

# Four Wheel Drives in Urban Areas: Who uses them and why?

Tim Raimond

Transport and Population Data Centre, NSW Department of Planning

Disclaimer: Any opinion in this paper is not necessarily reflective of NSW government policy

## 1 Introduction

There are increasing calls for measures to restrict use of four wheel drives in our cities. Some media commentators have said that 4wds are inconsistent with urban areas, with concerns focussed on safety and the environment.

Given the frequent negative media coverage, there appears to be an increasing stigma associated with owning and operating a four wheel drive in our cities. Evidence to date suggests that this has not resulted in a slowing in sales of new four wheel drives. The space and flexibility, high driving position, relative value for money, and weight advantage in an accident are often espoused as reasons for the popularity of four wheel drives.

To date, we have seen local government moves to impose higher parking charges on larger vehicles (eg in North Sydney). State Governments are considering registration charges commensurate with emissions, although the current formula based on vehicle weight is already higher for four wheel drives. Recently the NSW state coroner recommended banning four wheel drives from in or near school precincts after a child was run over by a slow moving four wheel drive on school grounds. The Commonwealth Government is under pressure to review the still favourable import tariff treatment of four wheel drives operated in urban areas.

The debate on these issues has to date relied largely on anecdotal evidence about the use and impact of four wheel drives in urban areas.

This paper seeks for possibly the first time to shed some light on the issue of four wheel drive use in urban areas by examining data from the Sydney Household Travel Survey on four wheel drives users, who they are, how they use their four wheel drives, and whether there are prospects for altering their vehicle choices or usage patterns.

## 2 Methodology and Definitions

The study approach was to first identify evidence of a growing problem with four wheel drives in urban areas by exploring vehicle sales and accident data. A necessary early step in this process was determining an appropriate definition for the four wheel drive class of vehicle that is incompatible with urban use. Having identified the existence of a problem, Sydney Household Travel Survey (HTS) data was explored with the aim of identifying the characteristics of households owning four wheel drives, and their pattern of usage of four wheel drives. In the light of evidence of who owns four wheel drives and how they use them, currently proposed policy responses to the problem were re-examined.

### 2.1 Data source

Analysis in this paper is largely of data sourced from the NSW Transport and Population Data Centre's (TPDC) Sydney Household Travel Survey (HTS). This is a continuous survey, from which three annual waves – 2000/01, 2001/02 and 2002/03 – were pooled and weighted to represent the travel behaviour of Sydney residents in 2002. The resultant data includes the responses from 10,000 households (25,000 individuals) to a comprehensive travel activity survey conducted by personal interview of all household members in sampled

households across the Greater Sydney Metropolitan Area (the GMA includes Sydney SD, Newcastle SSD and Illawarra SD). Information collected from households includes their travel patterns for a day, as well as person, household and vehicle characteristics. More details on the HTS methodology, weighting and associated issues are available in Transport and Population Data Centre (2004).

## 2.2 Definition of a four wheel drive

In reviewing statistics related to four wheel drives, there are many terms for and varied definitions of four wheel drives:

- *Off-road passenger vehicles* (NSW Roads and Traffic Authority) are vehicles used to carry up to 9 passengers that are designed for off-road operation
- *All terrain wagon* (Bureau of Transport and Regional Economics) are defined as four wheel drive passenger vehicles
- *Sports utility vehicle* (VFACTS) is designed as an off road vehicle with four wheel drive capability, high ground clearance and a wagon body type.
- *4WDS* (Australian Transport Safety Bureau) are vehicles not based on a car design, including long and short base four wheel drive passenger vehicles and utilities
- The ABS does not separately identify four wheel drives in their Motor Vehicle Census

For the purposes of establishing the problem, all the above data sources and varying definitions are necessarily used in this paper. However, for the purposes of identifying patterns of ownership and use in urban areas, the Household Travel Survey (HTS) offers some flexibility to construct the most appropriate definition.

