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**TUTI Report 28-2004**

**North-Eastern Suburbs Travel Survey (NESTS)  
- 2004 Survey Results Report**

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# DRAFT

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Table of Contents

**1 Introduction ..... 2**

**2 A Summary of the Procedural Results ..... 3**

    2.1 Quality of Sampled Addresses..... 3

    2.2 Delivery of Survey Packs ..... 4

    2.3 Motivational Calls ..... 5

    2.4 Survey Pack Pickup..... 5

    2.5 Reminder Calls and Letters ..... 6

    2.6 Response Rates ..... 7

**3 Unweighted Household Results ..... 8**

**4 Unweighted Person Results .....12**

**5 Unweighted Vehicle Results .....15**

**6 Unweighted Stops Results.....19**

**7 Odometer Survey Results .....21**

## List of Figures

Figure 2.1	Status of Checked Addresses .....	4
Figure 2.2	Type of Survey Pack Delivery .....	5
Figure 2.3	Collection Outcome by Day of Survey .....	6
Figure 2.4	Response Rates by Day of Survey .....	8
Figure 3.1	Geographic Distribution of Responding Households.....	9
Figure 3.2	Distributions of Household Size .....	10
Figure 3.3	Dwelling Type in NESTS2004 and Census .....	10
Figure 3.4	Dwelling Ownership in NESTS2004 and Census.....	11
Figure 3.5	Distributions of Vehicles per Household .....	11
Figure 4.1	Age of Respondents in NESTS2004 and Census .....	12
Figure 4.2	Personal Weekly Income of Respondents over 15 Years of Age .....	13
Figure 4.3	Personal Weekly Income of Respondents reporting Some Income .....	14
Figure 4.4	Personal Weekly Income for NESTS2004 before and after the use of Hot-Deck Imputation.....	15
Figure 5.1	Cumulative Distribution of untrimmed Odometer Readings.....	17
Figure 5.2	Average Odometer Reading as a function of Vehicle Age .....	18
Figure 6.1	Number of Stops per day per Person (aged 5 or more).....	19
Figure 7.1	Response to Follow-up Odometer Survey by Age of Vehicle .....	21
Figure 7.2	VKT/Vehicle/Day by Age of Vehicle .....	22
Figure 7.3	Cumulative Distributions of VKT/Household/Day from Odometer and Diary Surveys .....	22
Figure 7.4	VKT/Household/Day from Odometer and Diary Surveys .....	23

**List of Tables**

Table 2.1	Outcomes of Motivational Calls.....	5
Table 2.2	Type of Survey Pack Pickups.....	6
Table 2.3	Incidence and Types of Reminders .....	7
Table 2.4	Overall Response Rates by Week.....	7
Table 4.1	Country of Birth of Respondents in NESTS2004 and Census.....	12
Table 4.2	Employment Status of Respondents in NESTS2004 and Census .....	13
Table 4.3	Educational Status of Respondents in NESTS2004 and Census.....	13
Table 5.1	Ownership of Vehicle in NESTS2004.....	15
Table 5.2	Type of Vehicle by Vehicle Ownership in NESTS2004 .....	15
Table 5.3	Top 10 Makes of Vehicle by Vehicle Ownership in NESTS2004.....	16
Table 5.4	Top 10 Models of Vehicle by Vehicle Ownership in NESTS2004.....	16
Table 5.5	Year of Vehicle by Vehicle Ownership in NESTS2004.....	16
Table 5.6	Number of Vehicle Cylinders by Vehicle Ownership in NESTS2004.....	17
Table 5.7	Type of Fuel Used in NESTS2004 .....	17
Table 6.1	Destination Places of Stops.....	20
Table 6.2	Destination Purposes of Stops.....	20
Table 6.3	Mode of Transport Used on Trip Stages.....	20
Table 7.1	VKT/Household/Day Statistics from Odometer and Diary Surveys .....	23

## 1 Introduction

The Victorian Department of Infrastructure, as part of its long-term commitment to the development of sustainable transport policies and strategies, has taken a lead role in the implementation of large-scale TravelSmart programs. The objective of the Victorian TravelSmart Program is:

*To maximise sustainable travel and activity choices made by individuals, households and organisations through the utilisation of voluntary behaviour change tools.*

The Victorian TravelSmart Programs aims to achieve this objective by a combination of TravelSmart projects aimed at school, workplaces and communities.

The 2004 TravelSmart community project is designed to deliver a voluntary travel behaviour change methodology to approximately 30,000 households within the single local government area of Darebin. The objectives of the project are as follows:

- To achieve a change in travel behaviour of approximately 10% reduction in car trips and car kilometres, across the target population, without restricting personal activity, or adverse community or political reaction.
- To raise awareness of travel behaviour change, to facilitate a greater understanding of travel behaviour change, and to encourage positive attitudes towards travel behaviour change by the community, local and state government staff, and politicians.

To facilitate evaluation of the 2004 TravelSmart community project, a two-pronged monitoring program was commissioned by the Department. The evaluation project entailed:

- The conduct of a Before-and-After household travel survey of residents of Darebin, before and after the implementation of the TravelSmart project
- The conduct of a Trends Analysis using data available from public transport operators and VicRoads, to identify background trends in travel behaviour and to identify any specific changes in the study area of Darebin

This report is concerned with the “Before Survey” conducted as part of the first of the above monitoring exercises.

