

# A MULTIVARIATE STUDY OF MEDIUM DENSITY HOUSING DEVELOPMENT AND NEIGHBOURHOOD CHANGE WITHIN AUSTRALIAN CITIES

VALERIE KUPKE, PETER ROSSINI and STANLEY McGREAL  
University of South Australia

## ABSTRACT

*The introduction of medium density housing development within suburban areas has been favoured by government as a means of improving the efficiency of land use, reducing the costs associated with the delivery of government infrastructure and services, increasing the opportunity for affordable housing and balancing social mix. However, it has been hypothesised that such development may be having a negative impact on local neighbourhoods in terms of social structure; for example, reducing diversity as measured by economic status and family makeup or in terms of local housing market performance as measured by price. This paper considers whether such outcomes are able to be measured in terms of social structure and housing market performance for three Australian cities: Adelaide, Sydney and Melbourne between 2001 and 2006. The analysis is conducted at a disaggregated level to more accurately measure impacts at the local level. The paper attempts to identify whether medium density housing development has any impact on housing market performance at a suburb level as measured by median price and if there are associated changes in neighbourhood structure as measured by social constructs developed using the technique of principal components analysis.*

**Keywords:** Medium density housing, neighbourhood, social structure

## INTRODUCTION

The introduction of medium density housing development within suburban areas has been favoured by government as a means of improving the efficiency of land use, reducing the costs associated with the delivery of government infrastructure and services (Quirk, 2008), increasing the opportunity for affordable housing and balancing social mix. However, it has been hypothesised that such development may be having a negative impact on local neighbourhoods in terms of social structure; for example, reducing diversity as measured by economic status and family makeup or in terms of local housing market performance as measured by price (Bramley et al, 2007). On the other hand, concern has been expressed by social housing providers

that such infill or renewal may result in a reduction in the stock of affordable housing, in the displacement of original residents and in considerable community disruption (AHIU, 2008).

This paper considers whether such outcomes are able to be measured in terms of social structure and housing market performance within three Australian cities, Adelaide, Sydney and Melbourne between 2001 and 2006. The analysis is conducted at a disaggregated level to more accurately measure impacts at the local level. The paper attempts to identify whether medium density housing development has any impact on housing market performance at a suburb level as measured by median price (RP Data, 2008) and if there are associated changes in neighbourhood structure as measured by social constructs developed using the technique of principal components analysis.

For the purposes of this paper, medium density housing is defined as housing which is attached and includes one and two storey flats, units or apartments (ABS, 2006). The technique of principal components analysis (SPSS, 1993) is used to identify housing and social constructs using Australian Bureau of Statistics (ABS) census data for 2001 and 2006 (ABS, 2006a) for all Statistical Suburbs (SSCs) within the Statistical Divisions (SDs) of Adelaide, Melbourne and Sydney.

## **LAND USE POLICY & MEDIUM DENSITY DEVELOPMENT**

In the past, land in Australia has been plentiful and therefore cheap and for over 50 years, the typical housing form has been the single storey detached dwelling built on a large allotment of some 1000 square meters with substantial setbacks to side and street boundaries. These provided considerable areas of private open space and resulted in net urban housing densities as low as 17 dwellings per hectare (Planning SA, 2006) and correspondingly lower population densities. As of 2009, state capitals such as Adelaide and Melbourne are reported respectively to have some 1,400 and 1,600 persons per hectare and Sydney 2000 persons per hectare compared to London at 5,100 per hectare or Paris at 3,300 (Demographia, 2010). These lower densities are spread across large tracts of land, with Melbourne at 2152 square kilometres comparable to San Francisco at 2497, yet housing some 2 million fewer people (Demographia, 2010).

However, state governments across Australia no longer consider this low density form of development to be viable and over the last decade, urban containment strategies have been introduced to protect agricultural land, improve the efficiency of land use and to reduce the costs associated with the delivery of government services (Quirk, 2008). These strategies have included the establishment of urban growth boundaries, the introduction of public transport corridors and the facilitation through planning codes of higher forms of dwelling density. Writers such as Glaeser and Ward (2008)

