region's population is prone to homelessness. While useful this incidence measure also has limitations. The rate of homelessness could be high yet the homelessness *count* (the actual number of homeless) low if a region is sparsely populated. Conversely, there might be densely populated regions—inner city areas, for example—where the incidence or rate of homelessness might be relatively low but the number of homeless persons is high. For this reason we use the region's share or proportion of the national homelessness count to gauge the number of homeless in a region relative to the national total.

As the research endeavours to measure the spatial distribution of homelessness in a way that can potentially inform the allocation of homelessness services neither the incidence nor the share measure alone are sufficient. For example, use of the incidence measure alone might misdirect resources such as available bed-spaces away from areas where there are relatively large numbers of homeless persons. On the other hand, resources that aim to address the causes of homelessness might be better directed to regions where the incidence/rate of homelessness is relatively high.

4.1 The national picture of homelessness

Data presented by the ABS in their estimating homelessness publication (ABS 2012d) shows that the 2011 national rate of homelessness stood at 48.9 per 10 000, with over 100 000 declared homeless. The Northern Territory stands out with a homelessness rate that was almost 15 times the national average. Western Australian and Queensland populations were also more prone to homelessness back in 2001, but by 2011 their rates were below the national average, a relativity shared with all other states and territories.

Nationally, the rate of homelessness per 10 000 persons fluctuated over the decade between 2001 and 2011, with rates dropping in the first half of the decade from 50.8 in 2001 to 45.2 in 2006 (see Table 7). The homelessness count fell by 6 per cent over this five-year period, despite an increase in the national population of 5.8 per cent.

These declines emerged against a backdrop of strong economic growth, low unemployment and rising household incomes. Macroeconomic conditions deteriorated sharply in 2007 as the Global Financial Crisis (GFC) marked a sudden reversal of fortunes. National economic growth stalled, unemployment and underemployment rates shot up and growth in household income slowed,[13] While recovery was in sight by the end of our study timeframe, it seems that the recession triggered by the GFC at least coincided with and likely helped drive a steep increase in homelessness in the second half of the decade. By 2011 rates of homelessness had more or less returned to their level in 2001 as the numbers without satisfactory housing grew from 89 728 in 2006 to 105 237 in 2011, a 17 per cent increase in only five years.

A pro-cyclical pattern is clearly evident in the national figures, but very different patterns emerge across the states and territories. In the Northern Territory and Queensland declines in rates of homelessness were sustained throughout the decade, albeit at a slower pace in the second half of the decade. In the Northern Territory there was a particularly steep decline in rates per 10 000, such that the homeless count was slashed by 1400 despite an increase of 9216 persons (or 4.5% of the 2001 Northern Territory population) in the Territory's population over the 10-year period. Western Australia and South Australia also 'bucked' the national trend with rates almost static between 2006 and 2011. However, the most populous states of New South Wales and Victoria had strong pro-cyclical changes, with the deterioration in the second half of the decade sufficiently serious that the homelessness count at the end of the decade exceeded that at the start by roughly 5000 in each state, while rates per 10 000 were also higher in 2011 than 10 years previously. Particularly severe worsening in the homelessness situation was evident in Tasmania and the ACT, with the count measure increasing by 38 per cent and 88 per cent respectively in the second half of the decade, though these increases were from a small base figure (see Table 7).

Queensland and Western Australia both benefited from mining booms that helped maintain relatively buoyant economic conditions in state economies during the post-GFC period. On the other hand, South Australia and the Northern Territory managed a counter-cyclically stable rate of homelessness from 2006–2011 without such large resource sectors. A simple explanation that relies on differences in regional economic performance is therefore not convincing. Later in this section we drill down and examine other factors that might help explain these very different experiences across Australia.

[13] See Campbell, Parkinson and Wood (2013) for an examination of changes in unemployment and underemployment from 1994 to 2010 in Australia. Figure 2 (p.24) shows a clear jump on both following the GFC.

Table 7: The rate of homelessness per 10 000 persons and raw numbers of homeless persons nationally by state and territory

States and territories	2001		2006		2011	
	Rate per 10 000	Raw number	Rate per 10 000	Raw number	Rate per 10 000	Raw number
New South Wales	36.4	23,041	33.9	22,219	40.8	28,190
Victoria	38.9	18,154	35.3	17,410	42.6	22,789
Queensland	54.8	19,316	48.3	18,856	45.8	19,838
South Australia	39.8	5,844	37	5,607	37.5	5,985
Western Australia	53.6	9,799	42.3	8,277	42.8	9,592
Tasmania	27.5	1,264	24	1,145	31.9	1,579
Northern Territory	904.4	16,948	791.7	15,265	730.7	15,479
Australian Capital Territory	30.4	943	29.3	949	50	1,785
Australia	50.8	95,314	45.2	89,728	48.9	105,237

Source: ABS, 2012d, Estimating homelessness, cat. no. 2049.0

Table 8 lists each state and territory's share of the national homelessness count in 2001, 2006 and 2011. New South Wales has the highest share in each year, accounting for over 1 in 4 homeless persons in 2011. Despite a rate of homelessness that was 15 times the national average, the Northern Territory's share of the national homeless was only 14.7 per cent; or just under 1 in 7 homeless persons; its share also declined over the decade. National shares have increased in New South Wales, Victoria and the ACT.

Table 8: The share of national homelessness for each state and territory over the last decade

States and territories	2001 % of national homelessness	2006 % of national homelessness	2011 % of national homelessness
New South Wales	24.2	24.8	26.8
Victoria	19.1	19.4	21.6
Queensland	20.3	21.0	18.9
South Australia	6.1	6.2	5.7
Western Australia	10.3	9.2	9.1
Tasmania	1.3	1.3	1.5
Northern Territory	17.8	17.0	14.7
Australian Capital Territory	1.0	1.1	1.7
Total	100.0	100.0	100.0

Source: Authors' calculations using ABS homelessness estimates

4.2 Where is homelessness high and where is it low?

The state and territory figures could mask considerable intra-state and intra-territory variation in homelessness measures that help us to better understand the role of structural factors. Table 9 below takes the local regions (SA3s) and assigns them into deciles according to their homelessness rate per 10 000 persons (and their share of national homelessness). Consider first the rates per 10 000 persons. Each decile is a grouping of 10 per cent of all local regions;

the lowest decile (1) is the 10 per cent of all local regions with the lowest homelessness rates. The table lists deciles in ascending order, until we reach the highest decile (10) that groups the 10 per cent of local regions with the highest rates of homelessness. The median rate in every decile is listed; casting an eye down this column of figures gives a sense of the enormous spatial variation across the nation. The median rate (167) among the 33 regions in the highest decile was roughly 14 times the median rate (12) among the 33 regions in the lowest decile. It would seem that people were not equally vulnerable to homelessness regardless of where they live, though there is much to explore before such a conclusion can be definitively reached.[14]

Each local region's (SA3) share of national homelessness has also been used to group them into deciles in Table 9 below. The 99 regions in the three lowest national share deciles had a typical (median) share of less than one-tenth of 1 per cent, which was very small. It was only among the 33 regions in the highest decile that typical (median) regional shares exceeded 1 per cent. The local region with the highest homelessness count (East Arnhem) had a 4 per cent share of national homelessness. East Arnhem had a population of just 14 701 persons. Of the top five local regions with the highest share of national homelessness, four were from the Northern Territory, with one from Inner Sydney. The median share in the top decile (1.26%) was *42 times the median share (0.03%) in the lowest decile*; the comparison offers a second graphic illustration of homelessness's uneven geographic spread.

Table 9: The 2011 rate of homelessness per 10 000 persons and 2011 share of national homelessness by decile

	2011 rate per 10 000 persons				2011 share of homelessness			
Decile*	**Number of local regionss**	**Min**	**Max**	**Median rate per decile**	**Number of local regionss**	**Min**	**Max**	**Median share per decile**
1.00	31	0.0	13.9	11.7	31.0	0.0	0.0	0.0
2.00	33	13.9	18.3	16.0	33.0	0.0	0.1	0.1
3.00	33	18.3	22.3	20.2	33.0	0.1	0.1	0.1
4.00	33	22.3	26.4	24.4	33.0	0.1	0.1	0.1
5.00	33	26.4	31.0	28.2	33.0	0.1	0.2	0.2
6.00	33	31.2	35.5	33.1	33.0	0.2	0.2	0.2
7.00	33	35.6	43.1	39.8	33.0	0.2	0.3	0.3
8.00	33	43.7	52.9	48.3	32.0	0.3	0.4	0.3
9.00	33	53.1	82.2	60.1	33.0	0.4	0.6	0.5
10.00	33	84.1	2,878.0	167.1	34.0	0.6	4.0	1.3
Total	328	0.0	2,878.0	31.3	328.0	0.0	4.0	0.3

Source: Authors' calculations using ABS homelessness estimates.

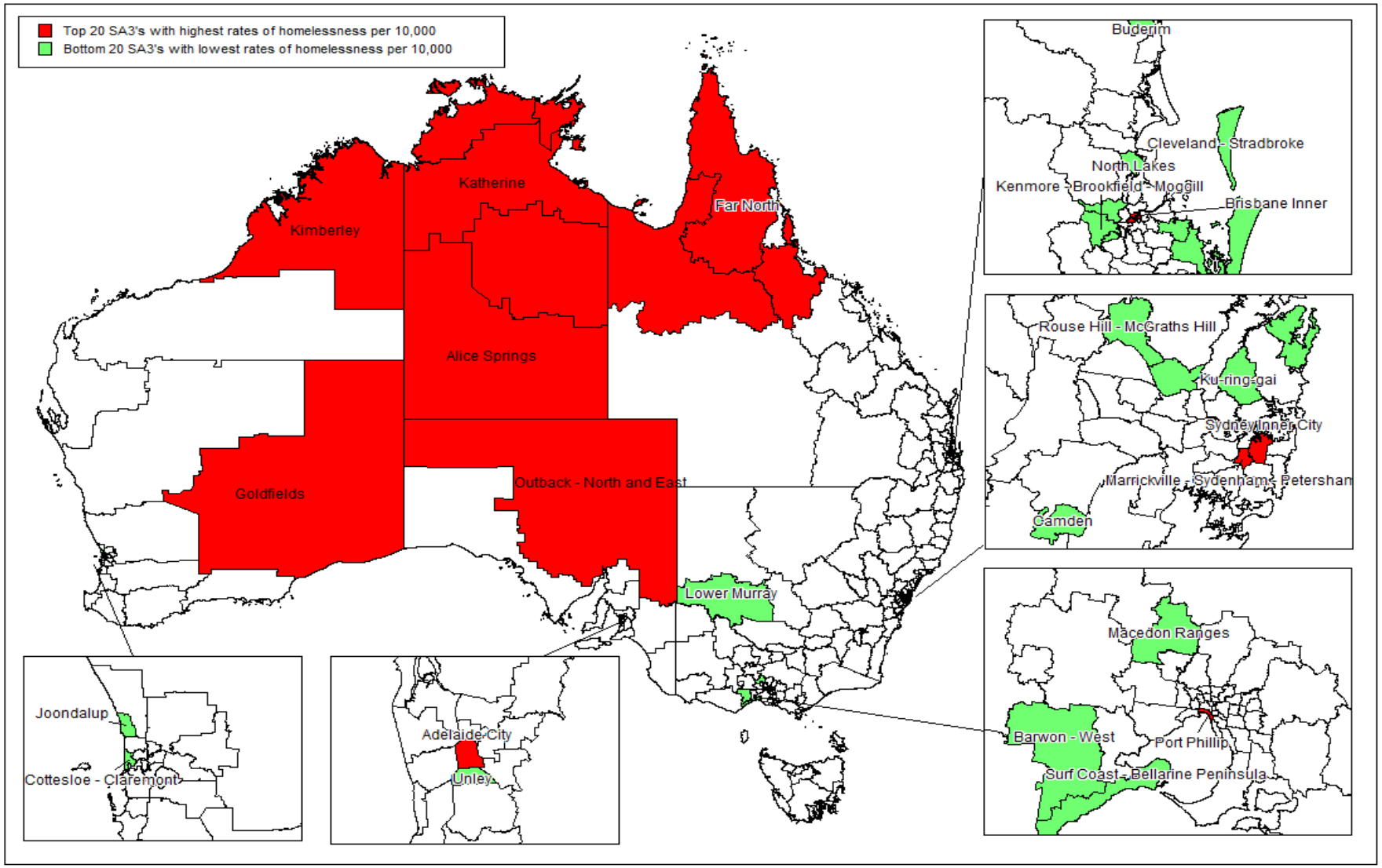
Notes: * Deciles are calculated separately for each variable.

The maps presented in Figures 1, 2 and 3 below offer a visual representation of homelessness in 2011 and its geography across the nation. Each map uses a different measure of homelessness with insets offering a visual depiction in the local regions belonging to the mainland state capitals. Figure 1 is based on the rate per 10 000 estimates. The 20 'hotspot' local regions that had the highest rates are coloured red and are contrasted with the 20 local

[14] People with personal characteristics that leave them prone to homelessness might be unevenly located across the nation. The places they live might then have no bearing on the chances of becoming homeless even though there is an uneven spatial distribution across the nation.

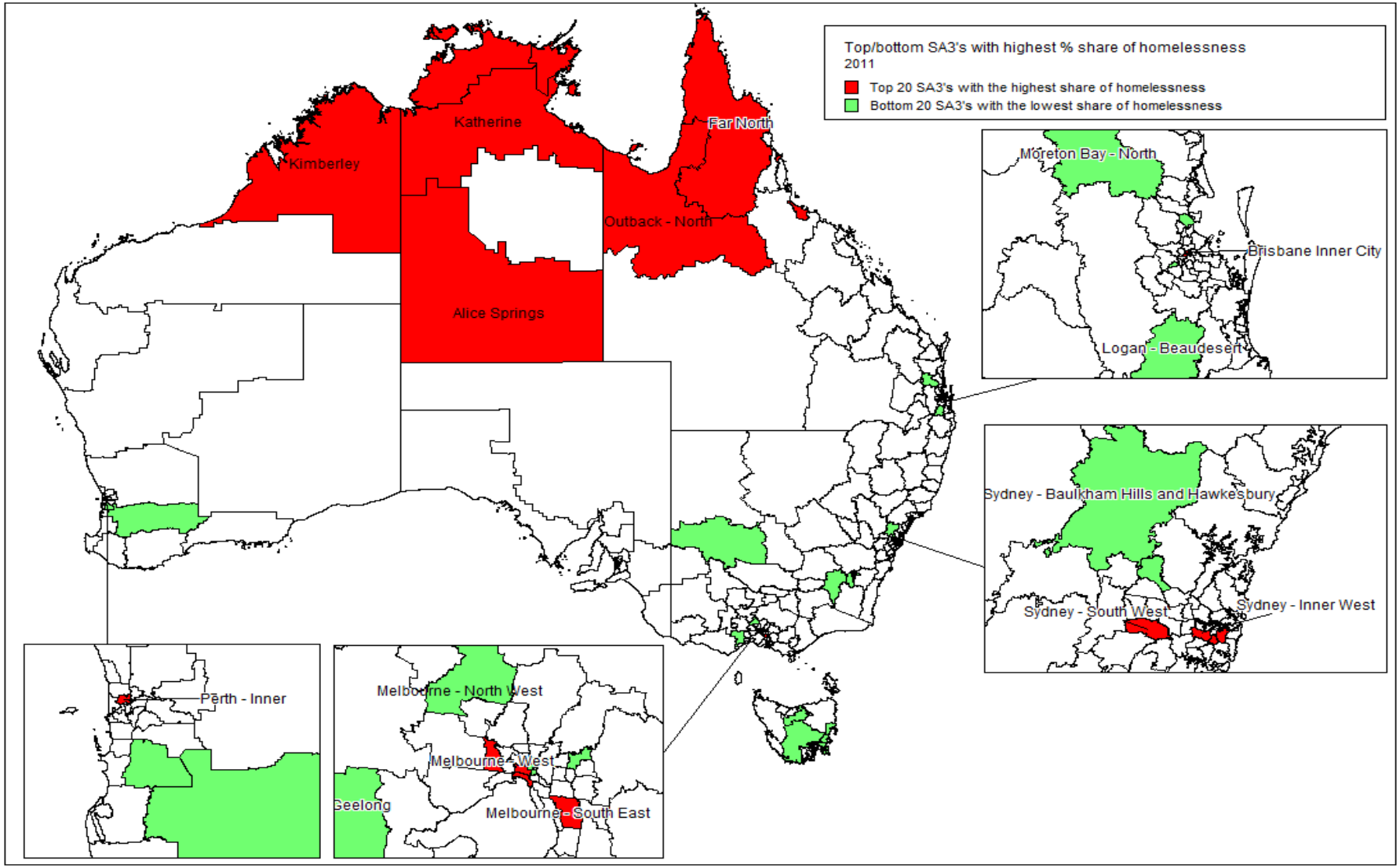
regions that had the lowest rates, which are coloured green. The red hotspots *typically* covered remote rural regions while the green regions were generally located on the coastal fringe and in urban areas. We might expect a different picture when mapped according to the regions' shares of the national homeless count, as in Figure 2. Visual comparison of Figure 2 and Figure 1 suggest that, on a share basis, homelessness was a more urban phenomenon than is apparent from an analysis based only on the rate measure. The Pearson correlation coefficient between rates of homelessness and shares of the national homelessness count is $r = 0.78$ ($p = 0.000$, $n = 327$). The positive coefficient is comforting but it is below 1 and so we cannot safely assume that a region where people were prone to homelessness was also one with a relatively high share of the national homelessness count.

