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Further editorial assistance with this Research Monograph was provided by Steven Horton of the URP.
Summary of the Research Monograph

Background to the Research
This Research Monograph is a preliminary investigation of transport disadvantage and social status on the Gold Coast. The project was undertaken by Griffith University’s Urban Research Program in collaboration with the Gold Coast City Council. It is funded through a Griffith University Industry Collaboration Scheme grant. The pilot project is the first stage of a broader research program. Australian Research Council funding will be sought for more substantial investigation into the empirical and methodological issues identified by the project.

Scope of the Research
The first part of this pilot project involved a major literature and methodological review. The review is published by the Urban Research Program as a Research Monograph (2004). It draws on previous studies and methods used to investigate the relationship between transport systems and the spatial geography of various potentially disadvantaged socio-economic groups (Dodson et al., 2004). The Monograph finds social scientific literature supports the proposition that transport systems can exacerbate social disadvantage. It urges the further development of method(s) to examine the dynamics of transport, social status and disadvantage.

This Research Monograph builds on its predecessor. It undertakes a preliminary investigation of public transport and the spatial distribution of vulnerable social groups on the Gold Coast. It develops a methodology to account for a greater range of factors in the construction of transport disadvantage. In particular the study examines the combination of spatial and temporal access in public transportation.

Main Findings
The results of this project divide into empirical and methodological findings.

Empirical research finds:

- the simple presence of a public transport route is an insufficient indicator of accessibility.
- there is marked variation in public transport service access both spatially and temporally across the Gold Coast City urban area.
- areas that are better served, both spatially and temporally, by public transport are located close to the coastline between Burleigh and Southport.
- outer urban or fringe area locations areas are less adequately served by public transport.
- west-east public transport on the Gold Coast City is particularly weak.
• three areas within the Gold Coast City have particularly poor access to public transport services. The areas are: Hope Island and Coombabah, most of Nerang, Carrara-Merrimac and Worongary-Tallai, and the Elanora and Currumbin Waters area.
• a minority of households within the Gold Coast City have good spatial access to high frequency public transport services at all times of day across the week.
• some social groups have particularly poor access to good quality public transport services. For example, less than fifty per cent of the 15 years and younger age group had access to public transport services operating at intervals of less than 30 minutes.
• some disadvantage social groups – the aged and households without a car – have better than average access to public transport.
• outer-urban residents, particularly those along the western fringe of Gold Coast City are poorly connected to employment centres.
• access by public transport specifically to employment and health services for residents of areas in the west and south west of the Gold Coast is constrained.
• the study did not investigate the institutional dimensions of spatial and temporal access to public transport however these deserve further separate investigation.

Methodological dimensions:

• data limitations required most of the analysis be undertaken at the Collection District level. Within a CD the density of population can vary widely. Many CDs are, therefore, coarse units of analysis.
• buffer distances of 400m and 700m are used as reasonable access distances for bus routes and train stations, respectively.
• assessment of the spatial and temporal ‘coverage’ of the public transport system is complicated by current geographic information systems and geographic data boundaries. In assessing coverage the study used the ‘centroid’ method whereby the population of a CD is deemed served by public transport if the district’s geometric centre falls within the buffer zone.
• employment and activity data is not available at a quality and spatial precision required for accurate analysis of employment and spatial patterns.
• the data and analytical techniques used in the study operate at such a coarse spatial scale that a number of highly concentrated areas of social disadvantage are subsumed within larger less concentrated areas. Social disadvantage, in effect, is sometimes diluted.
• currently available data sets are unable to furnish sufficient information to enable calculations of transport stress. Dedicated data collection would be required for such calculations.
• combining and representing spatial, social and temporal variables remains highly problematic both in terms of data manipulation and presentation of the results in an easily comprehended format.
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1. Introduction

Context for the Research

This Research Monograph is the second part of a pilot study into transport disadvantage and social status undertaken by the Urban Research Program (URP) and the Gold Coast City Council (GCC). Part one of the study was a literature and methodological review, available as an URP Research Monograph (Dodson et al., 2004). The present monograph reports the empirical and methodological findings of a study of the Gold Coast region. The purpose of the study is to investigate and field test important conceptual and methodological concerns identified in the literature review. The results reported here are, it is important to note, from a pilot study and thus contain much preliminary and methodological discussion. While a number of novel and important insights into different social groups across the Gold Coast and their relative access to transport services are presented, the broader significance of the research is to be found in the study’s methodological conclusions.

The literature and methodological review investigated the interrelationships between the location of various socio-economic groups and their access, via the transport system, to other activities and services. It concluded the concentration of socio-economically disadvantaged individuals or households in specific areas within cities can result in their being excluded from broader social, economic and political opportunity. This effect is particularly prominent in inner city locations in the United States. In Australian cities, however, disadvantaged areas are more likely to be located on the urban fringe.

The first Monograph also concluded the spatial concentration of social disadvantage may subsequently place households at a disadvantage relative to employment or services, and that transportation systems play an important role in mediating these accessibility dynamics (Dodson et al., 2004). Motor vehicles and/or high quality public transport can help the socio-economically disadvantaged overcome access restraints; but similarly, poor public transport, or excessive costs of owning and operating a private vehicle can restrict opportunities and effective services.

The literature review found few empirical or conceptual studies, either in Australia or internationally, of social status and transport disadvantage (Dodson et al., 2004). It also found the integration of socio-economic status into conventional transport research method(s) to be poor. The present Research Monograph is situated in this conceptual and empirical gap. Its task is to develop, in the context of the Gold Coast, appropriate concepts and methods to investigate the relationship(s) between socio-economic disadvantage and transport services.
Broader Research Issues

The research issues that frame the investigation of socio-spatial disadvantage and transport in the context of specific urban locations are:

- How is the distribution of socio-spatial disadvantage related to the distribution of access to transport services within metropolitan areas?

- How does poor access to employment and services impact upon the opportunities of socio-economically vulnerable groups?

- What methodological issues impede the capacity of urban researchers to investigate the links between social status and transport disadvantage?

- Can methodological advances be made which can better illuminate the issues of social status and transport disadvantage?

- What data deficiencies impede a comprehensive understanding of the links between social status and transport disadvantage?

Pilot Study Research Questions

The above issues frame an extensive field – too great for a pilot study. The present study, therefore, restricts itself to the Gold Coast City, and to a single mode of transport (i.e. public transport). In this context the initial research questions are:

1. How are different social categories of individuals and households distributed across the Gold Coast metropolitan area?

2. What is the gross spatial coverage of the public transport system on the Gold Coast, relative to the distribution of social disadvantage?

3. How does the coverage of the public transport system vary with time and how does this variation impact on the transport opportunities of different social groups?

4. How do the spatial and temporal variations in public transport impact access to employment and services on the Gold Coast?

5. To what extent can we assess the spatial distribution of household transport costs in the Gold Coast?

6. What conceptual and methodological insights into the investigation of transport disadvantage and social status are derived in the pilot study?

7. How can research and method(s) be further developed to refine understandings of transport disadvantage and social status?
Structure of this Monograph

The study report is in eleven Chapters.

Chapter One sets out the research questions.

Chapter Two is a contextual survey of the Gold Coast. The main lineaments of the survey are urban structure and the overall transport network. The section closes with an overview of the spatial distribution of socio-economic status.

Chapter Three briefly reviews the methods used to create data. It further examines types of data and the use of the Geographic Information System (GIS). Different methods of public transport coverage are also discussed.

Chapter Four presents broad socio-economic patterns and ‘gross’ public transport coverage. Areas with high concentrations of particular social characteristics are identified and gross access to bus routes or train stations estimated. In the estimate of gross access, frequency and time of service(s) are not included.

Chapter Five examines the variation by space and time of weekday and Saturday bus services. It assesses a general frequency coverage for the undifferentiated population of the Gold Coast (variation by socio-economic group is explored in the following Chapter). It identifies Gold Coast areas with high frequency bus service; and those with no bus service.

Chapter Six derives frequency coverage for different socio-economic groups. It investigates whether people living in areas with high socio-economic disadvantage or high unemployment have adequate access to public transport services. Time of the day and operating frequency are included in the definition of adequacy.

Chapter Seven complements Chapter Six. It is also concerned with the frequency of public transport; but estimates coverage as a proportion of defined population group. The production of empirical profiles for each socio-economic group, for each period of the day, allows the relative disadvantage of groups to be assessed.

Chapter Eight adds a new focal point to the study. It uses journey-to-work information in a preliminary assessment of public transport service for spatial concentrations of occupational or industry type. The variation of public transport service - this time from selected socio-economic locations to areas of tourist and health service employment - by time of day and frequency is estimated.

Chapter Nine introduces the notion of ‘transport stress’. It finds the methodological difficulties associated with developing a measure of transport stress (given the limitations of existing sources of socio-economic and transport data) restrictive.
Chapter Ten details the major findings of the study. It is in two parts. Part one, reviews the empirical results of the analysis of public transport and socio-economic disadvantage. Part two identifies issues of method requiring attention in subsequent projects.

Chapter Eleven concludes the monograph with a summary of the pilot case study as a whole. It derives directions and opportunities for further research.

**Limitations of the Study**

As part of a *pilot* study the investigation is exploratory and methodologically attentive rather than definitive and universally conclusive. Further, because of resource limitations, the focus is on the *public* transport system, rather than the total road and transport network. This lack is a substantial omission. Nevertheless, given the growing role of public transport in social, economic and environmental planning policy, the study, even in its limitation, is important. In the end, the task of the pilot study is to contribute to: the understanding of transport and social status in Australia; and to the capacity of urban research to inform important policy debate.
2. Study Area Description

Introduction
This Chapter presents an economic and social profile of the Gold Coast City. It establishes a base for subsequent analysis. The Chapter is primarily descriptive. It details the following characteristics of the Gold Coast: urban structure, population distribution, transport network, demographic and socio-economic patterns (e.g. age of residents, housing conditions, employment and car ownership). The demographic and socio-economic patterns are discussed expanded detail.

Urban Structure
The Gold Coast is a ‘linear city’. Framed by the Queensland coastline it forms around the Pacific Motorway (Figure 1), and covers approximately 1,400 square kilometres (www.goldcoast.qld.gov.au). Typically, it consists mostly of low-density detached dwellings, with a minimal amount of medium and high-density apartments and units clustered along the coast. The high-density apartments are concentrated in the Surfers Paradise area - a tourist and retail centre of the Gold Coast. Over the years improvements to the Pacific Motorway have opened access to the north. Many Gold Coasters now commute daily to Brisbane. There is no single dominant activity centre on the Gold Coast; rather a number of activity concentrations are located along the urban coastal strip. They include Southport, Surfers Paradise, Coolangatta, Broadbeach and Burleigh Heads. For the purposes of this monograph, this coastal area (including western areas such as Nerang) is called the Gold Coast Urban Area, while Beenleigh and Eagleby to the north of the Gold Coast are referred to as the Beenleigh Urban Area.

The Gold Coast City has grown rapidly in recent years. There has been a significant increase in job opportunities in key regional areas such Broadbeach, Nerang, Southport, Coolangatta and Helensvale (QLD Transport, 2001; Stimson, 1998). The emergence of an ‘industrial corridor’ along the Pacific Motorway between Ormeau and Beenleigh has also increased employment demand. However access to these areas is primarily by private not public transport. Gold Coast housing is largely concentrated in a suburban area to the west of the high-density coastal strip, between the Gold Coast and Pacific highways. It is an area of predominantly low-density detached dwellings, in many places interlaced with a network of waterways. Beyond the Pacific motorway a semi-rural and rural hinterland stretches off to the west.

Initial property investment in the Gold Coast focused on Southport. In time, road development opened access to cheaper land and, more significantly, a boom in tourism drew investment focus south to Surfers Paradise. This was more than a directional shift. The distribution of employment centres, and their consumer goods and services, consequent on residential demand, now take
second place to the investment and public policy needs of Surfers Paradise and the tourist industry (GCCC, 1998).

A 1998 employment study found 46 percent of all jobs are located in traditional centres, 27 percent are generated in specialist employment nodes, and the other 27 percent are dispersed throughout the region (GCCC, 1998). The key regional centres (of over 250,000 people) were identified as Beenleigh, Southport and Robina. Smaller regional centres (100,000 – 250,000) are located at Coomera, Nerang, Broadbeach, Burleigh and Coolangatta (Figure 1). Projected employment distribution for 2011 confirms the status of the three existing key regional centres, but shows a decline in employment in Coomera. Increases are expected in the coastal areas of Surfers Paradise, Mermaid Beach, Miami and Mermaid Waters. Growth is also predicted in the inland areas of Gaven and Mudgeeraba (GCCC, 1998).

Population
The large Gold Coast population is growing rapidly. The 2001 Census records 441,736 people as living in the Gold Coast City (2004a). The population of Gold Coast City grew by 16,099 between 2002 and 2003. This represents a 3.7 percent increase for the year; 0.2 percent higher than the previous year. The 2002-03 numerical increase was the second largest increase for any Local Government Area (LGA) in Australia. Only Brisbane LGA (938,384 persons) had a larger gross population increase; of 20,808 people or 2.3 percent (GCCC, 2004b). Between 2003 and 2021, the population of the Gold Coast is expected to increase from 455,743 to 700,404 - an increase of 35 percent or a quarter of a million people (GCCC, 2004c).

Gold Coast population growth is fuelled by northward migration to Sunbelt locations. These patterns have been predominantly away from the cooler, more industrialised cities of the south to developing tourist cities and coastal towns of northern New South Wales and South East Queensland (Taylor, 2004). It cannot be assumed migrants reflect the general population profile. It is more likely they form distinctive socio-economic groups (e.g., retired).

Transport Network
The linear run of the Gold Coast City is served by two major arterial roads running north to south. The Pacific Motorway, an inter-state motorway, is located inland from high-density coastal areas. The Gold Coast Highway runs along the coastline serving Southport, Surfers Paradise, Broadbeach and Burleigh Heads, before joining the Pacific Motorway at Coolangatta in the south. Lateral roads, but not many, run west to east connecting the two major routes. These routes include Southport Road and Gooding Drive (Figure 1).
Figure 1: Suburbs of the Gold Coast
The linear road pattern on the Gold Coast is reflected in its public transportation. The dominant direction of services is north-south. There are relatively few east-to-west connections. The main routes operate from Paradise Point to Tweed Heads running at least twice an hour during the week; and once an hour over the weekend. There are other north-south routes providing an hourly service for the majority of the day. A few lateral routes cross the Pacific Motorway to the west and continue further inland. Low population levels, uneven topography, cul-de-sac and incremental street development have, however, resulted in inland Gold Coast areas being poorly served by bus. The majority of services run once per hour and even less frequently on the weekend. Only 15 percent of the 1.65 million trips per day on the Gold Coast are work-related. The other 1.4 million occur mostly outside peak times (QLD Transport, 2001). Service coverage and frequencies are addressed in greater detail in Chapters 4 to 7.

Rail services are new to the Gold Coast. A line from Beenleigh to Robina opened in 2001. The line follows the Pacific Motorway route at a distance from the populated coast of Surfers Paradise and Broadbeach. The coverage of the Gold Coast rail line is limited by the number of stations. The average distance between stations is approximately 10km, whereas the average separation between stations in the Beenleigh Urban Area and Brisbane is 1km. The main function of the rail line south of Beenleigh is the transport of commuting workers to Brisbane. Future plans to extend the rail link to Coolangatta Airport (QLD Transport, 2001) would improve patronage on the line, and provide a stronger link with the southern regions of the Gold Coast and the hinterland.

Overall, the Gold Coast public transport system best serves the commute to and from key regional centres, and tourists travelling to and from theme parks. People not located along major transport routes have difficulty in accessing regular public transport services, especially on weekends. The lack of east-west connections is a significant mobility restraint.

**Age Structure**

Consistent with Australian demography the Gold Coast City population is ageing. The baby boom is well into middle-age, people are living longer and reproduction is declining. The proportion of Gold Coast City residents aged 55 and more is projected to rise from 23.9 percent of the resident population in 2001 to 31.7 percent in 2021 (GCCC, 2004d).

The 2001 Census counted 33.1 percent of permanent residents in Gold Coast City as young people aged less than 24 years old. The young population count in Queensland is 35.6 percent and in Australia as a whole 34.5 percent (GCCC, 2004e). Along with Queensland and Australia the proportion of young people in Gold Coast City is declining. It is projected to fall to under 30 percent by 2021.
Employment and Unemployment

Employment patterns are changing in Australia. Part-time and casual work, although still a lesser category, is replacing full-time and permanent employment. At the time of the 2001 Census, 59.1 percent of residents in Gold Coast City were employed in the labour force (GCCC, 2003). As is to be expected, given the above average proportion of (retired) older people, the number of workers in the Gold Coast City labour-force is below the social average. The respective figures are 61.3 percent for greater Queensland and 60.3 percent for Australia. Gold Coast employment is characteristically private sector in nature and tourist-related in sector. Unsurprisingly, perhaps, part-time employment is slightly higher (35.5 percent of employed persons) compared to greater Queensland (32.7 percent) (GCCC, 2003).

Unemployment levels are, in an Australian context, markedly higher. In 2002, 9.8 percent of the GCC labour force was unemployed; compared to 8.3 percent in Queensland and 7.4 percent in the nation as a whole. Overall, there were approximately 19,000 people aged 15 and over in the labour force but unemployed. In short, about 10 percent of the Gold Coast population are unemployed youth (GCCC, 2004a).

