



## **Changing travel behaviour – measures from the Sydney Household Travel Survey**

**Tim Raimond & Julie Gee**

*Transport Data Centre, New South Wales Department of Transport*

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### **Abstract**

Evidence is emerging from the Sydney Household Travel Survey (HTS) of changing travel behaviour within different “lifecycle” groups (ie single people, people with children, the elderly). This paper seeks to quantify these changes in terms of changing trip rates for different lifecycle groups, suggest reasons for these changes, and discuss the possible policy implications of such changes. Some key patterns to emerge are that on average, households are getting smaller as the population is ageing, while at the same time average household trip rates are rising, as is the share of trips to car. Some of the factors influencing these changes include the rising use of cars by people over 60 years at the expense of public transport which reflects the increasing proportion of older females licensed to drive, as well as the growth in car ownership generally. Furthermore, this lifecycle group is increasing as a proportion of the population. Conversely teenagers, the lifecycle group who travel most by public transport, are declining as a proportion of the population thereby reducing public transport’s market.

Another factor influencing household mode use is the increased participation in the workforce of women, particularly by those with children. This has resulted in more complex travel patterns and increased dependence upon the car. At the same time children are travelling more as a car passenger and less by public transport and walking.

These changes in travel behaviour by different lifecycle groups, coupled with their changing representation in the demographics of Sydney, have significant implications for future travel patterns in newly developing areas, urban consolidation areas, and around new road and rail corridors. The trip rate measures for different lifecycle groups presented in this paper are aimed to enhance the tools available for transport service planning in Sydney.

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### **Contact author**

Tim Raimond

Client Services Manager

Transport Data Centre

NSW Department of Transport

GPO Box 1620, Sydney NSW 2001

Tel: (02) 9268 2858

Fax: (02) 9268 2853

Email: [tim.raimond@transport.nsw.gov.au](mailto:tim.raimond@transport.nsw.gov.au)

## **Introduction**

The Transport Data Centre annually monitors travel behaviour changes in Sydney via its Household Travel Survey. Over the last decade, there have been significant changes to the key travel indicators, the main one being an increased dependence on the private motor vehicle for mobility.

Evolving social, demographic and land use trends over this period appear to have provided some impetus for this change. In particular, the increased participation of women in the workforce, and the ageing of the first generation of car-dependents – the baby boomers, appear to be profoundly influencing travel patterns in Sydney, and probably in other Australian and Western cities.

This paper examines the relationship between these travel behaviour changes and widely documented changes in the social, demographic and land use fabric of Sydney over recent years. To assist in understanding how these changes are interrelated, the paper examines the travel patterns of different lifecycle groups (eg single people, couples with children, the elderly) using per person and per household trip rates. The geographic variation in these trip rates is also examined. The aim is to present a series of new measures of travel behaviour for application by transport and land use planners which better reflect the complexity of current travel behaviour than the application of one-dimensional trips rates or mode shares, as is the current state of practice.

The data presented in this paper is from the Transport Data Centre's (TDC) ongoing Household Travel Survey (HTS) for the year 2000. Data for 1991 is from the TDC's 1991/92 Home Interview Survey (HIS).

## **Social and demographic changes**

Arguably the key social and demographic changes currently occurring in Australia with the greatest influence on travel behaviours are the ageing of the population, the decreasing average size of households and the growth in the number of women in the workforce.

Australia, like many other developed nations, has an ageing population. The ageing of Australia's population reflects increasing life expectancies and falling fertility rates. Over the last decade the median age of Australians increased by 3 years, from 32 years in 1991, to 35 years in 2001 (ABS 2002a).

This has been largely driven by greater life expectancies. Since 1901 the proportion of people aged 65 years and over increased from 4% to 12% in 2001. If current trends continue the ABS estimates that by 2020 18% of Australia's population will be aged 65 years and over (ABS 2002a).

Comparing population data from the last two Censuses, between 1996 and 2001 the number of Australians aged 65 years and over increased by 11%, with the number 85 years and over increasing by 32%. The population aged 14

years and under increased by only 2% over the same period, whilst for those aged 15 to 64 years the increase was 7% (ABS 2002b).