and McConnell et al (2006) have identified the importance of local planning controls, such as zoning and especially minimum lot sizes, in determining the density of housing development. McConnell, Walls & Kopits (2006) in their US study suggest that without minimum lot restrictions, housing development could be up to 50 percent higher in density. In Australia, most state governments have drawn up strategic plans which facilitate rather than impede higher density residential development, much of which is to be introduced into already established urban areas. These plans have included the Melbourne 2030 Plan (State Government of Victoria, 2005), Sydney's City of Cities: A Plan for Sydney's Future, (NSW Government, 2005) and the 30 Year Plan for Greater Adelaide (State Government of SA, 2010). The housing form that is to be encouraged is described as medium density; attached dwellings, typically but not exclusively units, flats or apartments of up to 3 storeys (ABS, 2006) on allotment sizes of less than 300 square meters with net dwelling densities of up to 67 per hectare (State Government of SA, 2010). Sydney, which has experienced a tight supply of green field outer suburban sites in recent years, already has some 60 percent of new dwellings being built with established urban areas and this is expected to increase to 70 percent (National Housing Supply Council, 2010). Both Melbourne and Adelaide have established urban growth boundaries, with Melbourne also demarcating an urban growth zone (State Government of Victoria, 2005) and both cities have also set infill targets in terms of higher density development. Adelaide has set a target of 70 per cent new development within its existing urban boundary and expects to reach this target by 2030 (State Government of SA, 2010). Melbourne is looking towards a lower target of 53 percent within already established areas by 2030 (National Housing Supply Report, 2010).

Thus, medium density housing development is being strongly supported by state planning authorities and is seen as a fundamental step towards improving social and economic outcomes for local neighbourhoods (Kearns & Mason, 2007). However, some alternate viewpoints are also apparent, stemming from the possible impact of the development on the social structure and housing market performance of local neighbourhoods. Some local councils have been reluctant to approve higher densities as a result of presumed negative externalities such as the disappearance of green space, the loss of privacy, the increase in traffic (Searle, 2007) and the expected fall in housing values. Local neighbourhood groups protesting under banners such as "Save our Suburbs" perceive higher urban densities to be the antithesis of suburban life, threatening urban amenity, house values and quality of life (Searle, 2007; Quirk, 2008). Lewis (1999) has written of a suburban "backlash" against higher levels of housing density. Fincher and Gooden (2007) recognise that with the increase in medium density development, there has been an associated increase in the intensity of the politics around it. Buxton and Tiemans (2005) suggest that medium density housing is objected to by local residents who see themselves as defending their neighbourhood character. In the UK, Bramley et al (2007) acknowledges that the physical form of suburbs in terms of housing density can have a significant effect on

house prices. However, Bramley et al (2007) also concludes that redevelopment may in fact increase house prices through improved social and environmental outcomes; especially if associated with an increase in the level of home ownership within a neighbourhood. Zielenbach (2003) suggests that in the US, the mix of private dwellings and rehabilitated public housing may improve property values with positive ripple effects on surrounding areas.

Within Australia, Yates (2001; 2006) has recognised that house prices may change as a result of higher density redevelopment which can give rise to an ‘uneven’ result in terms of housing affordability. State governments too have been concerned as to whether medium density housing will address housing affordability concerns for first home buyers or lower income households (National Housing Supply Council, 2010). Concern has been expressed that the upgrading of local areas through the rehabilitation of public housing stock “can be ad hoc with disruptive impacts on local character and amenity” (Bunker et al, 2005) and that such impacts require recognition. Forster (1991; 2006) too considers the potential of increasing urban density to increase social polarization, as government processes of urban regeneration and economic forces cause house price appreciation and loss of affordability. Zielenbach (2003) recognises that in the US, redevelopment and upgrading of neighbourhoods can cause controversy and effectively displace lower income residents. Within Australia, the replacement of public housing stock with medium density redevelopment is often associated with substantial on-selling and private market activity, resulting in the displacement of original tenants and in considerable community disruption (AHIU, 2008).

## **SUMMARY OF HOUSING & LAND MARKET IN AUSTRALIA**

In order to provide some context for the impact of medium density on suburbs, a summary overview of the Australian housing and land market is first presented. This summary considers changes in percentage of dwellings in Australia classified as attached, changes in median lot sizes and vacant land prices and trends in the sale of attached dwellings.

While there is considerable debate on the changes that can be expected from increasing urban densities, there seems to be general agreement that urban densities are in fact rising. Between 1996 and 2006, there was an increase in the percentage of dwellings in Australia classified as ‘attached’, which signifies higher density development, from 18.5 to 21 percent (Table 1). An 11.1 percent increase in the stock of semi detached, row or terrace house or townhouse dwellings was also reported for Australia between 1996 and 2006 (ABS, 2006a) and a 16.6 per cent increase in the number of flats, units or apartments compared to only a 6.7 percent increase in the stock of detached dwellings (ABS, 2006a).