Figure 1: The top and bottom 20 local regions with the highest/lowest rate of homelessness per 10 000 in 2011



Source: Authors' calculations using ABS homelessness estimates

Figure 2: The 20 top and bottom local regions with the highest/lowest share of homelessness in 2011



Source: Authors' calculations using ABS homelessness estimates

4.3 Where was homelessness rising or falling in Australia?

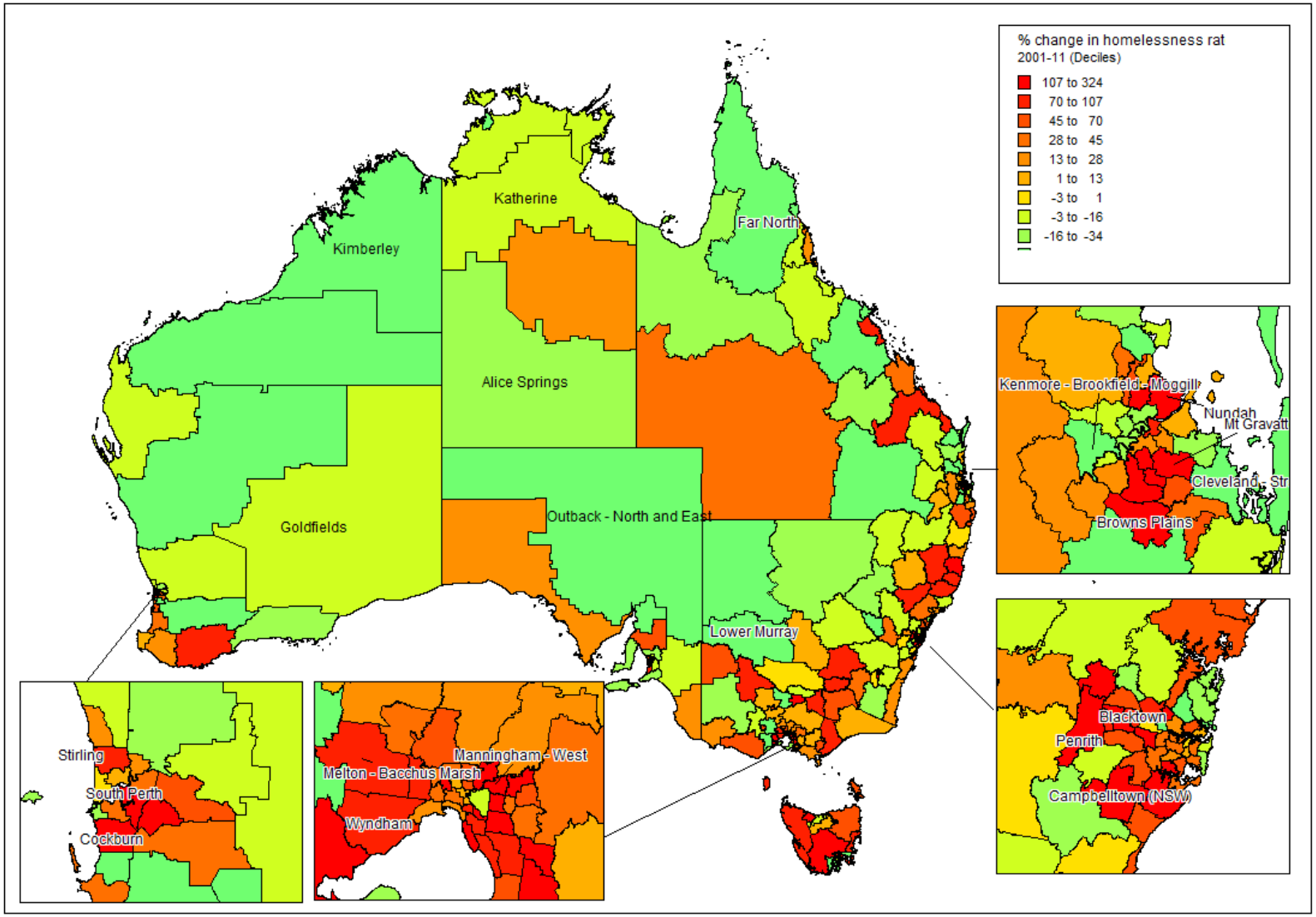
Figures 1 and 2 above present a 'snapshot' of the homelessness situation across Australia at one point in time (2011); but was this uneven distribution preceded by an equally uneven spread to changes in the homeless figures? Or is change in the homelessness figures spread evenly across the nation? Figure 3 below addresses this question focusing on percentage changes in the rate per 10 000 measure over the decade 2001–11. Once again local regions have been grouped into deciles, this time arranged according to the percentage change in homelessness from 2001–11.

Nationally the rate of homelessness fell between 2001 and 2006, before bouncing back in 2011 to almost the same rate as at the start of the decade. This national stability conceals dramatic differences or shifts across the regions over time. In the 33 regions comprising the highest decile (i.e. the top 10% of regions), rates more than doubled over the decade, and in some regions the rate in 2011 was in excess of three times what it was back in 2001. Yet there were declines in the incidence of homelessness in 179 (or just over half of the regions—55%), and in the lowest decile there were reductions that range from -34 per cent to -77 per cent.

When mapped, the patterns of change in regional homeless rates were the mirror image or reverse of the maps depicting point in time homelessness. The red areas depicting 'hot spot' regions where homelessness increased most were now clustered around the coastal fringe, and in the metropolitan regions of our mainland state capitals. The green areas, where homelessness has fallen, can now be more typically found in regional and remote Australia.

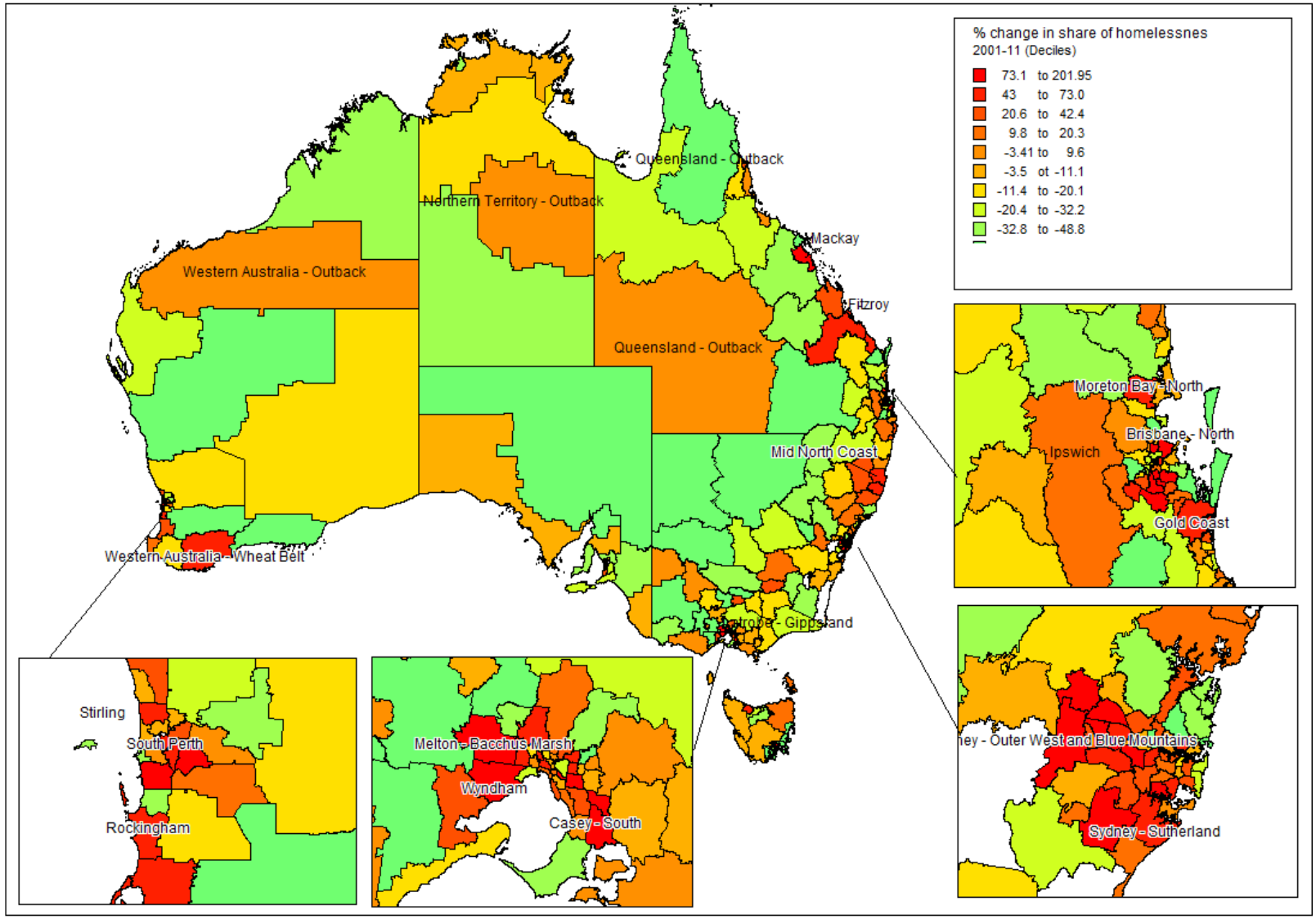
Figure 4 below maps the percentage change in each local region's share of the national homelessness count. A similar picture is portrayed with areas on the coastal fringe and in mainland state capitals expanding their share of the national homelessness count.

Figure 3: The percentage change in the rate of homelessness per 10 000 persons from 2001–11



Source: Authors' calculations using ABS homelessness estimates

Figure 4: The percentage change in the share of national homelessness from 2001–11



Source: Authors' calculations using ABS homelessness estimates

It would seem that homelessness has been declining in areas where it has been relatively high, but increasing where it has been relatively low. This is confirmed in Table 10 below where local regions are grouped into deciles, this time by reference to their 2001 rates of homelessness per 10 000 persons. The final column lists the change in the rate per 10 000 over the decade 2001–11. The pattern is strong. The 40 per cent (132) of local regions with the lowest rates were typically those where the population became more vulnerable to homelessness, a pattern that was reversed in the remaining 60 per cent of regions with higher rates (in 2001). In the 31 regions with the lowest rates of homelessness back in 2001 the rate increased by 27 persons per 10 000. Yet those 33 regions with the highest rates back in 2001 experienced a decline of 15 persons per 10 000. On calculating Pearson's correlation coefficient we obtain a negative and statistically significant value (r = -.31, p = .000), confirming the presence of a negative association between the 2001 incidence of homelessness and the 2001–11 percentage change in rates of homelessness.[15]

Table 10: The median percentage change in homelessness rates per 10 000 persons for 2001 by deciles for the 2001 rate of homelessness per 10 000 persons

2001 rate of homelessness per 10 000 deciles	Number	Median per cent change in rate of homelessness per 10 000 persons, 2001–11
1	31	26.73
2	33	11.78
3	33	8.63
4	33	5.71
5	32	-14.51
6	33	-5.47
7	33	-10.78
8	33	-1.3
9	33	-27.79
10	32	-15.62

Source: Authors' calculations using ABS homelessness estimates

This study seeks to understand geographic variation in the incidence of homelessness and the role of structural factors in this variation. The large divide separating regions with populations particularly prone to homelessness from those where populations have negligible risk of homelessness underlines the importance of this issue. These findings also raise a second question that was not anticipated when framing the study: why are regions that had previously offered secure housing outcomes to their populations now experiencing increases in rates of homelessness? Conversely: what explains the declines in homelessness (either rate or share) where homelessness had been relatively high?

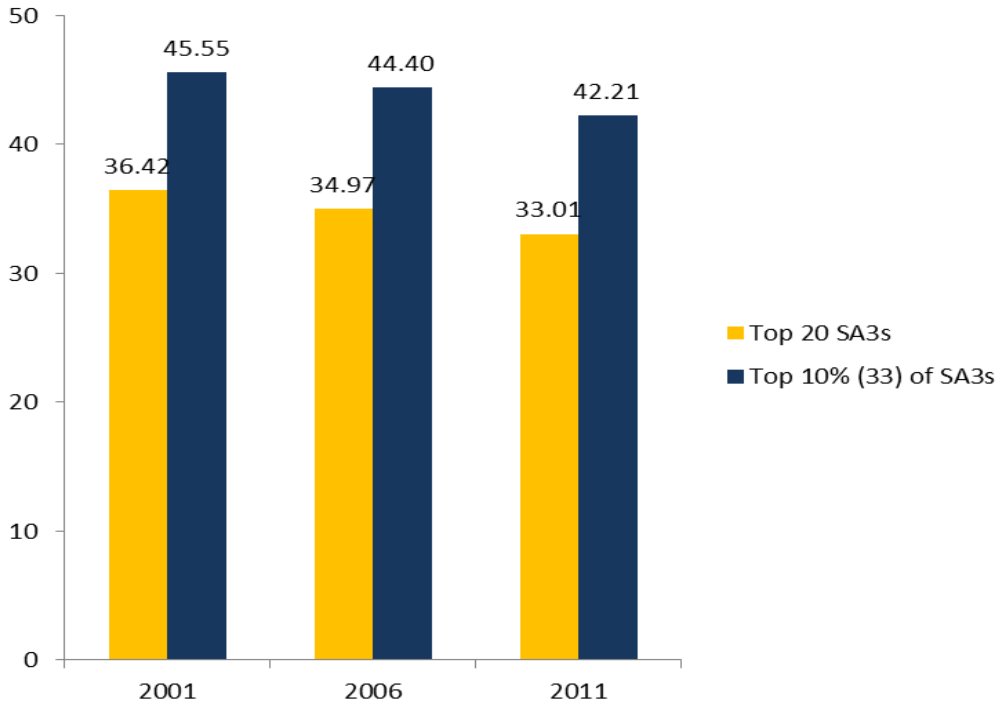
[15] Even though national rates decline between 2001 and 2006 before being reversed in the second half of the decade, over one-third (39%) of SA regions have changes in rates that are uniform across these five year segments. This is more likely among regions that exhibited an increase in the first half of the decade (59% went on to increase again in the second half) than among those that revealed a decline in the first half of the decade (31% with a continuing decline in the second half).

4.4 Is homelessness becoming more or less evenly distributed across the nation?

The maps presented previously document a large divide in the distribution of homelessness, suggesting that homelessness is geographically concentrated. However, the pattern of change indicates that the gap separating regions with high and low rates is closing, with convergence rather than divergence characterising the geographical distribution. Do formal statistical measures of concentration and convergence confirm these impressions?