Parts of the Gold Coast have exceptionally high unemployment. In 2001, more than 20 percent of the Eagleby and Bilinga labour force were unemployed. Cities and coastal locations tend to have higher levels of unemployment and welfare dependency. They are also home to their less traditional households such as one parent families, couples without children and people living alone (Taylor, 2004).

Income

Household income in the Gold Coast lags, marginally, behind Queensland and Australia. The median weekly household income recorded for Gold Coast City is $700. This is lower than the median income of Queensland ($742) and Australia ($786) (GCCC, 2003). At the high end of the income scale, 28.5 percent of GCC households reported incomes of $1,000 or more, compared to 31.1 percent for Queensland. At the other end, 38 percent of households recorded incomes of $599 or less, compared to 35.8 percent for Queensland (GCCC, 2003). The depressed income of the Gold Coast, which says nothing about wealth, can be partly attributed to the high number of retirees and others who have escaped to the ease of the seaside (Taylor, 2004).

The Gold Coast has several areas of low income (again, not to be necessarily conflated with poverty – a category mainly of wealth). In 2001, in the Beenleigh Urban Area in the north, in centrally located Coombabah and Labrador, and in Palm Beach, Bilinga and Coolangatta to the south, over 30 percent of households earned less than $400 per week. In addition, there are isolated concentrations of low income households in Surfers Paradise and Broadbeach.
Housing

The Gold Coast is an area of private housing. The 2001 Census counted 95,000 private dwellings. The average household size for occupied private dwellings decreased from 2.63 persons in 1986 to 2.43 persons in 2001 (GCCC, 2003). The highest level of private home ownership is in the central and hinterland areas of the Gold Coast. This pattern is linked to the relative level of two parent families with children (GCCC, 2004a). High-density apartment areas such as Surfers Paradise, Broadbeach, Mermaid Beach, Coolangatta, and other areas along the coast have low levels of home ownership. Main Beach is an exception to the trend.

In 2001 there were 10,145 persons renting 4,321 State housing dwellings in the Gold Coast City. There is significantly less public housing in Gold Coast City (2.5 percent) compared to Queensland (3.5 percent) and Australia as a whole (5.2 percent). The number of publicly owned dwellings has, however, slowly increased - from 2,668 dwellings in 1991 to 4,321 dwellings in 2001 (GCCC, 2003). In 2001 the median rent on the Gold Coast was $175 per week. This is substantially higher than the rate for Queensland ($149) and Australia ($153).

Some 51,000 households who rented private dwellings on the Gold Coast reported both their income and rent in the 2001 Census. An estimated 18,500 households (35.9 percent) had incomes of less than $600 per week and spent more than 30 percent of this on rent. This level of defined ‘housing stress’ (see GCCC, 2003) is substantially higher than in Queensland (28.3 percent) and Australia (26.7 percent) (GCCC, 2003). In Coolangatta, Palm Beach, Paradise Point, Bilinga, Tugun and Labrador more than 40 percent of households were living with ‘housing stress’.

‘Low cost rental dwellings’ are defined by rents of less than $150 per week. In parts of Beenleigh over 37 percent of dwellings are ‘low rent’. Other low rent areas are found in Labrador, Southport and the Reedy Creek-Somerset. The last result is surprising as Reedy Creek-Somerset is, in the round, an area of high income. Low rent living is also found in Hope Island, Main Beach, Gaven and Robina. There is some correlation between low cost dwellings and low-income households. Low rent accommodation is associated with public housing in the Ernest-Molendinar, Stephens and Worongary-Tallai (GCCC, 2004a).

Car Ownership

The vast majority of households on the Gold Coast have at least one motor vehicle. In the 2001 Census only 9.1 percent of households had no car; 40.9 percent owned one car, 31.4 percent had two cars and the remaining 10.4 percent had three or more motor vehicles (GCCC, 2003). Inner city or high-density areas close to public transport routes, such as Broadbeach, Mermaid Beach, Palm Beach, Southport and Surfers Paradise, had the highest proportion of households without a car (ranging between 13.5 percent and 22.9 percent). Beenleigh, a low income area to the north, distant from the high-density axial of Surfers Paradise and Broadbeach, also had low car-
ownership. Households with two or more cars were found away from urban centres, in the predominantly rural hinterland (GCCC, 2003).

SEIFA
The SEIFA Index (Socio-Economic Index for Areas) measures relative disadvantage. The scale consolidates a number of census variables. On the Gold Coast the areas of highest disadvantage are Eagleby, Beenleigh, Stephens, Labrador and Bilinga. Pockets of Surfers Paradise and Palm Beach also shows as highly disadvantaged. Coombabah and Southport are areas of very high disadvantage; while Hope Island, Broadbeach Waters, Mermaid Waters-Clear Island Waters, Robina and the hinterland are areas of relative advantage.

Conclusion
This Chapter has outlined the demographics of the Gold Coast City and provided background data for future analysis. It shows the Gold Coast City to be primarily a linear city that is growing rapidly. The area attracts a significant migrant flow. Its population is, on the whole, older that the state and national norm. Public transport routes reflect the linear, north-south city. Few services run east to west. Employment, traditionally structured around the retail and service sectors, now includes significant tourist-related employment. Some areas have high rates of unemployment. Income is slightly lower than for Queensland as a whole.
3. Methods

Introduction
This technical Chapter sets out the methods used to analyse spatial and temporal transport disadvantage. It opens with a brief review of selected studies of public transportation access. It continues with an introduction to Geographic Information Systems (GIS) and public transport analysis. It concludes with consideration of the types of data (and their basic transformations) used in the study.

Selected Studies
Murray et al. (1998) analysed pubic transportation access in South East Queensland. Their analysis was at the basic level of the simple geography of the service. Useful as a rough index of accessibility, it does not take into account additional dimensions such as time and quality of service. Wu and Hine (2003) incorporate different periods of the day, but do not differentiate between the days of the week and the weekend. Cheal (2003) distinguishes ‘transport rich’ and ‘transport poor’ areas in Melbourne on an index of service quality that incorporates frequency of route and the capacity for multidirectional travel at different periods of both work day and weekend. The index is mapped with socio-economic census data and the relationship between transport difference and social difference examined. The present study follows Cheal (2003) in both form(s) of output and categories of input (e.g., buffer, frequency, week, weekend).

GIS and Public Transport Analysis
GIS stores, classifies and displays datasets. Depending on the quality of the data and the flexibility of the software, GIS can display basic information such as the spatial coverage of the public transport network, or generate sophisticated multivariate analyses (Dodson et al., 2004). The great benefit of GIS is its ability to combine spatial and aspatial data.

The ‘buffer’ is the basic GIS input in determining access to public transport. In GIS terminology a ‘buffer’ is a ‘setback’ drawn around a particular object at a given distance. In this study it defines a catchment area of access to public transport. For buses the ‘buffer’ is described at a distance of 400m from the route; a radius of 700m is used for rail transport with the station as the centre. The 400m buffer for bus routes is the convention used in earlier Australian and international studies. It represents a comfortable walk for most people under normal circumstances. The Regional Transportation Plan for South East Queensland specifies a policy goal of at least 90 percent of the total population within 400 metres of a bus, rail or ferry stop.

Once fundamental physical access has been determined, GIS can add dimensions such as frequency of service, time and comfort. Such inputs are data dependent.
ABS and SEIFA Data

The Australian Bureau of Statistics (ABS) Census and its derivative SEIFA (Socio-Economic Indexes for Areas) are published in a format readily input into GIS programs. This study makes particular use of ArcView and MapInfo to analyse datasets and map the results. The ABS Census, counted every five years, covers Australia at several different geographic levels. This study uses selected socio-economic data from the 2001 Census determined at the level of the Collection District (CD). A drawback of data at the CD level is that the sizes of the CD vary from location to location (e.g. the CDs are smaller in Surfers Paradise than in areas further away from the densely populated coastline). It also uses the SEIFA Index of Disadvantage derived from Census data. The SEIFA Index, determined at CD level, combines income, unemployment, skill level and other variables to reflect disadvantage in the form of a comparative index. SEIFA has been criticised as being insensitive to individual circumstance. The present study does not address this perceived shortcoming.

Public Transport Data

GIS datasets for public transportation were obtained from Department of Main Roads and the Gold Coast City Council. The data represents the spatial distribution of bus and rail networks, including the locations of stops. There is no temporal data. Basic temporal data was compiled from timetables on the Translink transport agency website (www.translink.com.au). This is used to estimate service frequency by period of day by public transport mode for selected areas of the Gold Coast.

Centroid and Intersect Methods

Employment data excepted, the socio-economic data of the study is aggregated, in space, at the level of the ABS Census CD. The overlap of CD data and the ‘public transport buffer’, for buses a catchment of 400m either side of the route, defines base public transport coverage. There are two ways to estimate overlap. The centroid method consolidates CD data, usually differentiated by socio-economic dimension, at the geometric centre of the space. If the centroid falls within a ‘public transport buffer’ the whole population, or constituent group, of the CD are deemed covered. If the centroid falls outside the zone the consolidated population is deemed not to be served. In contrast, the intersect method includes the population of the entire CD as covered if any part of the CD falls within the public transport buffer. Both methods are clumsy and discontinuous. The intersect method, structurally indiscriminate, tends to overstate service coverage. Statistical spread, on the other had, tends to smooth the errors of centroid estimation (i.e. illegitimate inclusions tend to balance illegitimate exclusions). It, consequently, is the preferred method of this study.
Disadvantaged Groups

Previous studies found a number of social groupings were most likely to suffer transport disadvantage (Dodson et al., 2004; Denmark, 1998; Wu and Hine, 2003). These groupings include low-income people, the unemployed, beneficiaries, youth and children, women, the elderly, disabled people, outer-urban dwellers and ethnic minorities. Other categories of relevance are: households in low rent housing, households with low mortgage payments (a proxy for cheaper owner-occupied housing) and households that do not own a motor vehicle.

This study, constrained by time and resources, uses the following socio-economic groupings:

- total population of the Gold Coast (as a basis for comparison);
- resident in areas with a low score on the SEIFA Index of Disadvantage;
- unemployed persons;
- households paying less than $150 rent per week;
- households paying less than $600 mortgage per month;
- people under 15 years old;
- people over 65 years old;
- households without a car.

Employment Data

ABS employment is collected at the level of the Statistical Local Area (SLA). The SLA is larger than the CD. Consequently, the analysis of employment and access is relatively coarse.

The base employment datum is gross employment concentration. These are derived from ABS Census data.

In addition, two occupational categories are distinguished. The first is a composite of retail employment and accommodation, cafes and restaurant employment. The ABS ‘retail’ category includes food retailing, personal and household retailing and motor vehicle sales. The ABS category of ‘accommodation, cafes and restaurant’ aggregates employment in accommodation, pubs, taverns, bars, cafes, restaurants and hospitality clubs. Together the two categories account for the bulk of employment in the tourist industry and in this study their composite is called: ‘tourist employment’.

The second occupation distinguished in the study is ‘health and community services’. This ABS category includes workers in hospitals and nursing homes, medical and dental centres, veterinary services, and childcare and community services. The category is used as a proxy for the location of healthcare services. On this basis the public transport access of disadvantaged groups to health services is estimated.
Conclusion
The introductory overview is concluded. Both the Gold Coast setting and the methods of analysis have been reviewed. The study now turns to empirical research.
4. Socio-Spatial Patterns and Gross Public Transport Coverage

Introduction
The goal of this Chapter is to present a discursive overview of selected socio-economic groups and their access to public transport. A description of the distribution of the total Gold Coast population sets the context. Subsequently, patterns of disadvantage and gross public transport coverage are described for the following demographic categories: SEIFA Index, unemployment, low rent household, low mortgage households, young people, old people and households without a car.

Total Population
Five areas on the Gold Coast have high numbers of people (approximately 1,500 people per CD). The first two, Biggera Waters and Coombabah, are in close proximity at the northern end of the Gold Coast Urban Area. Closer to the high-density concentration of Surfers Paradise, part of Southport also has approximately 1,500 people. The two other areas with large populations are Nerang in the west and Currumbin in the south. The public transport buffer covers all of Coombabah, Southport, Nerang and Currumbin (Figure 2). Biggera Waters has less coverage, but is bordered by an east-west run of the Gold Coast Highway.

The others areas on the Gold Coast with over 1,000 people per CD are widely scattered. It is surprising the Surfers Paradise - Broadbeach pivot appears not to have the highest number of people. This, however, may be a spatial quirk of CD definition, rather than a reflection of the number of people living in the area. The Beenleigh Urban Area also failed to record (expected) high population numbers. The majority of the areas in the north have mid population levels. Surfers Paradise and the Beenleigh Urban Area are both covered by the public transport buffer.

SEIFA
Beenleigh and neighbouring Eagleby, a major portion of the Beenleigh Urban Area, have very high levels of SEIFA disadvantage. The area is well served by train, with four stops located in the immediate vicinity. Overall, it is better served than coastal areas. The bus routes tend to run parallel to the train line and the Pacific Motorway. This adds to the disadvantage of suburban areas located away from the motorway.

Southport and Labrador have a high level of social disadvantage. They are, however, almost entirely covered by the 400m buffer of the bus routes. Temporal coverage (i.e., time of day, frequency) is investigated later in the study.
Figure 2: Gross coverage for the total population
Nerang, located to the west of Surfers Paradise and proximate to the Pacific Motorway, is another area with high levels of disadvantage. For the most part, it too is adequately served by public transport. However, the northern part of Nerang, bordering the Nerang State Forest, lacks public transport. Suburban Nerang is hilly and the roads are typically dead-end cul-de-sacs with very low interconnectivity. In short, this makes a difficult environment for public transport to operate effectively.

There are several smaller areas scattered through the Gold Coast with high levels of disadvantage and no public transport service. These areas include Upper Coomera, Varsity Lakes, Merrimac, Palm Beach and Coolangatta.

**Unemployment Rate**

The Main Beach-Surfers Paradise-Broadbeach coastal strip, the core of Gold Coast tourism, has low unemployment. Coombabah, north of Labrador, and the area immediately to the south of Southport, however, have unemployment rates of over 37 percent. The majority of Coombabah is poorly served by public transport. The area south of Southport falls wholly within the bus buffer. Labrador, to the north of Surfers Paradise, has high unemployment but, as noted earlier, good (gross) public transport coverage. The areas of Nerang with high unemployment are covered by the bus buffer. In addition, many disadvantaged areas are proximate to Nerang station – and its train service. An area between Benowa and Carrara, to the west of Surfers Paradise, has a high unemployment rate but, again, is covered by the bus route buffer.

Unemployment in Varsity Lakes and Stephens, close to Bond University, ranges between 8 and 37 percent. The agglomeration of students likely inflates the rate. The public transport buffer does not cover all of Varsity Lakes, but the areas of high unemployment (> 14 percent) were more adequately served than areas of lower unemployment. On the southern Gold Coast, Burleigh Heads and Coolangatta recorded unemployment rates between 14 and 37 percent. A bus buffer covers the coastal margins of the area. Locations immediately inland are not served by public transport.

There is high unemployment inBeenleigh and Eagleby. Public transport cover in this northern area is mixed. Bus routes and train stations provide access to more than half of Beenleigh and Eagleby but the other parts fall outside the buffer zone. Unemployment in the Coomera region, along the Pacific Motorway, is high. The region is predominantly rural with a low population. The Pacific Motorway is a major public transport route. There are also two train stations in the area. Rural areas to the south of the Gold Coast Urban Area had moderate unemployment rates. Transport cover was mixed.

**Rental Households <$150 per week**

Labrador and Southport, echoing previous proxies of disadvantage, have a high percentage of low cost rental households. Gross spatial cover by bus service is, as recorded earlier, very high. In Oxenford, located to the west of
the Pacific Motorway, 60-80 percent of rental dwellings are less than $150 per week. Public transport service is mixed with some areas of Oxenford falling outside the buffer. In Nerang, also west of the Pacific Motorway, the rent for between 60-80 percent of (rental) dwellings is less than $150 per week. As with the mapping of the SEIFA Index, Nerang is generally well covered by the public transport, although the area close to the Nerang State Park has no service.

In Molendinar, between Surfers Paradise and Nerang, between 80 and 100 percent of renters pay less than $150 per week. A large portion of the area is not served by transport. Cul-de-sac road patterns dominate this area, making flowing public transport service difficult. In Varsity Lakes, a student area as its name suggests, the rent for between 60-80 percent of rental dwellings is less than $150 per week. Some areas of Stephens and Varsity Lakes fall outside the 400m public transport buffer making the commute to the university difficult. West Burleigh also has a high index of low rent housing, although the gross number of households is small. Several parts of the Beenleigh Urban Area have 80-100 percent of renters paying less than $150 per week. In Beenleigh, these areas are (spatially) covered by bus and rail services. Many parts of Eagleby, however, fall outside of the public transport buffer.

**Households with Mortgage Repayments <$600 per month**

The majority of households on the Gold Coast pay over $600 per month in mortgage repayments. Areas with a high percentage (between 80 and 100 percent) of households paying less than $600 per month are located in Surfers Paradise, Burleigh Heads, Tugun and Coolangatta. These areas are covered by the (bus) public transport buffer. Parts of Beenleigh also fall in the category of low (mortgage) cost accommodation. There are, as already noted, three train stations in the area, with bus service being largely restricted to the Pacific Motorway. All the areas of Beenleigh and Eagleby where between 80 and 100 percent of households are paying less than $600 a month on their mortgage are covered by public transport. Similar households in other areas are not.