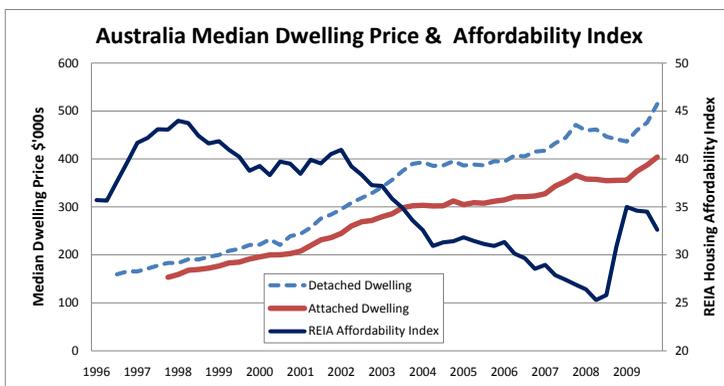
**Table 1: Housing stock: Australia**

	Housing stock Australia		
	% Detached dwellings	% Attached dwellings	% Other including unoccupied
1996	68.4	18.5	13.1
2001	68.3	19.9	11.8
2006	67.4	21	11.6

Source: ABS Census of Population & Housing 1996, 2001, 2006

There has also been a decline in detached dwelling completions relative to attached dwellings. The National Housing Supply Council (2010, pg 36) reports that in Australia “over the longer term, there has been a decline in detached housing completions relative to flats, units and apartments” which is “likely to reflect the housing preferences of the increasing proportions of one and two person households without children”. Buxton and Tiemans (2005) have identified that fewer detached houses were constructed in Melbourne in 2001 to 2003 than in 1988 to 1989, while the number of multi dwellings developments had increased four and half times.

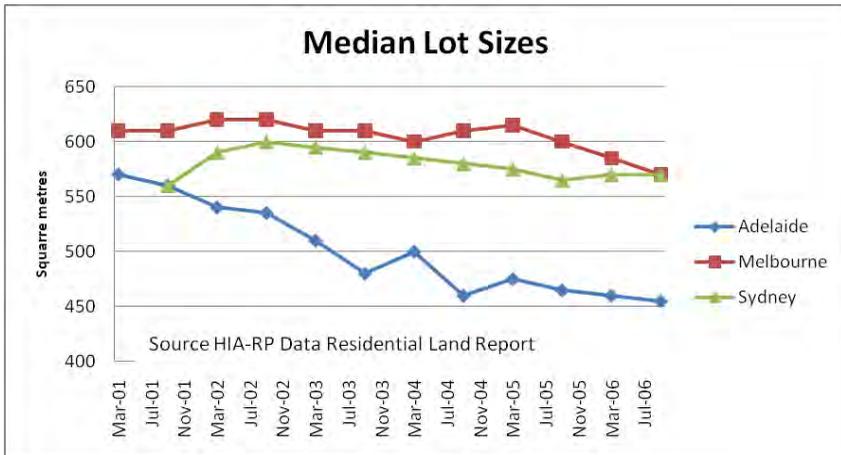
Over the last 10 years, median prices for both attached and detached dwellings in Australia have trended upwards, with a subsequent drop in housing affordability (Figure 1) especially for first homebuyers. After a short respite in terms of improved affordability in 2008, largely as a result of a fall in mortgage rates, house prices in both the detached and attached housing markets have begun to trend upwards again.

**Figure 1: Median dwelling price & affordability index**

Source: REIA median dwelling prices & REIA housing affordability index Australia, 2010

This trend in house price has in turn been associated with increased land prices and smaller block sizes. The average block size for new homes within Australian cities decreased from 802 to 735 square metres between 1994 and 2004 (HIA, 2008). In 2006, median lot sizes in Adelaide had dropped to 450 square metres (Figure 2), while for Melbourne and Sydney, median lot sizes averaged about 570 square metres (HIA-RP Data, 2009).

