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Abstract

The aim of this paper is to examine the spatial patterning and possible contributors to the geographic distribution of older people for the past decade (1996-2006). Local Indicators of Spatial Association (LISA) and mapping of Statistical Local Areas (SLAs) in South East Queensland (SEQ) region were used to investigate changes in spatial patterns of older people over time using ABS Census 1996 and 2006 with geo-coded 230 SLAs of SEQ. The study found three main patterns emerged in SEQ. First LISA method captured one third of the SLAs in SEQ are statistically significance when we account the changes in the spatial patterns of older people over time. Second, in all of the ten most rapidly growing clusters of the statistically significant SLAs studied, spatial pattern showed a "ageing-island" which areas with growth rates highest surrounded by areas with growth rate dropping. Third, the pattern of ageing spill-over to the neighboring areas was found in some coastal areas, particularly those in North-costal regions of SEQ.

Key word: spatial, temporal, location distribution, older people, ageing island

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Introduction

The ageing population in Australia is one of the major transformations being experienced by Australia's population (ABS, 2004). Gittins (2005) pointed out 'Australia's demographic time bomb' has been ticking away for some time. It is a process that began in the post-war period and is now starting to impact on Australian society: specifically its capacity to care for a significant proportion of its population who will be aged. According to ABS Population by Age and Sex, Australian States and Territories (2008) the number of people aged 65 years and over in Australia increased by 67,600 people representing a 2.4% increase during the period of the 12 months to 30 June 2008.. For the past two decades (1988-2008) the proportion of the population aged 65 years and over increased from 10.8% to 13.3%. Despite of this significant growth, a relatively little attention has been paid to its spatial distributions. Specific local studies have been undertaken which inform local needs (Costello 2007) but their conclusions call for a national view across different amenity regions. It is well documented that retiree migration intends to move to coastal areas such as the 'sunbelt' areas in New South Wales (NSW) and South-East Queensland (SEQ) (Burnley & Murphy, 2004; Burnley, 2005). During the past 1990s the majority of coastal local government areas in the northern North New South Wales, South East Queensland and much of central and northern Queensland experienced high growth, that were considerably higher than either national or state figures (Gurran and Blakely, 2007). The majority of the movers to high-growth coastal areas typically

came from large regional population centres (42 percent) and country areas (27 percent), with just over a third moving from a capital city (ABS 2004).

In the recent times there have been several researches to rethink the common perceptions to a location choice of older Australians. In one piece of work, Duggan (2005) argued that retirees are no longer the major drivers of coastal population growth in Australia. This study found the paradigm shifting from *seachange* to *treechange* for older Australians. It is evident that the location preference were towards a *treechange* back to the country. Interestingly Barker and Taylor (2005) found that the *seachange* phenomenon was mainly attributed to those working-class migrants. More importantly many studies informed that the spatial patterns of older people and its changes over time will be significantly impact on the current provision of housing, facilities and services across Australian cities and towns (Hugo 2007; AHURI, 2004; Burnley, 2005).

In this paper we examine the changing spatial distribution and location patterns of older people through a detailed study of these changes during the period 1996-2006 in one of the popular retirement destinations and the fastest population growth regions in Australia. Taking the geographic context the paper first investigates the factors associated with the changing location patterns of older Australians in the South East Queensland (SEQ) region, with a view to understanding the nature of these changing patterns. Subsequently we analyse the extent to which spatial distributions of the ageing population vary over time based on Australian Bureau of Statistics (ABS) Census data from 1996, 2001 and 2006 using Local Indicators of Spatial Association (LISA).

Analytical Factors in Location of Older Australians

Cohort Effects: Ageing in Place

We know that older people are likely to show a strong attachment to home, place and their roles in communities so as to carry out everyday tasks with few obstacles and barriers (Burholt, 2006). Generally older Australians intend to stay rather than migrate on retirement, in other words '*ageing in place*'. This factor is the most critical component of the regional ageing population growth in Australia (Hugo *et al.*, 1984). As the number of baby boomers aged 40 to 55 years get older those regions with a high number of the baby boomers will appear in an ageing locality like the Sunshine Coast region in Queensland. However the degree of the regional ageing population growth also depends on the mobility pattern of the younger age groups who more frequently move to meet their needs for a house and job.

Recent studies indicated that older people to '*ageing in place'* are broadly attributed to two major factors- home and location attachments. Olsberg and Winters (2005) revealed that 64.6 percent of respondents in Australia indicated that they wanted to stay in their present home for '*age in place'*. It found that relatively few (20.9 percent) respondents chose 'emotional attachment to the home itself' as a reason for remaining in their present home while most respondents simply wanted to remain in the same location. It indicated that older Australians highly regarded pleasure in and familiarity with an area and its facilities as the major factors contributing to people's day-to-day lifestyle. A similar US based survey illustrated a higher (83 percent) of older Americans preferred '*ageing in place'*, stating that "what I'd really like to do is stay in my home and never move" (AARP, 1996). Chapman and Howe (2001) also

highlighted a strong attachment to the house in which housing modifications and alternations were made in the selected cities in US. The study showed that the increase of 'accessory units', defined as the addition of a small, separate living unit within a detached single-family house (similar to granny house or nursing unit in Australia), could be a housing alternative facilitating older people to age in place.

Internal Migration: Seachange and Treechange

Hugo (2007) indicated that migration can substantially change the spatial distribution of older population in a short period of time through (1) Out-migration of young populations which results in the older people left behind and hence a regional ageing population growth; (2) In-migration of older people can have a similar effect while also increasing the actual number of older people. Although moving may occur less frequently among older people, there remains a significant volume of older population shifts across Australian cities and towns.

One of the major reasons of the retiree migration in Australia is lifestyle gains, moving towards coastal regions especially to warmer and scenic areas. The location decision for retirement migration was often accompanied by people's history with places (Gurran and Blakely, 2007). For instance, they once holidayed in these areas returned to birthplaces or had purchased second homes there (Burnley and Murphy, 2004). *Seachange* in the past has played a significant role in creating the current form of population distribution in the northern coastal areas of New South Wales and South East Queensland (Gurran and Blakely, 2007). Recently treechange became another major contributor of the locational distributions of older people in Australia (Marshall

et al., 2004). Costello (2007) explained the recent treechange as to housing affordability for the older Australians moving to rural areas because houses in metropolitan and coastal areas less affordable.

