

# The 0km Journey to Work – Travel Behaviour of Sydney’s Home-based Workforce

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## 1 ABSTRACT

The pressure on Sydney’s transport network is greatest in the morning peak, with the commute to work accounting for over a quarter of trips made during this period. Working at home (WAH) in one form or another (eg telecommuting or supplementing work at home) are often studied demand management strategies. However, less is known about the travel patterns of the more extreme example of working at home, eg full-time home-based workers. How are these workers behaving? Are they exerting pressures on the network, albeit of a different kind? Are their behaviours sustainable or requiring intervention? Are their trips being accounted for in travel models?

For six percent of Sydney’s workforce (and 4.6% of Sydney’s full-time workforce), who in 2010 were permanently based at home (figures that have been fairly constant over the previous decade) there is no commute to work<sup>2</sup>. There is currently little literature regarding the trip-making behaviour of this segment of the workforce; however, on an average weekday, these workers are still making a sizeable number of trips and the nature of their trips is examined in detail in this paper. Some key findings are that compared to their full-time work-based counterparts, full-time home-based workers:

- made significantly fewer trips overall
- made an equal number of car trips
- travelled over a significantly less total distance
- made significantly fewer trips during the morning peak period
- made significantly more ‘work-related’ and ‘personal business’ trips
- travelled equal numbers of vehicle kilometres
- spent significantly less time travelling overall

## 2 INTRODUCTION

In major cities all over the world, including Sydney, there are growing capacity pressures on the road and public transportation networks, particularly during the morning peak. In large part, it is the commute to work which accounts for a great proportion of trips in the morning peak. Working at home (WAH) is one demand-management approach to easing pressures on the network. Mokhtarian, *et al.* (2005) classify three distinct categories of home-workers: telecommuters, those with home-based businesses, and those who work at home as an over-flow to their normal work day. The authors suggest that whilst we can calculate the potentially reduced VKT (vehicle kilometres travelled) eliminated by telecommuting, the impact on transportation for home-based workers is less clear, as it is difficult to know what the alternative commute might be for home-based workers. Furthermore, this segment of the workforce has seemingly been ignored in the literature and in travel demand models.

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<sup>1</sup> Opinions expressed in this paper are those of the authors and do not represent Transport for NSW. The authors thank Praba Thangarajah for producing the maps in this paper.

<sup>2</sup> In 1997, the US Census Bureau conducted the Survey of Income and Program Participation and found that 5% of the US workforce was home-based, a similar figure found in Sydney (Kuenzi and Reschovsky, 2001).

However, whilst the proportion of home-based workers (compared to all workers in Sydney) has been relatively constant over the last decade, their growth has been rising slightly faster than that of full-time workers in general and the population as a whole. Between 2002/03 and 2010/11, the average annual growth rate of full-time home-based workers rose 1.6%, compared with 1.4% of all full-time workers and 1.1% of the Sydney population. Moreover, with the recent advances in information and communications technology (ICT), there is the potential for home-based businesses to grow. For these reasons, we have chosen to empirically assess the trip-making behaviour of this under-studied group of workers.

The Australian Telework Advisory Committee's (ATAC) report to the government highlighted many advantages associated with telecommuting. Benefits associated with telecommuting identified by the ATAC report include the revitalisation of rural and regional areas, increased work participation rate amongst people with disabilities and overall gains to the economy. Furthermore, telecommuting saves travel time and offers greater flexibility with respect to a work-life balance (DCITA and DEWR, 2006). These advantages are also relevant to the home-based workers studied in this paper (see Figure 2 for geographic findings).

Citing various studies, Zhou, *et al.* (2009) found that most studies show that telecommuters make fewer trips than those who travel to work; and such findings were recently replicated in Sydney (Corpuz, 2011). Furthermore, Corpuz (2011) also demonstrated that telecommuters generated less VKT than those who travelled to work. Yet, at the per capita level, the overall benefits on the transport task appear to be small due to the low incidence of telecommuting (Choo, *et al.*, 2005). Will these findings hold true for home-based workers compared with those who travelled to work?

### **3 AIMS OF THIS PAPER**

Using the Bureau of Transport Statistics' Sydney Household Travel Survey (Transport for NSW), we will empirically explore the travel behaviour of Sydney's home-based work force to better understand the trip-making behaviour and characteristics of this little-studied segment of the workforce.