**People Under 15 Years Old**

Reflecting the high population count, there are over 1,250 people less than 15 years of age in Coombabah and Nerang. Both areas are largely covered by the 400m public transport buffer, while most Nerang residents have (700m) access to the railway station. Other areas of the Gold Coast with a high number of young people are Biggera Waters, Ashmore and Currumbin. The public transport buffer of 400m covers most of these areas. The Coombabah, Palm Beach-Currumbin and Nerang High Schools fall within, respectively, the Biggera Waters, Currumbin and Nerang SLAs. This may account for the high count of young people.
People Over 65 Years Old

Similar, again, to the results for the total population, and for people under 15 years old, the two areas with the most people over 65 are Coombabah and Nerang. These areas are covered by the public transport. Coolangatta has the next highest number of people over 65. Only one constituent CD falls outside the 400m buffer. Most of the other areas with a high number of people over 65 are located along the coast. Overall mapping indicates people over 65 years old (the aged) are more evenly distributed through the Gold Coast than people under 15 years old (the youth). This variation should be considered when planning the tempo of public transport service.

Households Without a Car

Most households on the Gold Coast have at least one car. Parts of Beenleigh have a very high percentage (30-40 percent) of households without a car. Public transport coverage, as has been noted, extends over almost the whole area. Southport, too, has concentrations of households without a car – in some areas between 20 and 30 percent and others between 30 and 40 percent. Again, gross spatial coverage by public transport is good.

Surfers Paradise and Broadbeach also include areas of relatively low car ownership. This, however, may be less related to disadvantage and more to high density living and adequate public transport. This urban form continues south to Palm Beach and Coolangatta, where between 10 and 30 percent of households do not own a car.

Nerang was the only other area on the Gold Coast to contain concentrations of households without a car. The greater part of Nerang where between 20 and 30 percent of households do not own a car is covered by the 400m buffer. A small part is not.

Conclusion

This Chapter has started to develop a spatial image of disadvantage in the Gold Coast. Beenleigh, Eagleby, Labrador, Coombabah, Southport and Nerang are names that repeat in the proxies of disadvantage. Most of these areas fall within the gross public transport buffer of 400m for bus and 700m for train. Initial analysis suggests public transport routes are, in the case of buses, attracted to social disadvantage; and in the case of space-hungry train stations attracted by social disadvantage (and cheap land).

As well as route location in space, however, the quality of public transport has an equally important temporal dimension. The following Chapter takes up this dimension - defined by service frequency and time of day.
5. Space-Time Coverage of Public Transport Routes

Introduction
The temporal dimension of public transport is represented in three different ways. The analysis first separates the frequency data into four levels to measure service on a discontinuous scale from high through mid-frequency to low frequency and no service. Service is also divided by four periods of the day to identify peak and off-peak access. Finally, frequency and period of service is distinguished for weekday(s) and Saturday. Sunday, the weekly holiday, albeit under threat, was excluded from the analysis.

The categories of service frequency used in the analysis are:

- at least every 15 minutes (high frequency)
- at least every 30 minutes (mid-frequency)
- service interval of more than 30 minutes (low frequency)
- no service

The time periods used in the analysis are:

- start of service to 9:30am (morning peak)
- 9:30am until 3:00pm (daytime inter-peak)
- 3:00pm until 7:00pm (evening peak)
- 7:00pm until the end of service (evening off-peak)

Weekday AM
On weekday mornings high frequency public transport, operating at least every 15 minutes, covers Surfers Paradise and Broadbeach, extending northwards along the edge of Southport and Labrador (Figure 3). High frequency service is also available on the Gold Coast Highway in a westerly direction to Helensvale. Other areas with high frequency coverage are located around train stations, operating a 15-minute interval service in the morning. Train stations are located in Robina, Nerang, Helensvale and Coomera. In northern areas public transport, including rail service, at not more than 15 minute intervals, covers much of Beenleigh as part of the Brisbane metropolitan commute.

Beyond the coastal core, a ribbon of lower frequency services, operating at an interval more than 15 but less than 30 minutes, runs in linear fashion along the sections of the Gold Coast Highway not covered by high frequency services. Areas proximate to lateral, east-west roads, from coast to Pacific Motorway, are also covered by the lower frequency service.

Three large areas of the Gold Coast have inadequate public transport - with no service operating less than every half hour (Figure 3). These areas are Hope Island and Coombabah to the north of the coastal urban area, most of Nerang, Carrara-Merrimac and Worongary-Tallai, to the west of Surfers
Paradise, and Elanora and Currumbin Waters to the south. Smaller areas with no service during weekday mornings are located on the coast. These include parts of Southport, Surfers Paradise and Mermaid Waters-Clear Island Waters. Areas south of Beenleigh, along the Pacific Motorway, also fall into the ‘no service’ category.

**Weekday Inter-peak**

In most areas public transport frequency declines during the middle of the day. Gold Coast Highway from Main Beach - Surfers Paradise to Palm Beach is the exception. On inter-peak weekdays it continues to offer high frequency service at least every 15 minutes (Figure 4). Other high frequency morning services are discontinued during the daytime. Services on the northern route to Helensvale operate at a lower frequency, as do train services along the Gold Coast line. The Beenleigh Urban Area also has reduced high frequency services during this period.

As might be expected, the frequency of service in many areas with services operating at least every 30 minutes during the morning, decline thereafter to an interval of more than 30 minutes. Examples include parts of Southport, Broadbeach Waters and Robina. Other areas, however, predominantly to the north of Surfers Paradise, retain their service coverage. As do Hollywell, Runaway Bay and Labrador. The majority of areas with no service in the morning remain with no service during the day.

Inter-peak public transport in the larger areas of the Gold Coast is characterised by a service interval of greater than 30 minutes or no service. The areas extending from Surfers Paradise to Nerang in the west and from Southport to Robina fall into this category. This absence of high frequency services creates an enormous gap in adequate public transport coverage, making travel without a car difficult for Gold Coast residents.

**Weekday PM**

Public transport service frequency during the afternoon and early evening period improves, but does not recover to the levels of the morning commute. The coastal strip from Main Beach and Surfers Paradise to Palm Beach maintains its high frequency service. Afternoon peak services operate at least every 15 minutes along this linear corridor. High frequency coverage returns to Robina, Nerang and Beenleigh as the frequency of rail services increase in the late afternoon, bringing home commuting workers from Brisbane. The Helensvale and Coomera stations, however, do not return to high frequency service.
Figure 3: Frequency coverage during the weekday morning period
Figure 4: Frequency coverage during the weekday inter-peak period

LEGEND

Service Frequencies
- At least every 15 minutes
- At least every 30 minutes
- Greater than every 30 minutes
- No Service

Urban Areas
Statistical Local Areas

Data used in the creation of this map was sourced from ABS 2001 Census Boundaries. Public transportation data was sourced from Queensland Transport and modified to reflect changes up until the end of 2004.
The majority of areas covered by services operating at least every 30 minutes during the midday period retain that frequency through the afternoon and into early evening. In few areas of Southport, Surfers Paradise and Parkwood the frequency of service improves in the afternoon peak. Mudgeeraba, to the west of Robina, and Mt. Warren Park (adjacent to Beenleigh) increase service frequency to at least every 30 minutes. The rest of areas with services operating at an interval of more 30 minutes remained unchanged through the afternoon.

The three major areas, identified as having no service or services operating at an interval of more 30 minutes, also remain unchanged through the day. These are the Hope Island and Coombabah area, the Nerang, Carrara-Merrimac and Worongary-Tallai area and the Elanora andCurrumbin Waters.

**Weekday Off-peak**

Put simply, on the Gold Coast no public transport services operate at a frequency of at least every 15 minutes after 7:00pm on weekdays. The best off peak service operates at least every 30 minutes off-peak. The main elongated coastal strip from Main Beach and Surfers Paradise to Palm Beach falls into this category, as does the Gold Coast Highway corridor along the edge of Southport and Labrador to Helensvale (Figure 5).

Many areas, covered by services operating at least every 30 minutes during the afternoon, suffer a reduction of service to off-peak intervals of more than 30 minutes. Robina, Parkwood, Hollywell and Runaway Bay fall into this category. Parts of Helensvale and Mt. Warren Park suffer a greater loss of service - changing from having services operating at least every 30 minutes during the afternoon to having no service after 7:00pm.

In general, Gold Coast public transport is inadequate in the evening, with most areas have no service at all.

**Saturday AM**

A small area of Helensvale enjoys public transport at least every 15 minutes on Saturday morning. It serves the major (tourist) theme parks. The majority of Beenleigh, to the north, is served by public transport at least every 30 minutes as is almost the entire coastal strip from Paradise Point and Hollywell in the north to Coolangatta in the south. Mid-frequency service is also available on the northern section of the Gold Coast Highway (as it travels east-west), around the Nerang train station and between Broadbeach and Robina.
Figure 5: Frequency coverage during the weekday off-peak period
Areas with transport operating less than every 30 minutes and with no service occupied the remainder of the Gold Coast. Similar to the weekday findings, notable areas with poor public transport coverable included Hope Island and Coombabah, Nerang, Carrara-Merrimac and Worongary-Tallai, and Elanora and Currumbin Waters.

**Saturday Inter-peak**

On Saturday, unlike the work day, public transport frequency increases after the morning start. Inter-peak Saturday service in the coastal area from Main Beach and Surfers Paradise to Palm Beach is available at least every 15 minutes. Many other areas are covered by services running at least every half hour. These areas include Beenleigh, Helensvale, from Paradise Point to Southport, and from Palm Beach to Coolangatta. Mid-frequency service is also available on the two east-west routes from the Gold Coast Highway to: Helensvale and, further south, Robina. The remaining areas are interspersed with coverage operating less than every 30 minutes or with no service.

**Saturday PM**

Saturday service changes little into the late afternoon. The coastal area along the Gold Coast Highway continues to enjoy the highest frequency service. Areas with lower frequencies and no service are also very similar, if not identical. The three major areas with no service (the Hope Island and Coombabah area, the Nerang, Carrara-Merrimac and Worongary-Tallai area and the Elanora and Currumbin Waters area) are also easily identifiable.

**Saturday Off-peak**

The highest frequency public transport service offered on Saturday evening operates at least every 30 mins. Only Beenleigh to the north (approaching Brisbane) and the coastal strip from Main Beach and Surfers Paradise to Palm Beach Two area enjoy such service. A few other areas are served at an interval of more than 30 minutes. The majority of the Gold Coast has no public transport after 7:00pm on Saturday.

**Conclusion**

The Gold Coast has one spatial and one functional concentration of high frequency public transport. The spatial concentration, as might be expected, is found along the coastal strip from Surfers Paradise to Palm Beach. The other discontinuous or functional area is determined by the location of train stations at Robina, Nerang, Helensvale, Coomera and Beenleigh. The high frequency train service is not as consistent as the bus service of the coastal core. It is not maintained during the inter-peak period and the afternoon peak does not match morning levels at all stations.

The other discovery of the frequency analysis is the major discrepancies in the coverage between different periods of the day and between the week and Saturday. Overall, the highest level of service occurred on the weekday
morning commute. Frequency declined during the day, improved slightly for the workers journey home, and became non-existent after 7:00pm. During the off-peak (inter) period large areas had no service at all. From weekday to weekend overall service declined. Saturday service peaked after morning and, generally, maintained its (low) level until late afternoon when it ceased.
6. Space-Time Coverage of Public Transport Routes with Socio-Economic Characteristics

Introduction

This Chapter combines the temporal and spatial dimensions of Gold Coast public transport with its geography of social disadvantage. The task is to identify areas of high social disadvantage poorly served by public transport. The descriptive analysis uses the social categories of Chapter Four: total population, individuals with a low SEIFA level, unemployed people, low cost rental and mortgage households, young and old people, and households without a car. In the mapping of public transport only services operating at least every 15 and 30 minutes are indicated. Areas with lower frequency or no service may be inferred for the areas outside these buffer zones.

Total Population

The socially undifferentiated population is, for the purposes of this analysis, considered at its density extremes. The first pole consists of areas with a large number of people. These areas are Biggera Waters and Coombabah, Southport, Nerang, and Currumbin and Ashmore. Sparsely populated Molendinar, Carrara, Andrews and parts of Robina constitute the other pole.

Weekday AM

All of the areas with high population levels are served to some extent at least every 30 minutes by public transport. Southport is the only area with total spatial coverage. The other areas have partial coverage, meaning people outside the 400m buffer need another mode of travel to access public transport service. Some residents in Biggera Waters have access to a bus service operating at least every 15 minutes along the Gold Coast Highway.

Sparsely populated Molendinar, Carrara, Andrews and parts of Robina are all partially served by public transport operating at least every 30 minutes. Again substantial distances would have to be travelled by some residents in order to access public transport.

Weekday Inter-peak

As services operating at least every 15 and 30 minutes decline during the midday inter-peak period, so does the coverage of high population areas. None of the highly populated areas have access to high frequency services operating at least every 15 minutes during the inter-peak period; and only Coombabah, Biggera Waters and Southport are covered by services running at least every 30 minutes. The remaining areas of Nerang, Ashmore and Currumbin are covered by services operating less than every half hour or not at all.

Coverage in lowly populated areas also declines during the inter-peak period. Only selected parts of Robina are covered by services running at least every
30 minutes - to the Robina Town Centre shopping mall. Molendinar, Carrara and Andrews are reduced to default coverage - access to services operating less than every 30 minutes or no service.

**Weekday PM**

The afternoon brings little change in services operating at least every 15 and 30 minutes. Once again the highly populated areas of Coombabah, Biggera Waters and Southport are covered by services running at least every 30 minutes, while Nerang, Ashmore and Currumbin are served at intervals of more than half hour. Services improve around the sparsely populated Robina, with the addition of a bus route operating at least every 30 minutes. Services operating at this frequency also cover a small part of Molendinar.

**Weekday Off-peak**

On weekdays Gold Coast service frequency decreases dramatically after 7:00pm. There are no services operating at least every 15 minutes and only three routes operate at least every 30 minutes. Biggera Waters, located along the Gold Coast Highway corridor between Helensvale and Labrador, is partially covered by a service operating at least every half hour. All of the other areas irrespective of population level are reduced to default coverage of no service or service at intervals of more than 30 minutes.

**Saturday AM**

The level of service on Saturday morning is low. Of the highly populated areas, only Biggera Waters is covered by public transport operating at least every 30 minutes. Coombabah, Southport, Nerang, Ashmore and Currumbin are without effective service - running at least every half hour. Of the more sparsely populated areas, Robina is partially covered by services operating at least every 30 minutes. Molendinar, Carrara and Andrews have no effective service.

**Saturday Inter-peak & PM**

There is some improvement in high frequency service - operating at least every 15 minutes. This change, however, occurs outside the areas being analysed. For areas of high and low population Saturday service remains constant into the afternoon.

**Saturday Off-peak**

The off-peak period on Saturday is similar to the off-peak period during the week. Biggera Waters, located along the Gold Coast Highway, however, loses service operating at least every 30 minutes. In the end, none of the areas included for analysis, whether with a high or low population, have access to effective public transport.
**SEIFA**

Six Gold Coast areas - Beenleigh, Helensvale, Labrador and Southport, Nerang, Stephens, and Palm Beach and Coolangatta were identified with low SEIFA scores, indicating high levels of socio-economic disadvantage.

**Weekday AM**

Overall, high frequency services operating at least every 15 minutes on the Gold Coast are not common. Beenleigh has one high frequency service and one operating at least every 30 minutes. Several parts of Beenleigh, however, have bus stops and no depicted coverage, indicating that services at intervals of more than 30 minutes (Figure 6). Helensvale compromises of a mix of medium to high disadvantage on the SEIFA Index. It is served by the high frequency bus service travelling to Surfers Paradise and Broadbeach. Other parts of Helensvale are covered by services operating at least every 30 minutes, while yet others have no effective public transport service.

The Labrador and Southport areas of social disadvantage are served by the high frequency route from Helensvale to Broadbeach. Secondary routes running at least every 30 minutes serve the area to the west. Several parts of Labrador and Southport, however, only have access to services operating at intervals of more than half an hour or no service at all (Figure 6). Nerang is covered by much lower levels of service. There are no high frequency services, and coverage by a bus route operating at least every 30 minutes is marginal. The majority of people in Nerang must wait for services operating at an interval of more than half an hour. To the south, the area of Stephens is covered by services operating at least every 30 minutes, as is the majority of Palm Beach and Coolangatta. In several areas to the west of Coolangatta service is reduced to an interval of more than half an hour.

**Weekday Inter-peak**

Coverage in Beenleigh declines during the weekday inter-peak period. During this period some of Beenleigh is covered by a single service operating at least every 30 minutes, while the majority of Beenleigh is only served by public transport at intervals of more than half an hour. Public transport coverage in Helensvale also declines during the day with the discontinuation of the high frequency service to Surfers Paradise and Broadbeach. This leaves Helensvale poorly served by one route operating at least every 30 minutes, with the rest of the area relying on service at intervals of more than half an hour. The cessation of the high frequency Surfers Paradise route also affects highly disadvantaged people in Labrador and Southport. While the majority of the area is covered by services operating every 30 minutes, the frequency of some of these services reduces during the inter-peak, resulting in parts of Southport being inadequately covered.
Figure 6: Coverage of SEIFA areas during weekday mornings
Nerang’s poor weekday morning service deteriorates in the midday. No bus service operating at least every 15 or 30 minutes runs remotely close to Nerang. The only option for transit-dependent residents is the train. Public transport services running through the disadvantaged areas of Stephens also reduce in frequency in the middle of the day. As a result people in Stephens can only access services operating at intervals of more than 30 minutes. Coolangatta retains a service operating at least every 30 minutes, while a high frequency service extends south from Broadbeach to Palm Beach, allowing travel along the coastal highway.