Family Life-cycle Effects

Many studies on residential mobility often adopt a 'life cycle model' (Rossi 1980; Kendig, 1984; Clark and Huang 2003). According to this model, the propensity of move will increase in relation to the changes in life courses such as the last child left home, divorce, retirement and death of spouse. Some studies found the propensity to the moves higher at those life events in later life (Kallan, 1993; Chevan, 1995; Stimson & McCrea, 2004). A study of the residential mobility for older people (Burgess and Skeltys, 1992) shows that the highest rates of mobility among older people are closely related to the changes in family structure, which includes the separated or divorced (40 percent), widowed singles (30 percent) and couple (20 percent) respectively. International studies based on the life cycle model also confirm that the first move for older people is likely to occur among young retirees seeking lifestyle gains. They are more likely than non-migrants to be married, to have higher incomes and educational levels, and to be healthy (Biggar, 1980; Longino, 1990). However, a second move is likely to occur 20 or more years later, when older people tend to develop chronic disabilities, experience a serious illness, or become widowed. In Australia, over 90% of older people aged 65 years and over occupy a dwelling where they can live independently. This proportion drops to 66 percent for those aged 85 years and over, with a third of those aged 85 years old and over moving to where they can receive care and support (Stimson and McCrea, 2004). At this stage, their moves are motivated by a desire to be closer to children or physical incapacity may

force a third move to a nursing home or assisted living facility (Longino et al., 1991). A recent study shows that older Australians become less dependent to their children while more people decided to move a retirement village or care facilities (Olsberg and Winters, 2005).

Data, Methods and Boundaries

There are four technical dimensions of the spatial distribution of older people: (1) *numerical ageing*; (2) *structural ageing*; (3) *natural decline*; and (4) *absolute decline*. Numerical ageing refers to the absolute increase or decrease in the number of elder people in a regions and town. Structural ageing refers to the increasing proportion of the population that is considered 'old' in a region (Lutz et al., 2004). The structural ageing is used to measure its relative growth in the population growth within a region while the numerical ageing is used to measure the variations of location patterns by the changes in the number of older people within a region. On the other hand, the natural decline and absolute decline are meaningful when deaths exceed birth or when migration is insufficient to replace the 'lost' births and increased deaths.

Many studies on 'ageing Australia' are based on numerical ageing (ABS Population projection series, 2006; Productivity Commision, 2005), which is an almost certainty given that those currently aged 55 years (baby boomers) and over will be 65 years and over in a ten years time. In this case current birth rates will have no effect on numerical ageing for this age cohort in a short period of time. As they join to the older age cohort both the numerical and structural ageing will be significantly changed across Australian cities and towns. However the numerical and structural

ageing will occur independently of each other because they have different causes and implications in different locations (Jackson, 2007).

Given the fact that the population ageing is not spatially uniform this paper needs to construct spatial units to divide SEQ into geographically meaningful areas. We selected the nine key locations clustered by the nature of its geographic and administrative boundaries. In this paper, to better understand the spatial patterns exhibited by older people with their temporal dynamics, we first divided the study area into coastal regions and non-coastal (inland) regions and specify these areas. In total the nine SEQ sub-regions were selected based on the Australian Standard Geographical Classification (ASGC): (1) Brisbane City and Inner; (2) Brisbane Middle Rings; (3) Brisbane Outer Rings; (4) Logan and Surrounds; (5) Ipswich and Surrounds; (6) Caboolture and Surrounds; (7) Coastal North; (8) Coastal South and (9) Rural Hinterland. 282 Statistical Local Areas (SLA) of the nine regions of SEQ were analysed for its numerical and structural ageing over the period 1996 to 2006 using concorded data based upon the 2006 census boundaries. Using a 'Local Indicators of Spatial Association' (LISA) statistics that particularly useful for identifying the significant spatial congregation and disperse. This statistics are capable of measuring local spatial distributions and the associated patterning of a phenomenon such as population of a certain age (as analysed in this paper) (Anselin, 1995). A popular LISA is the local Moran's I statistic that has been derived from its global equivalent (the Moran's I statistic) which is the most common test to measure global spatial autocorrelation by combining each observation over all pairs of locations.

Whereas the global Moran's I is capable of summarising region-wide spatial associations, we are interested here in detecting localised regions where autocorrelation is unusually different; clusters of positive or negative autocorrelation; and abnormal observations in the data. In this case LISA tools are particularly relevant and where we apply the local Moran's I statistic to investigate local spatial associations. The local Moran's I statistic is defined as:

$$I_i = \frac{N}{(N-1)S^2}(x_i - \bar{x})\sum_{j=1}^{N} w_{ij}(x_j - \bar{x}). \qquad (1)$$

Here, w_{ij} is an element of the spatial weight matrix W, x_i is observation $i = 1,\mathrm{K}\,,N$ and $S^2 = (N-1)^{-1}\sum_{i=1}^{N}(x_i - \bar{x}).$ Common with the global statistic, a value of I that approaches 1 is indicative of positive spatial autocorrelation, a negative value suggesting negative correlation and zero indicating no autocorrelation.

Spatial Distribution of Older People in SEQ: 1996-2006

From a structural ageing perspective, Australia's population ageing (aged over 64 years) substantially increased from 12 percent to almost 13 percent over the decade 1996-2006 (Fig 1), equivalent to a numerical increase from 22 million to 26.8 million. In a state level, the structural ageing of Queensland, the fastest population growth state in Australia, was less significant than Australia's in a proportional gain from 12 percent to 12.4 percent. In Queensland the structural ageing is becoming apparent in outer SEQ. Surprisingly, the proportion of older people in SEQ decreased from 12.5 percent to 12.3 percent for the past decade, even though it experienced actual number

increase from 267,396 to 319,944. The gap between the structural ageing and numerical ageing are even more evident in the Brisbane city. For the past decade the proportion of older people in Brisbane sharply decreased from 12.7 percent to 11.9 percent while the absolute number increased from 115,404 to 128,786. This decrease in the structural ageing in SEQ is largely attributed to the fact that young and matured aged people proportionally increased much higher than those of older people cohort due to a large volume of inter-state and overseas migration. According to ABS (2004), 88 percent of inter-state migrants to coastal regions in Queensland (the so called 'sun-belt' migration) were aged less than 50 years.