The first technique used to assess convergence is the concentration ratio. The concentration ratio sums the share of national homelessness accounted for by each of the top *x* number of local regions (SA3s). We have calculated the concentration ratio for two values—the top 20 and the top 33 (10%) of local regions. In 2011, the 20 local regions with the highest share of national homelessness together accounted for roughly one-third of the nation's homelessness, while the top 10 per cent (33) of regions accounted for 42 per cent of national homelessness. So around four in every 10 homeless persons in 2011 could be found in 33 of the 328 local regions. We calculated the concentration ratio for both the top 20 and top 33 local regions for each year with results shown in Figure 5 below. Regardless of whether we use the top 20 or the top 33 local regions, Figure 6 below illustrates that while homelessness is a highly spatially concentrated phenomenon, its geographical concentration is slowly declining. The decade 2001–11 does not represent a dramatic shift; nevertheless it would seem that while the national count has risen, the geographical distribution is becoming more dispersed over time.

Figure 5: The share of national homelessness explained by the top 20 and top 33 (10%) of local regions over time



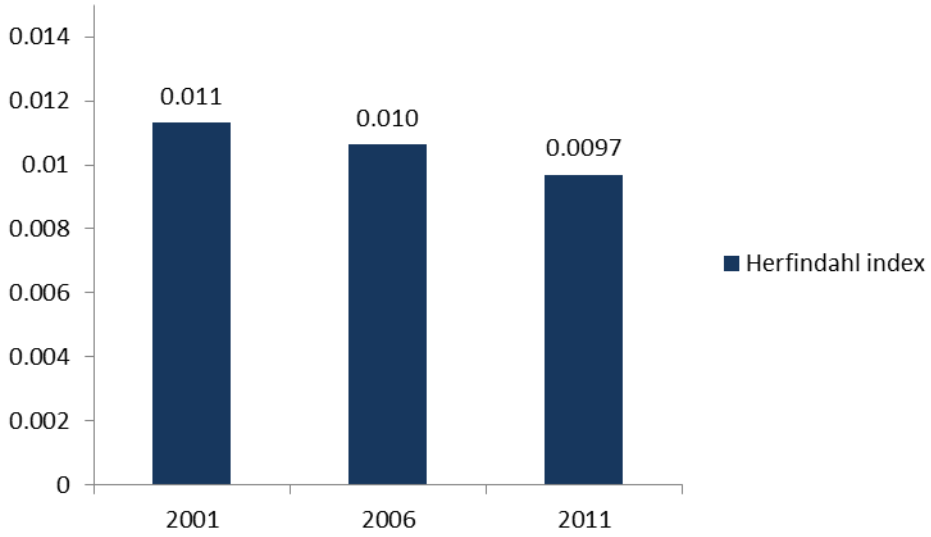
Source: Authors' calculations using ABS homelessness estimates

While useful, the weakness of the concentration ratio measure is that it takes no account of the distribution of the homeless outside the top regions, or the pattern of homeless shares among the top regions. Another measure, the Herfindahl index, addresses this weakness by measuring concentration across all 328 regions. It does this by computing the squared value of each region's share of national homelessness, and then summing these squared values across the 328 regions. It has a maximum value of 1—when only one region accounts for the entire

nation's homeless count—and a minimum value of 0 in the hypothetical circumstance where there are an infinite number of regions each of which has a negligible share of the national count. The higher the value, the more spatially concentrated the phenomenon under investigation. The index's computed value for 2001, 2006 and 2011 are presented in Figure 6 below.

In 2001, the Herfindahl index was in fact very low at 0.01. The low value reflects the fact that no region accounted for more than 4 per cent of the national count, and so national shares were small even in the regions that had relatively bigger shares. Figure 6 also shows a declining Herfindahl index over the decade, confirming the pattern revealed by the concentration ratio.[16]

Figure 6: The Herfindahl index for 2001, 2006 and 2011



Source: Authors' calculations using ABS homelessness estimates

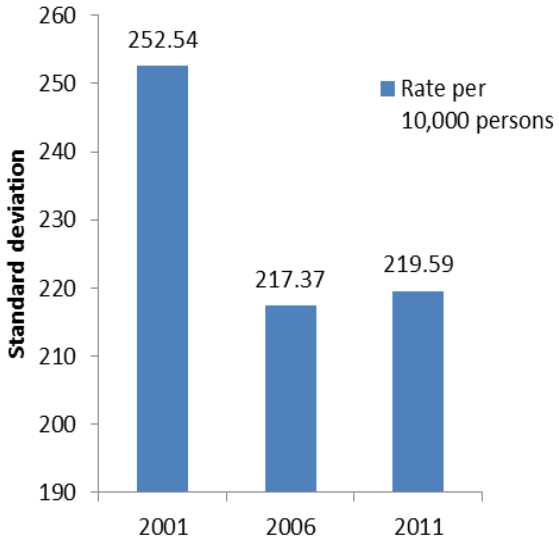
Both the concentration ratio and the Herfindahl index have shown that while homelessness is highly spatially concentrated, it is slowly becoming less so. We now use two measures of convergence to explore this pattern further—sigma and beta convergence. Sigma convergence occurs when there is less variation in homeless rates (or shares) over time. Sigma convergence is typically measured by examining changes in the standard deviation of measures over time. If the standard deviations are becoming larger over time this means that homelessness is diverging. If the standard deviation is becoming smaller it indicates convergence. Beta convergence exists when areas that have high rates (or shares) of homelessness have subsequently lower growth in homelessness, while areas that had lower rates (or shares) of homelessness subsequently have higher growth in homelessness. In technical terms, there is beta convergence when (in the present context) a negative relationship between the per cent change in the rate of homeless rates (per 10 000) and the initial homelessness rate is evident. This is measured by estimating a regression model with the growth rate as the dependent variable and the initial homeless rate on 'the right hand side'.

[16] Before moving on, it is worth remarking on the Herfindahl index's sensitivity to the level of geographical aggregation. To illustrate—suppose that we computed the index with respect to states' and territories' shares of the national homeless count. In 2011 we get a value of 0.19; because the number of spatial units is only 8 (states and territories) rather than the much larger 328 SA3 regions, we obtain a much higher value. The trend however is for a slight decline with the index creeping up from 0.18 in 2001.

Beta convergence is confirmed when the estimated initial homelessness rate coefficient is negative.[17]

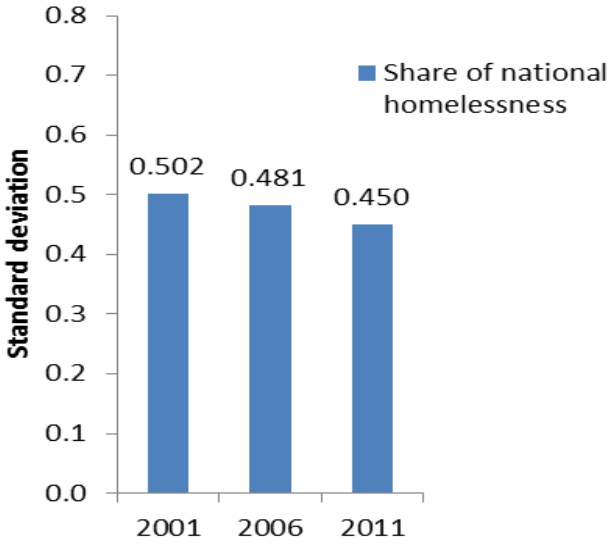
Figures 7 and 8 below use our two different homelessness measures (rate per 10 000 and share of national homelessness) to compute standard deviation measures of sigma convergence. The share measure reveals a consistent decline in the standard deviation measure; while the rate per 10 000 measure shows an overall fall between 2001 and 2011. This pattern indicates convergence.

Figure 7: The standard deviation in the national rate of homelessness per 10 000 persons for 2001, 2006 and 2011



Source: Authors' calculations using ABS homelessness estimates

Figure 8: The standard deviation in the national share of homelessness for 2001, 2006 and 2011



Source: Authors' calculations using ABS homelessness estimates

[17] A deck of cards analogy can assist our understanding here. Suppose that we rank cards from 1 (at the top of the deck) to 52 (at the bottom of the deck). The dispersion in ranking remains the same when we shuffle the pack (no sigma-convergence). However, after shuffling the pack there is beta convergence because when the change in ranking is regressed on the original ranking a negative coefficient is obtained. Cards that formerly had a high ranking will tend to have a lower ranking (and vice-versa) after the deck is shuffled.

In Table 11 below we report estimates of beta convergence using a log transformed model of the per cent change in homelessness rates. We produce regression estimates for the entire 10-year period and also for the sub-periods 2001–06 and 2006–11. Table 11 shows a negative sign on the coefficients in the second column. This indicates convergence rather than divergence. The statistical significance of the coefficients indicates that this pattern of convergence is a real effect. While there is evidence of greater polarisation of homelessness rates over the period 2006–11, the overall trend for the decade suggests that the incidence of homelessness has become less polarised than it was.[18]

Table 11: Percentage change in rates per 10 000 persons of homelessness (logs) between years 2001–06, 2001–11 and 2006–11

	Independent variable	
	Log of rates per 10 000 of homelessness, 2001	**Log of rates per 10 000 of homelessness, 2006**
Dependent variable	Coefficient	Coefficient
Log of rates per 10 000 of homelessness—2001–2006	-.79 (.18)**	-
Log of rates per 10 000 of homelessness—2001–11	-.94 (.17)**	-
Log of rates per 10 000 of homelessness—2006–2011	-	.26 (.154)*

Note: Standard errors in parentheses; * denotes coefficient statistically significant at 5 per cent, two-tailed test;

** denotes coefficient statistically significant at 1 per cent level, two-tailed test.

Source: Authors' calculations using ABS homelessness estimates

[18] The sign on the beta coefficients remains the same when using the raw count measures. Results are not reported because of space considerations, but are available from the authors on request.

5 ARE HOMELESS SERVICES WELL PLACED TO INTERVENE? DO HOMELESS SERVICES ACT AS A MAGNET ATTRACTING HOMELESS PERSONS TO A REGION?

This chapter explores two different but related issues concerning specialist homeless support (SHS) services which provide personal support and/or accommodation to homeless persons. First, we examine how well the distribution of homeless service capacity aligns with the distribution of homeless persons across regions between 2001 and 2011. Cross-tabulations are presented to determine whether areas with disproportionately large concentrations of homelessness have a commensurately high specialist homeless service capacity. Techniques allowing measurement of the degree of mismatch between the geographical location of homeless service providers and homeless persons are also used. Second, the magnet hypothesis is examined—the idea that homelessness services act as a magnet attracting homeless persons to regions with greater service capacity.

Three measures of service capacity were employed to investigate these issues. The first two are calculated using special request data from the Australian Institute of Health and Welfare (AIHW), and the third is obtained from a breakdown of the ABS homeless count estimates. They include a measure of support capacity and two measures of accommodation capacity or bed-spaces. Specifically the measures are:[19]

- SHS support capacity—the number of people who have received one or more hours of assistance from homeless services (per 10 000 persons) over the 2011–12 financial year.
- SHS accommodation capacity—the number of people accommodated by homeless services (per 10 000 persons) over the 2011–12 financial year.
- ABS accommodation capacity—the number of persons staying in supported accommodation (per 10 000 persons) on Census night, in 2001, 2006 and 2011.

We use three measures of service capacity to address the limitations of each (detailed at length in the method chapter). If findings triangulate across all three measures then we may conclude that differences in the methods of measurement do not affect conclusions drawn from the empirical work.

5.1 Were homeless services well placed to intervene?

We begin by exploring the overall relationship between service accommodation capacity and rates of homelessness per 10 000 persons in each year. The ABS accommodation capacity measure was used for this analysis because, of the three service capacity measures available, it was the only one with data available for all three years (2001, 2006 and 2011).

Table 12 below explores the relationship between homeless service accommodation capacity and homelessness rates by organising local regions into deciles according to their accommodation capacity (per 10 000 persons). Consistent with previous decile analyses used in this study, decile 1 groups the 10 per cent of regions with the *lowest* number of supported bed spaces per 10 000 persons. As we move down column 1 each row represents deciles with successively higher numbers of bed-spaces per 10 000 persons, until we reach decile 10 which groups the 10 per cent of regions with the *highest* number of supported bed spaces. Table 12 reports both the median rate of homelessness per 10 000 persons for each year

[19] Detailed definitions of these measures can be found in the method section.

(2001, 2006 and 2011) and the commensurate median number of bed-spaces per 10 000 persons for each year.[20]

This table gauges whether the per capita resources devoted to support accommodation are positively related to the per capita rate of homelessness. The findings are in this case encouraging; the per capita number of bed-spaces in regions seems to be positively linked to the incidence of homelessness, so that in those regions where the population was especially prone to homelessness there was a larger per capita supply of bed-spaces.

Focusing on 2011 only (columns 6 and 7) shows that in this year, the 'typical' region offered seven bed-spaces per 10 000 persons, but there was a huge divide separating the regions where supply was plentiful from those where it was scarce (see column 7). In the lowest two deciles where the 2011 median number of bed-spaces per 10 000 persons was zero, homelessness rates in 2011 were just under 20; on the other hand, in the highest two deciles, the per capita median number of bed-spaces was 17 and 28, while median homelessness rates were 52 and 109 respectively. This pattern of broad alignment between bed-spaces and rates of homelessness was also apparent in 2001 and 2006.

[20] Note that the deciles are organised contemporaneously so that 2001 homelessness rates are cross-tabulated with deciles defined using 2001 ABS accommodation capacity, 2006 homelessness rates are cross-tabulated with deciles defined using 2006 ABS accommodation capacity, and 2011 homelessness rates are cross-tabulated with deciles defined using 2011 ABS accommodation capacity.

Table 12: Rates of homelessness cross-tabulated with number of bed-spaces per 10 000 persons

ABS contemporaneous measure of number of supported bed spaces per 10 000	2001 rate of homelessness per 10 000	2001 number of persons staying in supported accommodation on Census night (per 10 000)	2006 rate of homelessness per 10 000	2006 number of persons staying in supported accommodation on Census night (per 10 000)	2011 rate of homelessness per 10 000	2011 number of persons staying in supported accommodation on Census night (per 10 000)
Decile	**Median**	**Median**	**Median**	**Median**	**Median**	**Median**
	(2)	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
1	24.3	0.0	17.5	0.0	17.7	0.0
2	18.4	2.3	18.0	0.0	19.0	0.3
3	20.8	3.5	23.6	3.0	21.7	3.3
4	30.0	4.5	30.4	5.2	30.4	5.7
5	30.0	5.2	19.1	7.0	34.7	6.6
6	28.3	6.0	30.1	7.2	29.4	7.3
7	34.6	7.5	33.3	10.4	31.5	10.6
8	35.2	9.9	29.9	13.6	52.3	12.8
9	43.3	14.0	45.4	18.6	51.7	17.1
10	71.4	25.3	97.6	27.7	108.5	28.0
Total	31.5	5.6	26.8	8.1	31.3	6.9

Source: Authors' calculations using ABS homelessness estimates

The ABS accommodation capacity measure is in fact one component of the ABS homeless measure (i.e. it is one of the six operational groups that make up the total homeless persons in each year in the homeless estimates), so the positive relationship between the two is not altogether surprising. As a further check, Tables 13 and 14 below use the two SHS measures of service capacity (both support and accommodation capacity) to scrutinise the relationship, but this time the examination is confined to the 2011–12 financial year. Once again regions are grouped into deciles according to capacity to support or accommodate the homeless; so regions in the lowest deciles are poorly resourced by comparison to those in the higher deciles. Consistent with Table 12 above, regions with a higher risk of homelessness are better resourced in terms of service capacity.[21]

Table 13: SHS support capacity by deciles with rate per 10 000 and share of national homelessness for 2011

SHS 2011 client support capacity per 10 000 persons			Rate of homelessness per 10 000, 2011	Share of national homeless count, 2011
Deciles	**N**	**Median**	**Median**	**Per cent**
1	33	0	17.9	3.4
2	33	0	19	2.9
3	32	10.8	19.7	5.8
4	33	20.5	28.2	7.5
5	33	35.6	36.9	10.6
6	33	60.6	32.5	9.6
7	33	90.1	33.5	7.9
8	33	128.1	34.4	15.4
9	33	216.1	43.7	12.9
10	32	404.3	95.2	24.1
Total	328	48	31.3	100

Source: Authors' calculations using ABS homelessness estimates

[21] According to Pearson's Correlation coefficient, there is a moderately positive and statistically significant relationship between client support capacity and the rate of homelessness per 10 000 persons in 2011 of 0.42. A correlation coefficient of 0 .44 was obtained between client accommodation capacity and rates of homelessness. Both are statistically significant at .01.