**Figure 2: Median lot sizes**



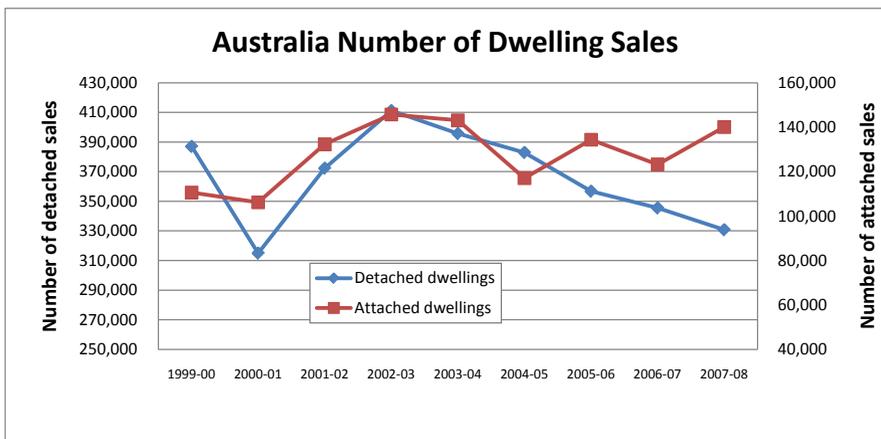
As of 2009, median lot sizes in Australia have declined further (Table 2), with Adelaide at 411 square metres representing the smallest average lot sizes for any state capital. Declining block sizes have also been associated with growth in median land values, with significant increases in land values between 2002 and 2009 for cities such as Sydney (57.1 percent), Melbourne (113.1 percent) and especially Adelaide (239.8 percent).

**Table 2: Median lot sizes: 2002 & 2009**

Vacant land 2009	Sydney	Melbourne	Adelaide
Median lot size sq metres 2009	532	582	411
Median price per sq metre 2002	\$310	\$137	\$118
Median price per sq metre 2009	\$487	\$292	\$401
% Change in price per sq metre 2002 to 2009	57.1	113.1	239.8

In Australia, attached dwellings have traditionally been less expensive than detached dwellings and in recent times, this has been strongly reflected in sales trends (Figure 3). From 2002 the number of dwelling sales in detached dwellings has shown a significant trend downwards. The attached market has shown more volatility in terms of number of sales, but of late has almost returned to the levels of sales achieved in 2002. A certain proportion of these attached sales are to individual investors who purchase what are considered affordable properties for rental income and capital return, though an increasing number of purchasers are likely to be owner occupiers, especially first time buyers.

**Figure 3: Number of dwelling sales**



Source: REIA number of dwelling sales Australia, 2010

In summary therefore, as land and house prices have risen, attached dwellings on smaller blocks have increased in number relative to detached dwellings. These attached dwellings have proved attractive to purchasers in terms of sales; purchasers who are likely to be investors, though owner occupiers may be a growing market, especially first home buyers.

## METHOD

Three steps were taken in analysing the social and housing market outcomes of medium density development. First, principal components analysis (PCA) was used to capture the main social structure of the Adelaide, Melbourne and Sydney (SPSS, 1993) Statistical Divisions (SDs) for 2001 and 2006 (ABS, 2006a). These SDs can be broken down into Statistical Local Areas (SLAs), which can be further disaggregated

into one of the smallest spatial units recognised by the ABS; the state suburb (SSC). This is the spatial unit used in this paper, with some 292 SSCs in Adelaide, 359 SSCs in Melbourne and 502 SSCs in Sydney included in the PCA. Next, those SSCs within each city which had experienced the greatest amount of percentage increase in medium density dwellings between 2001 and 2006 were identified. Finally, a simple independent samples t-test was used to test for differences between these suburbs and the rest of the city for each time period with the Levene's Test for Equality of Variances applied (SPSS, 1993).

The technique of PCA was used to identify housing and social constructs for each city using Australian Bureau of Statistics (ABS) census data for 2001 and 2006. The method of classifying urban areas along lines of social constructs has been a useful area of housing research, as such analysis has allowed for a better understanding of housing needs (Meen, 2001; Meen & Meen, 2003; Bunker et al, 2005), residential submarkets (Reed, 2001; Lockwood & Coffee, 2006), buyer behaviour (Ibrahim & Ong, 2004), and social polarisation (Reynolds & Wulff, 2005; Baum et al, 1999). The origins of this approach lie in the early work of Shevky and Bell (1955) who used census data to apply social area analysis to Los Angeles and San Francisco and hypothesized that the social make up of these two cities could best be understood along the lines of socio-economic status, family status and ethnic status. These they termed 'social constructs'.

In this study, some 42 variables which were consistent in their measurement across the two census periods were used to identify the social and housing constructs. A number of these variables were based on those selected by the ABS in the construction of their Socio Economic Indexes for Areas (SEIFA). There are four SEIFA indexes (ABS, 2006) which are used to track relative socioeconomic advantage and disadvantage, occupation and education and level of economic resources across statistical areas and are based on the ABS Census. However, a number of other variables not included in the SEIFA indexes were used in this analysis; in particular, those pertaining to mobility, language, ethnic mix and housing form. As well, the number of variables used is more than those used in the SEIFA indexes, which are based on a fairly narrow selection of variables, tend to be more particular to the census period in which they are constructed and are not suitable for comparison across census periods (ABS, 2006a). However, the SEIFA indexes were used in the paper to investigate whether there were significant differences within a census period between those suburbs which had experienced higher levels of flat and unit development and those that had not. Using a varimax rotation, PCA was carried out using percentage values for these 42 variables for each suburb to identify the core components or factors that cumulatively help to explain the housing and social fabric of each suburb for 2001 and 2006. KMO and Bartlett tests indicated that both data sets were suitable for this type for analysis.