Insert *figure 1* about here

Over the decade 1996-2006 the distribution of older people across the regions in SEQ has substantially changed (Table 1). The share of Inner Brisbane sub-region for older people aged 65 and over within SEQ decreased from 3.6 percent in 1995 to 2.4 percent in 2006, whilst SEQ as a whole experienced a striking 19.7 percent increase in actual older population from 267,396 to 319,944. Similarly, the share of Middle Brisbane dropped from 15.9 percent to 11.8 percent and the number of old people living there sharply decreased from 42,761 to 37,993. Whereas Brisbane City's outer suburbs appeared in their share of old population rise from 23.5 percent to 25.9 percent, experienced a substantial increase of 32.1 percent in their ageing population, to over 83,097.

The old population for the sub-regions adjacent to Brisbane City that include Ipswich, Logan, and Caboolture all increased their share of older people over the decade. In

particular Logan and surrounds experienced a big increase of 52.9 percent in their old population to reach 20,859. While those adjacent sub-regions were made both in regional share of old population and actual old population increase, the coastal sub-regions (Gold Coast and Sunshine Coast) declined their share of old population. The share of Coast South sub-region (Gold Coast) dropped from 21.1 percent to 18.5 percent, and appeared in a small rise of the actual number by 5 percent. The wide-spread areas of the Rural-hinterland sub-region that include the outer parts of SEQ with many small urban centres- such as Beaudesert, Boonah, Laidley, Esk, Gatton and Kilcoy- experienced a high growth of 49.1 percent in old population over the decade and their share of the SEQ's old population slightly increased from 4.7 percent to 5.9 percent.

Sub-regional Population Ageing in SEQ, 1996-2006

Figure 2 shows the changes in the proportion of older people in each sub-region as a reference to region's structural ageing. A pattern of changes appearing in the sub-regions of SEQ is generally described as "Existing older areas became older and younger areas became younger". For instance, the Brisbane Inner and Middle sub-regions where traditionally much young couples or families live in experienced a large drop of the proportion of the old people within the sub-regions. Whereas the rural hinterland sub-region in SEQ had a relatively higher proportion of older people in 1996 and increased the proportion of older people by 13.2 percent over the decade.

Insert *figure 2* about here

Some areas experienced a fast structural ageing while others move backwards. Although Logan and the Caboolture surrounds had a low proportion of older people in 1996 seeing around 7 percent, the proportions increased markedly. On the other hand the majority of decreases appear in the Brisbane inner and middle ring suburbs however, it is interesting that the proportion of coastal sub-regions has also decreased slightly. The Gold Coast and Sunshine Coast were large attractors of retirees from interstate and elsewhere in Queensland, but with rising land values of coastal properties some older residents may not have been able to afford to live there and have moved to new locations further to inland. Most new residents of high-growth coastal regions are typically of a younger age profile than Australia as a whole and significantly younger than the existing profile (ABS, 2006).

Mapping Structural and Numerical Ageing by SLAs: 1996-2006

Within the sub-regions of SEQ a disaggregated analysis was conducted to refine the changes in regional patterns of older population based on SLAs. The regional variation in the structural ageing is even more noticeable in SLAs. In 2006, the lowest proportion of older people by SLA is 3.97 percent (Pacific Pines-Gaven) while the highest proportion is 32 percent (Bribie Island), giving a deviation of the proportion in SEQ of over 28 percent. Regarding the population ageing of suburbs of the sub-region shows considerable differences between structural and numerical ageing, the evolution of these over time, as a spatial and temporal perspective of location for older people would provide an important guide to anticipate their future locational patterns. Both the structural and numerical ageing are mapped and classified by a method of natural break (Figures 3 and 4), showing changes in the proportion and the absolute number of older people aged over 65 years and over by

SLAs. A number of distinctive patterns can be drawn from each map by the sub-regions.

Insert both *Figure 3 & 4* about here

Brisbane inner, middle ring and outer suburbs

While the structural ageing refers to the proportional changes in ageing population the numerical ageing uses changes in absolute numbers. There were significant reductions in the number of persons over 64 years in the inner and middle suburbs of Brisbane city while the Brisbane outer suburbs increased. Figure 3 illustrates the structural ageing within Brisbane city is largely differentiated by Inner, Middle and Outer ring suburbs. While those suburbs in Brisbane inner and middle declined, the outer ring suburbs gained the proportion of older people within SLAs over the decade. For example, Carseldine and Rochedale in the Brisbane outer area added its proportion by 7.71 percent and 4.93 percent respectively (Table 2). Fortitude Valley in the Brisbane inner region gained 4,692 older people over the decade 1996-2006 whereas its proportion sharply decreased by -16.5 percent from 22.5 percent in 1996 to 5.9 percent in 2006. Paralleled to the growth in structural ageing in Brisbane outer suburbs, its numerical ageing is also placed. These suburbs are Doolandella-Forest Lake and Central Pine West increased by 11,038 and 10,212 respectively (Table 2).

Insert both *Table 2* about here

Coastal-North and South suburbs

Suburbs in the South Coastal appear in a major growth which includes: Eagleby (6.8 percent), Redland (5.06 percent), Cleveland (4.65 percent) and Main Beach-South Stradbroke (4.35 percent) (Figure 3 and Table 2). Whereas Coolangatta experienced the second largest drop to 16 percent in SEQ, followed by and Bilinga-Tugun (-13.7 percent). In a numerical ageing perspective, it is Surfers Paradise that the biggest number loss amongst all SLAs in SEQ, experienced a total loss of 5,580 people over the decade. However Northern Gold Coast gained more numbers such as Kingsholme-Upper Coomera increased by 11,340 (Table 2). Comparing with the suburbs in Gold Coast many suburbs in Sunshine Coast in the northern corridor of SEQ gained a large number of older people (Figure 4). For example the highest gain in SEQ was made by Maroochy-Buderim in Sunshine Coast that equated to over 15,600 people.