Table 14: SHS accommodation capacity by deciles with rate per 10 000 for 2011

SHS accommodation capacity per 10 000 persons			Rate of homelessness per 10 000, 2011	Share of national homeless count, 2011
Deciles	**n**	**Median**	**Median**	**Per cent**
1	33	0	18.3	3.8
2	33	0	18.4	2.8
3	32	3.1	20.3	5.8
4	33	7.8	26.4	8.9
5	33	15.6	28.4	9.3
6	33	23.4	30.3	8.8
7	33	33.9	28.8	7.1
8	33	46.2	42.2	10.3
9	33	72.3	39.9	9.4
10	32	127.7	112.7	33.9
Total	328	18.2	31.3	100

Source: Authors' calculations using ABS homelessness estimates

The aggregate amount of support and accommodation for homeless persons is often regarded as insufficient. The question remains as to whether those regions with the highest share of the national homelessness also received a commensurate share of support services. And to what extent has this relationship changed over time.

To explore this we return to calculating concentration ratios. In 2011, the 10 per cent of local regions with the highest shares of the national homelessness count accounted for 42 per cent of all homelessness. But their share of Specialist Homeless Services accommodation capacity was lower at 34 per cent. Using the ABS accommodation capacity measure, these local regions accounted for an even lower share of 28 per cent of supported accommodation. In earlier years the mismatch was more acute; in 2001, for instance, almost half (46%) of all homelessness is attributable to local regions in the top 10 per cent of the homelessness count distribution, but those same regions account for only one quarter (24%) of the nation's supported accommodation capacity. The picture appears more or less the same five years later in 2006, with the top 10 per cent of local regions hosting 44 per cent of overall homelessness but getting only 24 per cent of national accommodation capacity.

Clearly between 2006 and 2011 there has been a greater alignment of the supply of homeless support and accommodation services relative to demand in regions of need. However, these findings also indicate that regions with the highest shares of national homelessness host less than their commensurate share of support services and supported bed spaces, and so an inadequate level of resources could be compounded by their misallocation. This raises a further question which has significant policy implications. What proportion of homeless service capacity (either support or accommodation) should be redirected to areas of high need?

To address this issue we calculate a mismatch measure (M) which indicates the proportion of support services (support or accommodation) that must shift across regional boundaries in order to exactly match the distribution of the homeless across local regions. It is computed from:

$$M = {}^{1}/_{2} \sum_{i=1}^{n} \left| \frac{S_i}{S} - \frac{H_i}{H} \right| \qquad (1)$$

Where S_i is a measure of resource support (bed spaces, for example) in region *i*, *S* is the measure of resource support in the nation, Hi is the homeless count in region *i* and *H* is the homeless count in the nation.

Consistent with the overall triangulation approach to the analysis and interpretation of the service data, we calculated three separate mismatch measures using each of the three service capacity measures. Because persons staying in supported accommodation for the homeless are one of the six operation groups that make up the total homeless population, for this analysis we recalculated homelessness rates excluding this one group. That is, we calculated the rate of homelessness per 10 000 persons excluding those staying in supported accommodation for the homeless. This means we do not have people staying in supported accommodation for the homeless on both sides of our equation when using the ABS measure of service capacity.

When using the AIHW supported accommodation measure, the M coefficient is 0.41 in 2011; that is 41 per cent of (or over one in three) bed spaces need to be relocated across regional boundaries to ensure an exact match with the actual geographical location of the homeless. The AIHW support services measure produces a 2011 M coefficient value of 0.48, and when we calculate the 2011 M coefficient using the ABS accommodation capacity measure we obtain a value of 0.44. As it turns out these values are all close to each other, which is reassuring as it suggests that regardless of the way capacity to meet homelessness needs are calculated, roughly over one-third are misallocated. It seems that resources could be better coordinated than they are at present.

Only the ABS accommodation capacity measure allows measurement of the M coefficient in earlier census years; we obtain a value of 0.61 in 2006 and 0.41 in 2001. So the M coefficients at the start and end of the decade are more or less equal. But there was a spike at the midpoint of the decade, which correlates with a dip in the national incidence of homelessness in 2006. That spike has materialised because falls in the rate of homelessness must have been particularly large where supported accommodation was relatively abundant.

Given the important role of public housing as a housing option for those experiencing homelessness, we also calculated our mismatch measures to gauge the match between homeless persons and public housing. We find that over time public housing was becoming better matched to areas where there were higher rates of homelessness. In 2001, 41.61 per cent of public housing needed to move across local regional boundaries to match the distribution of the homeless population. However, in 2006 this reduced to 37.88 per cent and in 2011 to 33.67 per cent.

The analyses that we have reported so far yield somewhat conflicting messages. When we relate each region's service capacity to the rate of homelessness per 10 000 persons we find a positive relationship, indicating that more resources are targeted at regions where the population is at higher risk. On the other hand, when we examine the 10 per cent of regions with the highest shares of the national homelessness count we find that they had a disproportionately small share of resource support, whether in the form of accommodation or support services. The mismatch coefficient, which is also based on shares of the national homelessness count, suggests that over one in three bed spaces (or support places) needs to be relocated across regional boundaries if an exact match with the actual geographical location of the homeless were to be achieved.

The conundrum is due to some high risk regions having rather small populations and hence low homelessness counts. This is reflected in the final column of Tables 13 and 14 where we have summed their share of the national homeless count. (In the lowest decile of Table 14, for example, the regions in this decile account for 3.8% of the national homelessness count.) Clearly there is a weaker positive relationship between resource support and each decile's share of the national homelessness count than there is between resource support and each decile's rate of homelessness. These conflicting messages pose a dilemma for policy-makers; targeting resources at regions where populations especially vulnerable to homelessness will

not necessarily ensure that support is available where most of the homeless are located. On the other hand, targeting resources where the largest numbers of homeless are located will neglect some regions where there is a high risk of homelessness.

5.2 Are homelessness services acting as a magnet attracting the homeless to regions better served by support services?

The location of accommodation services and support offered by agencies in the homelessness sector might prompt some homeless to drift into those regions where their supply is relatively strong. This idea is sometimes referred to as the Magnet hypothesis (Corbett 1991; Loveland 1991). The Magnet hypothesis predicts that regions with a better service support capacity will *subsequently* attract a growing share of national homelessness. Initially, this prediction is scrutinised using the number of persons staying in supported accommodation (per 10 000 persons) on census night in 2001 as a baseline indicator of service capacity. Table 15 below groups regions into deciles according to this 2001 measure of service capacity; the row representing each decile records the median percentage change in the rate of homelessness over the *following* decade 2001–11.

Table 15: Do areas with higher homeless services capacity in 2001 have higher subsequent growth in the rate of homelessness per 10 000 persons?

2001 ABS accommodation capacity			Per cent change in rates per 10 000 homelessness 2001–11
Deciles	**n**	**Median**	**Median**
1	32	0.0	-15.2
2	33	2.3	19.4
3	33	3.5	13.2
4	33	4.5	0.8
5	33	5.2	-13.9
6	33	6.0	-10.4
7	33	7.5	-2.0
8	33	9.9	5.7
9	33	14.0	-10.8
10	32	25.3	-12.6
Total	328	5.6	-3.6

Source: Authors' calculations using ABS homelessness estimates

Median numbers in supported accommodation range from zero in the lowest decile to 25 persons in the highest decile. There is no evidence in Table 15 that regions in high deciles experienced stronger growth in rates of homelessness as is predicted by the magnet hypothesis. In fact regions with a superior support capacity more typically experienced a subsequent decline in homelessness rates, and an increase in homelessness rates was more typical in those regions with inferior support capacity. The negative relationship is confirmed by a Pearson correlation coefficient that is statistically significant (at 1%) though rather weak at -0.23.

We also undertook an alternative test which confirms these results.[22] It regresses the change in homelessness per 10 000 between 2001 and 2011 and a variable that measures the difference between the actual level of supported accommodation places and the expected number of

[22] We are grateful to an anonymous peer reviewer for this suggestion.

places given the national relationship between homelessness numbers and supported accommodation places. The expected number of supported accommodation places is the predicted values from the following regression:

$$S_i = \alpha_0 + \alpha_1 H_i \qquad 5.1$$

Where S_i is the number of supported accommodation places in region *i* in 2001, and H_i is the homelessness count per 10 000 persons in region *i* in 2001. When the deviation measure is positive, that is the actual number of places exceeds the predicted number of places, the region has a supply of places relative to homelessness numbers that is greater than typical nation-wide. We then estimate the following regression:

$$\Delta H_i = \beta_0 + \beta_1 \overline{S_i}$$

Where ΔH_i is the change in the homelessness rate between 2001 and 2011, and $\overline{S_i}$ is the difference between the actual level of supported accommodation places and the expected number of places ($\widehat{S_i}$). A statistically significant positive coefficient β_1 offers some empirical support for the magnet hypothesis because it indicates that where places relative to homeless numbers are greater than typical, homeless rates increase.[23]

Results gave a negative and statistically significant coefficient,[24] suggesting that services do not act as a magnet. We also examined whether public housing had a magnet effect using a modified version of the equations in which the predicted level of public housing is estimated using an equation equivalent to 5.1. Results indicate a positive but statistically insignificant coefficient.[25] It seems therefore that the stock of public housing relative to the national average plays no part in shaping future changes in the rate of homelessness.

When we cross tabulate the percentage change in the rate of homelessness over the decade 2001–11 against accommodation support capacity *in 2011* a different pattern emerged (see Table 16 below). In the higher deciles of Table 16, where in 2011 supported accommodation numbers are larger, there has typically been growth in the incidence of homelessness over the past decade. By contrast, if we focus on the lowest three deciles where supported accommodation numbers are especially low in 2011, there have been reductions in homelessness rates over the previous decade.[26] These relationships are a *tentative* sign that support services flexibly respond to the changing pattern of homelessness rates, but the dynamics of these relationships needs to be explored more thoroughly before firm conclusions are reached. Some indication of the nature of these dynamics is revealed by correlating the percentage change in accommodation support capacity with the percentage change in rates of homelessness over the period 2001–11. It turns out that where rates of homelessness are increasing there is some, albeit weak, evidence of corresponding increases in support accommodation as confirmed by an estimated correlation coefficient of 0.25, though this is only significant at 5 per cent.

[23] One of the components of the H_i measure is the number of people in supported accommodation. We have conducted this test including and excluding these people. Results are consistent for both strategies.

[24] β = -.848, SE = .359, p = 0.019.

[25] β = 115.366, SE = 75.852, p = 0.129

[26] The Pearson correlation coefficient r =.04 and is not significant.

Table 16: Have areas with higher accommodation capacity in 2011 also had higher growth in homelessness

2011 ABS accommodation capacity			Per cent change in rates per 10 000 homelessness 2001–11
Deciles	**n**	**Median**	**Median**
1	24	0.0	-22.5
2	25	0.0	-19.1
3	25	3.2	-8.6
4	25	5.2	-13.8
5	25	7.0	1.7
6	25	9.4	0.8
7	25	11.3	3.6
8	25	14.6	17.1
9	25	20.2	12.5
10	25	29.5	5.5
Total	250	8.1	-3.6

Source: Authors' calculations using ABS homelessness estimates.

Note: The ABS number of supported accommodation bed-spaces is not reported in 78 local regions for confidentiality reasons.

Table 17 below examines the same relationship but this time using the 2011–12 AIHW measure of support capacity per 10 000 persons (as indicated by the number of clients receiving support per 10 000 persons), and growth in the rate of homelessness over the past decade. Table 17 shows median 2011 SHS support capacity by decile and also the median growth in the rate of homelessness per 10 000 persons.

The information in Table 17 suggests that support capacity looks to have only a loose relationship with past growth in homelessness rates. This is confirmed by a Pearson correlation coefficient estimate which shows a statistically significant (at 5%), but weak, positive correlation (r=.14) between SHS support capacity in 2011 and the per cent change in the rate of homelessness over the past decade.

Table 17: Median SHS support capacity 2011–12 (decile) by per cent change in the rate of homelessness per 10 000 from 2001–11

2011–12 SHS support capacity			Per cent change in rates per 10 000 homelessness 2001–11
Deciles	**n**	**Median**	**Median**
1	32	0.0	-19.3
2	32	0.0	-18.5
3	33	10.8	-3.8
4	33	20.5	-1.3
5	32	35.6	9.1
6	33	60.6	-10.4
7	33	90.1	6.8
8	33	128.1	-10.6
9	33	216.1	3.8
10	33	404.3	4.5

Source: Authors' calculations using ABS homelessness estimates

5.3 The geography of resource support: some tentative conclusions

Over one-third of homeless service capacity (either support or accommodation) was in locations that did not match the location of homeless persons. While this is a noteworthy finding it is subject to caveats. Our analysis (so far) cannot confirm whether the mismatch would be resolved by switching resources across short distances, such as those separating adjacent urban regions, or by switching resources across large distances, as would become necessary if reallocations between urban and regional areas are called for. The distance over which adjustment is required will shape the ease with which mismatches can be resolved. But we do know that those regions with the highest shares of the national homelessness count offered a commensurately smaller share of supported accommodation and support services, and were therefore under-resourced. The dilemma for policy-makers is that these regions were not always where rates are highest and hence the population is most vulnerable to homelessness. Some regions had high shares of the national count because they had a relatively large population.

We can find no evidence of homeless persons migrating to those regions with relatively strong service support (the magnet hypothesis). Our empirical findings offer indirect evidence by relating measures of accommodation support back in 2001 to subsequent (2001–11) percentage changes in rates of homelessness. Those regions with more abundant accommodation capacity tended to experience reductions in rates of homelessness. In fact we find some supporting evidence for the proposition that support services are adjusting to better fit the changing pattern of homelessness. However, these findings are subject to important qualifications; the dynamics of these relationships and the role of possibly confounding influences will be explored further in the second half of this project.

6 THE ROLE OF COMPOSITION AND THE STRUCTURAL DRIVERS OF HOMELESSNESS IN AUSTRALIA—A PRELIMINARY INVESTIGATION

This final results chapter provides a preliminary analysis of how structural drivers may be shaping the changing geography of homelessness over the decade (2001–11). This issue will be the focus of the modelling work in our next report.

Here we first report on the changing composition of the homeless population, and ask whether a region's mix or composition of homeless persons helps explain changes in rates of homelessness. We then detail findings from a descriptive analysis of the role that housing market, labour market and demographic factors play in shaping the spatial distribution of homelessness.

6.1 The changing composition of the homeless population: 2001–11

The ABS point-in-time homelessness count measures are reported in Table 12 for each of the census years 2001, 2006 and 2011. We also list the count in each of six homeless sub-categories or operational groups (see the method section for detailed definitions).

In 2011, the national homelessness count was 105 237; those living in 'severely crowded' were the most common category of homeless accounting for nearly 4 in 10 homeless people[27] (ABS 2012d). Rough sleepers and persons in temporary lodging were the 'minority' categories at only 6 per cent and 1 per cent of all homeless respectively. There has been some change in the prominence of different categories of homeless over the decade 2001–11. Most important is the increasingly prominent supported accommodation category (from 14% to 20% of all homeless) that arguably reflects a growing commitment of government resources.

Among the categories that are contracting, persons staying in boarding houses stand out (declining from 22% to 17%), a trend that can be attributed to a fall in the traditional boarding house accommodation in Australia (Chamberlain 2012).[28] However there has been no change in the most important category; those in severely crowded housing were the most important category back in 2001 and remained so in 2011. Indeed, its share of the national homelessness count increased. The ABS (2012d) points out that the number of people in this group who were born overseas doubled over the decade, with people arriving from China, New Zealand, Afghanistan and India responsible for about half the rise in the overseas born estimate for this homelessness group.

[27] The severely crowded are the usual residents of dwellings needing four or more extra bedrooms to accommodate them adequately (ABS 2012d).

[28] Chamberlain (2012) argues that traditional boarding houses have declined, but that other forms of boarding or rooming house accommodation are growing to fill this gap and are undercounted by the ABS.