The North-Eastern Suburbs Travel Survey (NESTS) was a Survey of Day-to-Day Travel conducted in the North-Eastern Suburbs of Melbourne in March 2004 (the “After Survey” will be conducted in March 2005). "Day-to-Day" travel includes all the everyday travel that people do as they go about their lives, such as going to and from work, going shopping, visiting friends, going to sporting events, and even just walking the dog!

The survey was designed and conducted by The Urban Transport Institute and I-view Pty Ltd, two companies with extensive experience in such surveys throughout Australia and overseas. The survey was conducted for the Victorian Department of Infrastructure.

The survey was conducted by delivering questionnaires to selected households and having them fill in these questionnaires describing the travel they do on a specific Travel Day. Each household was also asked to provide some limited information about

the people who live in that household. The completed questionnaires were then picked up from each household after their Travel Day. A week later, respondents were asked to complete a brief follow-up survey to report the total kilometres travelled by each household vehicle that week.

The North-Eastern Suburbs Travel Survey (NESTS) used four procedures in the field for the delivery and collection of survey materials. These four stages were:

- Sample Address Check and Delivery of Pre-Contact Letter
- Delivery of Questionnaire Survey Packs
- Collection of Questionnaire Survey Packs
- Delivery of Odometer Follow-Up Surveys

Following the conduct of the NESTS Pilot Survey in February 2004, the Main Survey began with the first Travel Day on Monday 1st March 2004. A previous report has described the procedural results obtained from the four weeks of the survey. The purpose of this report is to describe the unweighted data results obtained from the 2004 NESTS survey. In parallel to this work, weighting of the sample results is being undertaken to obtain preliminary results for the (Darebin) population as a whole, so that the data can be used for normal transport planning purposes in this region.

## 2 A Summary of the Procedural Results

While this report will concentrate on an analysis of the data obtained from the respondents, it is worth summarising the main procedural results in order to put the travel data results in context.

The NESTS2004 procedures consisted of six main steps:

- Checking of Addresses and Delivery of Pre-Contact Letter
- Delivery of Survey Packs
- Placement of Motivational Phone Calls
- Collection of Completed Survey Packs
- Reminder Calls and Mailing
- Odometer Follow-Up Postcard Survey

The main procedural results obtained from each stage are summarised below

### 2.1 Quality of Sampled Addresses

The addresses used in the survey were obtained from Darebin Council, and represented addresses associated with the residential rates database. Once the addresses had been found in the field, they were checked to see whether they were in scope for the survey (i.e. whether they were the valid address of a private residential household). As shown in Figure 2.1, the quality of the address list was reasonably good, with 3% of all addresses being identified as sample loss (i.e. invalid residential addresses) at this stage of the survey. The main reason identified at this stage was that the address was not a residential address. This was because there were some properties in the Residential Rates database that were not residential properties (e.g. ambulance

stations, fire stations, Telstra properties and other “public service” properties which are charged residential, rather than commercial, rates). There were also a number of vacant residential properties identified at this stage, although many more were identified later in the process.