The HTS data set includes the full make and model of each vehicle garaged at a respondent's address, as well as the respondent's view on whether their vehicle is a four wheel drive. As this analysis is attempting to examine use of four wheel drives which are "incompatible" with urban use, the make and model has been used to identify medium to large four wheel drive passenger vehicles with high ground clearances and wagon-type bodies – the type that you can't see past when you are driving behind them. This definition ranges from vehicles like the Honda CRV medium sized vehicle through to large four wheel drives like Toyota Landcruiser and Ford Explorer – see Figure 1 for some examples. Lighter and smaller sedans like Subarus, and four wheel drive utilities are excluded from the definition of four wheel drives (referred to as 4wds hence forth) for the purposes of this paper, even though they may have four driven wheels. This definition is reasonably close to the "off road passenger vehicle" (RTA) and "sports utility vehicle" (VFACTS) definitions above.

## 2.3 Characteristics of 4wds sampled

4wds makes up approximately 10% of the vehicle fleet in the Sydney GMA (excluding trucks and motorbikes), or close to 300,000 vehicles (HTS, 2002).

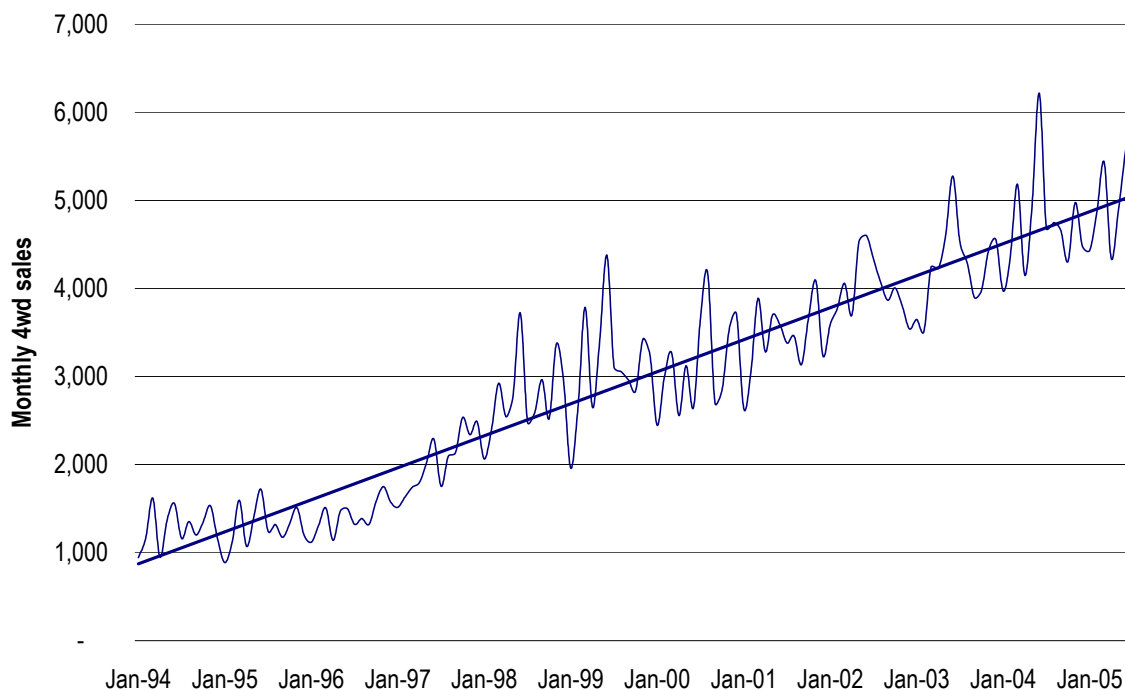
To give a flavour for the types of vehicle we are talking about, 22% of 4wds captured in the HTS are diesel, compared to less than 1% of passenger cars. Over 90% of 4wds have an engine capacity greater than 2 litres, more than a third having a capacity of over 4 litres. In comparison, almost 40% of passenger cars have an engine capacity below 2 litres. 4wd vehicles are much younger on average, with a median age of 8 years, compared to 10 years for cars. Thus, in terms of emissions, larger capacity engines moving heavier vehicles, often using diesel fuel, has serious implications, particularly for local air pollution with fine particulates.