Suburbs in Ipswich, Logan and Caboolture

Indicated that relatively lower proportions of older people lived within the local city council areas of outer Brisbane most of these areas exhibited a positive proportional growth (Figure 3). SLAs in the Logan sub-region gained the highest proportion growth in SEQ which include Logan (8.7 percent), Bethania (7.8 percent). Rothwell-Kippa-Ring and Deception Bay in the Caboolture sub-region also gained additional 4.91 percent and 4.86 percent respectively. Apart from this structural ageing the sub-regions of Ipswich and its surrounds, rural fringe and Caboolture-Pine Rivers also experienced a high growth in the absolute number of the older people followed by Ipswich-East (13,371 people) and Beaudesert (13,102 people). This local increase in the absolute number of older people is likely due to improvements in life expectancy and ageing in place.

Suburbs in Rural hinterland

The Rural hinterland suburbs show similar patterns in numerical and structural ageing to those discussed in Ipswich, Logan and Caboolture-Pine Rivers. All suburbs in the rural hinterland region have a positive proportion and number gain over the decade. In particular the suburbs with the highest quintile include: Caloundra-hinterland (5.35 percent), Beaudesert (3.43), Boonah (3.4), Laidley (3.32) and Gatton (3.28).

Local Indicators of Spatial Association of Older People

Although locational distribution of older people in Australia is regarded as an important public question, small areas with spatial and temporal changes remain unknown. The statistical analysis used in this study confirms the degree of ageing concentration is spatially different and the factors excelling influence on the changes in its spatial distribution are inherently complex.

Insert both *Figure 5* about here

Figure 5 illustrates only the SLAs with a statistically significant change. Five categories are used as: (1) high-high; (2) high-low; (3) low-low; (4) low-high; (5) statistically not significant (vacant). Most SLAs appear in the category of 'statistically not significant'. The level of spatial congregation (High-Low or High-High) and dispersal (Low-High or Low-Low) across SLAs are varied. In particular the areas with 'High-Low' show a spatial-temporal concentration on ageing population, known as *ageing island,* where ageing population extremely concentrated or isolated.

The High-Low areas of Brisbane outer ring, Logan, Caboolture and rural fringe suburbs such as Bethania-Waterford, Eagleby, Carseldine, Redland, Deception Bay and most Sunshine Coast SLAs need to pay particular attention to the provision of facilities and services for a regional ageing concentration. The *ageing island* (high-low) will place an ever increasing pressure on expenditure in terms of provision or maintenance of health and age care services in such areas. Our finding is consistent with Hugo (2007) who argued that older people will live at a greater distances from their children compared to previous generations. He stated that:

> "In the future the older people are likely to live in different areas that the current generation of older people. More will be in low density outer suburbs where accessing services is more difficult for older people that in higher density areas" (Hugo, 2007 p. 2).

Critical for policy and planning is developing an understanding of both spatial and temporal changes in addition to its local 'drivers'. A study shows living in a socio-economically disadvantaged area significantly increases the probability of premature death (Turrell et al., 2007). There are a number of suburbs such as Ipswich central, Carseldine and Doolandella-Forest Lake are newly developing under local government planning and strategies. In such areas numerical ageing will demand goods, services, and facilities oriented to meet the needs for an increasingly sophisticated and divers market of older people.

Conclusions

Overall this paper has highlighted that over the past decade, although there have been significant proportions of older people that inhabit the coastal regions, that these proportions have been declining, faced by increases in the Brisbane outer and rural hinterland region. Developing an understanding of the spatial and temporal dynamics of older people will in turn facilitate public policy formulation to assist a different level of the governments in maximising their capacities to accommodate the growth in locales of older people. For example, a region with a highly concentrated older population would require a different planning strategy and service provision by both the public and private sectors, involved in health service industry, retirement village industry, local government public transport plan, age care services provision and retail and shopping centre marketability. It is also interesting to know why they move or what makes them move to a particular suburb. However, the main focus of this paper is on structural or temporal changes in the patterns of distribution of older people and local ageing, not to test its causalities and correlations which has been the focus of other research (Hansen and Gottschalk, 2006; Stimson and Minnery, 1998).

The growing areas with a high proportion of older population should be provided with good footpaths, and close to public transport with bus stops, street seating and pedestrian crossings, near libraries, community halls, shopping centres and supermarkets, swimming pools and other sport and leisure facilities, and community services like medical centres and hospitals. The local planning requirements and infrastructure needs are crucial for its locational distribution as they choose ageing in place or moving to a new location for lifestyle gains. Increased numerical ageing in SEQ may place additional pressure on the existing infrastructure of public transport,

hospitals, nursing care and other social services. Local planning strategies should be formulated with regards to its target population group reflecting the structural and numerical ageing within its region.

Within the nine SEQ sub-regions we identified suburbs demonstrating rapid growth in structural as well as numerical ageing. We found that the increase of the number of older people in numerical ageing is not necessarily leading the structural ageing in SEQ. Mapping the spatial patterns of older people revealed that some areas are markedly different between changes in numerical and structural ageing. Identifying changes in both the numerical and structural ageing based in a small scale area is particularly useful for analysing ageing Australia. It appears to be a misperception with 'Ageing Australia' where people often believe one third of his/her neighbours will be a person aged 65 and over in 2040s (Productivity Commission, 2005). For instance, Inner and Middle suburbs in Brisbane will have a much less proportion of older population than those in outer ring suburbs and rural hinterland. However, areas such as Boonah, Laidely, Esk and Kilcoy where both structural and numerical ageing has rapidly progressed over time could lead to a high demand of care and nursing services and infrastructure provision. On the other hand the current concentration of older people in coastal areas of SEQ has tended to diffused to outer and hinterland areas. In particular there was a significant variation across SLAs in terms of ageing population growth and decline. Further investigation is now needed to address the question of whether the patterns of location change could result in a spill-over to neighbouring suburbs and if so what are the local drivers of these changes.

References

American Association of Retired Person (1996) Understanding Senior Housing: Survey of Consumer Preferences, Concernes, and Needs (Washington, DC)

Ansell, L. (1995). Local Indicators of Spatial Association – LISA. Geographical Analysis 27: 93-115.