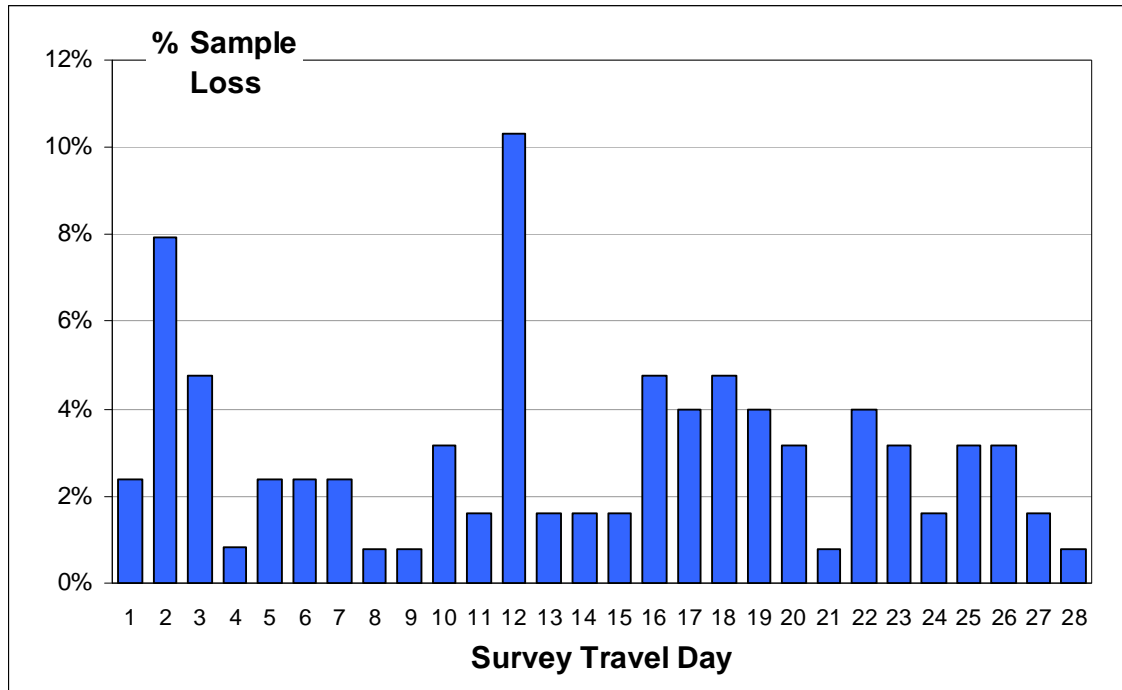


Figure 2.1 Status of Checked Addresses

## 2.2 Delivery of Survey Packs

Two days before each Travel Day, field staff attempted to deliver the Survey Packs to those households previously identified as being valid household addresses. The method of delivery of the Survey Packs is shown in Figure 2.2. It can be seen that a majority (about 63%) are in fact delivered personally to a member of the household. Another 24% are left at the household with a postcard attached, while about 11% are refused by households at this stage. A total of 74% of households are contacted personally (including refusals). A small number of addresses (about 2%) are also found to be Sample Loss at this stage (mostly households that are clearly unoccupied, either visibly or via advice from neighbours), while some Survey Packs (about 1%) could not be delivered (usually because access was prevented because of large dogs or other obstacles) and were mailed.

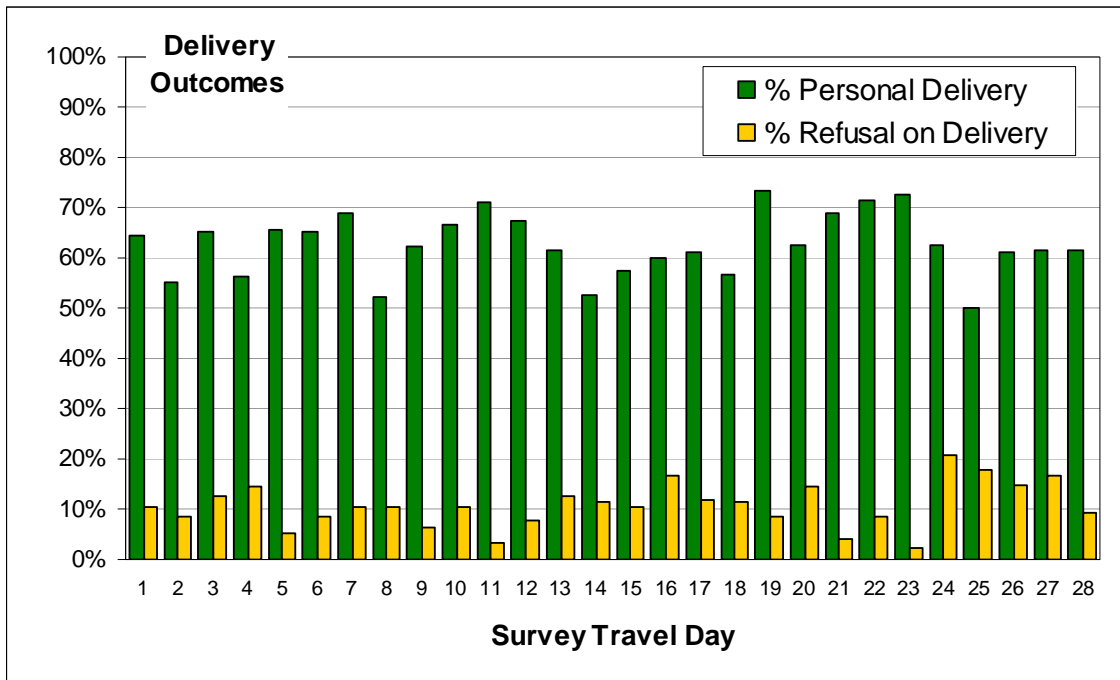


Figure 2.2 Type of Survey Pack Delivery

### 2.3 Motivational Calls

On the evening before each of the Travel Days, Motivational Phone Calls were placed to each household, where possible. The outcomes of the Motivational Calls are shown in Table 2.1. Across all households 52% were called in Weeks 1 through 4. The proportion called was lower in Week 3 because of a staffing problem which prevented any calls being made on two days of this week. Across the four weeks, an average of 32% of households were personally contacted. The vast majority of these calls were well received, even though some households took this opportunity to refuse to participate in the survey.

Table 2.1 Outcomes of Motivational Calls

Motivational Call Outcome	Week				Total
	1	2	3	4	
Not Called	285	304	442	257	1288
Successful Contact	202	230	166	268	866
Answering Machine	81	56	17	39	193
Refusal	18	10	6	23	57
No Contact Made	85	72	41	85	283
<b>TOTAL</b>	<b>671</b>	<b>672</b>	<b>672</b>	<b>672</b>	<b>2687</b>
% Called	58%	55%	34%	62%	52%
% Personally Contacted	30%	34%	25%	40%	32%

### 2.4 Survey Pack Pickup

On the day after each of the Travel Days, field staff visited the households to collect completed Survey Packs. The type of pickup procedure undertaken on each day in the four weeks of the survey is shown in Figure 2.3 and summarised by week in Table 2.2.