*Weekday PM*

In the areas under consideration there is little change from midday to late afternoon. While Beenleigh gains a service operating at least every 30 minutes to complement the existing one, the area to the north of the Gold Coast region remains poorly served by public transport (Figure 7). Service level in Helensvale remains constant, with only one service operating at least every 30 minutes. Residents of Helensvale living outside this buffer face a substantial wait for a bus. Frequency coverage also remains similar in Labrador and Southport, where much of the area is covered by afternoon services operating at least every 30 minutes. Coverage in Nerang, Stephens, Palm Beach and Coolangatta is also constant from midday through afternoon. Some parts are served by public transport at least every 30 minutes, while the rest face an interval wait of more than 30 minutes.

*Weekday Off-peak*

There are no high frequency services operating at least every 15 minutes on the Gold Coast after 7:00pm on weekday evenings. Services running at least every 30 minutes are also limited. In sum, the Gold Coast does not encourage evening travel by public transport. Bus services operating at least every 30 minutes run along the coastline between Surfers Paradise and Palm Beach, and also inland from Surfers Paradise to Helensvale. All of Beenleigh, Helensvale, Nerang, Stephens and Coolangatta, with low SEIFA levels, either have access only to services operating at intervals greater than a half hour or have no service at all. Labrador and Southport are bounded by the east-west route along the Gold Coast Highway to Helensvale. As a result some parts of these areas are covered by public transport operating at least every 30 minutes. Most of Labrador and Southport, however, do not have adequate public transport service. Likewise Palm Beach is covered by the coastal bus service operating at least every 30 minutes, but the route does not extend further south to Coolangatta.
Figure 7: Coverage of SEIFA areas during weekday afternoons
**Saturday AM**

The Gold Coast offers few Saturday morning services operating at least every 15 or 30 minutes. The only high frequency service (< 15 mins) is in Helensvale with focal termini at the rail station and the nearby tourist theme parks. As a result a substantial part of Helensvale is covered by high frequency service. Western parts, however, fall outside the buffer zone. There is little early morning public transport activity in Labrador and Southport. One route, along the Gold Coast Highway, runs at least every 30 minutes. The remaining areas away from the coast have either services operating at a lesser frequency (wait in excess of 30 minutes) or no service at all. Beenleigh, Nerang and Stephens are not covered by higher frequency services running at least every 15 or 30 minutes, making public transport travel difficult. Palm Beach and Coolangatta are covered by a north-south coastal route that operates at least every 30 minutes, although areas away from the coast in this southern region of the Gold Coast have very low frequency service or no service.

**Saturday Inter-peak & PM**

Saturday coverage improves with the day. Nevertheless, there are no buses running at least every 15 or 30 minutes in the Beenleigh Urban Area. Public transport, at least every 30 minutes, on the northern section of the Gold Coast Highway serves Helensvale and, to the south, the Labrador and Southport areas of disadvantage. In Nerang, west of the Pacific Motorway, service remains constant. The mapped area is not covered by either depicted operating frequency, indicating if there are bus services for Nerang, they are operating at an interval of more than every half hour. Train service out of Nerang station, however, is available. The areas of Stephens with high disadvantage are not covered by adequate services. The only area with public transport operating at a high frequency, of least every 15 minutes, is the coastal strip from Main Beach and Surfers Paradise to Palm Beach. The route serves the highly disadvantaged area of Palm Beach; but in Coolangatta, further to the south, service reduces in frequency - to at least every 30 minutes.

**Saturday Off-peak**

There is no high frequency bus service on the Gold Coast after 7:00pm on Saturday. Of the six main areas identified with high disadvantage, only part of Palm Beach is covered by services operating at least every 30 minutes. All of the remaining areas, Beenleigh, Helensvale, Labrador and Southport, Nerang, Stephens and Coolangatta are either covered by services operating at an interval of more than every half hour or have no service.

**Unemployment**

The areas of high unemployment identified for analysis are the Beenleigh and Eagleby area, Coombabah, Labrador, Palm Beach and Coolangatta, and parts of Nerang and Stephens. The public transport patterns in these areas very similar to those observed on the SEIFA base. Brief discussion will, therefore, suffice.
**Weekday AM**

In the Beenleigh Urban Area, both Beenleigh and Eagleby have high levels of unemployment. Beenleigh is well covered by two bus services, one operating at least every 15 minutes and the other operating at least every 30 minutes during weekday mornings. Eagleby (adjacent to Beenleigh) has no high or medium frequency service (at least every 15 or 30 minutes). Parts of Coombabah, located north of Labrador and inland from Runaway Bay, are covered by services operating at least every 15 minutes (on the Gold Coast Highway route) and at least every 30 minutes (on the route to Paradise Point). A large part of Coombabah, however, has no adequate service.

Labrador is partially covered on weekday mornings by the high frequency service running along the Gold Coast Highway on its periphery, and by other services operating at the lower frequency of at least every 30 minutes. On the southern coast, the Palm Beach and Coolangatta areas of high unemployment are covered in the morning by public transport running at a frequency of at least every 30 minutes. The parts of Nerang with high unemployment have limited bus coverage, while those of Stephens are covered by services operating at least every half hour.

**Weekday Inter-peak**

High frequency coverage declines during the day. The parts of Beenleigh with high unemployment with high frequency morning service are reduced to one route operating at least every 30 minutes. Eagleby remains poorly serviced. The frequency on the route running along the northern part of the Gold Coast Highway declines from at least every 15 minutes to at least every 30 minutes, reducing coverage in Coombabah and Labrador. The two areas lose all high frequency coverage but retain some services operating at least every half hour. Palm Beach, where there was no high frequency service in the morning, now gains an inter-peak one. Coolangatta is covered with routes operating at least every 30 minutes. Nerang has no service running at least every 15 or 30 minutes, while only parts of Stephens do.

**Weekday PM**

Overall, frequency coverage remains similar to the inter-peak period. Beenleigh, Coombabah, Labrador, Coolangatta and Stephens retain services operating at least every 30 minutes, while Palm Beach is covered by a high frequency service. Eagleby and Nerang have no services operating at adequate frequency (at least every 15 or 30 minutes).

**Weekday Off-peak**

On a weekday evening there is no high frequency public transport on the Gold Coast. Small parts of Coombabah, Labrador and Palm Beach are served by public transport running at least every half hour. The other areas with high unemployment, Beenleigh and Eagleby, Nerang, Stephens and Coolangatta, either have routes operating at an interval of more than 30 minutes or no service.
**Saturday AM**

On Saturday morning the only high frequency service is in Helensvale. It, however, is not one of the identified major areas of high unemployment. Limited parts of Coombabah and Labrador have access to public transport operating at least every 30 minutes, as do Palm Beach and Coolangatta. The remaining areas of Beenleigh and Eagleby, Nerang and Stephens are poorly covered.

**Saturday Inter-peak & PM**

Again the high unemployment areas of Beenleigh and Eagleby have no services operating at least every 15 or 30 minutes, while parts of Coombabah and Labrador have some service running along the Gold Coast Highway. The majority of these two areas, however, are not covered. On Saturday afternoon and into the evening public transport in Palm Beach improves to high frequency service. The Coolangatta service continues to operate at an interval of not more than 30 minutes. Parts of Stephens are also covered by services operating at least every 30 minutes. Nerang has no adequate service.

**Saturday Off-peak**

There are very few services operating off-peak on Saturday. The coastal strip from Main Beach and Surfers Paradise to Palm Beach is covered by bus services running at least every 30 minutes. All the remaining areas of interest have no adequate service.

**Rental Households <$150 per week**

Low rent areas were identified in Beenleigh and Eagleby, Nerang, and smaller parts of Helensvale, Labrador and Tugun.

**Weekday AM**

Beenleigh and Eagleby have some of the highest percentages of households with rent under $150 per week. Eagleby is not covered by adequate services operating at least every 15 or 30 minutes. A high frequency route along the Pacific Motorway covers Beenleigh. This route serves Brisbane rather than the Gold Coast. Public transport from Beenleigh to the central Gold Coast is difficult. Likewise there are train services but they do not connect to the Gold Coast core of Surfers Paradise. Nerang has a high percentage of low cost rental households, and very limited coverage by weekday morning services operating at least every 30 minutes.

Parts of Helensvale and Labrador have high levels of low rent accommodation. These areas are covered by high frequency services on the northern part of the Gold Coast Highway. The other areas of Helensvale and Labrador are covered by bus services running at least every 30 minutes. The inland part of Tugun, located between Palm Beach and Coolangatta, is one of the few areas with a high level of low rent accommodation and no public transport operating at least every 15 or 30 minutes.
Weekday Inter-peak
Again, bus service frequency declines during the day after the weekday morning peak. Beenleigh service declines to just one service operating at least every 30 minutes. Eagleby, with no adequate public transport in the morning, does not improve. Nerang, with just one morning bus operating at least every 30 minutes in the morning, loses this service. Helensvale and Labrador, containing areas of concentrated low rent accommodation, are covered by bus services operating at least every 30 minutes. Tugun again has no adequate service.

Weekday PM
The frequency pattern echoes that of the inter-peak period. Beenleigh and small corridors of Helensvale and Labrador are served by buses operating at least every 30 minutes. Nerang, Stephens and Tugun have services operating at intervals greater than every 30 minutes or no service at all.

Weekday Off-peak
Parts of Labrador are served by buses operating at least every 30 minutes. All other areas with a high percentage of low rent households have services operating at lesser frequencies or no service at all.

Saturday AM
High frequency service is limited on Saturday morning to Helensvale. The Labrador service operates at least every half hour. Nerang, Stephens and Tugun have services operating at lesser frequencies or no service.

Saturday Inter-peak & PM
Through the day into late afternoon Helensvale is served by buses running at least every 30 minutes, as are parts of Labrador bordered by the Gold Coast Highway. Service in Beenleigh and Eagleby, Nerang, Stephens and Tugun is, at best, at intervals of more than half an hour. At worst there is no service.

Saturday Off-peak
On Saturday evening the only service operating at a frequency of at least every 30 minutes runs along the coastline from Main Beach and Surfers Paradise to Palm Beach. This coastal contains no areas identified with high levels of low rent accommodation. All these areas have services operating at intervals in excess of 30 minutes or no service at all.

Households with Mortgage Repayments <$600 per month
Beenleigh in the north, around the Pacific Fair shopping area, and, in the south, Burleigh Heads and Coolangatta have been identified as areas with a high percentage of households paying less than $600 per month on their mortgage. The limit roughly equates to rental costs of $150 per week.
**Weekday AM**

During weekday mornings, the high percentage of households with mortgage repayments under $600 per month in Beenleigh are well covered by bus services operating at least every 15 and 30 minutes. High frequency buses running every 15 minutes also serve the Pacific Fair area, located just inland from Broadbeach. During the morning Burleigh Heads and Coolangatta, in the southern Gold Coast, are covered by services operating at least every 30 minutes.

**Weekday Inter-peak**

Throughout the midday inter-peak period most of Beenleigh is served by mid range frequency services - operating at least every 30 minutes. The Pacific Fair area, with its shopping, continues to be served by high frequency buses. High frequency coverage extends south to include Burleigh Heads. South along the coast, Coolangatta service remains unchanged - operating at least every half hour.

**Weekday PM**

There is, again, little change through midday into the afternoon. Pacific Fair and Burleigh Heads continue to be covered by high frequency services operating at least every 15 minutes. The Beenleigh and Coolangatta bus service is unchanged, with a frequency of at least every 30 minutes.

**Weekday Off-peak**

After 7:00pm the high frequency public transport of Pacific Fair and Burleigh Heads are replaced by a service operating at least every 30 minutes along the coastline from Main Beach and Surfers Paradise to Palm Beach. The service of Beenleigh and Coolangatta also declines a grade – to buses at intervals greater than 30 minutes or no service at all.

**Saturday AM**

None of the very few services operating at least every 15 minutes on the Gold Coast on Saturday mornings cover any of the four areas of interest. Pacific Fair, Burleigh Heads and Coolangatta are covered by services operating at least every 30 minutes. Beenleigh has services at intervals greater than every 30 minutes or no service.

**Saturday Inter-peak & PM**

Saturday public transport improves during the day along the coastal section of the Gold Coast Highway. As a result Pacific Fair and Burleigh Heads enjoy high frequency public transport through the day and into Saturday afternoon. The Coolangatta service, however, remains constant - with services running at least every 30 minutes. Again, any service into Beenleigh operates at an interval of more than half an hour.
Saturday Off-peak

Off-peak services on Saturday are comparable to off-peak services during the week. Pacific Fair and Burleigh Heads are covered by services operating at least every 30 minutes. Beenleigh and Coolangatta are served by buses at intervals greater than 30 minutes or have no service.

People Under 15 Years Old

People under 15 years old cannot legally drive and are thus more likely to use public transport. Five areas were identified with a high proportion of persons under 15 years old. Coombabah and Nerang had very higher numbers of young people, while Biggera Waters, Ashmore andCurrumbin, with slightly lower numbers, were also included in the analysis.

Weekday AM

The two areas with the highest numbers of people under 15 years old, Coombabah and Nerang, are covered by services operating at least every 30 minutes during weekday mornings. Parts of Nerang, however, have only partial coverage. Biggera Waters is covered by services operating at least every 15 minutes along the Gold Coast Highway, while Ashmore and Currumbin have partial coverage by public transport running at least every half hour.

Weekday Inter-peak

In the inter-peak period, high frequency public transport service for the young declines. Only Coombabah and Biggera Waters have services that operate at least every 30 minutes. Nerang, Ashmore and Currumbin have either no service or services running at an interval of more than half an hour.

Weekday PM

Coverage remains constant into the late afternoon period. Coombabah and Biggera Waters continue to be served by public transport operating at least every 30 minutes. Nerang, Ashmore and Currumbin have services running at an interval of more than half an hour or no service.

Weekday Off-peak

Evening public transport service into areas with a high number of people under 15 years deteriorates, with only Biggera Waters served by buses running at intervals less than 30 minutes - along the Gold Coast Highway between Helensvale and Labrador. All other areas identified for closer analysis have no discernable coverage, indicating services operating at intervals of more than 30 minutes or no service at all.

Saturday AM

Overall, areas with a high proportion of people under 15 have minimal coverage by adequate service operating at least every 15 or 30 minutes. The majority of areas have either no coverage or services operating at intervals of
more than 30 minutes. Biggera Waters is the exception, with services operating at least every half hour.

Saturday Inter-peak & PM
Although general public transport frequency improves during the middle of Saturday, no changes were recorded for the areas with concentrations of young people. Most of the areas, if served at all, remain covered by buses operating at intervals greater than 30 minutes.

Saturday Off-peak
After 7:00pm on Saturday no areas identified with a high proportion of young people have services operating at least every 15 or 30 minutes. Again, most of the areas, if served at all, are covered by buses operating at intervals greater than 30 minutes.

People Over 65 Years Old
Like people under 15 years old, people over 65 are also concentrated in areas of Coombabah and Nerang. Sections of Coolangatta, too, have a high proportion of aged people, as does a small part of Southport.

Weekday AM
During the weekday morning the part of Coombabah with a high proportion of people over 65 is covered by services operating at least every 30 minutes. Nerang and Coolangatta are in part(s) served by buses operating at least every 30 minutes. The western part of Southport, with a high concentration of residents over 65, is also served by public transport running at least every 30 minutes.

Weekday Inter-peak
Public transport coverage for people over 65 decreases during the inter-peak after the morning rush. Coombabah and part of Coolangatta retain their morning peak services operating at least every 30 minutes. However, Nerang and part of Southport lose service operating at least every half hour, making public transport accessibility difficult during the middle of the day, when the elderly are more likely to need it.

Weekday PM
Frequency remains unchanged into the afternoon. Coombabah and part of Coolangatta are covered by services operating at least every 30 minutes. Nerang and part of Southport, if served at all, are served by buses operating at intervals greater than 30 minutes.

Weekday Off-peak
Similar to the findings for young people, areas with a high proportion of people over 65 years old have little service in the evening. No areas are adequately
covered by services operating at least every 15 or 30 minutes. When there is any service it is at intervals of greater than 30 minutes.

**Saturday AM**

On Saturday morning public transport service to areas with high concentrations of the aged is poor. Coolangatta is the exception. At the southern end of the coastal strip it is, in parts, served by public transport operating at least every 30 minutes. On Saturday morning Coombabah, Nerang and Southport have no services operating at a frequency interval of less than 30 minutes.

**Saturday Inter-peak & PM**

Saturday service into the afternoon remained unchanged from the morning. Parts of Coolangatta are served by bus at least every half hour, while the remaining areas of Coombabah, Nerang and Southport have lower frequency service or no service at all.

**Saturday Off-peak**

Saturday off-peak public transport, mirroring the weekday evening, is almost non-existent. None of the areas identified with a high proportion of people over 65 years old have access to services running at least every 15 or 30 minutes.

**Households Without a Car**

Five areas with a high proportion of households without a car were identified for further analysis. These areas were Beenleigh, Southport, Surfers Paradise and Broadbeach, the coastal strip from Broadbeach to Coolangatta, and Nerang in the Gold Coast Urban Area.