**Figure 1: Examples of 4wds**

### 3 Relevant issues

While 4wds represented around 10% of the vehicle fleet in 2002, their penetration has continued to increase since that time. In 1994 this type of vehicle (sports utility vehicle) represented less than 7% of new vehicle registrations in NSW. It now (June 2005) represents 18% of all new vehicle registration in NSW (ABS, 2005). An examination of RTA data reveals that the proportion of registrations within Sydney has followed a similar trend, from around 5% a decade ago to 18% in 2005 (RTA, 2005). The monthly sales statistics to June 2005 show no evidence of a slowdown, as illustrated in Figure 2. The linear trend line in Figure 2 represents an average 12.5% per annum growth in new 4wd registrations in NSW, in comparison with 2.8% pa for all vehicles and 1.2% pa population growth.



**Figure 2: Monthly new 4wd registrations, NSW, 1994-2005, ABS (2005), actual sales and linear trend**

The stellar growth in 4wds can be partly attributed to the 10% import tariff advantage they held over passenger cars until this year. As of this year, the import tariff gap has shrunk to 5% (equalisation is due in 2010), but still represents a commonwealth tax concession on the purchase of 4wds in urban areas.

The Australian Transport Safety Bureau (2002) however, reports that 4wds (in this case defined as small, large and utility 4wds) are 20% more likely to be involved in fatal crashes than passenger vehicles on a fatalities per kilometres travelled basis. Their data also

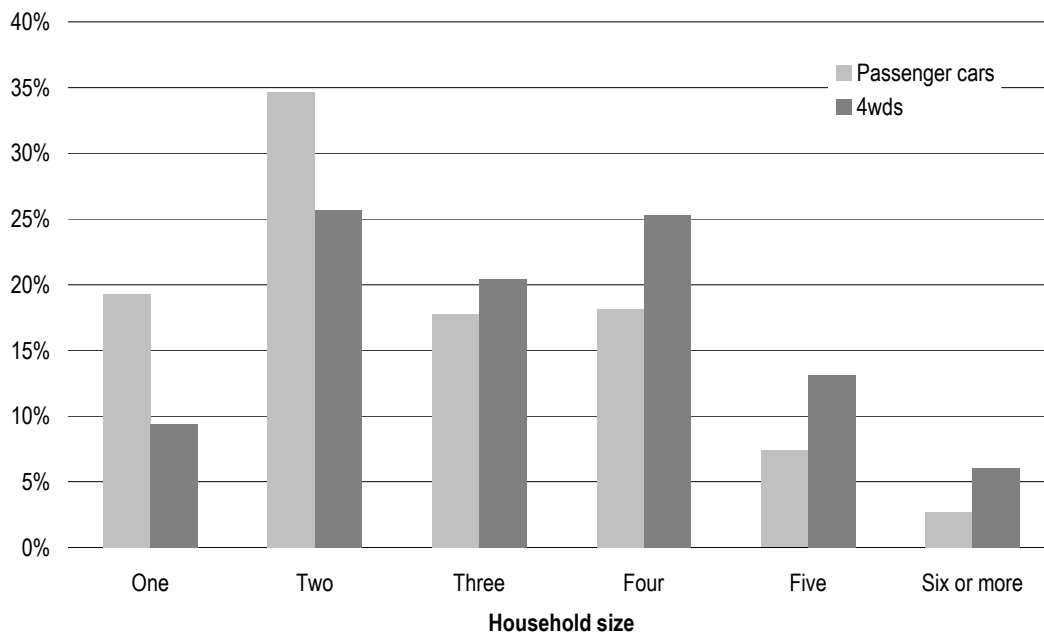
revealed that in accidents involving 4wds, only 18 percent of fatalities were of the driver or a passenger of the 4wd vehicle – 82 percent of fatalities were in other vehicles. This is a very strong incentive for 4wd owners in terms of their own safety and that of their families, but raises questions about the risks posed to other road users.