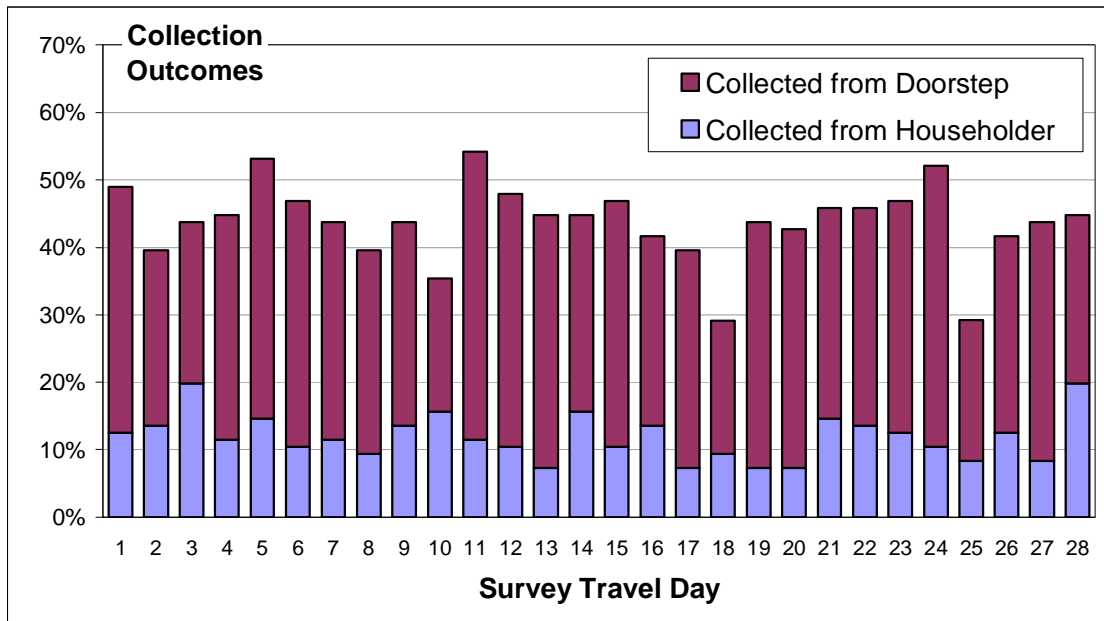


Figure 2.3 Collection Outcome by Day of Survey

Table 2.2 Type of Survey Pack Pickups

Pickup Method	Week				Total
	1	2	3	4	
From householder	90	80	67	82	319
From doorstep etc	218	218	211	210	857
Refusal-personally	46	44	56	37	183
Blank forms left on doorstep	24	46	45	72	187
R-P envelope left with householder	70	72	70	62	274
No contact-left a R-P envelope	113	108	113	106	440
Other (write in Comments)	19	12	18	4	53
No Collection Attempted	92	92	92	99	375
<b>TOTAL</b>	<b>672</b>	<b>672</b>	<b>672</b>	<b>672</b>	<b>2688</b>
% Collected from Respondent	13%	12%	10%	12%	12%
% Collected from Doorstep	32%	32%	31%	31%	32%
% Collected on Day	46%	44%	41%	43%	44%

It can be seen that Survey Packs were picked up from households on approximately 44% of occasions, with more completed Survey Packs being collected from doorsteps and other places where the householder had left them (32%) than were collected personally from householders (12%). On about 14% of occasions, a refusal was encountered either personally (7%) or via uncompleted Survey Packs being left out for collection (7%).

On about 26% of occasions, a reply-paid envelope was left with or at the household for the Survey Pack to be returned in the mail. The Reply-Paid Envelope was returned with a completed questionnaire from about 30% of households where the envelope had been left.

### 2.5 Reminder Calls and Letters

One week after each Travel Day, households that had not yet responded and for whom a phone number was available were phoned to ask whether they have completed the

survey. If they have, they are reminded to send it back in the mail. If they have not completed the survey, they were asked the two non-response questions. For those households for whom a phone number was not available, or those who were not contactable by phone, a Reminder Letter was mailed out on the following day.

The incidence of the various types of reminders is shown in Table 2.3. About 22% of all households received reminders, with the remaining households not needing reminders because they had already responded or refused. In the first three weeks, about 40% of reminders were done by phone. These reminders were done by the same person who did the Motivational Calls. However, once the Motivational Calls stopped being made, it was uneconomical to have someone employed just to do the Reminder Calls. In the last 9 days, therefore, all reminders were done by mail.

**Table 2.3 Incidence and Types of Reminders**

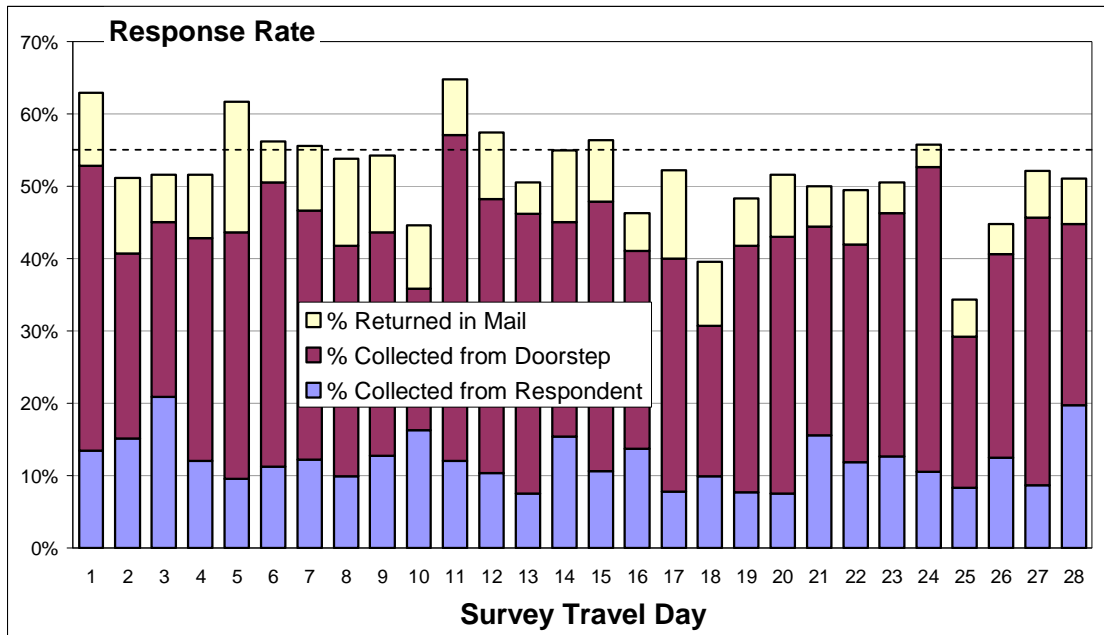
Reminder Method	Week				Total
	1	2	3	4	
No Reminder	547	513	504	533	2097
Phone Reminder	59	56	50	0	165
Postal Reminder	66	103	118	139	426
<b>TOTAL</b>	<b>672</b>	<b>672</b>	<b>672</b>	<b>672</b>	<b>2688</b>
% Reminded	19%	24%	25%	21%	22%
% Reminders by Phone	47%	35%	30%	0%	28%
% Reminders by Mail	53%	65%	70%	100%	72%