**Weekday AM**

Parts of Beenleigh Urban Area have a high proportion of households without a car. They are covered by higher frequency public transport operating at least every 15 minutes and at least every 30 minutes. This service does not continue south to the Gold Coast Urban Area, but extends north to the Brisbane metropolitan area. Access to the Gold Coast is, thus, limited. It is possible to take a train south. The station, however, is not ideally located, increasing the likelihood additional commuting. Southport, closer to the Gold Coast core, is covered by services operating at least every 15 and 30 minutes during weekday mornings. Public transport routes running at least every 15 minutes along the Gold Coast Highway cover Surfers Paradise and Broadbeach. The remainder of the coastal strip south of Broadbeach is served by bus at least every half hour, with a small part of Nerang enjoying the same frequency of service.

**Weekday Inter-peak**

During the middle of the day high frequency services of less than 15 minutes decline in Beenleigh to a service interval of not more than 30 minutes. In
Southport there is a similar drop-off in frequency. However, not only does the Surfers Paradise - Broadbeach area continue to have high frequency coverage, but the service extends south to Palm Beach, covering most of the coastal strip apart from Coolangatta. Nerang, when served at all, is covered by buses operating at intervals greater than 30 minutes.

**Weekday PM**

Inter-peak service levels are maintained through the afternoon. Beenleigh and Southport are covered by services operating at least every 30 minutes. Surfers Paradise and Broadbeach continue to enjoy high frequency coverage that continues south to Palm Beach. Nerang, again, has limited coverage.

**Weekday Off-peak**

As is to be expected households without cars are not well served by public transport in the weekday evening. There is no high frequency service and only three routes operate at least every half hour. The latter services cover most of Southport, and the coastal area from Surfers Paradise south to Palm Beach. Nerang and Beenleigh, situated away from the coastline, when served at all, are covered by buses operating at intervals greater than 30 minutes.

**Saturday AM**

The best public transport for households without cars on Saturday morning operates at a frequency interval of not more than 30 minutes. Such service covers, again, most of Southport, and the coastal area from Surfers Paradise south to Palm Beach, continuing on to Coolangatta.Beenleigh and Nerang have no adequate public transport service.

**Saturday Inter-peak & PM**

The areas of Beenleigh and Nerang with concentrations of households without a car have no adequate public transport during the inter-peak period and on into the late afternoon. Southport is again partially covered by public transport running at least every 30 minutes. High frequency services, operating at least every 15 minutes, start up along the coast, covering the area from Surfers Paradise to Palm Beach. Coolangatta remains at a lower service threshold with buses running at least every 30 minutes.

**Saturday Off-peak**

On Saturday evening there is no high frequency service. Two services operate at the lower threshold of at least every 30 minutes. They cover the coastal strip running from Surfers Paradise to Palm Beach. Beenleigh, Southport, Nerang and Coolangatta have less frequent service.

**Conclusion**

Beenleigh, Helensvale, Labrador and Southport, Nerang and Coolangatta are all names that appear repeatedly in the above analysis based on social disadvantage. These areas are often covered by some services operating at least every 30 minutes, although coverage patterns varied during different
periods of the day. Some areas are able to access high frequency services, although again, this coverage is also dependent on the time of the day.

Overall, coverage for people with a high level of disadvantage is highest during the morning period. Service dips during the day before improving slightly in the afternoon. There is very little public transport in the evening to areas of disadvantage. Operating frequencies and coverage on Saturday is consistently lower than during the week. Saturday evening public transport is minimal.
7. Quantification of Public Transport Frequency Coverage

Introduction

Preceding Chapters have described relations between socio-economic disadvantage on the Gold Coast and public transport. In the context of this qualitative image, the task of this Chapter is to quantify the relationships.

Total Population

Weekday AM

On weekday mornings, defined for the purposes of this study as before 9:30am, only 14 percent of all Gold Coast residents are covered by public transport operating at a frequency of least every 15 minutes (Table 1). Forty-one percent of the population are covered by services operating at least every 30 minutes. A further 27 percent of the total population live in areas served by public transport operating at an interval of more than 30 minutes. Almost one fifth of the Gold Coast population is without service on a weekday morning.

Weekday Inter-peak

Fifteen percent of people are covered during the work day midday period by services running at least every 15 minutes, (Table 1). This inter-peak period is defined as being from 9:30am to 3:00pm. There is a substantial decline in services operating at least every 30 minutes between the morning and inter-peak period (down from 41 percent to 23 percent). The opposite is true for services operating at an interval of more than half an hour. Such coverage changes from 27 percent in the morning to 43 percent during the midday period. From morning rush hour to mid-afternoon the percentage of population with no service remains constant (19 percent).

Weekday PM

In response to schools finishing around 3:00pm and the work day winding down service frequency increases slightly to cater for people travelling home. The aggregate coverage of all frequencies during the late afternoon and early evening remains similar to the midday rate, with only minor differences in services operating at least every 30 minutes and at an interval of more than 30 minutes (Table 1).

Weekday Off-peak

Off-peak is defined from 7:00pm until the end of service. After 7:00pm on a weekday no high frequency services operating at least every 15 minutes are available on the Gold Coast (Table 1). Almost a fifth of the total population has access to public transport services operating at least every 30 minutes (compared to the afternoon period of 28 percent). On a weekday evening 30 percent of the Gold Coast population have access to services running at intervals of more than 30 minutes, as compared to 35 percent in the afternoon.
period. The majority of Gold Coasters (51 percent) have no service after 7:00pm on a weekday.

Table 1: Coverage (percentage) for the total population

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**Saturday AM**

The Saturday morning period, from the start of services to 9:30am, has almost no high frequency service operating at an interval of less than 15 minutes. Only 0.3 percent of the population have access to such service (Table 1). The majority of the population are covered by public transport services operating less than every 30 minutes (48 percent). A notable 23 percent of the population have no access to public transport on Saturday morning.

**Saturday Inter-peak & PM**

High frequency service rises from 0.3 percent in the morning to 15 percent through the middle of the day and into Saturday afternoon. There is a concomitant decline in the number of people covered by public transport services operating at least every 30 minutes (down to 16 from 28 percent). Again, a substantial percentage of the total population (23 percent) are not covered by any service. Overall, Saturday coverage changes little between the midday period and the late afternoon and early evening period.

**Saturday Off-peak**

No services operate at a high frequency on Saturday evenings, and only 16 percent of people are served by public transport operating at least every 30 minutes. A further 23 percent of the total population have access to services operating at an interval of more than half hour. The majority of the population on the Gold Coast (62 percent) have no public transport access after 7:00pm on Saturday.
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### SEIFA

**Weekday AM**

Areas in the bottom quartile of the SEIFA Index were defined as disadvantaged. On a weekday morning only 17 percent of disadvantaged people living on the Gold Coast are covered by public transport operating at least every 15 minutes (Table 3). Forty-one percent are served by public transport operating at least every 30 minutes, a further 33 percent have access to public transport at intervals of greater than 30 minutes; and 9 percent have no service.

Compared to the total population, the disadvantaged are better served by public transport on a weekday morning. High frequency coverage is higher (17 percent compared to 14 percent; while a lesser proportion had no service (9 percent compared to 19 percent). Complete comparisons are available in Table 2.

**Weekday Inter-peak**

Public transport coverage for disadvantaged Gold Coast residents declines during the middle of the day. Just 9 percent of disadvantaged people are covered by high frequency services - compared to 17 percent earlier in the day (Table 3). Thirty-nine percent of people have access to public transport operating at least every 30 minutes, which is similar to the morning period. In the inter-peak period 43 percent of disadvantaged people must wait for more than 30 minutes for public transport, an increase from the 33 percent in the morning. The percentage of people with no service remains constant (9 percent).

During the weekday, in comparison to the total population (Table 2), SEIFA defined disadvantaged people on the Gold Coast have less access to high frequency/quality public transport (9 percent compared to 15 percent). Overall, however, they are more extensively served (i.e., greater quantity).
Thirty-nine percent of the disadvantaged have access to services operating at least every 30 minutes (compared to 23 percent of the total population); while only 9 percent have no service (compared to 19 percent).

**Weekday PM**

High frequency services increase between 3:00pm and 7:00pm such that 13 percent of disadvantaged people on the Gold Coast are covered by services operating at least every 15 minutes. The other two operational frequencies (with intervals less and greater than 30 minutes) serve, respectively, 39 percent and 35 percent of the defined population. Thirteen percent of disadvantaged people have no service (Table 3).

When compared with the total population, high frequency coverage is slightly worse for disadvantaged people (13 percent compared to 16 percent). However, a higher percentage of the disadvantaged are served by public transport operating at least every 30 minutes (39 percent to 28 percent); while, in this time period, 13 percent of the disadvantaged have no service, compared to 20 percent of the total population.

**Table 3: Coverage (percentage) for SEIFA**

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Weekdays</th>
<th>Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Start- 9:30am</td>
<td>9:30am- 3:00pm</td>
</tr>
<tr>
<td>At least every 15 minutes</td>
<td>16.8</td>
<td>9.1</td>
</tr>
<tr>
<td>At least every 30 minutes</td>
<td>40.9</td>
<td>38.7</td>
</tr>
<tr>
<td>Less than every 30 minutes</td>
<td>33.4</td>
<td>43.2</td>
</tr>
<tr>
<td>No Service</td>
<td>9.0</td>
<td>9.0</td>
</tr>
</tbody>
</table>

**Weekday Off-peak**

The percentage of disadvantaged people with no service (44 percent) is substantially higher during the off-peak period in comparison to earlier periods in the day. The coverage of services operating less than every 30 minutes is similar to earlier in the day, while, after 7:00pm, there is a reduction in coverage of services operating at an interval of more than 30 minutes from 39 percent to 17 percent.

In the off-peak, 39 percent of the disadvantaged have access to public transport operating more frequently than every 30 minutes, compared with 30 percent of the total population. Similarly, while 44 percent of SEIFA-defined disadvantaged people are unserved the comparable figure for the total population is 51 percent (see Table 2).
**Saturday AM**

On Saturday morning high frequency public transport, operating at least every 15 minutes, is available to 1 percent of the disadvantaged (Table 3); compared to 0.3 percent of the total Gold Coast population. As is to be expected coverage for services operating at least every 30 minutes declined (29 percent) when compared to weekday mornings service (41 percent). Coverage by less intensive service running at intervals of more than 30 mins, however, increased from 33 to 54 percent.

Saturday morning reinforces an emerging pattern. Compared with the total population, the disadvantaged are better served. The advantage is negligible, and indeed sometimes negative, at the highest level of service (frequency interval less than 15 minutes). It, however, increases with the decline in public transport frequency. Thus, on Saturday morning while 23 percent of the total population have no access to service, only 16 percent of the disadvantaged are in a similar position.

**Saturday Inter-peak & PM**

During this period coverage of the disadvantaged with high frequency services increases to 9 percent, in comparison to the morning 1 percent. This increase lowers the percentage of disadvantaged people able to access services operating at least every 30 minutes. The number of disadvantaged people without access to public transport is unchanged from the morning (16 percent).

Compared to total population, the disadvantaged, through midday and into Saturday afternoon, have, an expected pattern:

- worse access to high frequency services (9 percent compared to 15 percent);
- better coverage by lower frequency public transport (53 percent compared to 46 percent);
- a lower percentage of people without access to public transport (16 percent compared to 23 percent for the total population).

**Saturday Off-peak**

The pattern of transport service for disadvantaged people on the Gold Coast after 7:00pm shows:

- no high frequency services operating at least every 15 minutes;
- 13 percent of defined population with access public transport operating at least every 30 minutes;
- 28 percent with access to transport operating at a frequency interval of more than 30 mins;
- 59 percent not served.
Comparison with the public transport service on Saturday evening for the total population exposes no substantive differences. The comparative figures are: 0; 16; 23 and 62 percent for each respective operating frequency.

**Unemployment**

*Weekday AM*

On a weekday morning only 13 percent of residents living in areas with concentrations of unemployed people have access to public transport services operating at least every 15 minutes (Table 4). A further 43 percent are covered by services operating at least every 30 minutes; 28 percent have access to public transport at more than half hour intervals; and 16 percent have no service.

On a workday morning, comparison with Table 2 shows the unemployed to have a marginal advantage over total population at all levels of service.

*Weekday Inter-peak*

Into middle of the weekday, high frequency coverage remains unchanged at 13 percent (Table 4). Coverage by services operating at least every 30 minutes declines from 43 percent to 27 percent, with a concomitant increase in the percentage coverage at service intervals of more than 30 minutes (28 to 44 percent). The percent of people, living in concentrations of unemployed workers, with no service remains the same (16 percent).

*Weekday PM*

As the work day wanes into late afternoon high frequency coverage remains unchanged. Public transport to areas of high unemployment on the Gold Coast operating at service intervals of at least every 30 minutes increases slightly to 31 percent coverage, while declining slightly to 37 percent in the category interval of more than 30 minutes. Defined population without service is statistically unchanged at 17 percent.

In comparison to general service on a work afternoon public transport to areas of high unemployment is marginal better. In the categories of service at intervals of less than 30 minutes and not served, the unemployment show a percentage advantage of +8 and -2, respectively.

*Weekday Off-peak*

There is no high frequency off-peak service (at least every 15 minutes). Half of the population of areas with high unemployment have no access to public transport. Nineteen percent are covered by services operating at least every 30 minutes, and over 30 percent live in areas covered by low frequency services. Night tends to make social categories equal. At this time there is no public transport difference between the unemployed and all others.
Saturday AM

Effectively no areas of high unemployment on the Gold Coast are served by high frequency public transport services operating on Saturday morning (0.4 percent). Service coverage at least every 30 minutes is much lower than on a weekday morning (28 percent vs. 43 percent) (Table 4). The percentage of people with no service is also higher on Saturday (21 percent compared to 16 percent). Again, the difference in service levels on a Saturday morning between areas of unemployment and the total population of the Gold Coast is marginal.

Table 4: Coverage (percentage) for unemployed persons

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Weekdays</th>
<th>Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Start-9:30am</td>
<td>9:30am-3:00pm</td>
</tr>
<tr>
<td>At least every 15 minutes</td>
<td>12.9</td>
<td>12.7</td>
</tr>
<tr>
<td>At least every 30 minutes</td>
<td>42.6</td>
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<td>28.3</td>
<td>44.2</td>
</tr>
<tr>
<td>No Service</td>
<td>16.2</td>
<td>16.5</td>
</tr>
</tbody>
</table>

Saturday Inter-peak and PM

On Saturday, public transport coverage of areas with high unemployment increases during the day. High frequency coverage rises to 13 percent, matching that (of the same period) of the working week. Other levels of service decrease in comparison. Public transport frequencies operating at least every 30 minutes decrease from the weekday coverage of 30 percent to 18 percent on Saturday. Likewise, the proportion without service during the inter-peak period increases from a working day 16 percent to a Saturday 21 percent.

Saturday Off-peak

The vast majority of people living in areas of high unemployment on the Gold Coast (61 percent) have no public transport coverage after 7:00pm on Saturday. Twenty-five percent are covered by low frequency services operating at an interval of more than 30 minutes. The percentage without evening service increases from 50 percent to 61 percent on Saturday.

Rental Households <$150 per week

Weekday AM

On weekday mornings households living in areas of low rent accommodation are relatively well served (21 percent coverage) by high frequency public
transport services operating at least every 15 minutes. Forty-six percent of the defined population have access to services operating at least every 30 minutes, and 24 percent are served by public transport operating at intervals in excess of 30 minutes (see Table 5). Nine percent of households have no coverage.

In comparison to the total population, people living in low rent areas are, on a workday morning, again, advantaged. Twenty-one percent of such households have access to high frequency public transport; compared to the base percentage of 14 percent. Similarly, only 9 percent of households living in low rent areas are without any service on a weekday morning, compared to almost 19 percent of the total population (Table 2).

**Weekday Inter-peak**

High and mid-range frequency service declines for the defined population after the morning peak (53 percent down from 67 percent). Over the same period coverage with lower frequency public transport operating at intervals in excess of 30 minutes increases from 24 to 38 percent; while the number of unserved households remain constant.

Through the workday morning into mid-afternoon public transport service for households living in row rent areas is slightly superior to that of the base population. The highest frequency of service is similar but low rent areas have greater access to the next level of service (37 percent compared to 23 percent) and a significantly lower proportion of households with no access to public transport (9 percent compared to 19 percent).

**Weekday PM**

Service levels for low rent areas are similar for the weekday afternoon/evening period as compared to the inter-peak period (Table 5). There are small increases in the coverage of services operating at least every 15 and 30 minutes, and a decrease in services operating at an interval of more than 30 minutes. Overall coverage declines slightly with the percentage of households living in low rent areas without access to public transport, rising from 9 to 12 percent.

In a familiar pattern households living in low rent areas are better served by public transport than the base population. A greater proportion of defined households have access to services operating at least every 30 minutes (60 percent against 44 percent) and a lesser percentage of them are without any access to public transport (11 percent against 20 percent).

**Weekday Off-peak**

After 7:00pm on workday evening, public transport for those living in row rent areas declines markedly. The percentage of such households without access to services rises from 11 to 40 percent, but remains less than the percentage of total population without service (51 percent). Similarly, 60 percent of people living in low rent areas have access to public transport on a weekday evening, while only 49 percent of the base population are so served. Concomitantly, only 40
percent of defined households are without access to evening public transport, as compared to 51 percent of the total population (Table 2).