We will compare the characteristics of home-based and work-based workers and their trips, including:

- demographics
- location of employment/home
- number of trips made
- vehicle kilometres travelled (VKT)
- time of day travelling
- purpose of trips

The paper begins with a broad analysis of Sydney workers and their demographics before focusing on comparing full-time home-based workers and full-time work-based workers who travelled to work on their weekday travel day.

### **4 THE SYDNEY HOUSEHOLD TRAVEL SURVEY (HTS)**

The HTS is the largest and most comprehensive source of personal travel data for the Sydney Greater Metropolitan Area (GMA). This area includes the Sydney and Illawarra Statistical Divisions and the Newcastle Sub-Statistical Division (Figure 1). Analysis included in this paper will explore workers residing in the GMA and their trips across the entire region on an average weekday.

The HTS is the longest running household travel survey in Australia, having been running continuously since 1997. Detailed trip information for each day of the year, as well as socio-demographic information, is collected by face-to-face interview. Although the HTS was not specifically designed to study the travel behaviour of home-based workers, the broad scope of the survey in terms of travel-related questions, sample size and regional representation provides us with the opportunity to look at this working segment. For further details about the HTS, its scope, coverage and methodology, see Bureau of Transport Statistics (BTS, 2012).

The analyses presented in this paper are based on the 2010/11 estimates which represent nine years of pooled data collected from June 2002 to June 2011 weighted to the 30 June 2010 population. The total sample for this time period consists of 28,297 households; 72,976 individual respondents; 267,257 linked trips; and 312,990 unlinked trips.

As will be addressed in the following section, because the proportion of home-based workers is relatively small (6%) and the analysis was further narrowed to examine weekday trip-making behaviour, it was necessary to pool nine years of data. Such pooling allowed us to have enough of a sample to confidently compare the travel behaviour of home-based and non-home-based workers. There are obvious issues with pooling such a large dataset and using it to represent behaviour for a particular year. However, because the proportion of home-based workers has been relatively constant in Sydney over the previous decade, the advantages outweigh the limitations that a larger sample brings.



Figure 1 Sydney Greater Metropolitan Area (GMA)

## 5 DEMOGRAPHICS

### 5.1 Characteristics of Sydney workers<sup>3</sup>

In 2010, there were nearly three million workers aged 15 or over in the Sydney GMA. Of those, 6% (175,000) use their home as the address of their primary job. Initial descriptive comparisons will be made for:

- all workers
- all non-home-based workers
- all home-based workers
- all non-home-based full-time workers who went to work on their weekday travel day
- all full-time home-based workers with a weekday travel day

All subsequent analysis in this paper, particularly the analysis of travel behaviour, will focus on the latter two groups.

Analyses in this paper are meant to capture a typical workday, so that we could tease out the differences in travel behaviour between those who work from home and those who do not.

<sup>3</sup> The HTS only asks work-related questions to residents aged 15 or over. 'Worker' includes people in full-time, part-time, casual and unpaid voluntary employment.

One limitation we came across when selecting our study group of interest was that the HTS does not specifically ask of home-based workers whether their designated travel day was a 'typical workday'. However, by limiting our sample to full-time workers whose travel day was a weekday, we attempted to minimise the impact of possibly retaining home-based workers who did not work on their travel day. When looking at trip purposes (see section 6.3), we found that work-related business trips were high for this cohort, indicating that our sample selection was reasonable. Also, it is widely accepted that the main pressures on the network tend to be in the am peak on weekdays, another reason to focus on weekday travel only.

## 5.2 Socio-demographic characteristics

Tables 1a/b and 2 highlight the characteristics of home-based and non-home-based workers, as well as all Sydney workers. The five different workforce segments have been labelled A-E in the tables to add clarity. The most notable differences across the groups are:

- In terms of industry, home-based workers are over-represented in 'agriculture/forestry/fishing', 'property and business services' and 'cultural and recreational services'. They are under-represented in 'manufacturing', 'government administration and defence', 'education', and 'health and community services'. Clearly, certain industry types lend themselves to being run by sole operators/home businesses more than other types.
- Home-based workers are more likely to be managers, professionals and administrators than their non-home-based counterparts. This is likely related to the fact that most (85% - column E) of home-based workers work in their own business, with the majority not having employees. Any potential travel behaviour modifications should therefore be aimed at small businesses/individual owners of these businesses.
- Home-based workers in general are less likely to work full-time hours (52% - column C) than non-home-based workers (67% - column B). Being self-employed may offer some the ability to work fewer hours or perhaps even unconventional/flexible hours. Personal and household income tends to be slightly lower for home-based workers, which could be related to the industry of their business.
- Interestingly, women make up slightly more than half of the home-based workforce. Of the different work cohorts compared in this paper, this is the only group to contain more women than men. The U.S. Census Bureau in 1997 also noted that the majority of home-based workers were female, as compared to an overall majority of males in the general workforce (Kuenzi and Reschovsky 2001). Breen and Karanasios (2010) found that in Victoria, Australia, women owned home-based businesses (HBBs) aim to grow their businesses, including a significant proportion hoping to move to commercial premises. Breen and Karanasios suggest that this 'challenges conventional views of women-owned HBBs as stagnant and not growth orientated' (p44). Although it is beyond the scope of this paper, it would be interesting to know whether the number of female owned businesses are growing and in fact are tending to move from home-based to commercial-based premises and how such growth affects travel behaviour.
- Although home-based workers are slightly more likely to be female than male (column C), the pattern changes to nearly two-thirds (64% - column E) being male when looking at full-time home-based workers. This is considerably skewed compared to Sydney's work-force in general (54% male – column A).
- In terms of household composition, couples without children are slightly over-represented in terms of home-based workers (columns C and E). Single parents are slightly under-represented. Being a home-based worker (or even owning a HBB) may therefore be somewhat related to life-cycle. Mokhtarian and Henderson (1998) noted their surprise at similar findings. They found that home-based business

workers had the lowest number of people in their households, as well as fewer numbers of young children.

- The average age of home-based workers is about eight years older than non-home-based workers (48 compared to 40, columns C and B). For male home-based workers, the average age is even higher (50 compared to 46 for females).

Table 1<sup>4</sup>a Work-place socio-demographic characteristics of Sydney's workers

		A	B	C	D	E
		All workers	All non-home-based workers	All home-based workers	All non-home-based full-time workers who went to work on their weekday travel day	All full-time home-based workers with a weekday travel day
Occupation	Managers, professionals & administrators	42.3%	41.1%	60.8%	55.3%	71.0%
	Technicians, trades & related workers	12.4%	12.7%	6.6%	11.1%	8.1%
	Community, service, sales & clerical workers	32.7%	32.9%	29.3%	25.5%	18.5%
	Machinery operators & drivers	5.4%	5.7%	0.7%	4.2%	0.5%
	Labourers	7.2%	7.5%	2.6%	3.8%	1.8%
	Total	100.0%	100.0%	100.0%	100.0%	100.0%
Industry	Agriculture, Forestry & Fishing	1.0%	0.5%	9.1%	0.6%	11.8%
	Manufacturing	9.6%	9.8%	5.5%	14.3%	5.0%
	Construction	7.2%	7.1%	8.5%	2.4%	6.1%
	Wholesale Trade	3.3%	3.3%	4.0%	4.4%	6.2%
	Retail Trade	12.0%	12.4%	5.3%	10.3%	4.8%
	Accommodation, Cafes & Restaurants	5.3%	5.5%	2.0%	3.4%	2.3%
	Transport & Storage	4.9%	5.1%	2.3%	4.4%	1.8%
	Communication Services	2.4%	2.4%	1.9%	3.2%	2.0%
	Finance & Insurance	5.6%	5.7%	4.3%	9.1%	5.0%
	Property & Business Services	14.5%	13.3%	33.9%	16.7%	35.4%
	Government Administration & Defence	5.2%	5.5%	0.5%	6.7%	0.9%
	Education	8.6%	8.9%	3.4%	8.4%	1.5%
	Health & Community Services	10.3%	10.6%	5.1%	8.3%	4.0%
	Cultural & Recreational Services	2.8%	2.6%	5.6%	1.8%	5.7%
	Personal & Other Services	5.8%	5.7%	8.3%	4.5%	7.2%
	Other	1.5%	1.5%	0.3%	1.7%	0.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	
Base		2,961,000	2,785,000	175,000	1,180,000	84,000

<sup>4</sup> Figures in all tables have been rounded; however, totals, averages and percentages have been calculated from original unrounded data.