So, there is clearly a problem, but what should be done about it? Who is buying and using these four wheel drives, how are they using them and why?

#### 4 Who uses four wheel drives in urban areas?

Analysis of the HTS indicates that about 16% of Sydney households own at least one 4wd. 8% own more than one. In only 25% of cases is the 4wd the only vehicle in the household. In 50% of cases, it is a second vehicle and in another 25% of cases the household owns more than two vehicles, including the 4wd.

Large families with children are most likely to own a 4wd. Figure 3 shows the distribution of household sizes for 4wd and non-4wd owning households. On average, 4wd owning households have 3.3 persons, compared to an average of 2.7 persons for other households (ie 20% larger on average).



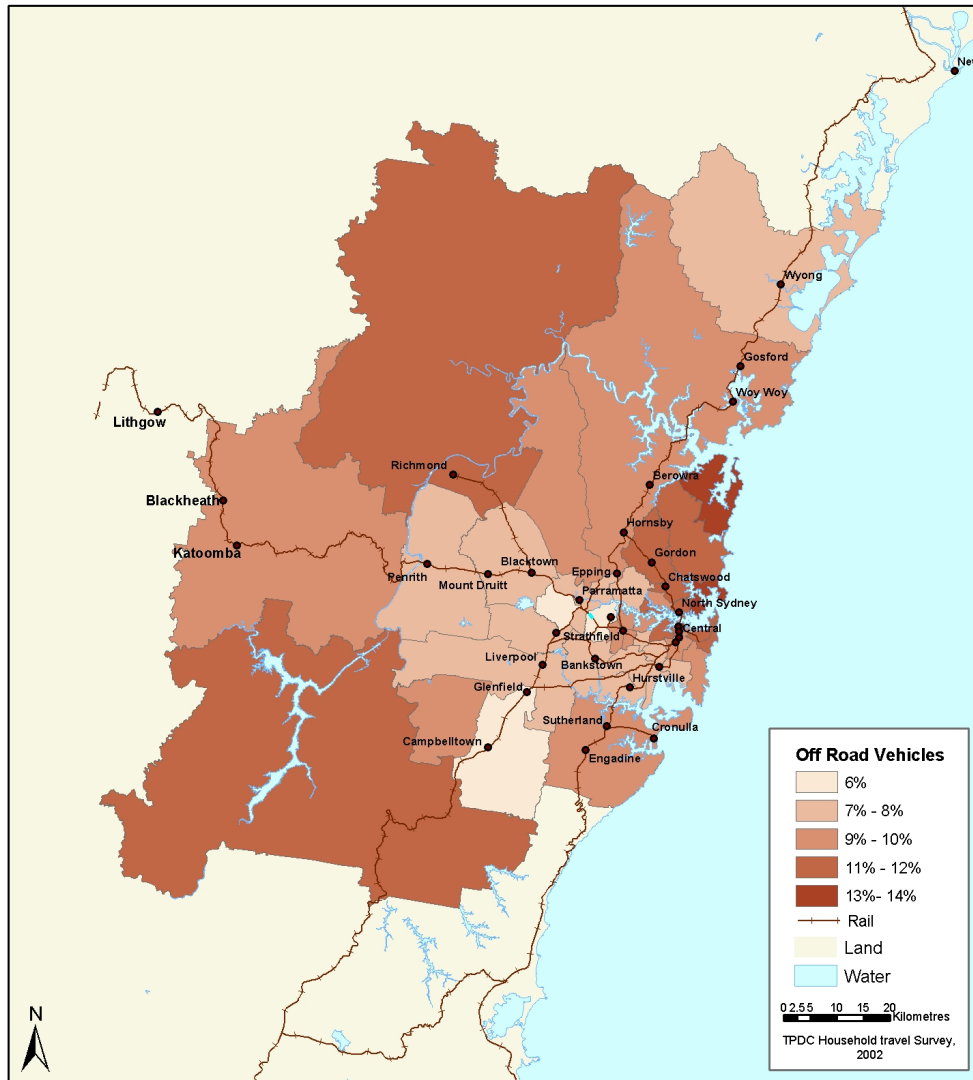
**Figure 3: Household size of 4wd and non-4wd owning households**