Fertility rates in Australia have fallen steadily since the “baby boom” of the 1960s. In 1961 fertility rates peaked at 3.5 babies per woman and by 2001 the fertility rate was 1.7 babies per woman, the lowest on record (ABS 2002a). Factors influencing this decline include major changes in access to birth control, the increasing median age of women giving birth and the increased participation of women in the workforce.

The median age of Australian mothers at their first pregnancy, resulting in a live birth, has increased from 24 in 1975 to 29 in 2000 (ABS 2002a). While fertility rates for women aged over 30 have increased over the period 1979 and 1999, fertility rates for those under 30 have declined even more. One of the factors delaying women having children are increased labour force participation rates, with the participation rates of married women in the 20-34 year age group - traditionally the major child-bearing age group – increasing from 48% in 1979 to 65% in 1999 (ABS 2001).

Increasingly women are more likely to stay in the workforce after they have children rather than take a long break to raise their families. This has become possible with the increased availability of part-time and casual employment and the expansion of childcare services. In 2001 50% of all women with children aged 4 years and under were in the labour force, up from 44% in 1991 (ABS 2001, 2002a).

As well as contributing to an ageing population, falling fertility rates have influenced the decline in average household sizes. In 1971 the average Australian household consisted of 3.3 people, falling to 2.6 people by 2001. Between 1971 and 2001 the proportion of lone person households increased from 18% of all households to 23%. Over the same period, lone parent families increased from 6% to 15%. Smaller households are also the result of an increase in the number of people living alone. This is related to the ageing of the population and an increase in lone parent households over time as divorce rates have risen (ABS 2002c).

### **Land use changes**

The economic boom in Sydney after the war and the pressure of population growth saw development in Sydney sprawl, aided by the increase in private car ownership. With the development of areas away from the radial rail network in Sydney and removal of tram lines public transport use declined. The result was increasing traffic congestion and air pollution.

By the late 1980s the NSW Government recognised that the prevailing pattern of growth in Sydney was unsustainable and introduced strategies to contain future housing and encourage employment development in designated commercial centres already well served by public transport (NSW Government 1988, 1995).

In addition there has been a cultural shift in the demand for housing in Sydney, with people no longer only demanding quarter acre blocks on the fringes of Sydney. At present 54% of current approvals in Sydney are for non-detached housing, compared with 27% ten years ago (HIA 2002). This reflects both the decreasing size of households and the declining affordability of housing in Sydney. Today many new housing developments, even on the city fringe, include a range of housing densities as well as a provision for commercial development.

These social, demographic and land use changes in Sydney have profoundly affected travel behaviour, as demonstrated with the following analysis.

### Evidence of changing travel behaviour

Traditionally travel behaviour is measured by “mode shares” and looking at changes in the use of different modes over time. The long term trend in Sydney’s mode share has seen private vehicle use increasing with a corresponding decline in the share of trips by public transport and walking.

In 2000, 69.8% of trips by Sydney’s residents were by private vehicle (driver and passenger), up from 66.9% in 1991 (Table 1). The mode share for public transport (train, bus and ferry) on an average weekday was 11.1% in 2000 compared to 11.9% 1991. The share of walking trips has declined significantly from 19.6% in 1991 to 17.4% in 2000.

**Table 1 Trips by Sydney residents by mode, average weekday 1991 and 2000**

<b>Mode</b>	<b>1991 '000</b>	<b>1991 %</b>	<b>2000 '000</b>	<b>2000 %</b>
Vehicle driver	6,366	46.2	7,519	48.0
Vehicle passenger	2,850	20.7	3,403	21.7
<i>Total vehicle</i>	<i>9,216</i>	<i>66.9</i>	<i>10,921</i>	<i>69.8</i>
Train	691	5.0	784	5.0
Bus	917	6.7	921	5.9
Ferry	33	0.2	34	0.2
<i>Total public transport</i>	<i>1,641</i>	<i>11.9</i>	<i>1,739</i>	<i>11.1</i>
Walk only	2,700	19.6	2,724	17.4
Other	253	1.8	299	1.9

Source: Home Interview Survey 1991/92 and Household Travel Survey 2000 (unlinked trips). In order to understand the link between the changes in Sydney’s social, demographic and land use patterns and the travel behaviour of the city’s residents, there is a need to look in greater depth at outputs from the HTS. One method is to look at trip rates for different groups in the population – in this paper we look at car and public transport trip rates for different social, demographic and geographic groups.