Table 18: The raw number and per cent of homeless persons per year for each operational group

Operational group	2001		2006		2011	
	no	%	No	%	no	%
Persons living in 'severely' crowded dwellings	33,430	35	31,531	35	41,390	39
Persons staying in boarding houses	21,300	22	15,460	17	17,721	17
Persons staying temporarily with other households	17,880	19	17,663	20	17,369	17
Persons in supported accommodation for the homeless	13,420	14	17,329	19	21,258	20
Persons who are in improvised dwellings, tents or sleepers out	8,946	9	7,247	8	6,813	6
Persons in other temporary lodging	338	-	500	1	686	1
Total	95,314	100	89,728	100	105,237	100

Source: ABS 2012d, estimating homelessness

The 'hot spot' regions we identified in Chapter 4 could have attained that status in 2011 because they have a more than proportionate share of homelessness types that grew rapidly nationwide (2001–10). For example, a region that had a relatively high share of persons living in severely crowded dwellings back in 2001 will likely exhibit a large increase in homelessness over the decade 2001–11. Conversely, a region that had a relatively high proportion of homeless people in the boarding house category in 2001 probably experienced below average increases in homelessness as this category declined nationally over the decade in question.

We can estimate the role played by the mix of homeless persons using the Shift-Share technique of analysis (see Armstrong & Taylor 2000). In this context, it divides a region's change in homelessness into three components:

- the national growth component
- the homeless mix component
- the regional share component.

The national growth component is a measure of the change in the homeless count (or rate per 10 000) if each of the region's homeless categories grow at the same rate as the national homeless count (or rate). It is the part of a region's homelessness trends that we attribute to nationwide triggers of homelessness (e.g. recessions). Change in the homeless count (or rate) that diverges from the national average because of the initial composition of the homeless in a region is termed the homeless mix component. The third regional share component has the most important bearing on the role of structural factors in driving change in homelessness. It is the share of a region's change in homelessness (count or rate) due to types of homelessness in that region taking (or losing) a larger (or smaller) share of national homelessness in those categories. These changes are the likely result of housing market, labour market and other region specific factors that is pushing homelessness up (or down) in that region. Appendix A3 sets out the formulae used to compute each of these categories.

As the analysis comprised 328 regions it is not feasible to report findings for each region. Instead, regions ranked in the top 20 (as of 2011) according to growth in their homeless count (and rate) between years 2001–11 are selected, and then these 'hot spot' regions are treated as if they were just one region. This exercise helps us to gauge whether the composition of the homeless back in 2001 played a large part in explaining changes in homelessness among those regions of Australia where homelessness is particularly high. This exercise is repeated for the bottom 20 regions with the lowest growth in homeless counts (rates). There are

commonly missing values for the minor categories where the ABS has not reported the figure on confidentiality grounds. This restricts the number of top and bottom regions that have complete data. Among the 20 local regions with the highest increases in counts (rates) there were only four(five) regions with complete data. Among the 20 local regions with the lowest increases in counts (rates), there were only one(two) regions with complete data. Findings for these regions are reported below.

Consider first the increase in the count measure for those four regions that had complete data and belong to the 20 local regions with the highest increases (see Table 19 or Figure 9 below). The overall increase was 711 (see final row of Table 19). If each of the categories of homeless had increased at the same percentage rate as the national count, homelessness in these five regions would have increased by only 88; so this national component was small, accounting for only 12 per cent of the total increase. The homeless mix component was even smaller at only 11, or 2 per cent. This rules out the initial composition of the homeless as a major cause of trends in these 'hotspots'. It is the regional share that is the most important component—contributing 612, or 86 per cent to the overall increase in these five regions. Consider now the increase in the count measure for that region with complete data and belonging to the 20 local regions with the lowest increases in homeless counts. This region experienced a decline of 118 in the total homeless count 2001–11. Once again it was the regional mix component that is responsible for this outcome; indeed in this region it was the only negative component, since the national and homeless mix components are positive.

Table 19: Components of change in homelessness counts between 2001–11 for selected local regions in the top and bottom 20 local regions

	Top 20		Bottom 20	
	Increase in count	**% of actual growth count**	**Increase in count**	**% of actual growth count**
National growth effect	88	12.4%	31	-26.5%
Homeless mix effect	11	1.6%	1	-0.7%
Regional growth effect	612	86.1%	-150	127.3%
Actual growth	711	100%	-118	100%

Source: Authors' calculations using ABS homelessness estimates

The count measure will reflect whether or not a local region is sparsely or densely populated. The changes in rate per 10 000 measures are a better gauge of whether a region's population became more or less vulnerable to homelessness. Table 20 below (see also Figure 10) decomposes the total increase in rates into the national, homeless mix and regional share components. There are five regions in the top ranked regions with complete data; homeless rates per 10 000 increase by 89 persons; the importance of the regional share component is confirmed despite a different measure. A negative national component was accompanied by a small homeless mix contribution, leaving the regional share component as the dominant factor driving changes in the rate of homelessness. Rates of homelessness in the two regions in the bottom ranked local regions (that have complete data) declined by 20 persons per 10 000. The national and homeless mix shares make modest contributions that account for 25 per cent and 15 per cent of the total reduction; the regional share accounts for the remaining 60 per cent.

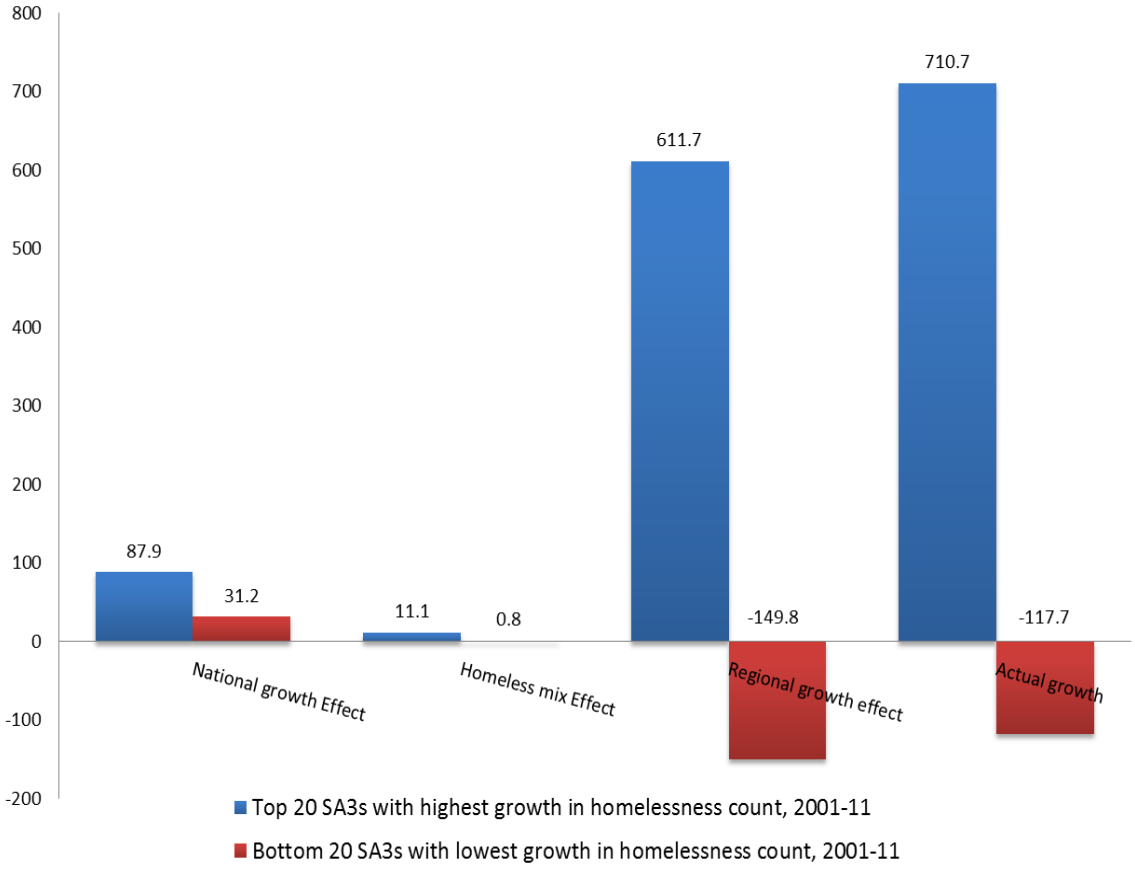
Table 20: Components of Change in homelessness rates between 2001–11 for selected local regions in the top and bottom 20 local regions

	Top 20		Bottom 20	
	Increase in rate per 10 000	% of actual growth rate	Increase in rate per 10 000	% of actual growth rate
National growth effect	-14	-15.2%	-5	22.5%
Homeless mix effect	10	11.6%	-3	16.3%
Regional growth effect	92	103.6%	-12	61.2%
Actual growth	89	100%	-20	100%

Source: Authors' calculations using ABS homelessness estimates

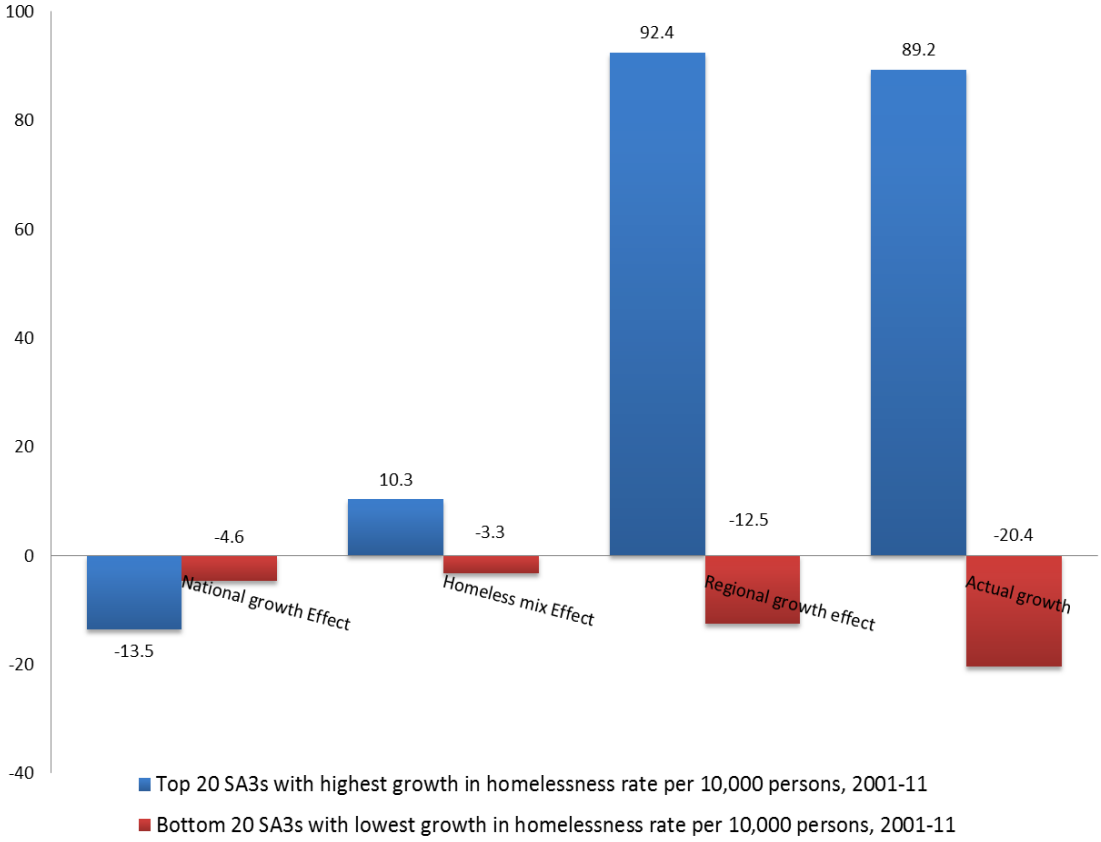
These findings have important implications; the regional share is the result of structural factors, whether they be housing and labour market, demographic or some other region specific feature. Its large size underlines the importance of this project's aims, which are to 'unpack' the regional share and detect which of the range of structural factors are important. The next section of this chapter begins to explore these structural drivers of homelessness.

Figure 9: Components of change in homelessness counts between 2001–11 for top and bottom 20 local regions with highest growth in homelessness counts between 2001–11



Source: Authors' calculations using ABS homelessness estimates

Figure 10: Components of change in homelessness rates between 2001–11 for top and bottom 20 local regions with highest growth in homelessness rate per 10 000 persons between 2001–11



Source: Authors' calculations using ABS homelessness estimates

6.2 Are high and low rates of homelessness related to any key housing, labour market and demographic factors?

In this preliminary examination, insights are sought from cross tabulations between rates of homelessness and key variables (e.g. unemployment rates), and complemented by Pearson correlation coefficient estimates that are designed to gauge the strength of relationships.[29] The dynamics of these relationships are an important focus because there is good reason to believe that housing and labour market conditions have impacts that are felt some years after their emergence (see Glomm & John 2002). Moreover, changes in homelessness over time can yield understandings of causal processes that are not possible from point in time cross-regional comparisons of homelessness rates. The empirical work uses the number of homeless per 10 000 persons and per cent change in this rate as key measures. This is consistent with the international literature which has focused on this rate measure when examining possible structural drivers. This is because a rate measure captures a population's vulnerability to (risk of) homelessness; regions with especially adverse structural factors expose susceptible sections of their populations to relatively high levels of homelessness. A simple homelessness count measure could mask the role of these structural drivers, as more populous regions will

[29] Correlation coefficients are computed using the (natural) log transformed values of variables because our key homeless and service capacity indicators are severely non-normally distributed. Appendix A2 presents histograms of key variables to support this claim.

have higher homelessness counts, even though the risk of homelessness might be lower for structural reasons.[30]

Tables 21, 22 and 23 below cross tabulate homelessness rates with housing market, employment, income and demographic variables. Consistent with previous sections of this chapter, regions are grouped into deciles according to their rates of homelessness per 10 000 persons. In each decile the median values of the key variables in the regions belonging to that decile are recorded to give a rough sense of whether median values of key variables are systematically related to rates of homelessness per 10 000. Changes in the strength or otherwise of a relationship are examined by relating 2011, 2006 and 2001 variable values to deciles that are organised contemporaneously. So 2001 key variable values are cross tabulated with deciles defined using 2001 homelessness rates and so on through 2006 and 2011.

6.2.1 Housing market characteristics:

We begin in Table 21 with the relationship between housing market variables and homelessness. It seems that there is little if any linear relationship between private rental housing supply and homelessness. Regions with higher rates of homelessness did not seem to be associated with low or high shares of households living in private rental housing.[31] On the other hand, there is a suggestion in Table 21 that private rental housing was less expensive in regions featuring a relatively high incidence of homelessness. Pearson correlation coefficients (*r*) confirm the patterns evident from 'eyeballing' the patterns in Table 21 with statistically significant (at 1%) and negative coefficients in all three years (2001, r = -.41; 2006, r = -.42; 2011, r = -.38). The most visible relationship occurs between public housing and homelessness; where public housing was a higher portion of the housing stock in a region, its population seemed to be more vulnerable to homelessness. Consider those regions in the lowest decile in 2011; public housing's share was only 1.5 per cent yet that share rose to just over 7 per cent in the highest decile. The correlation coefficient in that year was a statistically significant r = 0.54, and stronger than in earlier census years (though still statistically significant in those earlier years). It is important to note that these are statistical associations and do not necessarily reflect causal processes. For example, drug and alcohol abuse, family violence and poverty might be prominent in regions with more public housing and cheap rental housing opportunities, and could therefore account for these patterns. On the other hand, neighbourhoods dominated by public housing estates, and inexpensive but low quality rental housing, can result in spatial concentrations of disadvantaged households that precipitate the kind of social problems associated with homelessness. These ideas will be explored further in our second report.

[30] Note, we experimented with an additional two different measures of homelessness in order to check whether the broad measure we were using was influencing our preliminary descriptive analysis of structural drivers. There were no substantial differences detected and results can be found in Appendix 4.

[31] This is confirmed by correlation coefficients (*r*) that are statistically insignificant in two of our three observations. The exception is 2001 when r is -0.20 and significant.