Table 5: Coverage (percentage) for rental households <$150pw

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Weekdays</th>
<th>Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Start-9:30am</td>
<td>9:30am-3:00pm</td>
</tr>
<tr>
<td>At least every 15 minutes</td>
<td>21.0</td>
<td>15.1</td>
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<tr>
<td>At least every 30 minutes</td>
<td>46.2</td>
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<tr>
<td>Less than every 30 minutes</td>
<td>23.6</td>
<td>38.0</td>
</tr>
<tr>
<td>No Service</td>
<td>9.2</td>
<td>9.3</td>
</tr>
</tbody>
</table>

**Saturday AM**

On Saturday mornings, only 1 percent of households living in low rent areas are covered by public transport operating at least every 15 minutes (compared to 21 percent on a weekday morning). The proportion of households (40 percent) with access to services operating at least every 30 minutes declines slightly against the workday standard (46 percent). The number of households with access to services operating at frequency intervals in excess of 30 minutes, however, increases markedly from 24 to 47 percent. The percentage with no service also increases (from 9 to 12 percent).

**Saturday Inter-peak & PM**

Saturday coverage increases through the day. Fifteen percent of households in low-cost rental areas are served by public transport operating at least every 15 minutes - the same percentage recorded for weekdays (Table 5). A further 27 percent are covered by services running at least every 30 minutes, while the majority, 46 percent, are covered by low frequency services (at intervals of more than 30 minutes).

Saturday service, through the morning and into afternoon an early evening, for households living in low rent areas is, as expected, better than that for the Gold Coast population as a whole. The percentage of defined households with service operating at least every 30 minutes is higher (42 vs. 31 percent); while the percentage of households without service is lower (12 vs. 23 percent).

**Saturday Off-peak**

Almost half (49 percent) of households living in low rent areas of the Gold Coast have no public transport coverage after 7:00pm on Saturday. This is an
increase over the weekday evening (40 percent). There is no high frequency public transport after 7.00pm during the week or on the weekend. The aggregate level of evening service, adding the two lower frequency services, declines on Saturday from a weekday mark of 60 percent to 51 percent. This remains, however, significantly above the level for the population as a whole (39 percent); with the level of households with no service being concomitantly lower.

**Households with Mortgage Repayments <$600 per month**

**Weekday AM**

During the weekday morning, public transport operating at least every 15 minutes covers 9 percent of resident living in areas with a disproportionate number of households with mortgage repayments under $600 per month. A further 37 percent have access to services running at least every 30 minutes. Thirty-six percent are covered by low frequency services, operating at an interval of more than 30 minutes, while 18 percent of households have no service access in their area (Table 6).

In comparison to the total population, public transport to areas with concentrations of households with mortgage repayments under $600 is inferior. They have lower high-frequency service (9 vs. 14 percent) and while the percentage of households without service is the same for each (19 percent) the bulk of public transport for households living in low mortgage areas is evenly split between mid and low frequency services (38 and 36 percent) in contrast to the total population where service is concentrated in the mid frequency of less than every 30 minutes (41 and 27 percent).

**Weekday Inter-peak**

The quality of coverage declines inter-peak. While the percentage of households without (and with) public transport access remains constant, coverage becomes concentrated in the lowest frequency service which rises from 36 percent to 53 percent. The comparable figure for the total population of the Gold Coast is 43 percent.

**Weekday PM**

There is an improvement of service from mid-afternoon into early evening of the working day. The proportion of defined households covered by high frequency services rises from 6 percent earlier in the day to 9 percent (Table 6). A slight increase is also found in services operating at least every 30 minutes, while the potential number of households waiting more than half an hour for public transport declines from 53 percent to 43 percent. The percentage of households with no service rises to 21 percent – as yet marginally the highest level for this period.

When compared with the total population the defined households suffer a decline in quality rather than quantity. The total population has better access to the highest frequency service (16 vs. 9 percent) while public transport for
households with low mortgage payments is more concentrated in the lowest frequency service (43 vs. 36 percent).

**Weekday Off-peak**

Only 40 percent of defined households have access to public transport after 7:00pm Monday to Friday (Table 6). Service is heavily concentrated in the lowest frequency category requiring potential waits in excess of half an hour (31 percent). The Gold Coast population as a whole, in contrast, is 51 percent served on a weekday evening, with double the level of service in the mid-range frequency of less than 30 minutes (19 vs. 9 percent). Neither population has high frequency service at night.

Table 6: Coverage (percentage) for mortgage households <$600pm

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Weekdays</th>
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<th></th>
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</thead>
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<td></td>
<td>Start-9:30am</td>
<td>9:30am-3:00pm</td>
<td>3:00pm-7:00pm</td>
</tr>
<tr>
<td>At least every 15 minutes</td>
<td>8.8</td>
<td>6.3</td>
<td>9.2</td>
</tr>
<tr>
<td>At least every 30 minutes</td>
<td>37.5</td>
<td>22.4</td>
<td>27.0</td>
</tr>
<tr>
<td>Less than every 30 minutes</td>
<td>35.6</td>
<td>52.9</td>
<td>43.4</td>
</tr>
<tr>
<td>No Service</td>
<td>18.1</td>
<td>18.5</td>
<td>20.5</td>
</tr>
</tbody>
</table>

**Saturday AM**

Just 1 percent of residents, living in areas with concentrations of households paying less than $600 a month on their mortgage, are covered by Saturday morning services operating at least every 15 minutes. Most households (58 percent) have access to public transport operating at an interval of more than 30 minutes, while 24 percent of households are not covered by public transport.

Again, comparison with public transport service to the total population shows differences in quality. The total population is better served at the mid-range frequency of less than 30 minutes (plus 10 percent); and, concomitantly, less reliant on low frequency services running at intervals of more than 30 minutes (minus 10 percent).

**Saturday Inter-peak & PM**

High frequency service coverage for defined households increases markedly, from a low base, during the day on Saturday – up from 1 to 6 percent. The service level of other frequency categories remains substantially unchanged. Comparison with total population service levels confirms a pattern of polarisation. Households in areas of low mortgage payments are more reliant
on the lowest frequency service (57 vs. 46 percent) and less well served by high frequency public transport (6 vs. 15 percent).

**Saturday Off-peak**

The pattern of polarisation reaches an extreme on Saturday night. Across the board total population service levels exceed those of defined households. The mid-range frequency difference is 7 percent (16 vs. 9 percent) and the low frequency difference is 23 as compared to 20 percent. Seventy-one percent of households living in low mortgage areas have no public transport on Saturday night, as compared to 62 percent of the base population.

**People Under 15 Years Old**

*Weekday AM*

On a weekday morning 8 percent of households living in area with a concentration of young people, under 15 years old, are covered by high frequency public transport operating at least every 15 minutes and 23 percent have no service at all (Table 7). Thirty six percent of the defined population had access to services operating at least every 30 minutes, and 33 percent to services with a frequency interval of more 30 minutes.

Comparison with total population service levels show a decline in quantity and quality for areas with young public transport users. A greater percentage of households have no service (23 vs. 19); a lesser percentage have access to high frequency service (8 vs. 14); a lesser percentage have access to mid frequency service (36 vs. 41); a greater percentage are reliant on the lowest frequency service (33 vs. 27).

*Weekday Inter-peak*

Changes in weekday service levels through the morning into mid-afternoon see a decline in quality but not quantity. Essentially mid-range frequency service (36 down to 19 percent) is replaced by services with a potential wait of more than 30 minutes (33 up to 50 percent).

Comparison with base population service levels shows uniform disadvantage. Areas with a disproportionate number of young people have less access to high and mid frequency public transport. A greater percentage of defined household have no public transport options, and those that do are more reliant on low frequency service.

*Weekday PM*

From mid-afternoon into the evening of the working day the gross quantity of public transport service to 'youth areas' remains constant. Quality increases. High frequency service coverage rises about a fifth from a low base, to 9 percent of defined households; while mid-range frequency service rises from a morning 19 percent to 25 percent. There is a concomitant fall in the reliance on low frequency services - from 50 to 42 percent (Table 7). These improvements in service quality for youth areas are, at least, matched by
improvements in the general service level. In short defined areas remain disadvantaged.

Table 7: Coverage (percentage) for people under 15 years old

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Weekdays</th>
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<th></th>
<th></th>
<th>Saturday</th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
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<td>3:00pm-7:00pm</td>
<td>7:00pm-End</td>
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<td>9:30am-3:00pm</td>
<td>3:00pm-7:00pm</td>
<td>7:00pm-End</td>
</tr>
<tr>
<td>At least every 15 minutes</td>
<td>8.0</td>
<td>7.4</td>
<td>9.1</td>
<td>0.0</td>
<td>0.3</td>
<td>7.4</td>
<td>7.4</td>
<td>0.0</td>
</tr>
<tr>
<td>At least every 30 minutes</td>
<td>36.2</td>
<td>19.4</td>
<td>25.1</td>
<td>10.0</td>
<td>16.9</td>
<td>12.5</td>
<td>12.5</td>
<td>8.7</td>
</tr>
<tr>
<td>Less than every 30 minutes</td>
<td>32.8</td>
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<td>41.7</td>
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<td>53.6</td>
<td>51.2</td>
<td>50.1</td>
<td>19.8</td>
</tr>
<tr>
<td>No Service</td>
<td>23.0</td>
<td>23.4</td>
<td>24.1</td>
<td>60.4</td>
<td>29.2</td>
<td>28.9</td>
<td>29.2</td>
<td>71.4</td>
</tr>
</tbody>
</table>

**Weekday Off-peak**

On a weekday night, after 7:00pm, public transport for areas with concentrations of young people declines dramatically, in step with the general pattern. There is no high frequency service. Service, as for everybody else at this time, is concentrated at the lowest frequency requiring potential waits in excess of half an hour (both 30 percent). The base population, however, has greater access to mid-range frequency services (19 vs. 10 percent) and a concomitant lower level of no service access (51 vs. 60 percent).

**Saturday AM**

On Saturday morning there is, for ‘youth areas’, almost no coverage by services operating at least every 15 minutes (0.3 percent). Seventeen percent of households have access to mid-range frequency services operating at least every 30 minutes. The majority (54 percent) however, are, on a Saturday morning, reliant on services requiring potential waits of over half an hour. Twenty-nine percent have no access to public transport (Table 7).

Comparison with base population service shows an increase in disadvantage. Besides the polarisation of quality, the young have a persistent deficit of gross coverage. On Saturday morning 29 percent of young people have no access to public transport as compared to 23.5 percent for the general population of the Gold Coast.

**Saturday Inter-peak & PM**

High frequency public transport for increases through Saturday morning into mid-afternoon rising from 0.3 to 7.4 percent (Table 7). Mid frequency service, however, declines from 17 to 12.5 percent. Other service levels remain, substantially, constant. The qualitative improvement in public transport for ‘youth areas’ in the period is matched by general population service levels.
When compared the 100 percent disadvantage in high frequency service, for areas with a disproportionate number of young people, is the most notable feature (14.7 vs. 7.4 percent).

**Saturday Off-peak**

On Saturday night 71 percent of youth areas on the Gold Coast have no access to public transport (compared to 60 percent on weekdays) and only 9 percent have access to services operating at a frequency of least every 30 minutes (Table 7). This level of Saturday evening service is the lowest for all of the different socio-economic characteristics used in this analysis; approached only by household with low mortgage repayments.

**People Over 65 Years Old**

**Weekday AM**

On a weekday morning 16 percent of households living in areas with a high percentage of people over the age of 65 have access to high frequency public transport running at least every 15 minutes. Half have access to services at least every 30 minutes, while almost a quarter must wait more than 30 minutes for public transport (Table 8). Only 13 percent have no service access.

Households living in areas with a high proportion of residents over the age of 65 have higher quantitative and qualitative public transport service than the total population of the Gold Coast. By margins of approximately 5 percent ‘aged areas’ have better access to high frequency public transport operating at least every 15 and 30 minutes, they are less dependent on low(est) frequency services operating at intervals in excess of 30 minutes, and a lesser percentage of defined households have no access to service (see Table 2). This profile is consistent through the day and into the afternoon and evening.

**Weekday Inter-peak**

High frequency public transport for areas with concentrations of the aged improves with time into the mid-afternoon (19 percent compared to 16 percent in the morning). Mid-range frequency service (at least every 30 minutes) declines from 49 to 30 percent; dependency on low(est) frequency service (wait interval of more than 30 minutes) increases from 22 to 37 percent. The proportion of unserved is constant (14 percent). By all measures during this period service for the defined population is superior to that of the general population.

**Weekday PM**

From mid-afternoon to early evening on a weekday public transport is stable in gross terms but increases, slightly, in quality. The highest frequency service is unchanged. Mid-range frequency service, however, increases 4 percent to 34 percent; while dependency on services operating at intervals of more than
30 minutes decreases 6 percent to 31 percent. Again, in this period service exceeds, at all levels, the standards of the general population.

**Weekday Off-peak**

On a weekday evening 59 percent of households living in areas with concentrations of aged people have access to public transport. Its quality, however, has declined. There is no high frequency service; a quarter of the defined population have access to mid-frequency services (less than 30 minutes); and a third to low(est) frequency service (interval in excess of 30 minutes). At all frequencies this service profile is superior to that of the general population.

**Saturday AM**

On Saturday morning 83 percent of areas with a high proportion of aged residents fall within a public transport buffer zone. The bulk of the service is low frequency (operating at intervals in excess of 30 minutes - 45 percent) and mid frequency (operating at intervals of less than 30 minutes - 40 percent) public transport. This profile follows, at slightly elevated levels, that of the gross population service.

**Table 8: Coverage (percentage) for people over 65 years old**

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Weekdays</th>
<th>Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Start-9:30am</td>
<td>9:30am-3:00pm</td>
</tr>
<tr>
<td>At least every 15 minutes</td>
<td>15.7</td>
<td>19.2</td>
</tr>
<tr>
<td>At least every 30 minutes</td>
<td>49.3</td>
<td>30.0</td>
</tr>
<tr>
<td>Less than every 30 minutes</td>
<td>21.6</td>
<td>37.1</td>
</tr>
<tr>
<td>No Service</td>
<td>13.5</td>
<td>13.7</td>
</tr>
</tbody>
</table>

**Saturday Inter-peak & PM**

The quantity of Saturday public transport service is constant through the day and into the early evening. There is, however, a qualitative improvement in that high frequency service coverage increases from a negligible 0.3 percent to 19 percent. There is a matching fall in the next (lower) level service frequency from 38 to 22 percent. The bulk of service (43 percent) remains concentrated in frequencies operating at an interval of more than 30 minutes. This service profile is, again, superior to that of the general population.

**Saturday Off-peak**

On Saturday evening after 7:00pm 28 percent of households living in areas with concentrations of people over the age of 65 have spatial access to public
transport operating at least every 30 minutes. Twenty seven percent are served by public transport operating at an interval of more than 30 minutes, while 53 percent have no service in their area during this period. The comparable figure for the total population is 58.5 percent.

In every period of weekday and Saturday public transport service for areas with aged people is superior in quantity and quality as compared to general population standards.

Households Without a Car

Weekday AM

On a workday morning, over a quarter of households living in areas with a concentration of people without a car have access to high frequency services, and almost half are covered by services operating at least every 30 minutes (Table 9). In short, 76 percent of defined households are able to adequately access public transport during the morning rush hour(s). Sixteen percent have low(est) frequency service, while 8 percent are not served.

In comparison to the total population, households living in car deficient areas have a significantly superior profile in terms quantity and quality. While 19 percent of the general population lack public transport service on a weekday morning, only 8 percent of defined households live outside a service buffer zone. Similarly, while 13 percent of the total population have access to high frequency services running at least every 15 minutes, fully 27 percent of households in car deficient areas are so served. The other comparative figures, always to the advantage of areas without cars, are, in the mid-frequency service category, 49 percent and 41 percent; and in dependency on low(est) frequency service 16 and 27 percent.

Weekday Inter-peak

During the week, through the morning into the middle of the afternoon, public transport service for areas with a concentration of households without cars declines slightly in quality. Gross coverage remains constant but there is a fall in mid frequency service (at least every 30 minutes) from 49 to 33 percent, and a matching rise in dependence on service operating at an interval of more than half an hour from 16 to 30 percent.

In comparison with the general population the proxy for households without a car shows the latter to have twice the level of high(est) frequency service and half the proportion of households with no service access. Mid-frequency service is 10 percent better and low(est) frequency dependency is 13 percent lower.

Weekday PM

As has become familiar, the public transport service on a weekday afternoon running into evening, catering for the worker return commute, rises in quality but not quantity. For defined households there is a swing away from dependence on low(est) frequency service (30 to 23 percent) back to mid
frequency service (33 to 38 percent). The rest of the profile remains substantially unchanged as does its overall superiority to general levels of public transport service.

Table 9: Coverage (percentage) for households without a car

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Weekdays</th>
<th>Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Start-9:30am</td>
<td>9:30am-3:00pm</td>
</tr>
<tr>
<td>At least every 15 minutes</td>
<td>27.4</td>
<td>28.8</td>
</tr>
<tr>
<td>At least every 30 minutes</td>
<td>48.6</td>
<td>33.3</td>
</tr>
<tr>
<td>Less than every 30 minutes</td>
<td>16.3</td>
<td>30.0</td>
</tr>
<tr>
<td>No Service</td>
<td>7.8</td>
<td>7.8</td>
</tr>
</tbody>
</table>

**Weekday Off-peak**

After 7:00pm on a weekday night high frequency service disappears. For households in car deficient areas mid-frequency service is unchanged (39 percent); while dependency on low(est) frequency service increases from 23 to 30 percent. The number of households without service increases, too, from 9 to 31 percent. In comparison, 51 percent of all Gold Coast households are without service; 30 percent are reliant on public transport with service intervals of more than half an hour; and only 19 percent have access to mid frequency services at least every 30 minutes.

**Saturday AM**

On Saturday morning only 9 percent of defined households lack access to public transport. While there is, for all practical purpose, no high frequency service, 52 percent of households in car deficient areas have access to public transport running at least every 15 minutes; while 38 percent have access to service running at intervals in excess of half an hour.