## Measuring changes in travel patterns

In 2000 the average Sydney resident made 3.8 trips on an average weekday, up from 3.7 trips in 1991. For Sydney households each made an average of 10.3 trips on weekdays in 2000, up from 10.2 trips in 1991. However over that period the average household size decreased from 2.8 people in 1991 to 2.7 people in 2000 (and 2.6 people by the 2001 Census). Therefore people are travelling more in 2000 than they did in 1991.

### Trip rates per person

Although on average each Sydney resident makes 3.8 trips on weekdays, the rate varies greatly for people with different characteristics. Table 2 presents trip rates by gender in 1991 and 2000.

**Table 2 Average per person trip rates by gender, average weekday 1991 and 2000**

Gender	Vehicle driver trips per person		Vehicle passenger trips per person		Public transport trips per person		Total trips per person	
	1991	2000	1991	2000	1991	2000	1991	2000
Males	2.1	2.1	0.6	0.7	0.4	0.4	3.8	3.8
Females	1.4	1.6	0.9	0.9	0.4	0.4	3.6	3.7
All people	1.7	1.9	0.8	0.8	0.4	0.4	3.7	3.8

Source: Home Interview Survey 1991/92 and Household Travel Survey 2000 (linked trips).

The data shows that although there are some differences in mode use between the genders, it appears that these differences are reducing over time. By 2000 males and females were making a similar number of trips on weekdays. The overall increase in per person trip rates from 3.7 in 1991 to 3.8 in 2000 was due to the increase in trip rates for females, in particular as a car driver. In 2000 43% of all trips by females on an average weekday were vehicle driver, up from 39% of trips in 1991. This reflects the increase in women in the workforce, particularly those with children, that has resulted in more complex travel patterns and increased reliance on the car.

The vehicle driver trip rate for males has remained stable over time, however males are making more trips as a vehicle passenger. In 1991 16% of trips by males on weekdays were as a vehicle passenger increasing to 19% of trips in 2000. Public transport use has remained steady for both males and females between 1991 and 2000.

Per person trip rates by age group over time are presented in Table 3.

**Table 3 Average per person trip rates by age group, average weekday 1991 and 2000**

Age group	Vehicle driver trips per person		Vehicle passenger trips per person		Public transport trips per person		Total trips per person	
	1991	2000	1991	2000	1991	2000	1991	2000
10 or less	0.0	0.0	2.1	2.4	0.2	0.2	3.1	3.2
11 to 20 years	0.6	0.7	1.0	1.3	0.7	0.7	3.3	3.6
21 to 30 years	2.2	2.2	0.5	0.5	0.5	0.5	4.1	4.0
31 to 40 years	3.0	2.9	0.4	0.3	0.3	0.3	4.6	4.3
41 to 50 years	3.0	3.3	0.4	0.4	0.3	0.3	4.3	4.6
51 to 60 years	2.1	2.5	0.5	0.4	0.3	0.3	3.5	3.8
61 to 70 years	1.5	1.7	0.5	0.5	0.3	0.3	3.1	3.2
Over 70 years	0.8	0.9	0.4	0.5	0.3	0.3	2.3	2.5

Source: Home Interview Survey 1991/92 and Household Travel Survey 2000 (linked trips).

In both 1991 and 2000 per person trip rates increase to middle age and then decline. Between 1991 and 2000 per person trip rates increased for all age groups except those aged 21 to 40 years. Vehicle driver trip rates per person also increased over time for all age groups except those aged 21 to 40 years. Vehicle passenger trip rates are highest for children aged 10 or under, followed by 11 to 20 year olds, and vehicle passenger trip rates increased for these two age groups between 1991 and 2000. Public transport trip rates remained steady across all groups over time. People aged 11 to 20 years have the highest public transport trip rates, however this segment is declining as a proportion of the population, thereby reducing public transport's market (ABS 2002c).

One of the most interesting changes in mode use over time has been for people aged over 60 years, who are increasing as a proportion of the population (ABS 2002c). Their share of private vehicle trips has increased at the expense of public transport and walking trips. In particular their share of vehicle driver trips increased from 51% of trips in 1991 to 54% in 2000. This reflects the increasing proportion of females in that age group with a driver's licence, as well as the growth in car ownership generally. In 1971 43% of Sydney's female residents aged 18 years or over held a drivers licence rising substantially to 75% in 1998, while the licence holding of males over the same period increased from 82% to 89%. This trend towards higher licence holding is likely to continue for some years to come (Hague Consulting Group et al 2002).