No surprisingly, it is couples with children that are the most likely to own 4wds, with almost 60% of 4wds owned by couples with children, even though such households only make up around 40% of households in Sydney. Indeed, 20% of married couples with children under 15 own a 4wd, ie one in every 5 households of that type owns a 4wd.

Having multiple workers in the household significantly increases the chance of 4wd ownership, with over 20% of households with more than one worker owning a 4wd. In addition, households owning 4wds are on average much wealthier than other households. The average income for non 4wd owning households is \$61,000, while the average household income for 4wd owning households is around \$84,000. This is partially but not wholly explained by household size and multiple worker households, though obviously household size is a reason for the purchase of 4wds in the first place.

It appears then that the stereo-type of 4wds being used as substitutes for people movers or other large passenger cars may have a factual basis. But do they fit the complete Toorak Tractor / North Shore Shopping Trolley stereo-type of being located in wealthy areas and spending a lot of time in shopping centre car parks or around schools?

Figure 4 provides some factual evidence of the tendency of 4wd-owning households to be concentrated on the wealthy North Shore and Northern Beaches of Sydney, as well as on the urban fringes of Sydney, where they may actually be used for their designed purpose.



**Figure 4: Distribution of registered 4wds in Sydney**

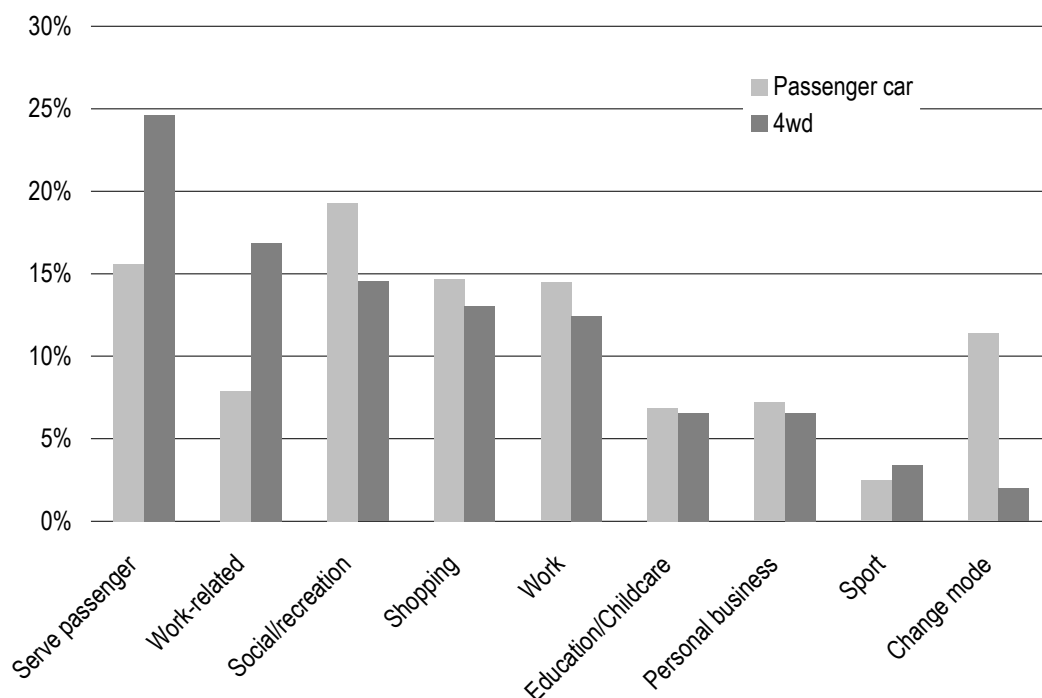
Comprising 10% of the vehicle mix on average in the GMA, LGAs such as Pittwater, Mosman and Ku-Ring\_Gai have concentrations of 4wds well in excess of the Sydney average. All areas north of the harbour had 10% 4wd ownership or above, while inner, southern and eastern suburbs generally had concentrations between 5% and 10% of the vehicle mix.