In this period the difference in quantity and quality between the public transport service to those in car deficient areas and the general Gold Coast population increases. Almost two and half times the proportion of the latter are without any service (23 and 9 percent); while the level of adequate mid-frequency service for defined households is more than double the standard (52 and 28 percent).

**Saturday Inter-peak & PM**

As is now expected the quality of Saturday service through the afternoon and into the evening increases in quality. High frequency service is resumed and
reaches 28 percent. Mid-frequency service declines by a similar amount to 25 percent; and low frequency service is unchanged.

The profile differential with the total population is also substantially unchanged.

**Saturday Off-peak**

High frequency service ceases on Saturday evening. For households living in areas with a concentration of people without a car, 31 percent are covered by services running at least every 30 minutes; another 30 percent have to wait more than half an hour for service; and 40 percent have no service. At the same time 62 percent of the total population of the Gold Coast have no access to public transport and only 16 percent are covered by adequate (mid-frequency) service.

**Conclusion**

The first task of the Chapter was to establish a general profile of public transport service on the Gold Coast. On a working day, until 7:00pm, the aggregate quantity of public transport, across all frequencies, to the total population of the coast is relatively constant at around 80 percent. During the day the quality of service varies as the initial, higher frequency service of the morning commute gives way an afternoon service based on the lowest frequency service. In the afternoon and into the return worker commute service quality builds back up but not to the initial, morning standard. After 7:00pm service declines markedly in quantity and quality.

Saturday public transport service is less extensive but it, too, is relatively constant at about 25 percent through the day until 7:00pm. The morning service is dominated by the lowest frequency/quality service. After 9:30am with the commencement of high frequency service, quality builds but, overall, services operating at intervals of more than 30 minutes provide bulk coverage all day. After 7:00pm service quality and quantity declines with over 60 percent of the population having no access to public transport.

Against this profile the analysis found a quantitative similarity between standard (total population) service and that in areas of high unemployment and with a concentration of households with mortgage payments under $600 per month. There is, however, a difference in the quality of service; with households living in low cost accommodation being less well served by higher frequency public transport.

There were quantitative similarities between areas with a low SEIFA score and the total population. The SEIFA defined areas of disadvantage, however, had less access to higher frequency service and more dependency on services operating with a service interval in excess of half an hour.

Areas of the Gold Coast with a high proportion of rental households paying under $150 per week rent were comparable to SEIFA areas of disadvantage.
Areas with a concentration of people aged over 65 had notably greater access (quantity) to more frequent services (quality) than the total population. The aged are a relative privileged group of public transport users.

In contrast, households living in areas with a disproportionate number of young under the age of 15 have the worst service of all the socio-economic categories defined for analysis. A high percentage had no service, or were dependent upon inadequate low(est) frequency service with wait intervals in excess of 30 minutes. Concomitantly, a very low percentage had access to rapid public transport operating at least every 15 minutes.

The most privileged group of Gold Coast public transport users, identified in analysis, are households living in car deficient areas. In terms of both quantity and quality they have the highest profile.
8. Access to Employment and Services

Introduction

Previous Chapters have focused on the spatial and temporal dynamics of access to public transport on the Gold Coast. This Chapter investigates public transport access to concentrations of employment and services for potentially disadvantaged groups.

The Chapter defines three types of access. They are:

- access to employment concentrations generally;
- access to ‘tourism-related’ employment;
- access to health services.

The spatial analysis of job distribution to identify concentrations of employment is straightforward in that the necessary data is immediately available in the Census. Tourism-related employment, in contrast, needs construction. In this study it is drawn from the ABS Census ‘Working Population’ category and is an aggregate of the retail, and cafes, restaurants & accommodation categories. Employment in this composite sector is frequently part-time or casual and is often low-skill requiring highly flexible hours. Such employment is likely to provide employment for those disadvantaged in the labour market. Public transport to such employment from residential areas of high unemployed and/or low-income groups is an important space-time dynamic of the urban labour market.

In the absence of information on the location of health services, employment in this sector is used as a proxy for service concentration. The approach has a major shortcoming. The data is only available at the SLA level – the level above the CD. When counted at SLA level, pockets of employment are, effectively, averaged out over a large area. Thus, when standardised by (SLA) collection area, data pockets are too often smoothed away to a thin film. Only very large concentrations, in relatively small SLAs, survive such attenuation. The coarse input data of the analysis resulted in the identification of Gold Coast hospital locations (confirmed by map location). Clearly, this is not very satisfactory. However, in the context of a pilot study, it was accepted.

Overall Employment Distribution

The employment pattern across the Gold Coast shows the SLA with the highest proportion of total employment (12-14 percent) to be Southport, in close proximity to Surfers Paradise. This, possibly, reflects the location of two hospitals in the SLA area (a topic to be taken up later). Surfers Paradise, the area of the Gold Coast most like a traditional CBD, and a tourist magnet, had the second highest percentage of employment. Southport and Surfers Paradise both contained between 10,000 and 20,000 jobs in 2001. Nerang had the third highest concentration of workers - between 8,000 and 10,000 jobs. Other areas of employment concentration included Bundall (south of
Surfers Paradise and Southport), Robina and Burleigh Heads. For the rest, employment appears widely spread in the Gold Coast with the majority of SLAs containing less than 4 percent of total employment.

The *Gold Coast City Activity Centre Strategy* (GCCC, 1998) provides a context for these findings. The strategy identifies the key regional centres of the time as Beenleigh, Southport and Robina – all with over 250,000 work age residents. Smaller regional centres included Coomera, Nerang, Broadbeach, Burleigh and Coolangatta. Significant growth was expected in Surfers Paradise and the greater southern coastal area. All the above centres, except Beenleigh, are confirmed in this study’s analysis of employment. Surfers Paradise, fulfilling its growth potential, now appears as a primary centre of employment.

Tourist employment on the Gold Coast is concentrated in Surfers Paradise. Five thousand five hundred workers (5,500), or approximately 13 percent of the tourist industry labour force, are employed in Surfers Paradise SLA. Southport, with between four and five thousand workers, or approximately 10-12 percent of tourist labour, is ranked next. Broadbeach Waters, south of Surfers Paradise, and inland from Broadbeach, containing the Pacific Fair shopping complex, ranks third with 7 percent of the tourist labour. There are small concentrations of tourist employment in Nerang, Robina and Burleigh Heads, with the balance spread evenly through the remaining Gold Coast SLAs.

Southport clearly has the highest concentration of health and community services. In 2001 it contained 32 percent of the entire Gold Coast employment in this category. This equates to approximately 4,000 employees, matching its tourist employment. The core of Southport’s health employment is the Gold Coast Hospital and, nearby, Allamanda Private Hospital. The second largest concentration of health service employment, at a substantially lower level, is in the Benowa SLA, home to Pindara Private Hospital. In 2001 it accounted for between 6-8 percent of total health service employment - or between 800 to 1,000 workers. A last area with a substantial concentration of health and community service employment was the Tugun SLA, near Coolangatta, the location of John Flynn Hospital.

**Access to Employment**

Public transport access to the ‘tourist’ employment areas of the Gold Coast is investigated for two different periods. The time intervals are selected to capture transport access for, mainly retail, tourist workers during the weekday morning, and in the Saturday off-peak period, cafe and restaurants workers.

The origin of tourist worker travel was defined using SEIFA. Resonate with the focus of this study – disadvantage and transport– three SLAs from the lowest rank were selected with an eye for clarity in the mapping process. These areas are Nerang, Labrador and Stephens.
The destination(s) of employment related travel were narrowed to the three SLAs with the highest tourist employment numbers - Surfers Paradise, Southport and Broadbeach Waters.

**Weekday AM**

The Nerang SLA doubles its area beyond the boundaries of the Gold Coast Urban Area. The excluded portion of the SLA is, however, sparsely populated. Western Nerang is covered by low frequency services operating at intervals of more than half an hour. A bus route runs from the Nerang train station along Broadbeach Road to Broadbeach Waters. Access to either Surfers Paradise or Southport is via a change to the high frequency service on the Gold Coast Highway. There is also a multi-modal option for Nerang workers commuting to coastal destinations. The train ride from Nerang to Helensvale connects a high frequency bus to Southport and Surfers Paradise. Overall, on a weekday morning public transport service for Nerang workers travelling west to east to the tourist areas of Surfers Paradise, Southport and Broadbeach Waters, is poor (Figure 8).

Two sides of Labrador, the second of the SEIFA defined areas, are bordered by the Gold Coast Highway with high frequency public transport, at least every 15 minutes, serving coastal strip destinations. Other parts of Labrador, located away from the Gold Coast Highway, are served by bus routes operating at least every 30 minutes. Overall, on a weekday morning Labrador is well served by public transport to the coastal core(s) of tourist employment.

On a weekday morning more than half of Stephens to the east is served by public transport running at least every 30 minutes. One route for tourist workers is inland to Robina, to pick up connecting services to the coastal strip. The more likely option is a connecting bus, operating at least every 30 minutes, to the Gold Coast Highway and its service to coastal destinations. The connecting services on the Gold Coast Highway also only operate at least every 30 minutes during weekday mornings, making significant delays likely. Overall, the level of public transport service for Stephens' tourist workers lies between the good service of Labrador and the poor service of Nerang.

**Saturday Off-peak**

Earlier analysis has highlighted inadequate public transport after 7:00pm on all days of the week. In this period, upwards of half Gold Coast residents have no access to public transport; while the bulk of the restricted service is comprised of buses running at intervals of greater than half an hour. Nerang workers travelling to the three main tourist employment areas of Surfers Paradise, Southport and Broadbeach Waters for an evening shift face major hurdles. There are no proximate bus services operating at least every 15 or 30 minutes. Travel down poorly served east-west corridors risks waits in excess of half an hour. Finally, at this time the train to Helensvale that provides a morning alternative is no longer a viable option. In sum, public transport service for workers travelling to the tourist concentrations of the Gold Coast, after 7:00pm, is poor.
Figure 8: Access to tourist employment areas from Nerang, Labrador and Stephens
Labrador is adjacent to Southport, and it is possible some tourist industry workers walk or bicycle to their jobs on Saturday evening. For the rest, working further a field in areas such as Surfers Paradise, the public transport options are poor. A very limited service operates at intervals in excess of 30 minutes. If Labrador workers are well served with public transport during the day, their Saturday evening service approaches the norm – poor.

Stephens fits the Saturday evening public transport profile. After 7:00pm no public transport operates at a frequency greater than every half an hour, the train is too far away in Robina, and it is too far to walk to the Gold Coast Highway to catch a bus.

Access to Services

This section concentrates on the access of disadvantaged groups to Gold Coast public health services. The SLAs of Nerang, Labrador and Stephens are again designated as origin zones. Their connectivity to health service areas, during the weekday inter-peak period (9:30am to 3:00pm) when people are most likely to access public health services, is analysed.

Southport, Benowa and Tugun SLAs are the designated destination zones, having been earlier identified as areas with a high concentration of health workers.

Nerang residents are poorly served by public transport during the middle of the day, and it would be difficult for them to travel by bus to areas of the Gold Coast with high concentrations of health and community services (Figure 9). All bus routes to and from Nerang operate at service intervals in excess of half an hour. Long delays are, consequently, the norm at this time of day. One possible route from Nerang to the Gold Coast Hospital is the train to Helensvale and then a bus to Southport. Again, the low frequency of both these services makes the route very inflexible. In sum, public transport access for Nerang residents to area health care services is constrained and time consuming.

Labrador has the highest public transport coverage of the three disadvantaged SLAs. While it does not have any high frequency public transport, there are services that run through Labrador at least every 30 minutes (Figure 9). Labrador is located adjacent to the Southport SLA, and its Gold Coast and Allamanda Hospitals. The majority of Labrador residents have good public transport access to these two health facilities. Travel to Benowa and, further a-field, is considerably more difficult as there are no proximate public transport service operating at less than half an hour intervals.
Figure 9: Access to health service areas from Nerang, Labrador and Stephens
During the inter-peak period Stephens is served by one bus service running at least every 30 minutes (Figure 9). Stephens is connected to Tugun and its hospital by three bus routes: Stephens – Gold Coast Highway – Palm Beach – Tugun. Access to the Gold Coast Hospital also requires service changes. In sum Stephens’ residents wishing to access health service by public transport face an extended journey.

**Conclusion**

Employment distribution on the Gold Coast is increasingly dominated by the Southport – Surfers Paradise axial, with Nerang, a longer standing, inland, job centre continuing to be important.

The public transport links to these employment centres from three areas of social disadvantage were investigated. On a typical weekday morning Labrador tourist workers are adequately served by public transport. Service for Stephens’ workers is marginal; while that for Nerang workers is poor. For the whole Gold Coast, public transport on Saturday night, a busy time for some tourist industry workers, is marginal. Within the general pattern, Nerang with its need for west – east travel, is particularly disadvantaged; while Labrador, in its proximity to Southport, is relatively advantaged.

Analysis of public transport access to public health services produced a similar pattern. Labrador has the highest frequent connections and is in close proximity to the Southport SLA and its two hospitals. For Nerang and Stephens residents travel for health care requires multiple bus and/or train services and considerable time. In neither case is public transport an adequate option.
9. Transport Stress

Introduction
This Chapter discusses the burden of transport costs. It introduces the concept of transport stress. The discussion is theoretical and methodological since no data is available for empirical analysis. The substantial limitations of Census data are highlighted throughout the Chapter.

From Housing Stress to Transport Stress
Since the early 1990s, Australian housing researchers have used the notion of 'housing stress' to measure financial difficulty in the private housing market. The concept of 'housing stress' emerged in response to the perception that while urban housing may be physically adequate, its cost often imposes a debilitating financial burden on households. The *National Housing Strategy* defines a household to be in housing stress if it is among the lowest two income quintiles and housing costs exceeded 25 percent of income. While measures of this sort are crude, they do provide useful indications of the level of financial difficulty experienced by particular populations at particular spatial scales. Randolph and Holloway's (2002) study of housing stress for example, indicates 32 percent of private renters in metropolitan Sydney suffer housing stress.

Housing stress measures the relationship between the income of a household and its geographic position within a spatial housing market, given that average housing costs vary by locality and are in part themselves determined by the amenity and accessibility of that location. Because the distribution of employment and services varies across metropolitan regions, it is reasonable to assume that different geographical locations within cities will have differing levels of access to services. Conventional land market analyses assume that housing prices follow a gradient that declines as distance from a desirable location increases. Such models assume land consumers trade off travel costs against housing costs. In the model a household whose purchasing power is constrained will balance the cost of land against the cost of accessibility to centralised services and/or employment.

As part of the 1992 *National Housing Strategy*, Maher et al. (1992) explored the trade-off between access to services or employment and housing cost. They found many households were willing to accept reduced accessibility to employment and services, and higher transportation costs including longer travel times, to achieve the goal of home ownership. Badcock (1994), on the other hand, argues that structural housing market constraints are the real cause of this willingness to accept reduced amenity. Nonetheless, the basic notion of a location/transport trade-off persists in Australian urban policy; although recent metropolitan strategies suggest the government’s role in ensuring the spatially equitable distribution of services and employment is currently being refigured.
The trade-off between housing costs and travel costs becomes relevant at the point where the cost of travel becomes a financial burden on the household, to a degree comparable to housing costs. Thus, it is reasonable to consider the possibility of ‘transport stress’ being implicated in household disadvantage. The remainder of this Chapter considers the notion of transport stress in greater detail and outlines methodological issues associated with its measurement. Some of the discussion reflects that already undertaken by Dodson (2004) in a study of ‘spatial mismatch’ in Melbourne.

Calculating Transport Stress

Like housing stress, transport stress can be calculated as the proportion of household income consumed by transport costs. This yields an index of the aggregate level of transport stress by particular locality. In this context, ‘travel’ is defined as the quotidian trips necessary for employment and service(s) access. Other travel, such as recreational travel, is excluded.

The calculation of transport stress requires disaggregated household income, transport cost, and location data. In a perfect research world, a dataset on the expenditure patterns of households by income level at a local scale would allow the mapping of patterns of differences among and between households for different geographic areas. This unfortunately is not the case. The inadequacies of currently available data sets preclude a meaningful investigation of transport stress as a component of the present Gold Coast pilot study. This Chapter must be content to examine some of the methodological issues associated with assessing transport stress.

Comprehensive data on household expenditure is not readily available in Australia. The main source of such data is the ABS Household Expenditure Survey (HES). The most recent HES was undertaken in 1998/1999 - rendering the data dated. The ABS undertakes periodic surveys of households’ expenditure together with a very detailed breakdown of costs, including transport costs. HES, however, surveys only a sample of the population, before projecting the data onto a large space, typically the metropolitan area. The sampling method and the lack of a spatial precision means that it is not possible to identify household expenditure for specific localities within the broader metropolitan context. Nor is income information provided in a way that can be linked to expenditure at a meaningful spatial scale.

The other source of comprehensive household data is the five-yearly Census. But the Census only provides information about housing costs as opposed to household expenditure generally. Census information is collated at a very fine local scale, but the data is aggregated and categorised into income bands. This categorisation means it is difficult to use even an imputed or nominal average transport cost to assess the proportion of household income likely to be expended on public transport by those households. Suburban house prices have a strong spatial component as they are tied to the metropolitan land market. Transport costs however are less dependent on the spatial location of
a given household, and more dependent on the behavioural (socio-economic) characteristics of the households.