The other major change has been for people 20 years and under, with increased use of private vehicle trip rates over time, particularly vehicle passenger trip rates, and less public transport and walking trips. A similar pattern of mode use has also occurred for education/childcare trips, which may reflect safety concerns for children travelling unsupervised as well the increasing average distance of education trips.

Another factor could be the increasing participation of women with children in the workforce who drop-off/pick-up their children at school on their way to/from

work. The data shows that the share of vehicle driver trips by females for both commuting and serve passenger trips increased from 1991 to 2000. In 1991 50% of serve passenger trips by females on weekdays were as a vehicle driver, increasing to 56% by 2000, while 50% of commuting trips by females in 1991 were as a vehicle driver, increasing to 54% by 2000. The private car appears to provide the speed and convenience to allow the juggling of these work and family commitments.

These emerging changes to children's travel behaviour are most starkly reflected in travel patterns to school. On an average weekday in 2000, 26% of education trips were by public transport, down from 29% in 1991. Trips by other modes (mainly walking) accounted for 23% of education trips in 2000 down from 29% in 1991. In 1991 40% of education trips were by private vehicle, rising to 50% in 2000.

Labour force status is also an important indicator of propensity to travel. Table 4 presents per person trip rates for different labour force groups.

**Table 4 Average trip rates per person by labour force status (people aged 15 years and over), average weekday 1991 and 2000**

<b>Age group</b>	<b>Total trips per person 1991</b>	<b>Total trips per person 2000</b>
Full-time worker	4.4	4.4
Part-time/casual worker	4.8	4.8
Full-time student	3.3	3.6
Unemployed	3.1	3.3
Retired/aged pensioner	2.6	2.7
Keeping house	3.5	3.6

Source: Home Interview Survey 1991/92 and Household Travel Survey 2000 (linked trips).

For people aged 15 years and over the highest trip rates are for part-time/casual workers (4.8), many of whom are women whose travel patterns are heavily influenced by the demands of their families. The next highest trip rates are by full-time workers (4.4). Although trip rates for these groups remained stable over time there have been significant increases in the number of people in these groups, particularly part-time and casual workers who increased by 40% from 1991 to 2000. Total trip rates for all other labour force groups increased between 1991 and 2000.

Vehicle driver trip rates increased for all labour force groups over time, except for full-time workers. Full-time students are more likely to travel as vehicle passengers and by public transport than any other labour force group. Public transport use is lowest by people keeping house. Although pensioners had the lowest trip rates overall in 2000 (2.7), they have increased since 1991.

Trip rates per household

While trip rates per person assist in understanding Sydney's travel patterns, household trip rates provide a useful unit for analysis when assessing the likely travel contribution of new developments in established or developing areas.

In 2000 the average household in Sydney of 2.7 people made 10.3 trips on an average weekday, while in 1991 the average Sydney household comprised 2.8 people and made 10.2 trips.

Table 5 presents average trip rates per household by dwelling type.

**Table 5 Average per trip rates per household by dwelling type, average weekday 1991 and 2000**

Household characteristics	Vehicle driver trips per household		Vehicle passenger trips per household		Public transport trips per household		Total trips per household	
	1991	2000	1991	2000	1991	2000	1991	2000
Separate house	5.7	6.0	2.5	2.7	0.9	0.9	11.3	11.4
Semi-detached	3.5	3.5	1.4	1.4	1.1	1.1	8.9	8.5
Flat/unit	2.6	2.5	1.0	0.9	1.3	1.3	7.2	7.0
All households	4.8	5.1	2.1	2.2	1.0	1.0	10.2	10.3

Source: Home Interview Survey 1991/92 and Household Travel Survey 2000 (linked trips).

Households residing in separate houses make more trips than households residing in medium/high density dwellings, a reflection of the average number of people living in the different types of dwellings. Between 1991 and 2000 total household trip rates increased for separate houses, caused by increases in both vehicle driver and vehicle passenger trip rates. In comparison, total household trip rates declined over time for households living in semi-detached houses and flats, related to a fall in trips by modes other than car and public transport.