**2.6 Response Rates**

A key measure of performance for the survey was the response rate achieved. It was for this reason that the personal delivery and pickup were instituted, along with the motivational and reminder calls. The response rates achieved from the Darebin area in the VATS survey was about 7% less than the Melbourne-wide average, and for this reason a lower-than-average response rate was again expected in Darebin. In the NESTS Pilot Survey, a response rate of 52% was achieved. The response rates achieved in the four weeks of the main survey are shown in Table 2.4 and Figure 2.4.

**Table 2.4 Overall Response Rates by Week**

Response Category	Week				Total
	1	2	3	4	
Responses	352	347	317	320	1336
Sample Loss	42	33	28	12	115
Refusals	165	168	197	221	751
Non-Responses	113	124	130	119	486
<b>TOTAL</b>	<b>672</b>	<b>672</b>	<b>672</b>	<b>672</b>	<b>2688</b>
Response Rate	56%	54%	49%	48%	52%
% Collected from Respondent	13%	12%	10%	12%	12%
% Collected from Doorstep	33%	33%	31%	31%	32%
% Mailed Back	10%	9%	8%	5%	8%

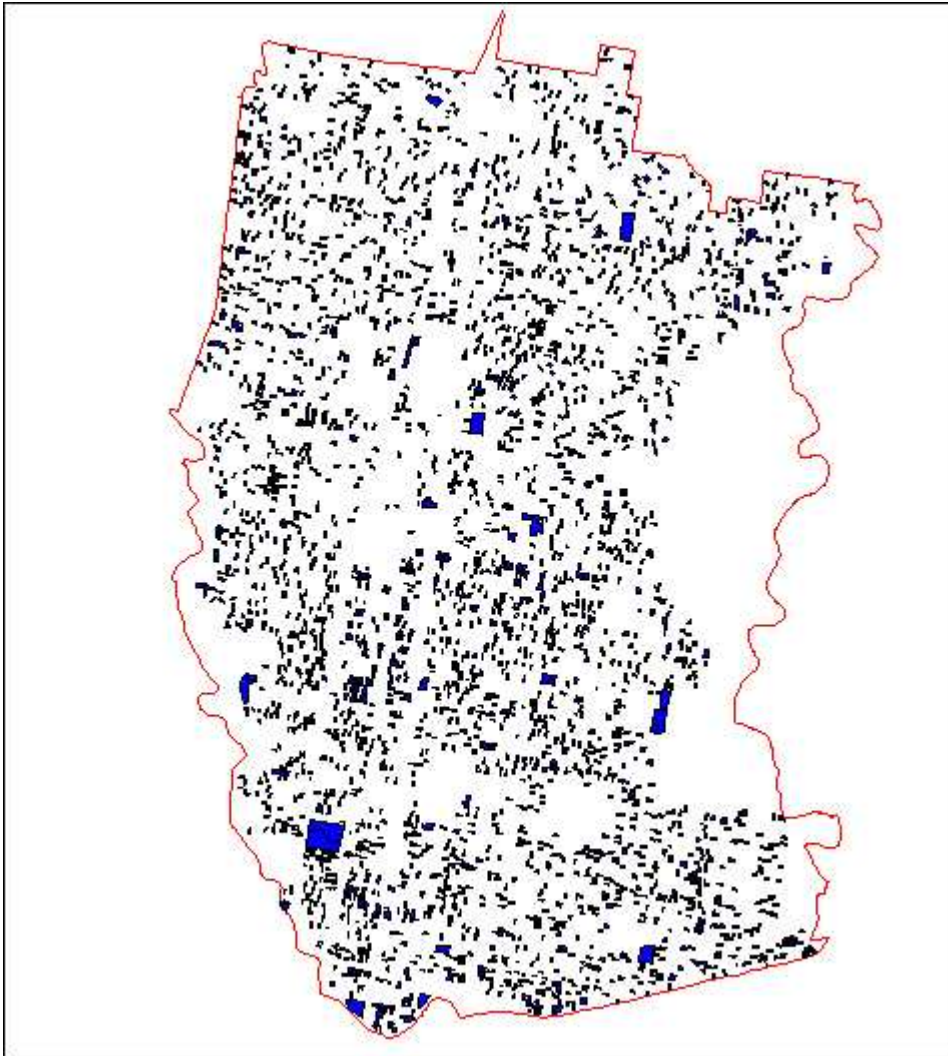


**Figure 2.4 Response Rates by Day of Survey**

It can be seen that the overall response rate was 52% (the same as obtained in the Pilot Survey). Response rates started out at 56% in Week 1, and then gradually fell to about 48% in Week 4. The main reason for this fall in response rate is the fall in returns through the mail. This could be due to the fact that Easter immediately followed the survey and hence households who were yet to return their surveys may have forgotten to do so once Easter had passed.