Table 21: Median housing characteristics by the rate of homelessness per 10 000 persons; 2001, 2006 and 2011

Homeless rates per 10 000 (deciles)	Median weekly rent			Private rental (% of all occupied private dwellings)			Public housing (% of all occupied private dwellings)		
	2001	2006	2011	2001	2006	2011	2001	2006	2011
1	170.0	230.0	350.0	7.8	10.4	10.4	1.8	1.6	1.5
2	160.0	200.0	300.0	9.6	10.4	11.6	2.7	1.9	1.9
3	140.0	175.0	260.0	9.2	10.7	12.1	3.7	2.4	2.3
4	125.0	170.0	270.0	9.4	11.3	13.8	3.4	3.3	3.0
5	140.0	185.0	204.5	10.8	11.2	11.8	3.4	3.5	3.3
6	135.0	160.0	241.0	10.4	11.9	12.9	3.6	3.9	4.0
7	120.0	180.0	260.0	10.3	12.4	14.0	3.8	4.3	4.5
8	130.0	185.0	300.0	9.7	13.4	17.8	3.3	4.1	3.8
9	138.0	162.0	280.0	12.7	13.6	15.1	4.7	3.5	3.9
10	110.0	132.5	220.0	9.5	11.2	13.5	6.0	6.1	7.1
Total	140.0	180.0	280.0	9.7	11.8	13.1	3.6	3.4	3.4

Source: Authors' calculations using ABS homelessness estimates. Note: deciles are contemporaneous for each year

6.2.2 Income, housing stress and unemployment

This section considers a group of variables—incomes, housing cost burdens and unemployment—typically associated with housing stress and labour market disadvantage (see Table 22 below). Median weekly household income (from all sources) in a region is often used as an indicator of a region's socio-economic profile, but when used in this analysis there was no apparent linear relationship with rates of homelessness. Weekly household incomes seem to be higher at the extremes, that is, in regions where homelessness was either low or high.[32] A somewhat different picture emerges when examining housing cost burdens (rent to income ratios) and unemployment. Rent to income ratios tend to be lower in regions where homelessness rates were relatively high, and the negative relationship is consistent across all three census years (2001, r = -0.44; 2006, r =-0.45; 2011, r =-0.42). The strongest evidence so far that disadvantage is associated with homelessness comes when inspecting the distribution of unemployment rates across deciles in Table 22. In 2011 unemployment rates were 1 to 2 percentage points higher in the deciles representing regions where populations are most at risk, despite a fall in the national unemployment rate from 7.2 per cent in 2001 to 5.4 per cent in 2011.

Indeed an intriguing feature of Table 22 is the stronger link between unemployment and homelessness that develops over a decade when national unemployment rates fall. At the onset of the decade the correlation coefficient is low (0.05) and statistically insignificant, yet subsequently increases to 0.12 in 2006 and 0.24 in 2011, both positive coefficients proving statistically significant in those years. While unemployment seems to be increasingly important, it is important to wait for the larger modelling exercise before drawing any firm conclusions. For example, while Batterham (2012) found many significant relationships between homelessness rates and structural drivers using descriptive analysis, the relative importance of these relationships was only clarified during modelling work. There is a lot to puzzle over here, as a

[32] Correlation coefficients are statistically insignificant in all years

simple equation relating disadvantage or adverse housing market conditions to homelessness is not emerging.

Table 22: Median labour market and income characteristics by the rate of homelessness per 10 000 persons for 2001, 2006 and 2011

Homeless rates per 10 000 (deciles)	Median total weekly household income			Rent to income ratios			Percentage unemployed		
	2001	2006	2011	2001	2006	2011	2001	2006	2011
1	919.0	1,235.0	1.475.0	0.2	0.2	0.2	5.4	3.3	4.4
2	931.0	1,076.0	1.365.0	0.2	0.2	0.2	5.8	4.4	4.6
3	823.0	941.0	1.149.0	0.2	0.2	0.2	7.1	5.0	5.0
4	703.0	1,056.0	1.087.0	0.2	0.2	0.2	7.7	4.4	5.1
5	718.0	944.5	968.0	0.2	0.2	0.2	8.6	5.4	5.6
6	687.0	875.0	1.064.0	0.2	0.2	0.2	7.9	5.1	5.4
7	682.0	937.0	1.103.0	0.2	0.2	0.2	8.2	4.6	6.0
8	664.0	903.0	1.303.0	0.2	0.2	0.2	8.0	5.7	6.2
9	741.0	907.0	1.100.0	0.2	0.2	0.2	7.7	5.8	5.6
10	821.0	1,129.0	1.333.0	0.2	0.2	0.2	6.3	4.8	5.6
Total	753.0	1,005.0	1.184.0	0.2	0.2	0.2	7.2	4.9	5.4

Source: Authors' calculations using ABS homelessness estimates. Note: deciles are contemporaneous for each year

6.2.3 Demographic factors:

Table 23 below brings important demographic features into the picture. The most visually striking relationship is that between the share of Indigenous persons in a region's population and its rate of homelessness. In 2001, those regions in the highest decile had demographic profiles such that people of an Indigenous background accounted for 8.7 per cent of the population, over 17 times their share (0.5%) of regional populations in the lowest decile. The strength of the relationship diminished somewhat over the decade, but nevertheless remained strong in 2011 (2001, r = .55; 2006, r = .50; 2011, r = .43). Although overcrowding is a category of homelessness (if above a person per room threshold), and Indigenous persons are more likely to live in crowded housing circumstances, the cross tabulations reported in Table 23 fail to reveal a positive association between household size and homelessness.[33] On the other hand, regions with a relatively high proportion of lone person households do seem to have correspondingly higher rates of homelessness. However, the correlation is not as strong as that found with respect to Indigenous persons (2001, r =.11; 2006, r = .14; 2011, r = .13).[34]

In summary, the populations of regions that have lower rents, more public housing, smaller rent to income ratios, higher unemployment and a larger share of Indigenous persons were more vulnerable to homelessness. These are characteristics more commonly associated with remote and rural regions of Australia, particularly those unaffected by the recent commodity price boom. This geographical dimension could be the reason why there is no straightforward link between measures of disadvantage, adverse housing market conditions and homelessness. To explore this further we undertook additional analysis looking at urban compared with regional and remote areas (see Appendix A5).

[33] Correlation coefficients are insignificant in all years.

[34] Statistical significance is achieved at 5 per cent.

The prominence of public housing in a region deserves particular attention because it is the only housing variable that our simple descriptive statistics suggest as predictive of changes in rates of homelessness. Regions with relatively high shares of public housing back in 2001 tended to experience increases in homelessness, while those with small public housing segments typically experienced falling homelessness.[35] These patterns might reflect the gravitation of homeless persons to regions where public housing opportunities are in more plentiful supply. This may also be a product of the increasing targeting of public housing over the study time frame to those most in need, specifically those experiencing homelessness. There is evidence to suggest that those with histories of homelessness and other multiple needs can struggle to maintain their public housing tenancies without support (see NWHN 2010; Habibis et al. 2007).The dynamics of this relationship are important to explore further.

Table 23: Median household and demographic characteristics by the rate of homelessness per 10 000 persons for 2001, 2006 and 2011

Homeless rates per 10 000 (deciles)	Percentage of Indigenous persons			Percentage of lone-person households			Average household size		
	2001	2006	2011	2001	2006	2011	2001	2006	2011
1	0.5	0.7	0.8	19.7	19.2	19.0	2.7	2.7	2.7
2	1.0	1.0	1.1	21.2	21.5	20.9	2.6	2.6	2.7
3	1.1	1.5	1.7	21.0	23.4	23.8	2.6	2.5	2.5
4	1.4	1.6	1.3	22.6	21.6	24.2	2.5	2.6	2.5
5	1.5	1.6	2.5	23.1	22.6	24.8	2.6	2.5	2.5
6	1.3	1.2	1.8	24.0	24.4	25.5	2.5	2.5	2.4
7	2.3	1.3	2.7	23.2	24.7	23.9	2.6	2.5	2.6
8	2.1	1.7	1.9	22.6	24.8	23.1	2.6	2.5	2.5
9	1.3	2.7	2.2	24.1	23.0	25.0	2.5	2.5	2.5
10	8.7	9.3	7.3	20.7	22.2	24.4	2.6	2.6	2.5
Total	1.4	1.4	1.7	22.7	23.3	23.7	2.6	2.5	2.5

Source: Authors' calculations using ABS homelessness estimates. Note: deciles are contemporaneous for each year

[35] There is a positive r=0.2 between the 2001 share of public housing in the region's occupied housing stock and percentage change in the rate of homelessness between 2001–11 (r = .200**).

7 SUMMARY AND CONCLUDING COMMENTS

This is the first of two reports investigating the structural drivers of geographical differences in homelessness. Australia has a rich bank of qualitative research that describes the circumstances, personal characteristics, and practices of people who experience homelessness. More recently research has investigated the pathways into and out of homelessness. However, to date there has been little investigation of the structural drivers of homelessness and minimal use of quantitative evidence to inform an understanding of the role that housing and labour market conditions play in shaping whether people are more or less vulnerable to homelessness. Our project aims to fill this research vacuum by designing a panel data base that allows researchers to describe the changing geographical pattern of homelessness, as well as analyse the causes of geographical differences in rates of homelessness. It is hoped that a better understanding of how housing and labour markets influence the incidence of homelessness will help the design of policies aimed at the prevention of housing insecurity and homelessness.

The first stage of the project, detailed in this report, describes the changing geography of homelessness in Australia over the decade 2001–11, including the identification of homelessness hotspots. It also begins an analysis of the relationship between local housing and labour market conditions ('place-based factors') and rates of homelessness. The second stage will estimate panel models of regional homelessness which will form the evidence base for recommendations on how government might address 'place-based' causes of homelessness.

7.1 Key findings

The empirical work is based on the ABS definition of homelessness (see ABS 2012d) and employs two distinct measures of homelessness in each local region (SA3): The rate per 10 000 persons (which is used by the ABS) and the region's share of national homelessness.

7.1.1 The national picture of homelessness

Nationally the rate of homelessness per 10 000 persons has fluctuated over the decade between 2001 and 2011. In 2001, the rate was 50.8 persons per 10 000, falling to 45.2 in 2006 and then bouncing back to 50 persons per 10 000 in 2011 at the tail end of the global financial crisis.

When the rates of homelessness were examined for the states and territories in 2011, the Northern Territory stood out with a homelessness rate 15 times the national average. In 2001, Western Australian and Queensland populations were also more prone to homelessness, but by 2011 their rates, while still not exactly low, had fallen below the national average. Tasmania had the lowest rates of homelessness across the decade.

Homelessness rates per head of population measure the risk of homelessness at an area level. Each region's share of national homelessness tells us where most homelessness is located. In terms of the national share of homelessness, New South Wales accounted for over 1 in 4 homeless persons in 2011, and its share of national homelessness increased over the decade 2001–11. Victoria had the second largest share with just over 1 in 5 (22%) homeless persons. Because of its small population, the Northern Territory's 2011 share of the national homeless count was only 14.7 per cent, or less than one in seven; its share also declined over the decade.

7.1.2 Where is homelessness high and where is it low?

Rates of homelessness were higher in remote rural and regional areas, and small pockets in some of our major cities. The rate measure identified the entire Northern Territory, and the northern most parts of Western Australia and Queensland as homeless hotspots in 2011.

Alternatively, areas with relatively low rates of homelessness were generally located on the coastal fringe and in urban areas.

Of those hotspot regions identified, around half (9 out of 20) were located in inner city areas or pockets in growth corridors of state capitals, which have traditionally been poorer areas.

7.1.3 Where is homelessness rising or falling in Australia?

A close examination of regional rates of homelessness reveals that they have not remained static over the decade. For example, while relatively low rates of homelessness are evident for areas clustered around the coastal fringe and the urban areas of mainland capital cities, these rates have been increasing in these regions over time. Interestingly, areas where homelessness rates have fallen were more typically found in regional and remote Australia even though these areas were often identified as having high rates of homelessness. This suggests that homelessness rates have been declining in areas where homelessness is particularly high.

7.1.4 Is homelessness becoming more or less spatially concentrated in Australia?

Homelessness is highly spatially concentrated in Australia. In 2011, the 20 regions with the highest share of homelessness accounted for roughly one-third of the nation's homelessness. Further, the top 10 per cent (33) of regions with the highest share of homelessness accounted for 42 per cent of the nation's homeless population. That is, around 4 out of 10 homeless persons in 2011 could be found in just 33 of the 328 local regions under examination.

While homelessness is highly spatially concentrated it is becoming less so over time. And this trend is occurring because homelessness has been declining in areas where it has been relatively high, but increasing where it has been relatively low.

7.1.5 Are homeless services well placed to intervene? Do homeless services act as a magnet attracting homelessness to a region?

Three different indicators of services capacity were used in our analysis to address the limitations of each individual measure. Yet, regardless of the measures used, our findings were broadly consistent. There is higher service capacity in areas with higher incidence of homelessness. However, we found no evidence for services acting as a magnet and attracting more homeless persons to a region. In fact, we found the opposite. Those regions with more service capacity per head of population in 2001 were not more likely to experience growth in homelessness in subsequent years. Instead, regions with less service capacity per 10 000 persons in 2001 were more likely to experience growth in homelessness over the decade.

When we looked at the service capacity of regions in 2011, those with more service capacity per head of population in 2011 had experienced more growth in homelessness over the past decade. These findings tentatively suggest that governments and/or support services have flexibly responded to the changing demand for homeless services by providing more resources in areas of high need.

Yet, despite this finding, in 2011 there was also clear evidence of a mismatch between homelessness resources relative to demand. For example, in 2011 the top 10 per cent of areas in terms of national share of homelessness accounted for 42 per cent of all homelessness, but their share of Specialist Homeless Services accommodation capacity was lower at 34 per cent. This was more severe in earlier years. In 2001, almost half (46%) of all homelessness was attributable to local regions in the top 10 per cent of the homelessness count distribution, but those same local regions accounted for only one-quarter (24%) of the nation's supported accommodation capacity. Similar levels of mismatch were found in 2006.

Clearly then, over the decade between 2001 and 2011 there has been some improvement in matching homelessness resources to demand, however, mismatches remain. This suggests that inadequate supply of bed spaces may be compounded by their misallocation.

These findings were confirmed by our Mismatch measure (M) suggesting that regardless of the way capacity to meet homelessness needs are calculated, over one-third of accommodation capacity was misallocated in 2011 and needs to shift across local regional boundaries to match the distribution of homeless persons.

These conflicting messages pose a dilemma for policy-makers. Targeting resources at regions where homelessness rates are high and therefore populations are especially vulnerable to homelessness will not necessarily ensure that support is available where most of the homeless are located. On the other hand, targeting resources where the largest numbers of homeless are located will neglect some regions where there is a high risk of homelessness.

7.1.6 What role does the changing composition of the homeless play in explaining homeless hotspots?

We examined whether high or rising homelessness in an area could be explained by the composition or mix of the homeless population. In terms of composition, we looked at the six operational groups used by the ABS—persons who are in improvised dwellings, tents or sleepers out; persons in supported accommodation for the homeless; persons staying temporarily with other households; persons staying in boarding houses; persons in other temporary lodging; and persons living in 'severely' crowded dwellings.

Findings suggested that the composition or mix of the homeless population explained little of the variation in both the count and rate of homelessness over time (from 2001–11). Changes in the homeless population at the national level also did not account for much of the variation observed. Instead, our analysis suggested that the largest amount of change was accounted for by regional effects—that is, characteristics of areas such as labour markets, housing markets, demographics or some other regionally specific feature.

7.1.7 What does our preliminary analysis tell us about the importance of structural factors in explaining homelessness in Australia?

Our descriptive analysis of the role that housing market, labour market and income, and demographic factors may play in explaining homelessness in Australia revealed that structural factors do seem to be important.

We found that populations of regions that have lower rents, more public housing, smaller rent to income ratios, higher unemployment and a larger share of Indigenous persons are more vulnerable to homelessness.

However, in terms of growth, it was only those regions that had higher shares of public housing which were more likely to experience growth in the rate of homelessness over the period.

The prominence of public housing in a region deserves particular attention because it is the only variable that our simple descriptive statistics suggest as predictive of changes in rates of homelessness. Regions with relatively high shares of public housing back in 2001 tended to experience increases in homelessness, while those with small public housing segments typically experienced falling homelessness. However, we urge caution in interpreting this preliminary result. This relationship may be a product of the increasing targeting of public housing over the study time frame to those most in need, specifically those experiencing homelessness. There is evidence to suggest that those with histories of homelessness and other multiple needs can struggle to maintain their public housing tenancies without support (see NWHN 2010; Habibis et al. 2007).