Australian Bureau of Statistics (2008) *Population by Age and Sex, Australian States and Territories, 3201.0* (Canberra: ABS).

Australian Bureau of Statistics (2006) *Population Projections, Australia, 2004-2101, Catalogue, 3222.0* (Canberra: ABS).

Australian Bureau of Statistics (2006) *Australian Demographic Statistics*

Australian Bureau of Statistics (2004) *Sea Change New Coastal Residents*, *Australian Social Trends, 4102.0* (Canberra: ABS).

Barker, R. and Taylor, A. (2005) Myths about migration in Queensland: Are They Fact or Fiction?, Dialogue, *Academy of the Social Sciences*, **24**, pp. 38-52.

Baum, S., Mitchell, B. and Han, J (2008) Socio-economic performance across Australia's non-metropolitan functional labour market regions, Australia and New Zealand Regional Science Association International Conference, Adelaide, December 2008

Biggar, J. (1980) Who moved among the elderly?, *Research on ageing*, **2,** pp.73-91.

Brown, L. A. & More, E. G. (1970) The inter-urban migration process, A perspective, *Geografiska annaler*, **52**B, pp. 1–13.

Burgess R & Skeltys N, 1992,``Housing and location choice survey: an overview of findings", National Housing Strategy, Commonwealth of Australia, Canberra

Burholt, V. (1998). Pathways Into Residential Care: Service Use, Help and Health Prior to Admission. *Health Care in Later Life*, 3(1): 15-33.

Burnley, I. (2005) Sea change, social change? Population turnaround in New South Wales, Dialogue, Academy of the Social Sciences, 24, pp. 66-75.

Burnley, I. & Murphy, P. (2004) Sea change: movement from metropolitan to Arcadian Australia (Sydney: UNSW Press).

Chapman, N. & Howe, D. (2001) Accessory Apartments: Are They a Realistic Alternative for Ageing in Place?, *Housing Studies*, 16(5), pp. 637-650.

Costello, L. (2007) Going bush: the implications of urban-rural migration, *Geographical Research*, 45(1), pp. 85-94.

De Jong, U. (2002) Blairgowrie: the meaning of place, *Urban Policy and Research*, 20, pp. 73-86.

Gittins, R. (2005). Australia's demographic time bomb. *The Age,* September 21.

Olsberg, D. & Winters, M. (2005) Ageing in place: intergenerational and intrafamilial housing transfers and shifts in later life, AHURI Final Report, No.88, Melbourne

Doughney, J and king, J. (2006) Crisis? What crisis? Myth and reality in the debate on an ageing Australia, People and Place, 14(1), pp.65-75

Duggan, A. (2005) What a treechange? The Sunday Mail Magazine (19 June)

Fielding, A. (1989) Inter-regional migration and social change: astudy of south-east England based upon data from the longitudinal study, *Transactions of the Institute of British Geographers*, *New Series*, 14, pp. 24-36

Gurran and Blakely (2007) Suffer a Sea Change? Contrasting perspectives towards urban policy and migration in coastal Australia

Gurran, N., Squires, C. and Blakely, E. (2006) Meeting the sea change challenge: best practice models of local and regional planning for sea change communities, report for the National Sea Change Taskforce, Planning Research Centre, University of Sydney, Sydney.

Hansen, E. and Gottschalk, G. (2006) What makes older people consider moving house and what makes them move?, *Housing, theory and Society*, 23(1), pp. 34-54.

Hugo, G., Rudd, D. and Downie, M. (1984) Adelaide's aged population: changing spatial patterns and their policy implications, *Urban Policy and Research*, 2, pp. 17-25.

Hugo, G. (2007) Some spatial dimensions of Australia's future aged population: a demographic perspective, Ageing 2030- Creating the future, Parliament House Sydney, 30-31 October 2007.

Housing Industry Association (HIA) (2003) A Quarterly review of housing affordability, June Quarter 2004.

Lutz, W., Sanderson, W. and Sherbov, S. (2004) The End of World Population Growth in the 21st Century: New Challenges for Human Capital Formation and Sustainable Development, The international institute for applied systems, Analysis/Earthscan, London and Sterling, VA

Longgino, C. 1990 'Geographical distribution and migration' p.45-63 in Handbook of aging and the social sciences, edited by R. Binstock and L. George, San Diego, CA: Academic Press

Marshall, N., Murphy, P., Burnley, I. and Hugo, G. 2003, Welfare outcomes of migration of low-income earners from metropolitan to non-metropolitan Australia , final report, Australian Housing and Urban Research Institute (AHURI), MelbourneProductivity Commission (2005) The Economic Implications of an Ageing Australia, Research Report, Canberra

Spencer, D. (1995) Counterurbanisation: a local dimension, *Geoforum* 26, pp. 153-173

Stimson, R. and Minnery, J. (1998) Why people move to the 'Sun-belt': A case study of long-distance migration to the Gold Coast, Australia, *Urban Studies*, 35(2) pp.193-214.

Stimson, R. and McCrea, R. (2004) A push-pull framework for modelling the relocation of retirees to a retirement village: the Australian experience, *Environment and Planning A*, 36, pp.1451-1470.

Turrell G, Kavanagh A, Draper G and Subramanian, S, 2007. "Do places affect the probability of death in Australia? A multilevel study of area-level disadvantage, individual-level socioeconomic position and all-cause mortality, 1998-2000" *J Epidemiol Community Health* 61 13-19

Walmsley, D., Epps, W. and Duncan, C. (1998) Migration to the New South Wales North Coast 1986-1991: Lifestyle Motivated Counterurbanisation, *Geoforum*, 29, pp. 105-118.

Warnes, A. (1992) Age-related Variation and Temporal Change in Elderly Migration, in Elderly Migration and Population Redistribution: A Comparative Study Ed. A Rogers (Belhaven Press, London) pp 35-55.

Wolpert, J. (1965) Behavioral aspects of the decision to migrate, Paper and proceedings of the regional science association, 15, pp. 159–169.

Wolpert, J. (1966) Migration as an adjustment to environmental stress, Journal of social issues, 22(4), pp. 92–102.

Yates, J. (2007) Housing affordability and financial stress, National Research VentureL Housing affordability for lower income Australians, Research Paper No.6 (Sydney: AHURI).