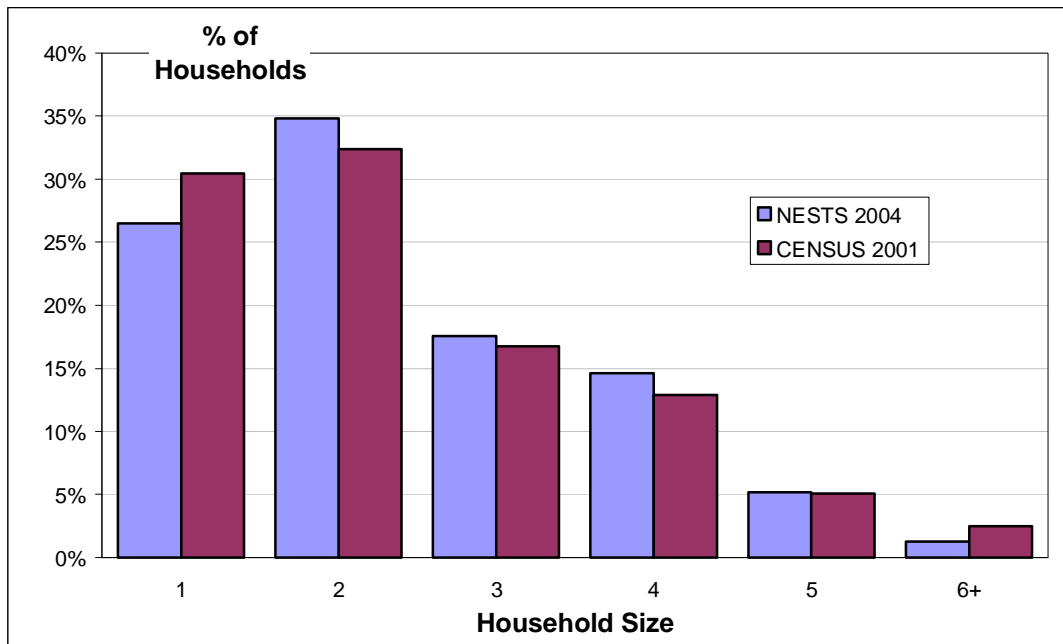
### 3 Unweighted Household Results

The unweighted results from the NESTS2004 Household Questionnaire are presented in this section. The geographic distribution of surveyed households is shown in Figure 3.1. This figure shows a relatively even distribution of households across the entire study area (since every CCD in the area was sampled from). The apparently unsampled area on the eastern side of the study area consists of industrial, commercial and parkland land-uses bordering on the Darebin Creek.



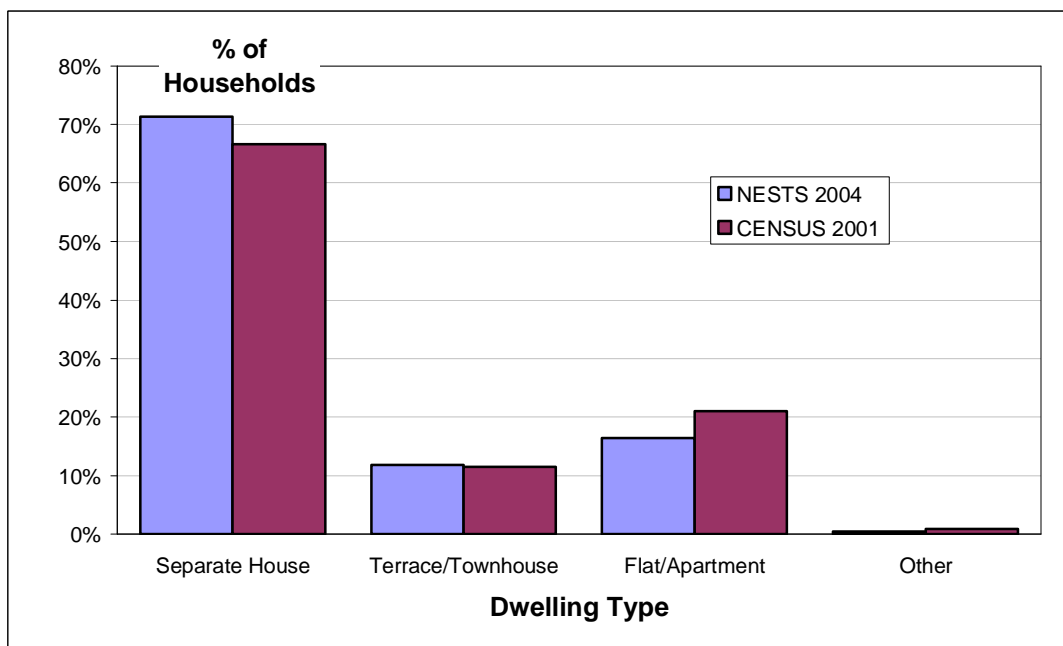
**Figure 3.1 Geographic Distribution of Responding Households**