Next, those suburbs which had experienced higher levels of unit, flat and apartment development between 2001 and 2006 were identified. Development was measured as the percent change at suburb level in the number of one, two and three storey flats, units and apartments between 2001 and 2006. Those suburbs which had experienced at least a 50 per cent increase in this type of dwelling form were selected for further analysis.

Finally, for each city, those suburbs which had experienced at least a 50 percent increase in medium density were compared to those suburbs which had not for each census period using the simple independent samples t-test for differences. Items used to identify differences between the two groups included the 42 census variables, the factors representing neighbourhood social structure identified by the PCA, the SEIFA indexes, and finally median price and median price change for attached and detached dwellings (RPData, 2009).

## **RESULTS**

### **Principal components analysis**

Based on the criteria of eigenvalues greater than 1, factors were produced for each city for the 2001 and 2006 census (Table 3 and Table 4). The minimum cumulative percent of variance achieved was 67.6 percent for the 2006 Adelaide results (Table 4). This was considered adequate for the purposes of the analysis (Hair et al, 1998). From these rotations, factors were identified for each data set based on the interpretation of those variables with factor loadings greater than .5 (details of these loadings are available from the contact author on request). For each city, factor labels were applied (Table 3 and Table 4) which included Socioeconomic (based on the inclusion of variables representing items such as income, qualifications and occupation); Familism (based on variables representing such items as age and family structure); Mobility (based on variables covering dwelling change or stability in last one to five years); Ethnicity (based on language and place of birth); Housing Authority (based on selection of housing form and housing authority dwellings) and finally Medium or High/er Density (representing higher density forms of housing development). For each city, there were factors that were not able to be summarized adequately. The positive and negative ends of each factor were identified and interpreted. Finally, factor scores which measured the scale of each construct within a suburb were calculated.

**Table 3: 2001 factor labels & cumulative variance**

Adelaide	Cumulative %	Melbourne	Cumulative %	Sydney	Cumulative %
Socioeconomic	20.875	Familism	21.299	Familism	20.941
Familism	34.498	Socioeconomic	40.863	Socioeconomic	38.081
Mobility	45.137	Mobility	53.518	Mobility	53.309
Ethnicity	54.988	Ethnicity	65.712	Ethnicity	64.744
Medium density	62.957	Housing Authority	72.706	Housing Authority	73.925
High density	70.402	6	78.553	Higher density	78.223
7	74.946	7	82.417	7	82.081
8	78.893			8	84.953

**Table 4: 2006 factor labels & cumulative variance**

Adelaide	Cumulative %	Melbourne	Cumulative %	Sydney	Cumulative %
Socioeconomic	20.488	Familism	21.334	Higher Density	26.874
Mobility	31.993	Socioeconomic	42.376	Socioeconomic	47.291
Ethnicity	42.91	Mobility	57.446	Ethnicity	59.011
Family structure	53.017	Ethnicity	71.143	Familism	68.81
Tenure	60.538	Housing authority	76.328	Clerical & sales workers	76.561
Medium density	67.602	6	80.321	6	80.278
7	71.522	7	84.185	7	83.97
8	75.373	8	87.605		
9	79.112				

## Identifying suburbs

For each city, some 20 percent of suburbs were identified as experiencing at least a 50 percent change in their volume of medium density development between 2001 and 2006; that is 21.2 percent for Adelaide, 22.3 per cent for Melbourne and 19.9 per cent for Sydney (Table 5). For each city, this represented the top quintile of valid suburbs. However, for both Melbourne (19.8 percent) and Sydney (26.7 percent), there were a

considerable number of suburbs which were unable to be compared either because a suburb did not exist in 2001 or because data, such as a median house price, was not available.