7.2 Implications for policy and future research

The panel dataset created through this project has made it possible to ask new questions about the geography of homelessness in Australia. The preliminary analysis presented is exploratory and it lays the groundwork for more in-depth and fine-grained analysis of the spatial dynamics of homelessness. While the findings are suggestive for policy, at this point in

the analysis it is premature to identify specific policy recommendations. Nevertheless some broad yet important implications are evident.

Our analysis of the alignment between homeless service capacity and demand for services showed a degree of mismatch. This mismatch should be given attention by both governments and service providers to ensure that homelessness resources are allocated to areas of high demand. However, allocation of resources must be informed by an understanding of the nature of this demand and therefore the type of resources required in given areas. Further, determination of the type of resource required will also need to be informed by an understanding of the role of structural drivers in homelessness in areas. If, for example, labour market issues are found to be key drivers then interventions would be better focused on employment rather than bed-spaces. Again, the modelling in our next report will be crucial.

Second, there are implications arising from the methods employed in the study itself. The application of economic analyses to the issue of homelessness is unique in the Australian context and provides new possibilities for the ongoing monitoring of the effectiveness of the main policy instruments on homelessness—the NAHA and NPAH. For example, further performance indicators could include:

- → Ongoing calculation of the mismatch between homeless service capacity relative to demand.
- → The number of areas with high and rising/falling rates of homelessness and number of areas with low and increasing/declining rates of homelessness.

There is also the potential to monitor the impact of investment in homelessness resources on levels of homelessness in regions, across states and nationally over time.

Finally, preliminary analysis of the role of structural drivers in understanding homelessness suggests that the characteristics of regions themselves are important. Our second and Final Report for this project teases out the role of structural factors in the distribution of homelessness. In addition to the variables examined in the present report, additional data will be included to assess the role of the supply of affordable rental housing in understanding homelessness. This will be of key interest to policy-makers and will relate directly to the key elements of the main policy instruments on homelessness. Our review of the international literature showed that weather was an important factor in explaining variations in the incidence of homelessness across regions. With additional data from the Bureau of Meteorology this variable will also be included in the modelling for our next report.

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APPENDICES

Appendix 1: Summary statistics for key indicators

Table A1: Summary statistics on key indicators contained within the final data sample

Variable Name		No. of obs.	Mean	Standard deviation	Minimum	Maximum
Homelessness indicators						
Homeless persons, 2001	Raw count	328	290.6	478.8	0	3982.5
	National share (%)	328	0.3	0.5	0	4.2
	Rate per 10 000 persons	328	76.0	252.5	0	3,226.7
Homeless persons, 2006	Raw count	328	273.6	432.0	0	3767.0
	National share (%)	328	0.3	0.5	0	4.2
	Rate per 10 000 persons	328	64.5	217.4	0	2,572.4
Homeless persons, 2011	Raw count	328	320.8	473.7	0	4218.0
	National share (%)	328	0.3	0.5	0	4.0
	Rate per 10 000 persons	328	66.7	219.6	0	2,878.0
Availability of homeless services indicators						
No. of specialist homelessness service agencies, 2011		328		4.5	6.0	0
No. of specialist homelessness service agencies with multiple delivery points, 2011		328		1.6	3.4	0
No. of clients in receipt of homelessness services (other than accommodation)		328		720.6	1,299.2	0
No. of clients accommodated by homelessness services		328		231.1	405.5	0
Housing, labour market and demographic indicators						
Median weekly household rent	2001	328	144.3	51.1	32	371.0
	2006	328	187.5	61.8	30	420.0
	2011	328	271.4	91.1	26	575.0
% of private occupied dwellings rented from real estate agent	2001	328	10.3	5.5	0	29.0
	2006	328	12.3	6.1	0	39.2
	2011	328	14.1	6.5	0	40.0
% of private	2001	328	4.4	3.6	0	29.2

Variable Name		No. of obs.	Mean	Standard deviation	Minimum	Maximum
occupied dwellings rented from State Housing Authority	2006	328	4.0	2.9	0	19.6
	2011	328	4.0	3.5	0	27.4
Median total household income (weekly)	2001	328	798.7	203.0	492	1,628.0
	2006	328	1,023.8	253.4	595	2,137.0
	2011	328	1,263.5	368.3	727	2,690.0
% unemployed persons	2001	328	7.5	2.6	2	17.2
	2006	328	5.2	1.8	2	13.0
	2011	328	5.6	1.6	1	11.4
% Indigenous persons	2001	328	3.2	7.1	0	59.4
	2006	328	3.3	7.2	0	59.6
	2011	328	3.6	7.2	0	58.6
% lone-person households	2001	328	22.4	5.8	10	43.0
	2006	328	22.6	5.4	9	46.2
	2011	328	23.0	5.3	10	48.1
Average household size	2001	328	2.6	0.3	2	4.4
	2006	328	2.6	0.3	2	4.5
	2011	328	2.6	0.3	2	4.0

Source: Authors' calculations using ABS homelessness estimates

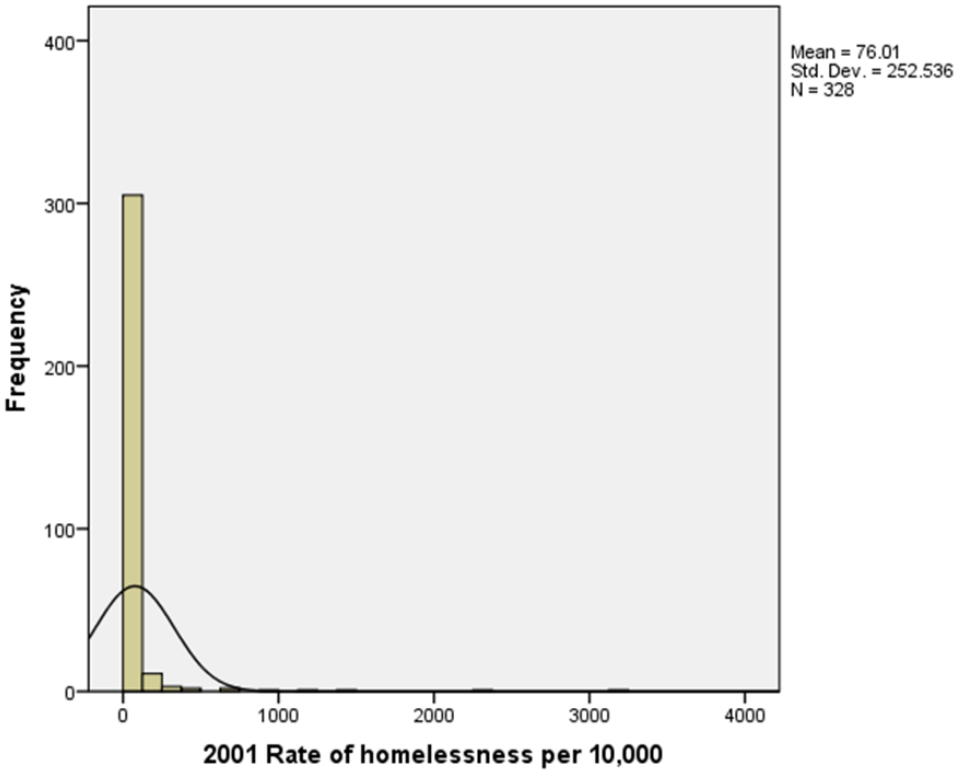
Appendix 2: Histograms for key homeless variables

This appendix contains histograms for some of the key homeless variables used. It shows that many of our measures are heavily skewed and could not be considered normally distributed. The distribution for each measure was similar across years. For example, the rate of homelessness per 10 000 persons in 2001 has a highly similar shaped distribution in 2006 and 2011. Because of this, histograms for only one year are shown for each variable.

As discussed in the body of the report, natural log transformations were conducted to ensure all variables were normally distributed so that Pearson Correlations could be undertaken. Variables were not transformed for other descriptive statistics. Histograms of some log transformed variables are also included below and show that once transformed the variables are much closer to being normally distributed.

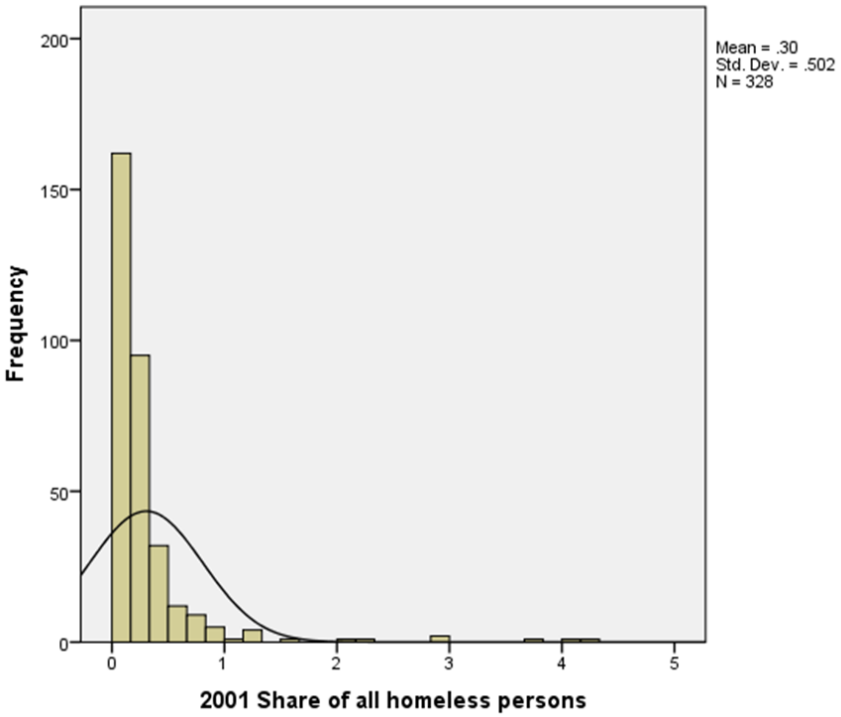
Figure A1 below shows the distribution of values for the rate of homelessness per 10 000 persons for 2001. Note that the distribution is skewed heavily to the right. This is also the case for the share of national homelessness (Figure A2).

Figure A1: The 2001 rate of homelessness per 10 000 persons



Source: Authors' calculations using ABS homelessness estimates and population estimates from ABS TSP dataset

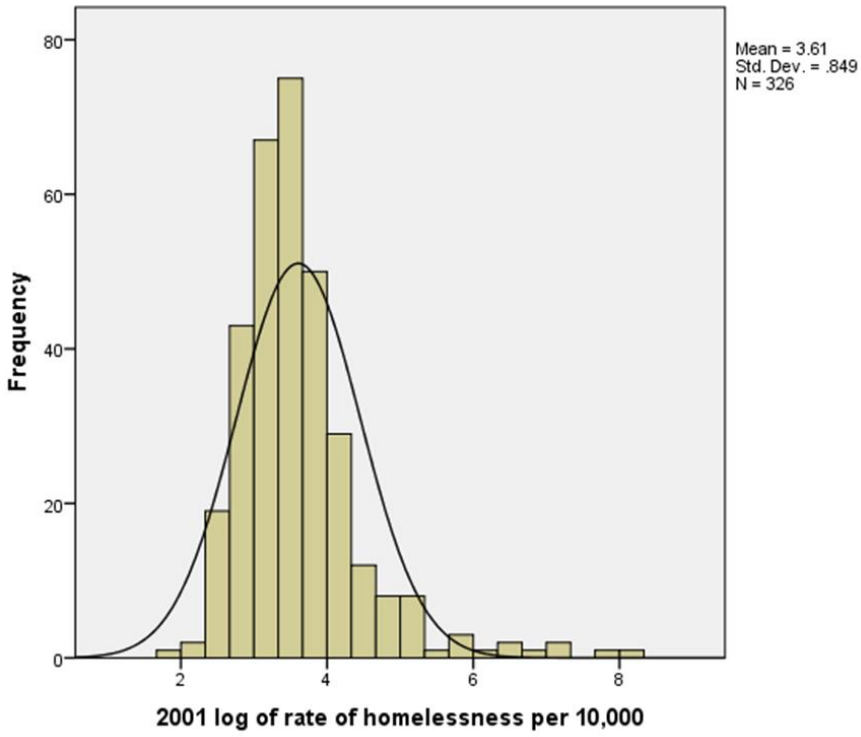
Figure A2: The 2001 share of national homelessness



Source: Authors' calculations using ABS homelessness estimates and population estimates from ABS TSP dataset

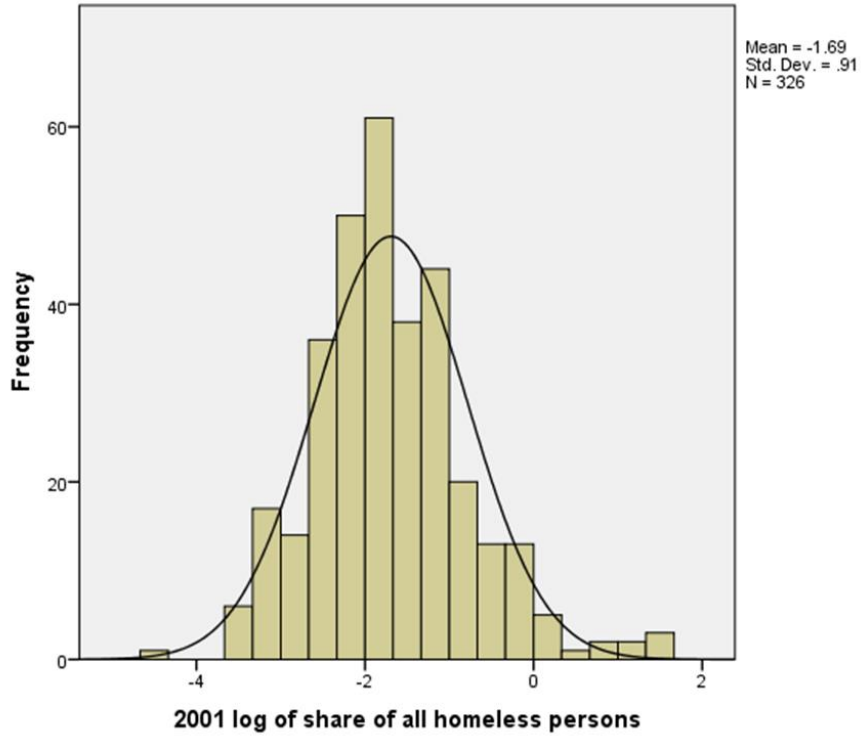
Once these variables are transformed with a natural log function, they show a distribution which is much closer to normal (see Figures A3 and A4 below).

Figure A3: The logged 2001 rate of homelessness per 10 000 persons



Source: Authors' calculations using ABS homelessness estimates and population estimates from ABS TSP dataset

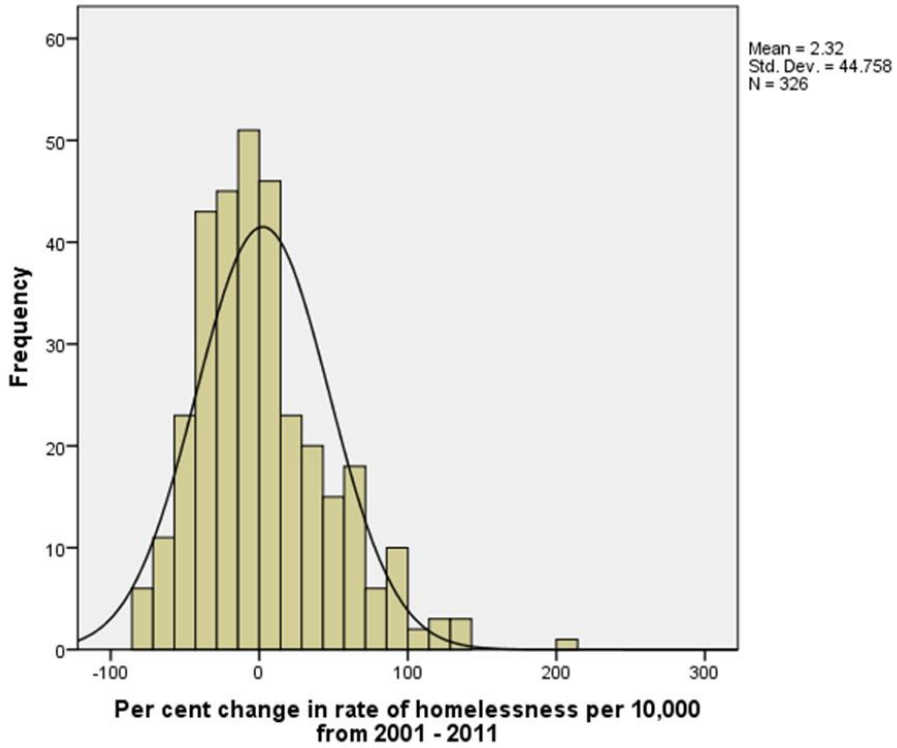
Figure A4: The logged 2001 share of national homelessness



Source: Authors' calculations using ABS homelessness estimates and population estimates from ABS TSP dataset

The per cent change variables for the two homeless measures appeared to be sufficiently normally distributed at the outset. For example, see Figure A5 below.