The distribution of household sizes (in terms of number of Usual Residents) recorded in the sample of responding households is shown in Figure 3.2. Also shown in Figure 3.2 is the distribution of household size for the same study region of 168 CCDs, as recorded in the 2001 Census. The agreement between the NESTS2004 Usual Residents and the 2001 Census Usual Residents is very good, especially considering that this is comparing the unweighted NESTS2004 data with the 2001 Census. It indicates that the NESTS2004 sample is a good representative sample of the total population, in terms of household size. The average household size in NESTS2004 is 2.42, compared to 2.40 in the Census.



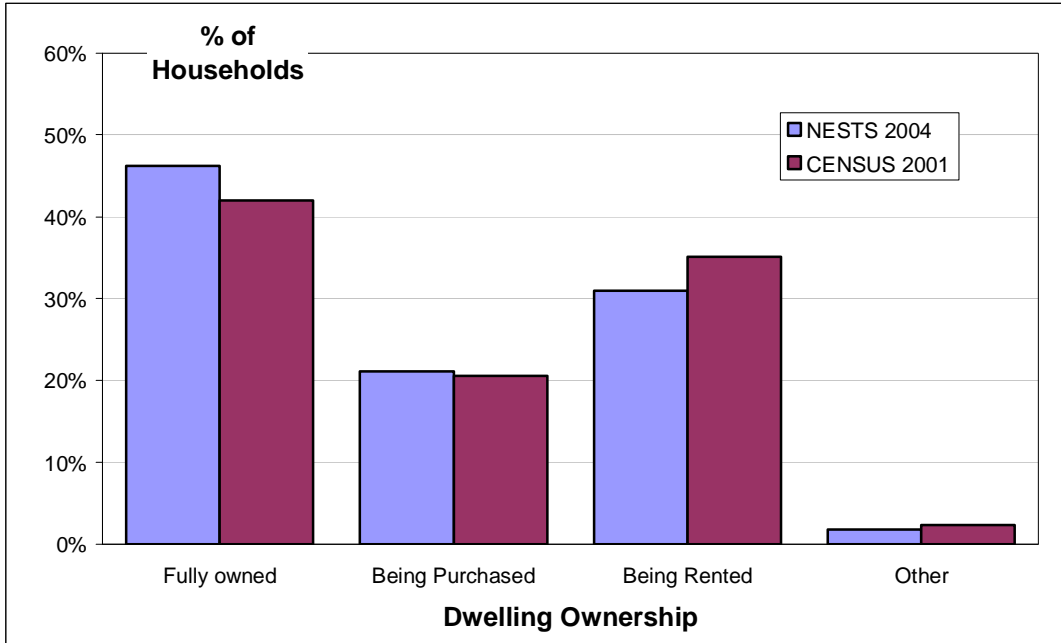
**Figure 3.2 Distributions of Household Size**

The type of dwelling in NESTS2004, as reported by the respondent, is shown in Figure 3.3. It can be seen that the split between single dwellings and multiple dwellings closely matches the 2001 Census, with NESTS2004 having slightly more Separate Houses than in the Census.



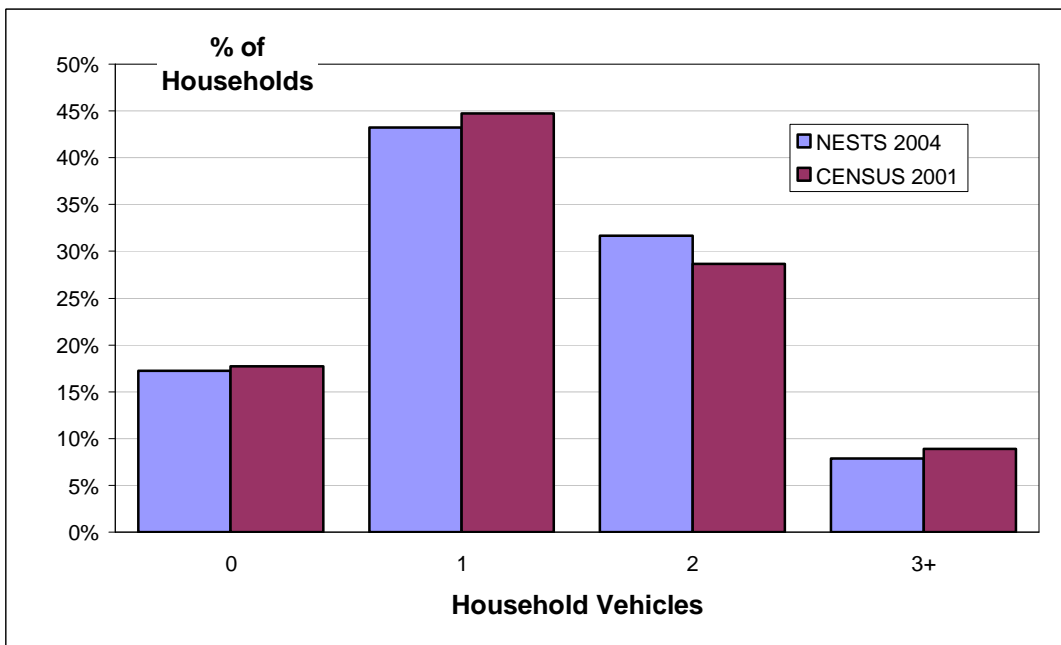
**Figure 3.3 Dwelling Type in NESTS2004 and Census**

The ownership of the dwelling in NESTS2004 is shown in Figure 3.4. It can be seen that NESTS2004 has more dwellings that are fully owned than in the Census. These are findings found in most travel surveys, where fully-owned separate houses are over-represented, compared to rented apartments.