Table 1b Work-place socio-demographic characteristics of Sydney's workers continued

		A	B	C	D	E
		All workers	All non-home-based workers	All home-based workers	All non-home-based full-time workers who went to work on their weekday travel day	All full-time home-based workers with a weekday travel day
Labour force status	Full time work	65.8%	66.7%	51.7%	100.0%	100.0%
	Retired or aged pensioner	2.5%	2.4%	5.1%	-	-
	FT post secondary study	4.3%	4.5%	1.7%	-	-
	Part time or Casual work	23.3%	22.3%	39.0%	-	-
	Other (including students & pensioners)	4.0%	4.0%	2.6%	-	-
	Total	100.0%	100.0%	100.0%	100.0%	100.0%
Employment type	Salaried employee	78.4%	82.4%	14.8%	88.9%	14.7%
	Own business with employees	7.4%	6.5%	21.6%	7.8%	28.5%
	Own business without employees	10.3%	7.4%	56.6%	3.2%	56.5%
	Without pay in family business	0.3%	0.2%	2.1%	-	0.2%
	Voluntary or payment in kind	3.6%	3.5%	4.9%	-	0.2%
	Total	100.0%	100.0%	100.0%	100.0%	100.0%
Base		2,961,000	2,785,000	175,000	1,180,000	84,000

Table 2 Person/household socio-demographic characteristics of Sydney workers

		A	B	C	D	E
		All workers	All non-home-based workers	All home-based workers	All non-home-based full-time workers who went to work on their weekday travel day	All full-time home-based workers with a weekday travel day
Gender	Male	53.8%	54.2%	48.5%	59.7%	64.3%
	Female	46.2%	45.8%	51.5%	40.3%	35.7%
	Total	100.0%	100.0%	100.0%	100.0%	100.0%
Household type	Person living alone	9.6%	9.5%	9.9%	10.2%	10.9%
	Couple only	21.0%	20.7%	26.8%	23.5%	25.0%
	Couple with children 15+	20.7%	20.8%	19.5%	19.5%	20.6%
	Couple with children 0-14	22.6%	22.5%	24.4%	22.4%	22.2%
	Couple with children 0-14 and 15+	9.2%	9.2%	8.7%	7.9%	9.8%
	One person with child(ren)	9.2%	9.5%	5.3%	8.2%	6.2%
	Other households	7.6%	7.8%	5.3%	8.2%	5.4%
	Total	100.0%	100.0%	100.0%	100.0%	100.0%
Age	mean	40.35	39.88	47.85	39.89	47.16
Household income	mean	\$102,783	\$102,937	\$100,330	\$113,342	\$108,067
	median	\$89,941	\$90,187	\$83,951	\$99,802	\$92,533
Personal income	mean	\$50,380	\$50,643	\$46,198	\$64,748	\$58,971
	median	\$41,976	\$41,976	\$33,942	\$54,108	\$46,266
HH cars	mean	1.98	1.98	2.09	1.92	2.15
Base		2,961,000	2,785,000	175,000	1,180,000	84,000

### 5.3 Location of home-based workers

As illustrated in Figure 2, there are higher numbers of home-based workers in the outlying travel zones, as shown in dark red<sup>5</sup>. This is likely to be partially related to the industry, in particular agriculture. In looking at characteristics of the built environment and their relationship to working from home in Northern California, Tang, *et al.* (2008) suggest that high regional accessibility tends to support home-based businesses. Although perceived regional accessibility is not explicitly looked at in the HTS, it is interesting to note the higher proportions of home-based businesses in regional Sydney areas. The U.S. Census Bureau similarly found that home-based workers were less likely to live in metropolitan areas compared to non-home-based workers (Kuenzi and Reschovsky, 2001).

Additionally, closer to the city centre, there are some pockets, particularly in the Northern Beaches, where there is a higher concentration of home-based businesses. These are relatively affluent areas that are not particularly well linked to the train network. Trip-making by mode is discussed in the next section.

<sup>5</sup> Travel zones are a level of geography which is between ABS Census Collector Districts and Statistical Local Areas. Travel zones are the basis of analysis generally used for BTS modelling and analysis. Travel zones cover the Sydney Greater Metropolitan Area without omission or overlap.