## 5 How and why are four wheel drives used in urban areas?

### 5.1 Weekday travel

On average weekday (mon-fri), 12% of vehicle trips and vehicle kilometres travelled (VKT) by Sydney GMA residents are made using a four wheel drive. Given they are 10% of the vehicle mix, this means that 4wds tend to be used more than normal passenger cars.

Perhaps the most telling difference between the use of normal cars and 4wds is in their role ferrying people around. Figure 5 shows that 25% of the time, 4wds are being used to ferry passengers around, compared to around 15% of the time for normal vehicles. This suggests fairly clearly that 4wds are indeed being used as substitutes for people movers/vans like Toyota Taragos.



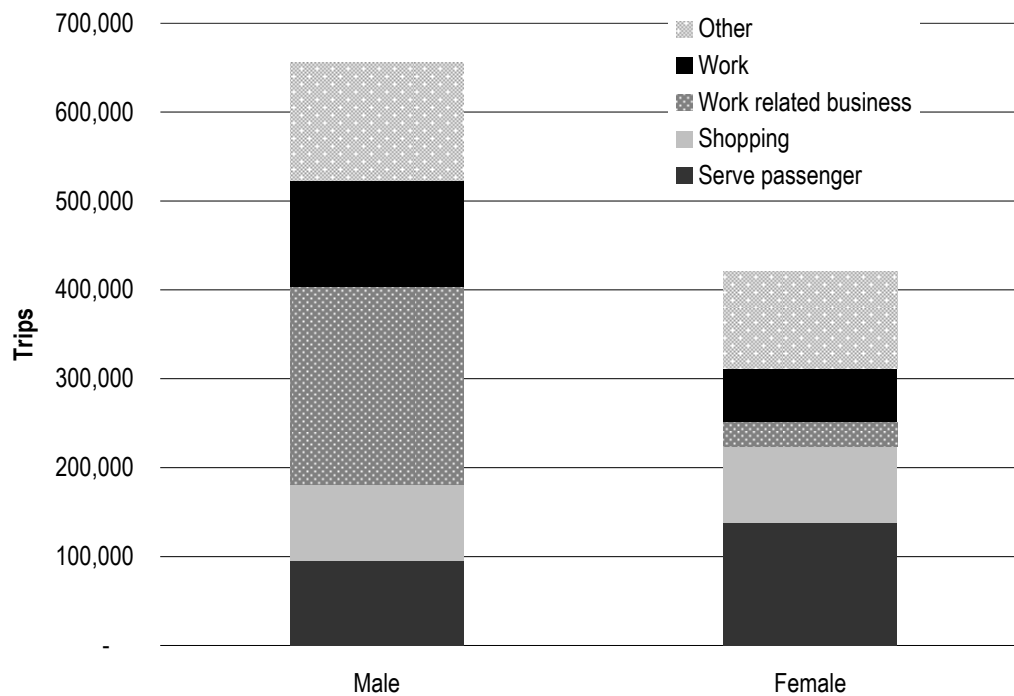
**Figure 5: Purpose of trips by 4wds and other vehicles**

Another main difference is that 4wds are used for work related business more than normal vehicles, perhaps a function of their space to carry work-related equipment as well as their ruggedness on building sites and the like.

Contrary to the stereo-type, 4wds do not dominate the shopping centre car park, being used only 13% of the time for shopping trips, compared to 15% for other vehicles. While the percentages are too small for a significance tests, the data also suggests that 4wds are used more often to access sporting locations, both to spectate and participate. Here is an indication that the more active “image” of 4wds over the more bland people-mover or family sedan translating into usage patterns. One way in which normal cars are used more frequently than 4wds is for changing mode, for example driving to the station or bus stop and either being dropped off or parking the car there.