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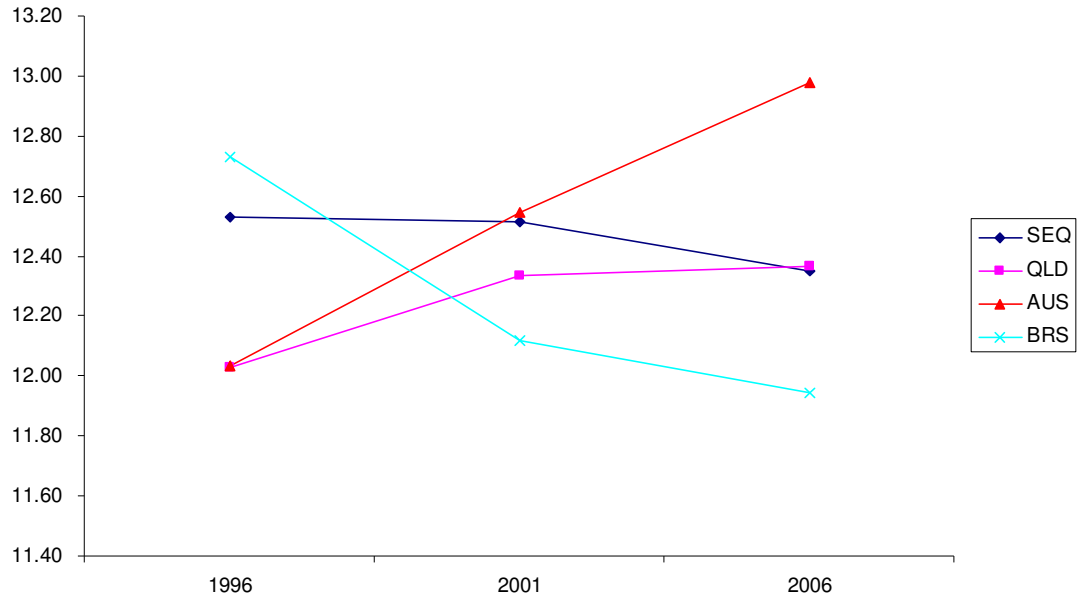

Source: ABS Census (1996, 2001, 2006); ABS No.3218.0 - Regional Population Growth, Australia, 1996 to 2006

Figure 2: Proportion of older people aged over 65 years and over in Brisbane, SEQ, Queensland and Australia: 1996-2006