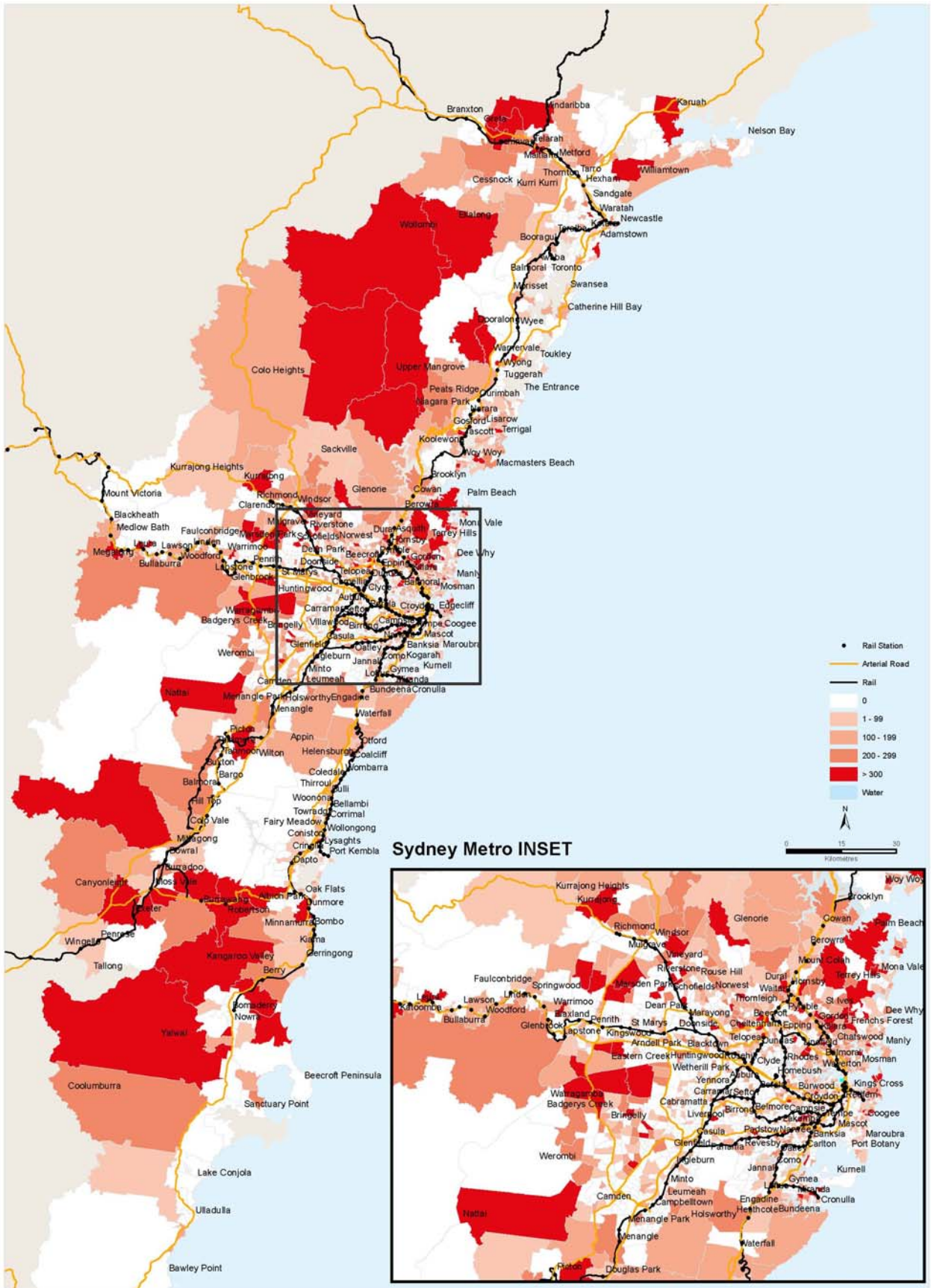


Figure 2 Home/Work travel zone for home-based workers



## 6 PATTERNS OF TRAVEL

### 6.1 Trip-making

In this section, we narrow our focus to full-time home-based workers with a designated weekday travel day and full-time non-home-based workers who went to work on their designated weekday travel day.