Who is behind the wheel of these 4wds? Figure 6 shows that it is mainly men travelling for work related business. Around 20% of 4wd trips are made by tradespersons or labourers. However, 4wds are also greatly used by women for ferrying the family around (serve

passenger). Drivers are mostly in full or part time employment or those keeping house, and 65% of them are in the 30 to 49 (child rearing) age group (compared to 50% for normal cars).



**Figure 6: Gender of 4wd drivers for trips to drop off, pick up or accompany someone, average weekday, 2002**

## 5.2 Weekend travel

4wd trips on weekends represent a slightly lower proportion of vehicle trips than on weekdays, at 11% vs 12%. However, the trips are longer, representing 12% of VKT. Indeed VKT is now higher on weekends for both normal cars and 4wds than on weekdays. While there are a slightly fewer 4wd trips on weekends than weekdays (1.4 vs 1.7 million), there are more 4wd VKTs on weekend days (18 million VKT) than weekdays (17 million VKT) – meaning 4wd trips average 12.5 kilometres on weekends, and 10.4 kilometres on weekdays.

Weekend purposes of 4wd trips are quite similar to those of normal vehicles, apart from a continuing focus on ferrying people around (19%) and more of a focus of trips to sport (6%).

## 6 Policy responses

All levels of government in Australia are considering policies to address the popularity of 4wds in urban areas, or restrict the areas where they can be used. The policy options fall into two broad categories – those aimed at restricting the use of 4wds through pricing or some other punitive measure; and those aimed at reducing the impact of 4wds through engineering solutions. In light of the above analysis of who owns 4wds and how they use them, it is instructive to look at each policy option and consider its likelihood of success.

Important background to consider in looking at these options are the following salient facts:

- 4wds are being purchased in greater numbers despite higher fuel consumption costs
- 4wds are being purchased despite higher weight and registration charges
- 4wds are often owned by large families and are used as people movers
- employers often cover purchased and operating costs of 4wds (Table 1)

- 4wd owners are generally wealthy and live in well off areas of northern and eastern Sydney

**Table 1: Employer involvement in 4wd ownership and use, Sydney GMA residents**

Employer involvement	4wds owning households	Car (excl 4wd) owning households
Employer owns vehicle	22%	11%
Employer pays operating costs	27%	15%

Source: Transport and Population Data Centre Sydney Household Travel Survey, 2002.

Taken at face value, this context might indicate that policies with moderate price incentives aimed at altering choices may have limited effect.

### 6.1 Measures to restrict 4wd use

At a *Federal* level, an option is to eliminate the favourable import duty treatment of 4wds sold in urban areas. Until 2005, 4wds attracted 5% import duty, while passenger vehicles attracted 15%. This year, the passenger vehicle import tariff has been reduced to 10%, and in 2010 it will be reduced to 5% to be in line with the treatment of 4wds (Parliamentary Library, 2003). The impact of import tariff parity will be to bring people movers and 4wds in line in terms of price, perhaps with people movers even slightly cheaper. The analysis of those owning 4wds in urban areas suggests that a significant proportion are used as substitutes for people movers, by larger families, so there is a legitimate need for the space offered by 4wds, and they are often cheaper than equivalently sized and equipped people movers.

A high proportion of 4wds are owned by tradespeople (15%) and are used for work related business. A lot of these vehicles are paid for by the employer, or owned by the tradesman's business, and their operating costs are also covered by the business, not the individual. It is unlikely that import duty parity with passenger vehicles will have a significant impact on purchase decisions for this group, as the vehicle may actually be appropriate for their purposes.

It is worth noting that 4wds are already paying more than other road users to the Federal Government via fuel excise. 4wds are much less fuel efficient than other vehicles, being much heavier and having larger engines, so users are already paying an extra impost. The current significant spike in petrol prices will provide an interesting test of the impact of higher fuel charges on 4wd use and ownership.