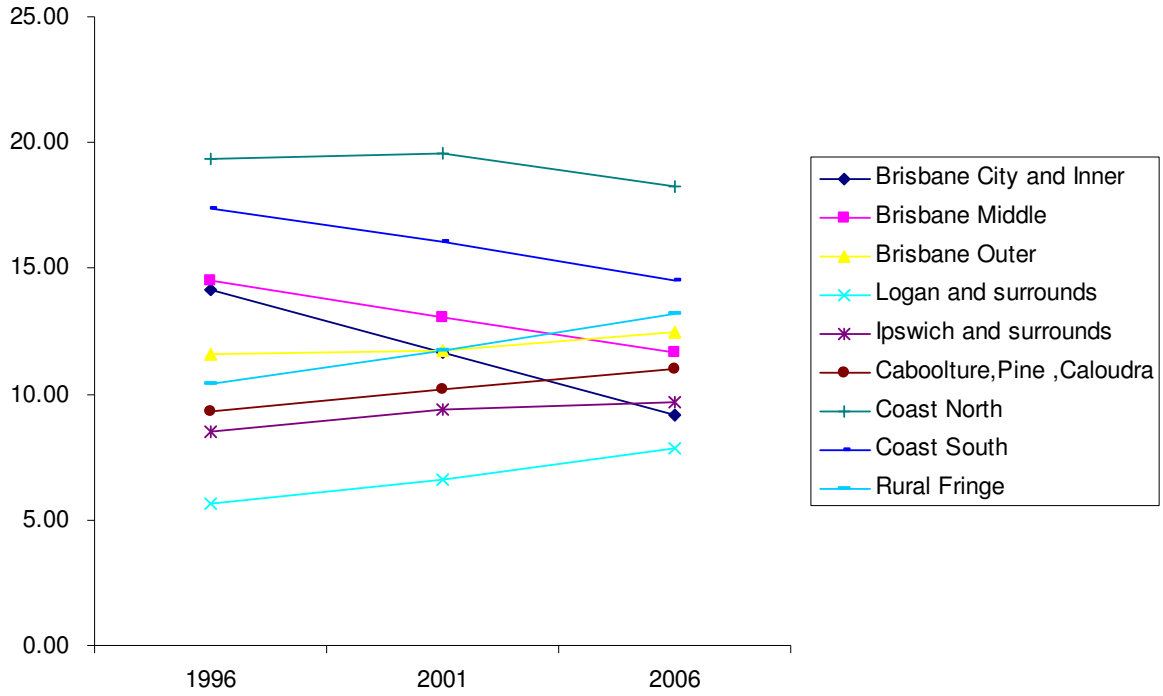

Figure 3: Changes in proportion of older people in sub-regions of SEQ

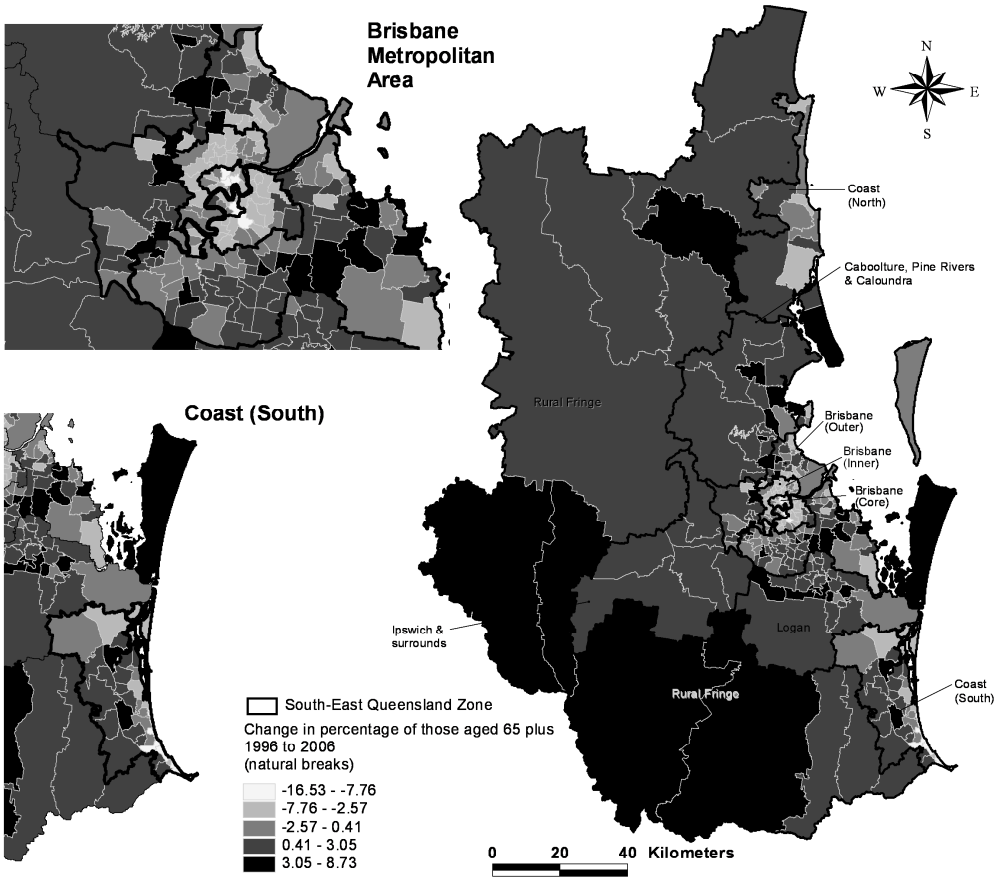

Figure 4: Changes in proportion of older people in SEQ from 1996 to 2006

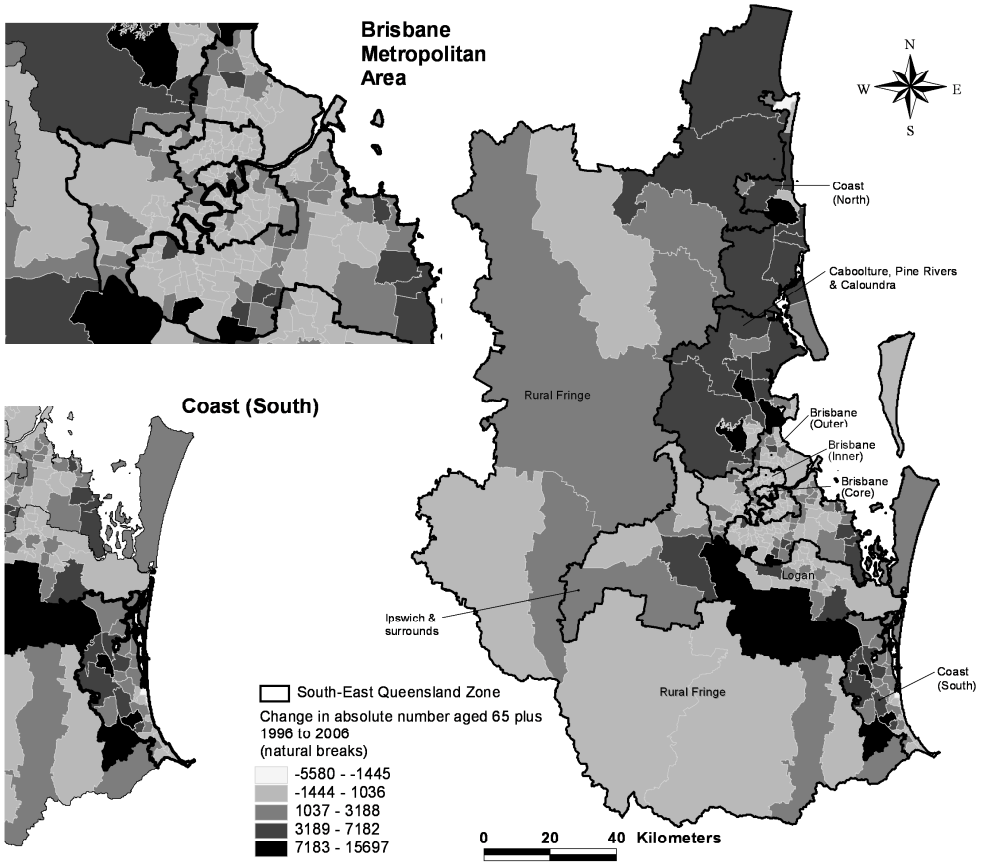

Figure 5: Changes in absolute number of older people in SEQ, 1996-2006

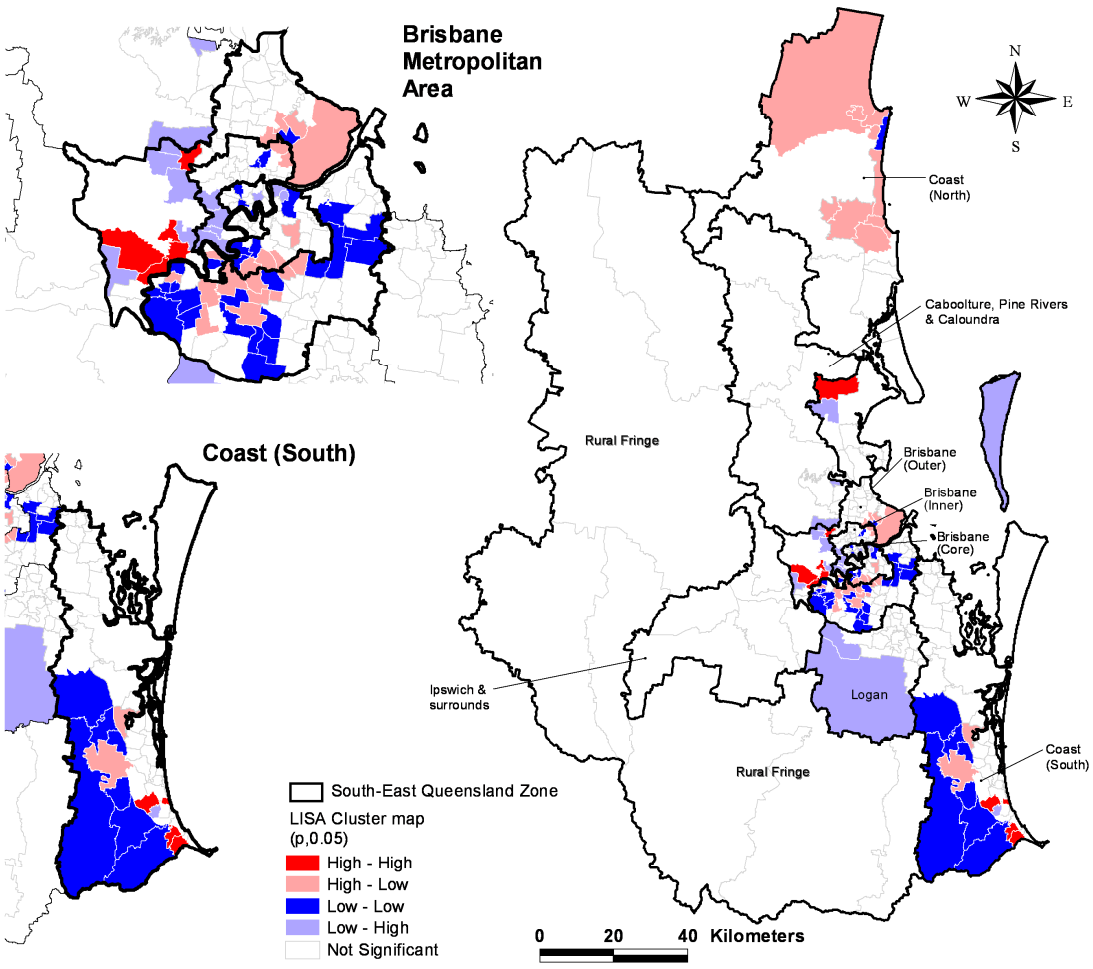

Figure 6: Changes in spatial congregation and dispersal in SEQ, 1996-2006

	1996		**2001**		**2006**		
Sub-region	65 and over % of SEQ	65+Total Number	65+Total % of SEQ	65+Total Number	65+Total % of SEQ	65+Total Number	% Change 1996-2006
Brisbane City and Inner	3.65	9765	3.11	9222	2.41	7696	- 21.2
Brisbane Middle	15.99	42761	13.50	40075	11.87	37993	- 11.2
Brisbane Outer	23.51	62878	24.13	71655	25.97	83097	32.1
Logan and surrounds	4.77	12760	5.42	16084	6.52	20859	63.5
Ipswich and surrounds	3.97	10607	4.06	12061	4.42	14153	33.4
Caboolture,Pine ,Caloudra	8.13	21749	8.92	26474	10.39	33248	52.9
Coast North	14.05	37568	14.79	43921	13.90	44486	18.4
Coast South	21.16	56592	20.94	62159	18.58	59450	5.0
Rural Fringe	4.76	12716	5.14	15251	5.93	18962	49.1
SEQ Total	100.00	267396	100.00	296902	100.00	319944	19.7

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Table 1: Summary of old population distribution in the sub-regions of SEQ

	Structural Ageing			**Numerical Ageing**		
	Statistical Local Area	SEQ region	Percentage Gain/Loss 1996-2006	Statistical Local Area	SEQ region	Number Gain/Loss 1996-2006
Top 10 Ranked Growth SLAs (Age 65yrs and over)	Logan (C) Bal	Logan and surrounds	8.73	Maroochy (S) - Buderim	Coast North	15697
	Bethania-Waterford	Logan and surrounds	7.80	Ipswich (C) – East	Ipswich and surrounds	13371