Some data is available on general motor vehicle running costs. Private motor vehicle ownership and operation costs are available from the Royal Automobile Club of Queensland (RACQ), which calculates and publishes annual assessments of the running costs per representative models of private motor vehicle in categories ranging from ‘small car’ to ‘large car’ and ‘SUV’. These costs include loan repayments, depreciation, maintenance, insurance, registration and operating costs. They are, in short, a potential set of standardised costs of motor vehicle ownership. Such costs would then be subtracted from household incomes to provide an imputed level of household expenditure on transport. Such a calculation would however be insensitive to differences in a household’s composition and consumption patterns.

Motor Vehicle Operating Costs

The RACQ (2003) provides calculations of the running costs for private motor vehicles, by vehicle model, on an annual basis. While these calculations are not intended for use in academic research, they do provide some indication of the annualised cost of motor vehicle ownership. The calculations assess ownership costs from new, over five years, and include finance, insurance, registration, maintenance and depreciation costs, as well as an assumed 15,000 annual kilometres travelled.

Two patterns in Table 10 are worth noting. First, operating costs rise with size of vehicle. This suggests that operating costs for larger households, who are more likely to own larger vehicles, may be higher. Second, the magnitude of the (weekly) costs is also worth noting. A small or medium sized car, when total ownership costs are taken into account on an annual basis clearly imposes a high weekly cost on the household owning the vehicle – as inspection of Table 10 and Table 11 (below) show.

Table 10: Weekly average running cost per car size (Source: RACQ, 2003)

<table>
<thead>
<tr>
<th>Car Size</th>
<th>Small (1.3L)</th>
<th>Medium (1.8L)</th>
<th>Large (&gt;2L)</th>
<th>Light 4wd (~2L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly Cost</td>
<td>99.15</td>
<td>124.40</td>
<td>151.06</td>
<td>151.01</td>
</tr>
</tbody>
</table>

As these figures are calculated on the basis of a new vehicle, they can only be used as indications. Obviously, low-income households are more likely to own second-hand vehicles. Used cars have lower up-front costs in terms of financing and depreciation, but are likely to have higher maintenance and running costs. On the basis of the available data it is difficult to impute the weekly costs of owning and running a used motor vehicle. Given that finance and depreciation are the major cost differences between new and used vehicles, it is reasonable, in the absence of other information, to assume that costs for a used vehicle would be approximately fifty percent of the cost of a new vehicle. This would suggest the all up cost of running a small to medium car might be between $60 and $80 per week per year. This represents a more reasonable financial burden on households with low incomes.
Income and Household Transport Costs

Morris et al.’s (1979) study shows lower income households tend spend absolutely less on transport than higher income households. Contemporary evidence of this relationship is provided by the ABS Household Expenditure Survey (2000) data for income quintiles, as shown in Table 11.

Table 11: Average weekly household expenditure on motor vehicle ownership per income quintile for all households, Australia, 1998/1999 (Source: ABS, 2000)

<table>
<thead>
<tr>
<th>Income Band</th>
<th>Lowest 20 percent (Less than $301)</th>
<th>Second quintile ($301 to $551)</th>
<th>Third quintile ($552 to $883)</th>
<th>Fourth quintile ($884 to $1373)</th>
<th>Highest 20 percent (More than $1373)</th>
<th>All Households ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Vehicle Ownership Costs</td>
<td>45.27</td>
<td>68.13</td>
<td>99.38</td>
<td>143.64</td>
<td>196.30</td>
<td>110.51</td>
</tr>
</tbody>
</table>

The data is averaged and aggregated at such a spatial scale it is unable to provide substantial insight into local scale relationships between household income, spatial location and transport costs. However there is a clear pattern with lower income households spending less on motor vehicles per week than higher income households. This suggests access to transport is financially limited for lower income households when compared to higher income households. The data is however unable to provide any information as to the burden that transport costs impose on low-income households.

Conclusion

The absence of appropriate data severely limits the spatial analysis of transport stress. Further research, especially the collection of disaggregated data on a finer spatial scale, is necessary if the analysis of social status and access to transport is to develop an emotional dimension.
10. Discussion of Findings

Introduction

The Chapter is comprised of two parts. The first discusses empirical findings. The second identifies methods, potential problems and possible directions for future research.

Empirical Discussion

Temporal-Spatial Coverage

Empirical analysis shows Gold Coast weekday public transport coverage of about 80 percent through the day until 7:00pm.

While the quantity of coverage is relatively constant, the quality of service varies noticeably. The initial high frequency service of the morning commute gives way an afternoon service of mostly lowest frequency service. In the afternoon and into the return worker commute service quality builds back up but not to the initial, morning standard. After 7:00pm service declines markedly in quantity and quality.

Saturday public transport service while less extensive is, also, constant through the day until 7:00pm. In contrast to the work day, however, public transport in the morning is dominated by the lowest frequency/quality service. After 9:30am quality improves with the addition of some high frequency service. The bulk services, however, remain operating at intervals of more than 30 minutes. After 7:00pm service quality and quantity declines, with over 60 percent of the population having no access to public transport.

It is estimated that of the 1.65 million daily trips on the Gold Coast only 15 percent are work-related, with the remainder generally occurring outside of peak times (Queensland Transport, 2001). The present tempo of public transport ill-fits such a demand profile.

Within the temporal profile there are broad spatial dimensions. The Gold Coast Highway, especially between Helensvale and Labrador, and between Surfers Paradise - Broadbeach – Palm Beach, is a high frequency route. Morning train services, also operating at intervals of less than 15 minutes, are available in parts of the interior and Beenleigh. Three large areas of the Gold Coast Urban Area are notable for less than adequate public transport coverage - with no service or services operating at intervals of more than half hour for most of the day. These areas are the Hope Island and Coombabah area to the north, the majority of Nerang, Carrara-Merrimac and Worongary-Tallai, west of Surfers Paradise, and the Elanora and Currumbin Waters region to the south. All are peripheral locations far distant from the Surfers Paradise- Broadbeach core.
Temporal-Spatial Coverage With Socio-economic Data

Several areas are repeatedly identified, on various social dimensions, as locations of disadvantage. These areas are Beenleigh, Helensvale, Labrador and Southport, Nerang, Stephens, Palm Beach and Coolangatta.

Palm Beach and Coolangatta are located on the high frequency bus route that runs along the coastal highway and are, in the Gold Coast context, well served by public transport. Areas proximate to the Gold Coast core, such as Labrador and Southport, are covered by services operating at least every 30 minutes for several periods of the day. Inland areas such as Beenleigh, Nerang and Stephens are poorly served by public transport. Helensvale is the exception to the pattern. An inland area of social disadvantage it has good access to public transport connecting it to Surfers Paradise on the Coast and local theme parks.

The spatial distribution of transport disadvantaged is cross-cut by socio-economic difference(s).

Areas with a high percentage of people aged over 65 have notably greater access (quantity) to more frequent services (quality) than the total population. The aged are a relative privileged group of public transport users.

Households in areas with a concentration of young people under the age of 15 have the worst service of all the socio-economic categories included for analysis. They have a higher than normal proportion of ‘no service’, or are dependent upon inadequate low(est) frequency service with wait intervals in excess of 30 minutes. The lack of Saturday evening public transport for the ‘youth areas’ is also worthy of note.

Finally, households in areas where a relatively high proportion of people do not own a car are the most privileged group of public transport users on the Gold Coast. Their access profile in terms of both quantity and quality is significantly greater than the standard defined by the total population.

Access to Employment and Health Services

Employment distribution on the Gold Coast is increasingly dominated by the Southport – Surfers Paradise axial. Public transport access for workers in the tourist industry was investigated for three areas of social disadvantage. On a typical weekday morning Labrador workers are adequately served; Stephens’ workers have marginal access; and Nerang workers are poorly served. On Saturday night, a busy time for some tourist workers and period of reduced public transport, Nerang with its need for west – east travel is particularly disadvantaged; while Labrador, proximate to Southport, is relatively advantaged.

Analysis of public transport access to public health services produced a similar pattern. Labrador has the highest frequent connections and is in close proximity to the Southport SLA and its two hospitals. For Nerang and Stephens residents travel for health care requires multiple bus and/or train
services and considerable time. In neither case is public transport an adequate option.

Methodological Discussion

Data Limitations

For the Gold Coast, Census data at the CD level is the most disaggregated form of spatial information. Since data at the level of the individual is unavailable, the potential for generalisation about the study area is a factor in the analysis. One possible way to address this limitation would be to conduct individual or household surveys to obtain primary data. A survey would enable specific questions relating to transport disadvantage and social status to be posed.

Public Transport Coverage

Gross public transport coverage was estimated using a 400m buffer on bus routes. The standard was adopted from previous work (Murray et al., 1998; Wu and Hine, 2003). Buffering by bus-stop rather than bus route would have allowed a finer grained estimate of public transport coverage. In this study bus routes were used as the bus stop data did not have any service frequency data associated with it.

The initial, gross-coverage estimates lacks any temporal dimension. A frequency dimension was added to the analysis by distinguishing four levels of service:

- high frequency - service at least every 15 minutes;
- mid-range frequency – service at least every 30 minutes;
- low frequency – service at intervals in excess of 30 minutes;
- no service.

The temporal profile over the week was also investigated by distinguishing week day (or work day) service from Saturday weekend service.

Quantification of Public Transport Coverage

There are two possible ways, when using census data at CD level, to estimate the population falling within a buffer zone (i.e. public transport ‘coverage’).

The centroid method consolidates the district’s population at its geometric centre. If the centre falls within a buffer zone the whole CD population is deemed covered.

With the intersect method the total CD population is deemed covered if the CD boundary intersects the buffer zone at any point. Clearly, this can give an inflated estimate of public transport coverage. This study used the centroid method.

Future studies should consider laying the Census CDs over the property boundary cadastre, to determine those parts of the CD that demonstrably
contain residential properties. Using the average household size for each CD a value could be assigned to each property on the cadastre. On the base of the resultant localised population count the trace of a buffer zone provides a refined coverage count.

Limitations of Map Analysis

To map is to generalise at a certain scale. All maps dissolve detail below the elected scale. The study used data at the CD scale to identify key areas of the Gold Coast with high levels of social disadvantage. However, because the urban environment is not uniform other, smaller, concentrations of high disadvantage are to be found throughout the Gold Coast City. In some cases these smaller areas were included in the qualitative discussion if not the quantitative analysis. In most cases, however, they were neglected.

The mapping in this study does not describe the physical landscape of the urban environment. While the public transport buffer assumes people have access to public transport if they live within 400m of a bus route, not all 400m are created equal. For example, there may not be adequate footpaths, creating a problem for mobility-limited people such as the disabled, the young, the elderly or those with children. In addition to the physical landscape there is a social landscape that may, for example, discourage residents walking between their residence and the bus stop especially after daylight hours. In sum, the drawback of relying heavily on GIS is that neighbourhood characteristics are not able to be incorporated into the final analysis.

There is also no way of knowing how residents' perceive the public transport system. Whether, for example, they find it to be reliable, clean, safe and reasonably priced – or the opposite. This important dimension needs be addressed in further studies. The work of Hine and Mitchell (2001) is a study in the use of individual interviews to understand transport behaviour. Alternatively, Johnson and Herath (2004) use focus groups and community workshops, as well as discussions with local residents to explore the issue.

This study found temporal data difficult to represent visually, particularly when multiple variables are presented in combination. Socio-spatial patterns, such as the distribution of socio-economic characteristics or the buffer zones of public transport, are relatively easy to map with GIS. It is however substantially more difficult to represent temporal patterns - such as the changing public transport frequencies and the different time periods of the day - given the multiple layers of information that must be represented. Some form of mathematical indexing would offer greater opportunity to combine and depict this complex array of data. It is suggested future studies consider this dimension, although initial practice cautions such methods can obscure as much as they enlighten.

Access to Employment and Health Services

The pilot study mapped the level of employment within the Gold Coast at the SLA level for all employment, the composite category of 'tourist employment', and for health and community services. Employment levels were expressed
as a proportion of total Gold Coast employment. The analysis demonstrated that overall employment is concentrated within specific locations in the Gold Coast, in particular Southport, Surfers Paradise, Nerang and Robina. Health and community services are strongly concentrated, with 32 percent of Gold Coast employment in this category situated in Southport. This in part reflects the co-location of two hospitals within this SLA. Tourist employment, compromising retail and cafes, restaurants and accommodation, is, as to be expected, concentrated in Surfers Paradise. However the proportion of Gold Coast employment situated in Surfers Paradise is not substantially greater than that for comparable SLAs such as Nerang, Southport or Robina. Clearly tourist employment is not as concentrated as health and community services.

The composite tourist employment category was chosen because it tends to be marked by flexible working arrangements, including part-time and casual employment and often requires fewer qualifications than other employment sectors, such as business and financial services. Tourist employment is thus viewed as offering opportunities for individuals and households who are currently disadvantaged in the labour market; as a potential ‘first rung’ to secure ongoing employment. The location of low SEIFA households relative to the locations where tourist employment is more prevalent could potentially produce a disadvantageous ‘spatial mismatch’ if transport access is poor.

To assess the public transport access of disadvantaged areas to employment, the trace of the lowest seven SEIFA areas was laid over a mapping of employment distribution and then the public transport network placed on top. The selection of three of the seven lowest SEIFA SLAs was driven by the need for clarity in the mapping process, but also because it is the most disadvantaged locations that are of concern to this project. It will be a purpose of the larger subsequent project, to further develop methods of representing spatial access between sites of concentrated disadvantage to sites of employment concentration.

**Transport Stress**

In this study the absence of data at an individual or household scale limits any substantial conclusions about the impact of motor vehicle ownership costs on the financial status. Australian data shows the average weekly expenditure on motor vehicles of households in the lowest income quintile (of less than $301 per week) to be $45. At the lowest level of household income running a car costs at least 15 percent of income. The relative cost for households earning less than the upper limit of the income category will be higher.
11. Conclusion

Introduction
This study has investigated the relationship between transport disadvantage and social status on the Gold Coast. Its primary focus is the spatial and temporal nature of the public transport system and the access of people living in disadvantaged areas to that system. The study tested some of the methodological and empirical concerns identified in a previous work. This concluding Chapter links the initial research questions to the main findings of the study.

The Distribution of Social Groups
The study shows the Gold Coast to be a socially diverse region. In its relatively short history of urban development the Gold Coast Urban Area has developed in a largely linear fashion. Highways and motorways follow the coastline, as do the main bus routes. There is, therefore, good public transport service along the coastal strip. East-west travel towards the hinterland is, however, constrained. Demographic analysis found an aging population located throughout the region, employment structured around the retail and service sector, and high levels of unemployment. Areas with the highest SEIFA scores of social disadvantage were Beenleigh, Helensvale, Labrador and Southport, Nerang, Stephens, Palm Beach and Coolangatta.

Gross Coverage and Social Status
Gross access to public transport, using 400m as the maximum acceptable access distance to a bus route, is available to the majority of highly disadvantaged areas on the Gold Coast.

Temporal Variation and the Impacts on Social Groups
Several areas consistently appeared throughout the study with high levels of social disadvantage. These areas were Beenleigh, Helensvale, Labrador and Southport, Nerang, Stephens, Palm Beach and Coolangatta. The temporal access (through the day and through the week) of these areas to public transport was investigated. Areas along the coastline and the Gold Coast Highway, such as Labrador, Southport and Palm Beach, had the greatest spatial access to high frequency services. Peripheral areas such as Beenleigh, Nerang and Stephens were more likely to have infrequent or no service.

Helensvale was an apparent exception to the pattern. Although located in the northern interior, it is served by high frequency public transport. These service, however, are structured around providing a connection from Surfers Paradise to the tourist theme parks, rather than a service to local residents for work and living purposes.
The Impact of Access to Employment and Services
Disadvantaged populations living close to areas of tourist employment and health service provision also enjoyed higher frequency public transport. Peripheral populations were not only further away but also were inadequately served by public transport.

The Burden of Transport Costs
The lack of appropriate data prevented meaningful investigation of the burden of transport costs on households. Analysis of this question will require finer grained data than that published in the census.

Understanding Transport Disadvantage and Social Status
Overall the findings of this Monograph echo previous work on the disadvantaged and the public transport system. The location of concentrations of the highly disadvantaged on the Gold Coast place these households at a disadvantage relative to employment and services. Transportation systems play an important role in mediating these accessibility dynamics, confirming conclusions drawn in the first URP Monograph by Dodson et al. (2004). Inequalities in the distribution of public transport services may be exacerbating socio-spatial disadvantage, however more detailed qualitative work, including household surveys, would be required to confirm this hypothesis.

Developing Research into Transport Disadvantage and Social Status
Data limitations have restricted the scope of this Monograph. For the Gold Coast, data at the CD level is the most disaggregated form of spatial information available from the national Census. Employment data is only available at the SLA level, making its resolution quite coarse. Unfortunately little can be done to overcome this problem, as the form of data is often beyond the control of the investigator. A possible way to overcome this limitation would be to conduct large scale individual or household surveys to obtain primary data. While this would cost significant time and money, it would enable specific questions relating to transport disadvantage and social status to be more closely addressed.

A major opportunity exists for further research into transport stress. The collection of more detailed data specific to both the spatial scale and purpose of the investigation is a first necessary. Such data would need to include household income and household expenditure on transport, especially in relation to car use.

This Monograph focused on the public transport system, to the neglect of the total road and transport network. It has also been restricted by the availability data. The lack of adequate data about car ownership or use has meant that private car use could not be included in the study. More specific data, such as the Census journey-to-work by modal split, would allow more comprehensive treatment.
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