On a weekday, home-based workers made significantly fewer<sup>6</sup> unlinked trips than their non-home-based counterparts (4.17 compared to 5.63). Notably, 24% of home-based workers did not make a trip at all. Whilst home-based and non-home-based workers made statistically equal number of car driver trips, home-based workers made statistically fewer car passenger, bus, train and walk trips. The difference between the two groups in terms of the total number of trips made can mostly be accounted for by the difference in walk trips, as shown in Table 3. Walk trips include 'walk only' trips and 'walk-linked' trips<sup>7</sup>. Walk-linked trips are generally associated with public transport trips. Bus and train trips are higher amongst the non-home-based workers. We can assume that there would be two walk-linked trips associated with each of these public transport trips. These walk-link trips fully explain the difference between the number of walk trips between the two groups of workers. This therefore implies that the two groups are making equal amounts of 'walk only' trips.

As per Figure 2, we see higher concentrations of home-based businesses in areas away from train lines. This helps to explain why fewer train trips are made by home-based workers. Also, home-based workers may have less need to travel to the CBD and other employment centres, which attract higher proportions of train trips (TDC, 2008).

Table 3 Trip characteristics by work type

	Full-time home-based workers	Full-time non-home-based workers	Significantly different at p<.05
	<b>Mean (95% confidence interval of the mean)</b>	<b>Mean (95% confidence interval of the mean)</b>	
Number of trips (all modes)	<b>4.17 (3.91 - 4.44)</b>	<b>5.63 (5.57 - 5.69)</b>	*
Number of car driver trips	<b>2.86 (2.64 - 3.07)</b>	<b>2.79 (2.74 - 2.84)</b>	
Number of car passenger trips	<b>0.23 (0.18 - 0.29)</b>	<b>0.34 (0.33 - 0.36)</b>	*
Number of bus trips	<b>0.04 (0.02 - 0.07)</b>	<b>0.20 (0.19 - 0.21)</b>	*
Number of train trips	<b>0.06 (0.03 - 0.08)</b>	<b>0.36 (0.35 - 0.38)</b>	*
Number of walk trips	<b>0.91 (0.77 - 1.04)</b>	<b>1.81 (1.77 - 1.86)</b>	*
Total distance travelled (kms)	<b>34.52 (31.33 - 37.72)</b>	<b>46.22 (54.45 - 46.98)</b>	*
Total vehicle kilometres travelled	<b>29.18 (26.15 - 32.21)</b>	<b>32.04 (31.31 - 32.78)</b>	
Total time spent travelling (mins)	<b>75.73 (70.10 - 81.37)</b>	<b>99.05 (97.96 - 100.13)</b>	*

As for the distances and duration of trips, home-based workers are spending significantly less time travelling and are travelling shorter distances<sup>8</sup> over the day. Clearly, because they

<sup>6</sup> Analysis involved the use of independent sample t-tests. These were constructed using data that were weighted but *normalised* to execute proper statistical tests of significance particularly when comparing means. The estimates were normalised by using a normalising factor equal to the sample size divided by the population size or the sum of weights (n/N).

<sup>7</sup> A walk-linked trip is the walk component of a 'linked trip' involving multiple modes of transport. Public transport trips usually have an associated one or two walk-linked trips, in terms of the access and egress modes.

<sup>8</sup> Trip distances are calculated based on origin/destination x,y coordinates and the road network.

are travelling less overall, they are spending less time travelling. Further to this, the quicker travel times might be related to the time of day in which they are travelling (to be discussed in a later section) or to the mode of travel. Of course, walk trips are particularly associated with shorter distances and associated longer times spent travelling. With respect to total VKT, the two groups travelled for statistically equal distances.

Table 3 also shows that 95% confidence intervals of the mean are larger for home-based workers. This implies that there is greater variability within the group (also likely due to the smaller sample size). Mokhtarian and Henderson (1998) similarly noted that home-based workers are a rather heterogeneous group in terms of their travel behaviour.

## 6.2 Time of day

As illustrated in Figure 3, the temporal travel patterns are very different for home-based and non-home-based workers<sup>9</sup>. There is a clear bi-modal distribution amongst non-home-based workers, peaking at 8am and 5.30pm. For home-based workers, there are less distinctive peaks. Rather, there is a single more moderate peak at 9am and slowly declining amounts of travel between 8.30am and 6pm. This pattern of travel largely corresponds to that found by Mokhtarian and Henderson (1998) in California.