**Table 5: Change in 1 or 2 storey flats & units as percent of total dwellings: 2001 & 2006**

		> 50% Increase	1 to 49% Increase	Decrease	Invalid missing data	Total suburbs
Adelaide	Number of suburbs	62	116	114		292
	% of suburbs	21.2	39.7	39.0		100
Melbourne	Number of suburbs	80	125	83	71	359
	% of suburbs	22.3	34.8	23.1	19.8	100.0
Sydney	Number of suburbs	100	115	153	134	502
	% of suburbs	19.9	22.9	30.5	26.7	100.0

Source: ABS Census of Population & Housing

## T-test results

### *Housing stock*

The independent samples t-test results (Table 6 & 7) identify that for each city, suburbs which went on to experience large increases in medium density development in 2006 (> than 50 %) could be distinguished in 2001 by significantly lower volumes of one or two storey development (Sig>.05); for Adelaide 5.09%, compared to 12.31% for the rest of the statistical division; Melbourne 3.5 %, compared to 10.2% for the rest of the city and Sydney 3.7%, compared to 6.7% for all other suburbs. Sydney suburbs could also be distinguished in 2001 by lower levels of high density development as indicated by the Higher Density Factor. For both Sydney and Melbourne, these suburbs could also be distinguished by significantly lower prices for detached dwellings. Given planning approval, these sites could, after demolition, offer larger blocks with the potential for subdivision. Pre-existing lower levels of medium density development are likely to offer the potential for investment in terms of redevelopment and infill housing subject to planning approval.

By 2006, suburbs in Adelaide which originally had lower volumes of medium density development could no longer be distinguished in this way. In other words, they had achieved a stock of medium density development comparable to the rest of the city, giving rise it would be surmised, to substantial change in their built form within a relatively short period. In Melbourne in 2006, these suburbs still retained a lower volume of medium density development than the rest of the city, 7.8% compared to 10.6% though with a lower percentage difference than in 2001. However, in Sydney

by 2006, those suburbs which previously had lower levels of medium density development could now be distinguished by higher levels of one or two storey units or flats than the rest of the metropolitan area, 7.9% compared to 5.9%. From this, the conclusion is that these suburbs have changed significantly in their built form in quite a short period of time.

### *Social structure*

In terms of social structure as measured by factor scores, the suburbs in Adelaide which experienced greatest change in medium density development could be distinguished in 2001 by lower levels of Ethnicity; that is higher levels of Australian born and English only speaking households and by lower levels of Mobility; that is more households who had remained at the same address in the last five years. However, these suburbs could not be distinguished from the rest of the city by scores on Socioeconomic or Familism Factors or by SEIFA scores. In Melbourne, the suburbs when measured by factors scores could also be distinguished by lower levels of Ethnicity, but also by higher levels of Familism; that is, more couples with children, and by lower levels of socioeconomic status. However, they could not be distinguished by any of the SEIFA scores. In Sydney in 2001, the suburbs which later experienced high levels of medium density development could not be distinguished at all by their social makeup.

By 2006, the suburbs in Adelaide could be distinguished from the rest of the city by lower levels of socioeconomic status (Sig >.05) as measured by factor scores and in terms of a lower score on the SEIFA index of Education and Occupation, which measures education levels and job skills (977 compared to 1014 for the rest of the ASD). This would appear to indicate some change in neighbourhood character as suggested by Buxton and Tiemans (2005), but not the marked displacement of lower income residents as discussed by Zielenbach (2003). The suburbs could still be distinguished significantly (Sig >.05) by a lower Ethnicity score, indicating that they had retained a higher than average level of Australian born and English only speaking household. However, there was still no distinction in terms of family structure and they could no longer be distinguished by lower levels of mobility. This represents a relatively stable, lower to middle income, Australian born neighbourhood. In Melbourne by 2006, the suburbs which had experienced greatest change in medium density development had retained their higher level of Familism; that is couples with children and of Australian born households. Their lower level of socioeconomic status had also been retained and in 2006, this is reinforced by a lower SEIFA Education and Occupation score. Essentially, the social structure of these Melbourne suburbs seems to show little change, despite a significant change in their built form. Again in 2006, suburbs in Sydney cannot be distinguished in any way by their social structure, which may be indicative of the much larger volume of medium and especially high density development in Sydney which is occupied and purchased by a broad spectrum of income levels.