Therefore the increase in trip rates from 1991 to 2000 is due entirely to vehicle travel by households living in separate houses. This has implications for long term household travel patterns as non-detached dwellings are becoming increasingly popular as the population ages and lone person households increase (ABS 2002c; HIA 2002).



The data also shows that there are differences in trip rates by mode for different housing types. Vehicle trip rates decrease as housing density increases, while the opposite pattern occurs for public transport trips. Vehicle trip rates for semi-detached dwellings have remained stable over time while they have fallen for households residing in flats/units. Public transport trip rates remained stable for each housing type between 1991 and 2000.

Trip rates by household can also be looked at by number of residents and type of household (Tables 6 and 7).

**Table 6 Average per household trip rates by number of residents, average weekday 1991 and 2000**

Household characteristics	Vehicle driver trips per household		Vehicle passenger trips per household		Public transport trips per household		Total trips per household	
	1991	2000	1991	2000	1991	2000	1991	2000
One	1.5	1.7	0.2	0.2	0.6	0.5	3.4	3.6
Two	3.7	3.9	1.1	1.0	0.8	0.8	7.4	7.4
Three	5.6	5.8	2.0	2.2	1.1	1.0	10.9	11.0
Four	7.6	8.0	3.9	4.1	1.4	1.4	16.0	16.2
Five or more	8.0	8.8	5.3	6.1	1.8	1.8	19.2	19.8

Source: Home Interview Survey 1991/92 and Household Travel Survey 2000 (linked trips).

**Table 7 Average per household trip rates by household type, average weekday 1991 and 2000**

Household characteristics	Vehicle driver trips per household		Vehicle passenger trips per household		Public transport trips per household		Total trips per household	
	1991	2000	1991	2000	1991	2000	1991	2000
Person living alone	1.5	1.7	0.2	0.2	0.6	0.5	3.4	3.6
Couple only	3.8	4.1	1.1	1.1	0.7	0.7	7.1	7.5
Couple with children	7.3	7.9	3.8	4.1	1.3	1.2	15.3	15.7
Lone person with children	3.8	4.2	2.0	2.1	1.1	1.2	9.8	10.0
Other	5.4	4.7	2.1	1.9	1.7	1.6	12.7	11.3

Source: Home Interview Survey 1991/92 and Household Travel Survey 2000 (linked trips).

As would be expected, the total number of trips per household increases with the number of people in a household. People living alone make an average of 3.6 trips, which is below the Sydney average of 3.8 trips per person. This suggests that living with other people increases the amount a person travels.

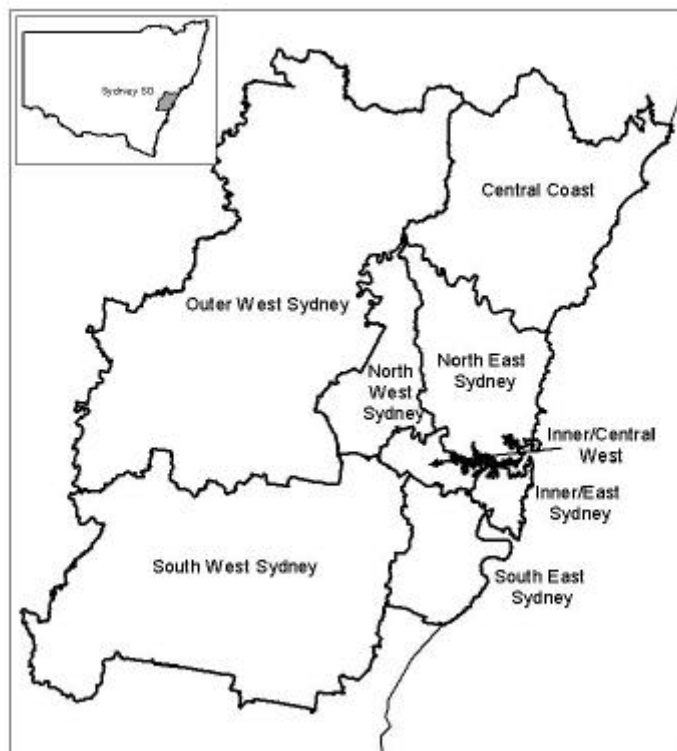
Between 1991 and 2000 total household trip rates remained steady for two person households and increased for all other types. The increase in total household trips rates are due to increased vehicle driver and passenger trip rates, while public transport trips are stable for most groups.