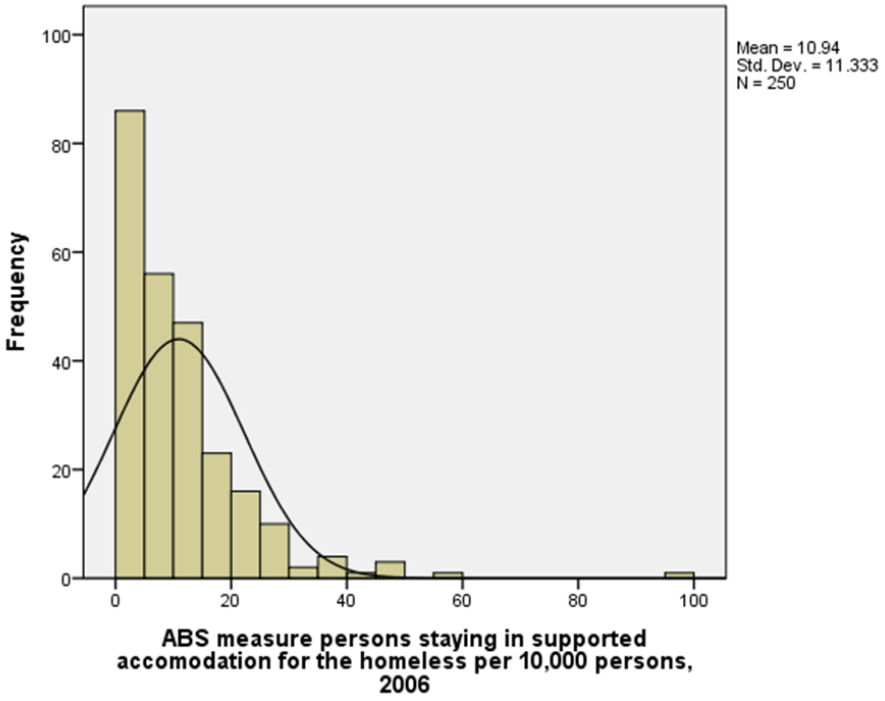
Figure A5: The per cent change in the rate of homelessness per 10 000 persons from 2001 to 2011



Source: Authors' calculations using ABS homelessness estimates and population estimates from ABS TSP dataset

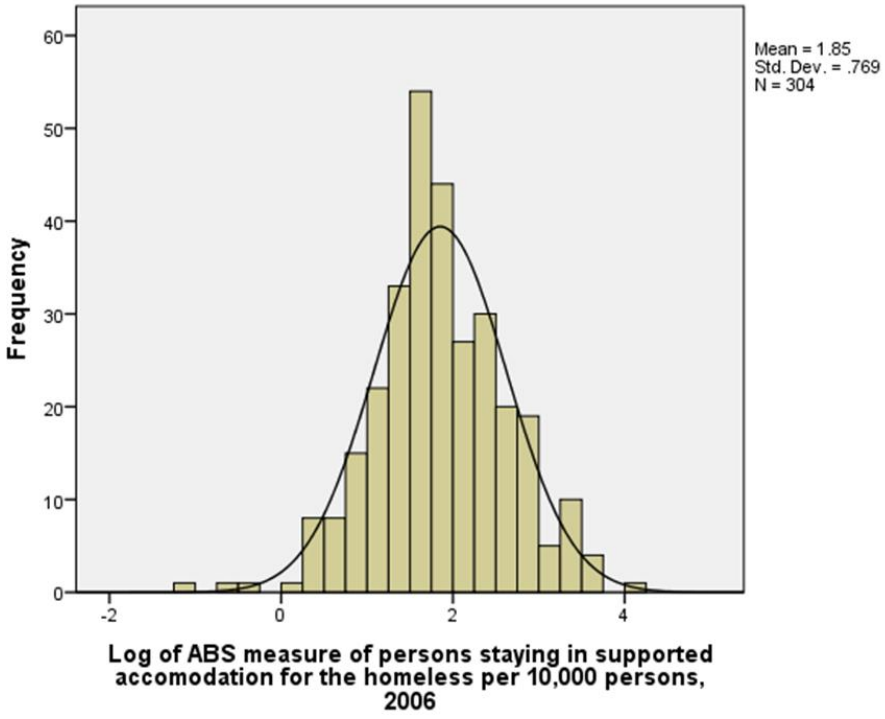
Finally a histogram of one of our measures of service capacity is shown below (Figure A6). Again, it appears to be closer to normally distributed after transformation (Figure A7).

Figure A6: The number of persons staying in supported accommodation for the homeless on census night in 2006, per 10 000 persons



Source: Authors' calculations using ABS homelessness estimates and population estimates from ABS TSP dataset

Figure A7: The logged number of persons staying in supported accommodation for the homeless on census night, 2006 per 10 000 persons



Source: Authors' calculations using ABS homelessness estimates and population estimates from ABS TSP dataset

Appendix 3: Formulas for shift-share analysis

To identify the source of growth in homelessness rates between years 2001–11, we employ the three-component shift-share analysis which decomposes growth in homelessness operational group *i* into the following three components—national share (NS_i), homeless mix (HM_i) and regional share (RS_i). We use a variant of Stimson, Stough and Robert's (2006) notation to define growth in homelessness (Δh_i) in the following way:

$$\Delta h_i \equiv h_{i,t} - h_{i,t-1} \equiv NS_i + HM_i + RS_i \quad (1)$$

Where:

$h_{i,t}$ denotes homelessness rates for operational group *i* at the end of the data period *t* (2011); and

$h_{i,t-1}$ denotes homelessness rates for operational group *i* at the start of the data period, *t-1* (2001).

To calculate the National Share component of growth in homelessness rates in operational group *i*, we apply the following formula:

$$NS_i \equiv h_{i,t-1}\left(\frac{H_t}{H_{t-1}} - 1\right) \quad (2)$$

Where H_t and H_{t-1} represent national homelessness rates in years 2011 and 2001, respectively, and $h_{i,t-1}$ represents regional (or SA3-level) homelessness rates for operational group *i* in year 2001.

The equation for measuring homeless mix is as follows:

$$HM_i \equiv h_{i,t-1}\left(\frac{H_{i,t}}{H_{i,t-1}} - \frac{H_t}{H_{t-1}}\right) \quad (3)$$

Where $H_{i,t}$ and $H_{i,t-1}$ represent overall homelessness in operational group *i* for years 2011 and 2001, respectively.

Finally, we measure Regional Share as follows:

$$RS_i \equiv h_{i,t-1}\left(\frac{h_{i,t}}{h_{i,t-1}} - \frac{H_t}{H_{t-1}}\right) \quad (4)$$

Where $h_{i,t}$ and $h_{i,t-1}$ represent SA3-level homelessness rates for operational group i in years 2011 and 2001, respectively.

Appendix 4: Examining relationships between structural factors and homelessness using three different definitions

We experimented with three different ways of defining and measuring homelessness in order to tease out our preliminary descriptive analysis of structural drivers. In addition to the full ABS statistical definition of homelessness used throughout the report, we also experimented with two alternative measures: the cultural definition—that omits the severe overcrowding category. And thirdly, a US style literal definition—that includes two categories: those staying in supported accommodation for the homeless and those sleeping rough.

It is possible that the difference between our findings and those in US-based studies is due to structural factors driving the literal homelessness categories, despite being causally unimportant as drivers of other homelessness categories.

Results

A full set of decile level tables and correlations were run analogous to those reported in Chapter 6 of the report. For the sake of brevity only a small table of Pearson correlation coefficients is reported in Table A2 below. It investigates the correlation between structural variables (e.g. median rents and the per cent of one person households) and each of the three different measures of homelessness (for 2011 only).[36]

Table A2: Pearson coefficients between structural variables and each of the three different measures of homelessness for 2011 only

Structural variables for 2011	2011 ABS definition of homelessness (per 10 000 person)s	2011 ABS total homeless persons less severe overcrowding (per 10 000 persons)	2011 US style literal definition (per 10 000 persons)
Median weekly rent	-.374**	-.230**	-.256**
Median total weekly household income	-0.02	-0.097	-0.081
Average household size	0.012	-.403**	-.271**
Percentage unemployed	.241**	0.084	0.039
Percentage of Indigenous persons	.428**	.319**	.267**
Percentage of lone-person households	.129*	.436**	.333**
Rent to income ratios	-.424**	-.190**	-.239**
Private rental (% of all occupied private dwellings)	-0.021	.131*	0.075
Public Housing (% of all occupied private dwellings)	.540**	.457**	.490**

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Source: Authors' calculations using ABS homelessness estimates and population estimates from ABS TSP dataset

It is evident that correlation coefficients for median weekly rent, median household income, Indigenous persons, lone-person households, rent to income ratios, private rental housing and

[36] Results for 2001 and 2006 are available from the authors upon request. The patterns are very similar across the three years.

public housing are the same sign and invariably significant (or insignificant) at the same statistical level, regardless of the homelessness definition. However, average household size is statistically insignificant for the ABS broad definition, but is negatively related to homelessness when using the cultural and literal definitions. This could be due to the omission of the severe overcrowding category in the cultural and literal definitions. Those regions with larger households will typically have a higher rate of severe overcrowding. Using the ABS broad definition of homelessness, unemployment rates are positively and significantly linked to homelessness. However, on using the narrower definitions the relationship is statistically insignificant. There is no obvious reason why the overcrowding component is more closely associated with unemployment.

Appendix 5: Examining relationships between structural factors and homelessness for urban compared with regional and remote areas

We have explored whether structural factors have a different relationship to homelessness in urban regions of Australia. This might arise because the Indigenous population is more vulnerable to homelessness and Indigenous persons are a higher percentage of the rural and remote regions' populations of Australia. A second motivation for this exercise is the focus of US-based studies on metropolitan areas only.

In order to classify local regions (SA3s) as urban or regional and remote, we used the Accessibility/Remoteness Index of Australia (ARIA+) which is produced by the University of Adelaide (ABS nd2). This index divides Australia up into 1 kilometre square blocks. The average distance to service centres via road for all square kilometre blocks is then calculated for each SA1. This gives each SA1 a remoteness score on a scale of 0–5 based on this average distance; 0 is Major cities of Australia, 1 is Inner Regional, 2 is Outer Regional, 3 is Remote Australia and 4 is Very Remote Australia. 5 is classified as offshore shipping and migratory areas (ABS nd2).

To assign larger spatial units to a remoteness category, the ABS has produced correspondences which detail the percentage of each SA3 in each of the aforementioned categories. Using this correspondence file, we assigned remoteness categories to SA3s based on where the majority of that SA3 was classified. We then grouped SA3s which were mainly in major cities into the urban category. The remainder of SA3s that were majority—Inner Regional, Outer Regional, Remote and Very Remote—we refer to as regional and remote.[37]

Of the 328 SA3s (local regions), 263 were classified as being urban, while the remaining 65 were classified as being regional and remote.

Results

Consistent with the approach in Chapter 6, we reproduced decile tables and ran correlation matrices to explore the relationship between remoteness and structural factors (e.g. median rents, unemployment and so on). For the sake of brevity in this appendix we only report correlation coefficients to give a sense of these relationships. Decile tables are available upon request from the authors and broadly confirm the relationships revealed by reported correlation coefficients.

[37] For a map that shows the remoteness structure across Australia, see: http://www.doctorconnect.gov.au/internet/otd/Publishing.nsf/Content/locator.

Table A3: Pearson correlation coefficients between structural variables and the rate of homelessness for both urban and regional and remote areas for 2011 only

Structural variables for 2011	Urban rate of homelessness per 10 000, 2011	Regional and remote rate of homelessness per 10 000, 2011
Median weekly rent	-0.143	-.504**
% renting from real estate agent	.479**	-.266**
% of people in public housing	.522**	.583**
Median household income	-.234**	.334**
Rent to income ratio	.180*	-.611**
Unemployment	.336**	.180*
Indigenous %	0.081	.724**
Lone-person households %	.473**	-.384**
Average household size	-.417**	.589**
Number of accommodated clients per 10 000	.555**	0.149
Number of supported clients per 10 000	.576**	.344**

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed)

Source: Authors' calculations using ABS homelessness estimates and population estimates from ABS TSP dataset

Table A3 reveals that in urban areas, homeless rates are positively related to the prevalence of lone-person households, unemployment rates, the percentage of private rental households and weakly related to rent to income ratios. On the other hand, homeless rates are negatively related to household size and household income. Homeless rates are not (in a statistically significant way) related to median weekly rents or the per cent of Indigenous persons. In regional and remote areas, homeless rates are positively related to median household income, household size and the per cent of Indigenous persons, and negatively related to median weekly rents, rent to income ratios, the per cent of people renting from real estate agents and the per cent of lone person households.

Regardless of urban or regional location, homelessness is positively associated with unemployment, the per cent of people in public housing and the number of people supported by homeless services per 10 000 persons. It is also negatively related to median weekly rents regardless of location.

Hence, of the three housing variables the relationship of two with homelessness is unaffected by our subdivision of the sample of regions. Public housing is positively associated with homelessness in both sets of regions. Median weekly rents are important in regional and remote areas with lower rents associated with higher homelessness. The relationship is in the same direction within urban regions though it is not statistically significant.

But overall, there seems to be contrasting findings between urban and regional areas.

In urban areas, homelessness is higher in areas where the per cent of households renting from real estate agents is higher while the reverse is true in regional and remote areas. Homeless rates are higher in regional areas when rents are cheaper but when fewer people are renting privately. It is difficult at this stage to make sense of the contrasting patterns. In the second half of this project we will use modelling techniques to better tease out the underlying relationships. We have also successfully negotiated access to ABS variables that allow us to better analyse housing market conditions for low-income groups in each region.

There is also evidence that rent to income ratios have a different relationship to homelessness in urban than regional areas. Urban areas with housing expensive relative to incomes seem to have higher homeless rates, but the reverse is the case in regional areas. Household income also has a varying relationship across the different geographies; in urban areas with high (low) mean incomes, homeless rates tend to be low (high), and so there is some association between an area's economic prosperity and homelessness. But in regional areas this is absent; indeed the reverse is true, perhaps reflecting the effects of the resources boom. Those areas affected by the resource boom tend to have expensive housing, and this might account for the different relationship in the regions.

The demographic variables—lone person households and household size—appear to have very different relationships with homelessness in urban versus regional areas. For example, the prevalence of sole person households is positively related to urban homelessness but negatively associated with regional homelessness. This could be a product of household arrangements and mobility among Indigenous persons (Indigenous Australians often travel for cultural and family reasons and stay with other Indigenous family and community members. In Indigenous cultural practices it is inappropriate to turn away visitors regardless of the capacity to accommodate them (see ABS 2014) and Indigenous people account for a higher percentage of the regional population. In urban areas, it is likely to reflect the shortage of affordable housing for this demographic (in Victoria in March 2014, only 0.4% of one-bedroom dwellings were affordable to single persons on government payments, Department of Human Services 2014). Household size is negatively related to urban homeless rates, but positively related to regional homeless rates. Again Indigenous housing circumstances might be central here; most Indigenous homelessness is severe overcrowding (75%, ABS 2013b) and most Indigenous severe overcrowding is in remote and very remote regions of Australia (ABS 2013b)

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