Even though the home-based workers are making an equivalent number of car trips to the non-home-based workers, they are *not* making these trips during the peak periods. The nature of being self-employed might allow for more flexible working hours, and thus more choice as to when to travel. Furthermore, home-based workers, most notably, *do not* have a commute trip, whereas many office-based workers have fixed work times. Shaz and Corpuz (2009) found that for the majority of workers with fixed work locations outside the home, the time at which they left for work in the morning was because it was the 'latest departure time to arrive on time [to work].'

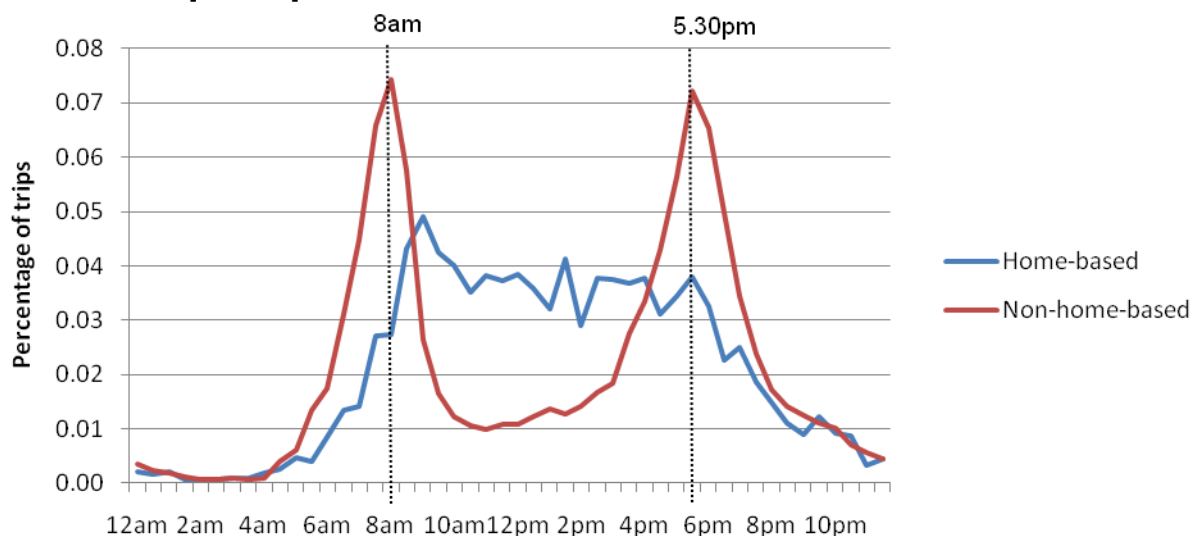


Figure 3 Time of day travelling (by motorised modes only)

Looking specifically at departure times of trips (for all modes), chi-squared analyses showed that home-based workers are significantly more likely to travel during the inter-peak period (9.01am-3.00pm) as compared to their non-home-based worker counterparts. Home-based workers were also significantly less likely to travel during the morning and afternoon peak periods.

<sup>9</sup> The percentage of trips within each group is graphed, to allow for comparison of the two groups. The magnitude of the actual number of trips is, of course, much higher for non-home-based workers.

Table 4 Departure time period by work type

Departure time	Home-based workers	Non-home-based workers	Total
7.01am to 9.00am	13.8%	22.0%	21.6%
9.01am to 3.00pm	46.8%	21.6%	22.9%
3.01pm to 6.00pm	22.3%	26.2%	26.0%
6.01pm to 7.00am	17.1%	30.2%	29.5%
Total	100.0%	100.0%	100.0%

### 6.3 Trip purpose

With respect to trip purposes, it is not surprising that ‘commute to main job’ constitutes the biggest proportion of trips for non-home-based workers (45.4%). With respect to trip rates, non-home-based workers who went to work on their travel day made 1.98 commute trips. Because there are no such trips for home-based workers, home-based workers are making significantly more trips of other kinds, including work-related business trips, shopping trips, personal business trips, social trips and serve passenger (accompanying and dropping off) trips. Not having the commute trip might free up their time to make other trips or to do other activities, instead.

Non-home-based workers are making more ‘return to work’ trips (included in ‘other’), which would relate to the return journey from a lunch trip, for example. Table 5 below illustrates the breakdown of trip purposes for the two working groups. Chi-square analyses showed that the proportions of trip purposes were significantly independent of the two groups. Moreover, Table 5 also shows trip rates per purpose. T-tests showed that the trip rates were significantly different for each trip purpose across the two groups.