### Regional analysis of household trip rates

As we have seen in the previous section, household trip rates vary widely by household type, and household types are not uniformly distributed throughout the urban landscape. Therefore it is important to recognise the geographical distribution of households, and therefore trip rates, when applying trip rate analysis to new developments.

The following analysis looks at household trip rates by eight geographic regions in Sydney, defined as the Sydney Statistical Division. The location of each region is illustrated in Figure 1.

**Figure 1**      **Regions in the Sydney Statistical Division**



Some of the key characteristics of each region are presented in Table 8.

**Table 8 Characteristics of regions in Sydney, 2000**

Region	Population growth 1991 - 2000	Average household size		Average no. of vehicles per household	
		1991	2000	1991	2000
Inner & East	10.3%	2.3	2.2	0.9	1.0
North East	6.7%	2.6	2.6	1.4	1.4
South East	6.6%	2.8	2.8	1.3	1.4
Inner & Central West	7.7%	2.7	2.7	1.2	1.3
North West	17.1%	3.2	3.1	1.6	1.7
South West	18.5%	3.3	3.2	1.4	1.6
Outer West	12.0%	3.1	2.9	1.6	1.7
Central Coast	22.0%	2.6	2.6	1.3	1.4
Total Sydney	11.2%	2.8	2.7	1.3	1.4

Source: Home Interview Survey 1991/92 and Household Travel Survey 2000.

The outer and western regions have experienced the fastest population growth since 1991. These regions also have larger average household sizes and higher rates of vehicle ownership than regions in inner and eastern Sydney. Overall the average household sizes have fallen in most regions between 1991 and 2000, while the average number of vehicles increased. These characteristics reflect the different prevailing land use patterns in the inner regions compared to the outer regions. The inner regions in Sydney are generally higher density and well served by public transport, while the outer regions are characterised by lower density development and limited public transport. The household characteristics and land use patterns of the regions are reflected in the household trip rates in Table 9.

**Table 9 Household trip rates by region in Sydney, 1991 and 2000**

Region	Total trips per household		Vehicle driver trips per household		Public transport trips per household	
	1991	2000	1991	2000	1991	2000
Inner & East	9.2	8.6	3.6	3.2	1.3	1.2
North East	10.7	10.3	5.2	5.1	1.1	1.1
South East	9.8	10.6	4.8	5.3	0.9	0.9
Inner & Central West	8.7	9.7	4.1	4.5	1.0	1.2
North West	11.4	11.1	6.0	6.3	0.9	0.8
South West	11.0	11.2	5.1	6.0	1.0	0.8
Outer West	11.8	11.5	5.9	6.4	0.9	0.8
Central Coast	9.7	9.8	4.8	5.1	0.8	0.6
Total Sydney	10.2	10.3	4.8	5.1	1.0	1.0

Source: Home Interview Survey 1991/92 and Household Travel Survey 2000 (linked trips).

It is apparent that travel patterns of households in the inner and eastern regions of Sydney are quite similar, and quite different from those of people living in the outer and western regions. In general people living in the inner and eastern regions of Sydney use public transport more than people living in the outer and

western regions. By contrast, vehicle trip rates are significantly higher for households in the western regions of Sydney, averaging over 6 vehicle driver trips a day, the Sydney average being around 5 car driver trips per day.

Table 9 also indicates that growth in trip rates between 1991 and 2000 has not been uniform across Sydney. Total household trip rates have increased in the regions of the South East, Inner and Central West, South West and Central Coast, while they decreased for the regions of Inner and Eastern Sydney, North East, North West and Outer West.

Household vehicle driver and vehicle passenger trip rates have fallen over time for Inner and East and North East Sydney, but have risen for all other regions. Household public transport trip rates increased for Inner and Central West Sydney and remained stable for North East and South East Sydney. This reflects urban consolidation around public transport nodes close to the centre of Sydney.

## **Conclusions**

The evidence presented in this paper suggests a clear relationship between increased vehicle dependency and major social, demographic and land use changes such as the ageing of a car-reliant population, increased participation of women in the workforce, and continued fringe development.