**Table 6: Independent sample t-tests**

Adelaide - Independent samples test - t-test for equality of means	Group 1* mean value	Group 2** mean value	t	Sig. >.05 (2-tailed)
<b>2001 – significant difference before development</b>				
% Dwellings 1 or 2 storey flats, units and apartments 2001	5.09%	12.31%	-8.949	0.000
Ethnicity Factor Score 2001 (+ve High –ve Low)	-0.38	0.14	-3.898	0.000
Mobility Factor Score 2001 (+ve High –ve Low)	-0.18	0.02	-2.002	0.046
	N=62	N=230		
Percent change in 1 or 2 storey flats, units, or apartments 2001 to 2006	205.55%	-4.61%	5.469	0.000
<b>2006 – significant difference after development</b>				
Ethnicity Factor Score 2006 (+ve High –ve Low)	-0.4	0.15	-3.969	0.000
SEIFA Education Occupation Score 2006	977	1014	-2.673	0.008
Socio Economic Factor 2006 (+ve High –ve Low)	-0.31	0.09	2.550	0.011
Median price detached dwellings 2006	\$302590	\$327973	2.220	0.027
	N=62	N=230		
Group 1 * suburbs > 50% increase in 1 or 2 storey units, flats, apartments 2001 to 2006				
Group 2 ** remainder of suburbs				

<b>Melbourne</b> - Independent samples test - t- test for equality of means	Group 1* mean value	Group 2** mean value	t	Sig. >.05 (2-tailed)
<b>2001 – significant difference before development</b>				
% Dwellings 1 or 2 storey flats, units and apartments 2001	3.50%	10.20%	-6.769	0.000
Familism Factor Score 2001 (-ve High +ve Low)	-0.1661	0.1590	-2.846	0.005
Ethnicity Factor Score 2001 (+ve High –ve Low)	-0.2281	0.1352	-2.824	0.005
Median price detached dwellings 2001	\$240,891	\$269,629	-2.747	0.006
Socioeconomic Factor Score 2001 (+ve High –ve Low)	-0.2276	0.0511	-2.222	0.027
	N=81	N=223		
Percent change in 1 or 2 storey flats, units, or apartments 2001 to 2006	217.50%	-5.50%	9.668	0.000
<b>2006 – significant difference after development</b>				
Median price units 2006	\$310,588	\$291,319	2.415	0.016
% Dwellings 1 or 2 storey flats, units and apartments 2006	7.80%	10.60%	-2.348	0.020
Median price detached dwellings 2006	\$370,596	\$405,856	-2.282	0.023
Median price % change units 2001 to 2006	41.1%	26.7%	2.283	0.023
Socio economic factor 2006 (+ve High –ve Low)	-0.2234	0.0746	-2.274	0.024
Ethnicity factor score 2006 (+ve High)	-0.1339	0.1299	-2.091	0.037
SEIFA education occupation score 2006	1020	1045	-2.063	0.040
Familism Factor Score 2006 (-ve High +ve Low)	-0.0337	0.1988	-2.025	0.044
	N=81	N=223		
Group 1 * suburbs > 50% increase in 1 or 2 storey units, flats, apartments 2001 to 2006				
Group 2 ** remainder of suburbs				

<b>Sydney - Independent Samples test - t test for equality of means</b>	Group 1* mean value	Group 2** mean value	t	Sig. >.05 (2-tailed)
2001 – significant difference before development				
% Dwellings 1 or 2 storey flats, units and apartments 2001	3.27%	6.75%	-5.025	0.000
Higher Density Factor Score 2001 (+ve High)	-0.1869	0.2121	-3.445	0.001
Median price detached dwellings 2001	\$383,968	\$417,340	-2.061	0.040
	N=101	N=318		
Percent change in 1 or 2 storey flats, units, or apartments 2001 to 2006				
	316.65%	-23.97%	7.663	0.000
2006 – significant difference after development				
Median price % change detached dwellings 2001 to 2006	53.8%	32.2%	2.555	0.012
% Dwellings 1 or 2 storey flats, units and apartments 2006	7.90%	5.90%	2.448	0.015
	N=101	N=318		
Group 1 * suburbs > 50% increase in 1 or 2 storey units, flats, apartments 2001 to 2006				
Group 2 ** remainder of suburbs				

**Table 7: Results of difference between suburbs****Medium density suburbs (>50% increase in dwelling stock) compared to the rest of the metro area (Sig >.05)**

	2001	2006
<b>Housing stock</b>		
Adelaide	less medium density	n.s.
Melbourne	less medium density	less medium density
Sydney	less medium density	higher medium density
<b>Social structure</b>		
Adelaide	more Australian born, lower Mobility	more Australian born, lower Socio-economic, lower SEIFA
Melbourne	more Australian born, higher Familism, lower Socio-economic	more Australian born, higher Familism, lower Socio-economic, lower SEIFA
Sydney	n.s.	n.s.
<b>Dwelling price</b>		
Adelaide	n.s.	median price lower detached dwellings
Melbourne	median price lower detached dwellings	median price lower detached dwellings, higher price for units
Sydney	median price lower detached dwellings	median price lower detached dwellings
<b>Significant % price change: 2001 to 2006</b>		
Adelaide	n.s.	
Melbourne	higher % increase for units	
Sydney	higher % increase for detached dwellings	