At the State level, one policy lever that is often discussed in relation to 4wds is vehicle registration charges. Given these are currently levied on the basis of vehicle weight, 4wd owners are generally already paying higher registration charges than other road users. A move to consider a wider range of vehicle impacts in registration charges, including safety and environmental measures, may further heighten registration charges for 4wds. However, given the relative affluence of 4wd owners, it is unlikely that this would have a significant impact unless the registration charge was increased dramatically.

At a local level, councils in areas with high levels of 4wd ownership are considering charging higher parking fees for 4wds than other vehicles (through a council parking permit system for residents). An example of where this is being considered in North Sydney, and again, given the affluence of 4wd owners in this area, it is difficult to imagine this being an effective deterrent to 4wd ownership and use.



Saturation coverage of a coronial inquest into the death of a five year old girl run over by a four wheel drive (eg Sydney Morning Herald 17, 18 and 19 May 2005) inside the grounds of a primary school has renewed calls for a range of policy responses. In this case, the driver was travelling at slow speeds, but “did not see” the child because of blind spots. Research for the NRMA (2005) has suggested that blind spots are not unique to 4wds, and that the humble Holden Commodore has worse reversing visibility than most 4wds. This case led the NSW State Coroner to call for 4wds to be banned from within several hundred metres of schools, and from within school grounds. Given the location of many schools near main roads, this suggestion appears difficult to enforce.

## **6.2 Engineering responses**

Engineering responses have been suggested as an alternative response to slow moving vehicles around school. Proximity sensors or video cameras for blind spots are two possible engineering solutions to address the sight line issue common to many 4wds, but also to other vehicles. Given the relative affluence of 4wd owners, and the fact that they do use their cars very often to drop children to school, it is likely that such solutions would be readily accepted and adopted by owners. Several new vehicles are being sold with these features, and such systems are now available for retro-fitting to existing vehicles.

People movers, the most obvious alternative to 4wds offer similar sight line and bulk disadvantaged to 4wds, but in an accident are lighter than 4wds, presenting less of a danger to other road users. There are however some examples, such as the Honda Odyssey or Holden Zafira, which are more like station wagons in build, have efficient 4 cylinder engines, and therefore offer significant safety and environmental advantages for other road users. If urban passenger 4wds had a similar design philosophy, with lower emissions, improved sight lines and reduced weight, much of the negative impact could be reduced.

## **7 Conclusion**

Urban dwellers are voting with their wallets and purchasing flexible and safe (for the occupants) vehicles, 4wds, in record numbers. They are often used as substitutes for people movers, being used 25% of the time to ferry passengers around. Indeed, one in five couple households in Sydney with young children owns a 4wd. The types of households owning these 4wds are wealthy enough not to worry unduly about moderate pricing measures to alter their choices – significant price incentives (or penalties) would likely be required to encourage a behavioural shift towards vehicle types more acceptable in a safety and environmental perspective to the community as a whole. The tariff equalisation program and the current trend in petrol prices are likely to have an impact, but maybe not a large one.

Current station-wagon-like people movers such as Honda Odyssey and Holden Zafira offer safety and environmental advantages over many types of 4WD vehicles in urban areas while retaining much of the flexibility and carrying ability that 4wd users require.

Are there any other options? Well, it may surprise to learn that there is no strong evidence for 4wd owning households using public transport more or less than other households. Thus, methods to encourage greater use of public transport by 4wd owners may be as successful as with any other households in the population. In addition, households owning 4wds are almost twice as likely to own adult bicycles than other households (.9 of a bike per household vs .5 of a bike for non-4wd households), perhaps indicating more active lifestyle, but also perhaps another reason for the 4wd purchase – for carrying bikes.

This paper just scratches the surface of analysis possible with rich data sets like the Sydney Household Travel Survey. Access to this data set is free of charge for not-for-profit research,

so researchers should be encouraged to use data sets like this to shed light on the many transport policy issues in need of a quantitative basis of analysis.

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