The fact that work-related business trips are particularly high for home-based workers alleviates one of our earlier concerns about not knowing for sure that the weekday travel day represented a typical ‘working day’ for the home-based workers.

Table 5 Trip purpose by work type

Trip purpose <sup>10</sup>	Home-based workers	Non-home-based workers	Total	Home-based workers	Non-home-based workers	Significantly different at $p < .05$
				Trip rate		(t-test)
Commute - go to main job	0.0%	45.4%	42.7%	0.00	1.98	*
Commute - go to other job	1.3%	0.3%	0.4%	0.05	0.01	*
Work-related business	26.2%	6.0%	7.2%	1.00	0.26	*
Shopping	17.7%	10.3%	10.8%	0.67	0.45	*
Personal business	11.4%	3.5%	4.0%	0.43	0.15	*
Social/recreation	23.3%	15.1%	15.5%	0.89	0.66	*
Serve passenger	19.5%	9.8%	10.4%	0.74	0.43	*
Other	0.5%	9.6%	9.0%	0.02	0.42	*
Total	100.0%	100.0%	100.0%	3.81	4.37	*

<sup>10</sup> Linked trips were used in the analysis of trip purpose. Trips to ‘return home’ have been recoded to their previous priority purpose. For more discussion on ‘priority purpose’ see BTS (2012). Because linked trips may contain multiple trip legs, there are fewer total trips in Table 5 as compared to Table 3.

## 7 SUMMARY AND CONCLUSIONS

Working from home (WAH) is a demand-management strategy that can be used to alleviate the pressures on the network. Many studies to date have examined the travel behaviour of those engaging in some form of WAH. However, such research has primarily looked at telecommuting, including a recent study in Sydney (Corpuz, 2011). Very little empirical work has looked at those who are permanently based at home, though a fairly comprehensive study was done based on 1991 data in California (Mokhtarian and Henderson, 1998). To date, no study has looked at this working segment in Sydney. Using the Sydney Household Travel Survey, we have investigated the demographic characteristics and travel patterns of full-time home-based workers and compared their behaviours to full-time non-home-based workers.

One constraint with respect to our study group of interest was that the HTS does not explicitly ask home-based workers whether their travel day was a 'typical workday'. Yet, by limiting our sample to full-time workers whose travel day was a weekday, we attempted to reduce the risk of retaining home-based workers who did not actually work on their travel day. Moreover, with regards to trip purposes, we found that work-related business trips were high for this cohort, indicating that our sample selection was sound. To study this working group in even greater detail in the future, we would recommend that a question be added in the HTS to affirm whether home-based workers actually worked on their travel day.

Although the proportion of home-based workers in Sydney has been relatively stable over the last decade, the actual numbers are growing and are slightly outpacing population growth. The advances in ICT are likely to contribute to further growth in the number of home-based businesses. It is necessary to study this working group's travel behaviour to understand the impact on the network.

We found that Sydney's transport network does benefit from home-based workers, as they make fewer trips in general (primarily fewer public transport and walk trips) than non-home-based workers and, more importantly, their trips tend to be made during off-peak periods. In general, these findings are consistent with telecommuters who worked from home as compared to those who travelled to work (Corpuz, 2011). Furthermore, on an average weekday, 24% of home-based workers did not make a trip at all. What would the impact be if more people developed home-based businesses?

Despite some benefits, we did note that home-based workers make an equal number of car trips and produce equal amounts of VKT, compared with non-home-based workers. However, these vehicle trips are undertaken outside the peak, and therefore, generate fewer greenhouse gas emissions due to the reduced congestion on the roads. Previous research focusing on telecommuters who worked from home showed that this group made equal number of car trips as compared to those who travelled to work, though telecommuters generated less VKT. (Corpuz, 2011). This implies that home-based workers have distinct travel patterns, as compared to telecommuters and may require potentially different interventions. These strategies may include travel behaviour programs that encourage more sustainable mode choices. Future research might focus specifically on comparing home-based workers and telecommuters; this would help us understand which interventions should be targeted to each group.

We found that because home-based workers avoid a commute trip, they tend to make more trips of other kinds, particularly work-related business trips. They also make more discretionary trips. Potential interventions to reduce car usage for this group could be greater application of ICT tools to replace work-related trips and travel planning programs that educate travellers to be more efficient in their trip-making, especially those trips of a discretionary nature.

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