***Dwelling price & % price change***

In 2001 in Adelaide, there was no distinction across suburbs in terms of the median price paid for all dwellings, detached dwellings or units. In other words, residential property was not selling at a significantly different price in the suburbs that went on to be developed between 2001 and 2006. However, in Melbourne and Sydney, the median price of detached dwellings in 2001 was significantly lower in those suburbs which went on the experience high levels of medium density development in 2006. Again, pre-existing low price levels for detached dwellings and especially their associated land parcels are likely to offer the potential for investment in terms of redevelopment and medium density housing, given an appropriate planning regime.

In Adelaide by 2006, there was a distinction in the median price being paid for detached dwellings (Sig >.05) which was lower than that for the rest of the city;

\$302590 compared to \$327973. However, there was no difference in the median prices paid for units or for all dwellings overall. In Melbourne by 2006, these suburbs still retained a lower median price for detached dwellings, but in contrast showed a significantly higher median price for units (\$310,588 compared to \$291,319 for the rest of the city). Again in Sydney in 2006, these suburbs showed no distinction in terms of dwelling prices. It would appear that more affordable housing is being retained in these suburbs in the form of detached dwellings, which is important for neighbourhoods where overall household incomes are lower and for Melbourne in particular, where there are more family households.

Between 2001 and 2006 for Adelaide, there was no distinction in terms of the percentage increase in median price for detached dwellings or units between the suburbs who had experienced higher levels of medium density development and those which had not. In other words, property prices did not appear to have been negatively impacted by the increased density of development. In fact in Melbourne, suburbs with higher levels of medium density development showed a significantly larger price increase for units than for the rest of the city (41.1% compared to 26.7%). In Sydney, there were higher price increases for detached dwellings (53.8% compared to 32.2%); so again, dwellings prices in these suburbs do not seem to have suffered from the increase in medium density development. Thus, while detached property prices were lower overall, unit prices were not and in terms of the change in capital values, there was no drop in either category. Thus, investment returns between 2001 and 2006 do not appear to have been significantly compromised in areas which have experienced higher levels of medium density development. This is good news for those who have entered into home ownership and for residential investors seeking capital gain on their properties and may go some way towards alleviating the fears of those groups identified by Searle (2007) and Quirk (2008).

## **CONCLUSION**

In conclusion, the factors which encourage medium density development to take place would appear consistent across all three cities. Given planning approval, pre-existing lower levels of medium density housing and lower price levels for detached dwellings may attract this type of development. The impact of this development on suburbs in terms of their built form and physical appearance is also likely to be significant for every city. However, in terms of social structure, it seems to have had minimal impact, with most suburbs in Adelaide and Melbourne retaining a lower level of socioeconomic status, lower levels of mobility, higher levels of family makeup and higher concentrations of Australian born before and after development. These neighbourhoods may reflect a more stable population with home ownership aspirations. Sydney remains apart, in that suburbs were not able to be distinguished by social structure either before or after development.

In terms of price dwellings, both detached and units show the same level of price increase within suburbs which have seen major redevelopment as those which had not. Overall in every city, it would appear that these neighbourhoods which have experienced significant change in their built form are not experiencing any significant difference in terms of housing market performance and in fact, for certain dwellings may be outperforming the rest of the city. As such, there may be no winners or losers in terms of housing investment. Those who worry that medium density infill may dampen house prices significantly may have less to fear than they expect, while those who are concerned that redevelopment signals the end of affordable housing may still find that housing opportunities remain for those on lower incomes. However, it would also appear that increasing medium densities and improving tenure mix may not necessarily improve the opportunities for socio-economic mix or for cultural diversity.

Planning strategies continue to be critical in determining the level of medium density development across metropolitan areas. Given the current promotion by state governments, the impact of such development will continue both in terms of built form, market performance and social structure. It will be important to track such impacts over the next inter census period. Questions such as whether medium density will replace detached housing as the preferred tenure for owner occupiers will be important, as will the continued need for affordable housing for first time buyers. In terms of further research, the impact of medium density development could also be examined using individual transaction data with accommodation made for the constant quality issue which may arise from combining older and more recently constructed dwellings in the analysis. It could be further supported by qualitative work which engaged local communities and households in a review of their experiences of neighbourhood change and explored their aspirations for the suburb.

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**Email contact:** [valerie.kupke@unisa.edu.au](mailto:valerie.kupke@unisa.edu.au)