	Carseldine	Brisbane Outer	7.71	Beaudesert (S) - Pt A	Logan and surrounds	13102
	Eagleby	Logan and surrounds	6.80	Kingsholme-Upper Coomera	Coast South	11340
	Caloundra (C) - Hinterland	Rural Fringe	5.35	Doolandella-Forest Lake	Brisbane Outer	11038
	Redland (S) Bal	Brisbane Outer	5.06	Central Pine West	Caboolture, Pine ,Caloundra	10212
	Greenbank-Boronia Heights	Logan and surrounds	5.04	Mudgeeraba-Reedy Creek	Coast South	9755
	Rochedale	Brisbane Outer	4.93	Pacific Pines-Gaven	Coast South	9651
	Rothwell-Kippa-Ring	Caboolture, Pine ,Caloundra	4.91	Parkinson-Drewvale	Brisbane Outer	9433
	Deception Bay	Caboolture, Pine ,Caloundra	4.86	Griffin-Mango Hill	Caboolture, Pine ,Caloundra	8876
Bottom 10 Ranked Decline SLAs (Age 65yrs and over)	Fortitude Valley	Brisbane City and Inner	-16.53	Surfers Paradise	Coast South	-5580
	Coolangatta	Coast South	-16.01	Noosa (S) -Noosa-Noosaville	Coast North	-2435
	Bilinga-Tugun	Coast South	-13.79	Coolangatta	Coast South	-1747
	Herston	Brisbane City and Inner	-12.24	Broadbeach-Mermaid Beach	Coast South	-1725
	Burleigh Heads	Coast South	-11.85	Main Beach-South Stradbroke	Coast South	-1445
	Spring Hill	Brisbane City and Inner	-9.18	Herston	Brisbane City and Inner	-1103
	Broadbeach-Mermaid Beach	Coast South	-8.41	Maroochy (S) - Mooloolaba	Coast North	-916
	Palm Beach	Coast South	-8.39	Broadbeach Waters	Coast South	-779
	Woolloongabba	Brisbane City and Inner	-8.38	Rochedale South	Logan and surrounds	-742
	Greenslopes	Brisbane Middle	-8.01	Woolloongabba	Brisbane City and Inner	-729

Table 2: Top and bottom-ranking SLAs for structural and numerical change in population aged 65 years and over

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