In order to improve the toolset available to planners, in particular for analysis of the likely travel impact of new developments, the paper presented a range of trip rates for different social, demographic and geographic groups in Sydney. The level of variation in these trip rates between different groups highlights the importance of using data specific to the geography and demography of any particular development to assist in determining likely transport demands.

The level of variation in trip rates over time also highlights the need to regularly monitor trip rates used for strategic planning to ensure that they reflect the latest available information on travel behaviour.

Trip rates are but one measure to help understand the linkages between social, demographic and land use changes, and travel behaviour change. For example, trips vary in length. Vehicle trips have steadily increased in length over the last decade, compounding the impact of increased vehicle driver trip rates, and increased population. Kilsby and Milthorpe (2002) further explore these issues in their paper.

### Note on source of data

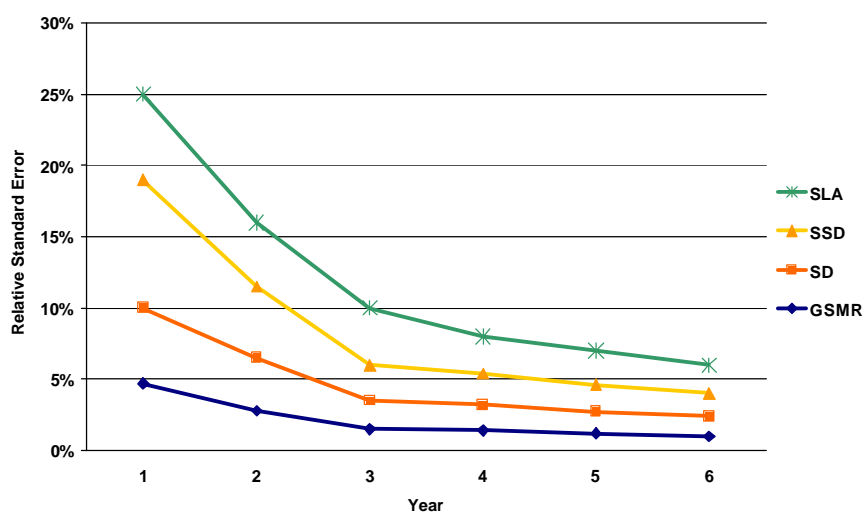
The HTS consists of a personal interview survey carried out every day from June to June each year. Information is collected through face-to-face interviews. The survey instrument is a travel diary which collects information on all travel undertaken for a nominated 24 hour period by all members of each selected household (including children of all ages). Detailed socio-demographic information is also collected on the household, as well as information for each member of the household. The data collected in the HTS is similar to that collected in the 1991/92 HIS, allowing for comparisons over time.

The continuous survey sample of the HTS is designed on a three yearly cycle so that pooling three waves of data gives a sample size similar to that achieved in the 1991/92 HIS. Each annual HTS estimate consists of three years of pooled HTS data weighted to Estimated Resident Population (ERP) from the Australian Bureau of Statistics (ABS) for a given year. Pooling the data maximises the reliability of the estimates and minimises the influence of sampling variability from one wave to the next.

The year 2000 estimates are based on pooling data from waves 2 to 4 of the HTS (1998/99, 1999/2000 and 2000/01) and weighting it to represent travel by Sydney's population in 2000. Waves 2 to 4 of the HTS sampled a total of 14,556 households in the GMR with responses obtained from 10,205 households (70%), and 26,517 people were interviewed.

The sampling methodology for the HTS was designed by ABS so that the statistical reliability of the sample increases at lower geographic levels with each pooled wave of data. The graph below shows the estimates of the relative standards errors (RSE) of total trips at the 95% confidence level over time at various geographic levels. It shows that the estimates of RSE are greater at finer geographic levels, but that they decrease over time.

**Figure 2: Estimates of relative standard errors**



## Comparisons over time

The 1991 data in this paper, sourced from the 1991/92 HIS, has been adjusted to ensure a high degree of comparability with the HTS. Nevertheless, care should be taken when interpreting changes over time. Some key issues to consider when comparing between years are:

- Improved collection and processing techniques have been used in HTS compared to the 1991/92 HIS.
- The surveys occurred at very different points in the economic cycle, with 1991 in a trough, whilst 1998, 1999 and 2000 were years with strong economic activity.
- The RSEs associated with the calculation of change between 1991 and 2000 are greater than those at each point in time, ie 1991 and 2000.

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