**Figure 3.4 Dwelling Ownership in NESTS2004 and Census**

The distribution of vehicles per household is shown in Figure 3.5. The agreement between the NESTS2004 Vehicle Ownership and the 2001 Census Vehicle Ownership is very good. Approximately 18% of the NESTS2004 sample and 18% of the Census population have no vehicles in the household, while the average vehicles per household in both data sets is 1.31.



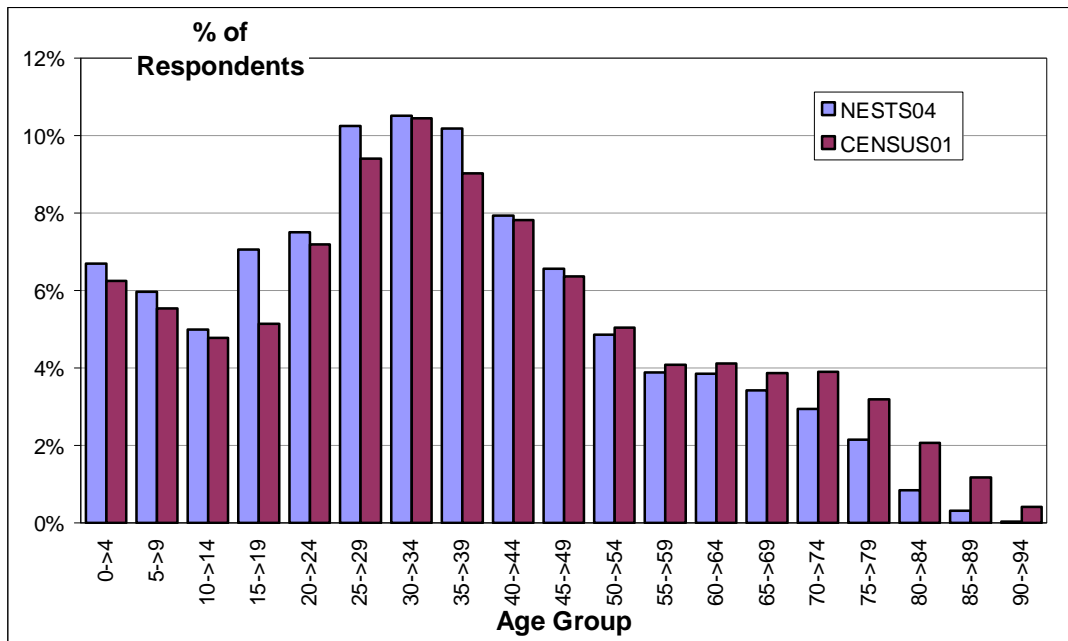
**Figure 3.5 Distributions of Vehicles per Household**

The above comparison between the unweighted NESTS2004 household demographics and the 2001 Census results is very encouraging, indicating that the NESTS2004 survey has captured a very representative sample of households in the study area.

## 4 Unweighted Person Results

The unweighted results from the NESTS2004 Person Questionnaire are presented in this section.

The distribution of respondents by 5-year Age Groups is shown in Figure 4.1, and compared with the same data from the 2001 Census. It can be seen that NESTS2004 captures the double-hump of the age distribution for the under-5s and those in their early 30s. However, NESTS2004 tends to slightly over-represent those aged between 15 and 30 and under-represent those aged over 60. NESTS2004 represents the Gender distribution well, with 47% of the NESTS2004 sample being male, compared to 48% in the Census.



**Figure 4.1 Age of Respondents in NESTS2004 and Census**

A concern in the original survey design was that, being a written self-completion questionnaire, there might be a bias against completion of the questionnaire by those whose mother-tongue was not English. To investigate this, a question was asked about country of birth, and the results are shown in Table 4.1

**Table 4.1 Country of Birth of Respondents in NESTS2004 and Census**

Country of Birth	NESTS 2004	CENSUS 2001
Australia	67%	67%
Italy	6%	6%
Greece	4%	6%
UK	3%	2%
China	2%	2%
Vietnam	1%	1%
Macedonia	1%	1%
Lebanon	1%	1%
NZ	2%	1%
India	1%	1%
Elsewhere	11%	10%

It can be seen that NESTS2004 has the same representation of Australian-born respondents (67% in Darebin) as in the 2001 Census. Apart from the Greek population, no specific population group appears to be under-represented. This statistical finding mirrors the anecdotal results reported by field interviewers (including our Greek interviewers), who reported that the Greek population was the most difficult to convince to do the survey.

The employment status of respondents in NESTS2004 and the Census is shown in Table 4.2. It can be seen that NESTS2004 provides a very representative picture of employment status by full-time and part-time by gender.

**Table 4.2 Employment Status of Respondents in NESTS2004 and Census**

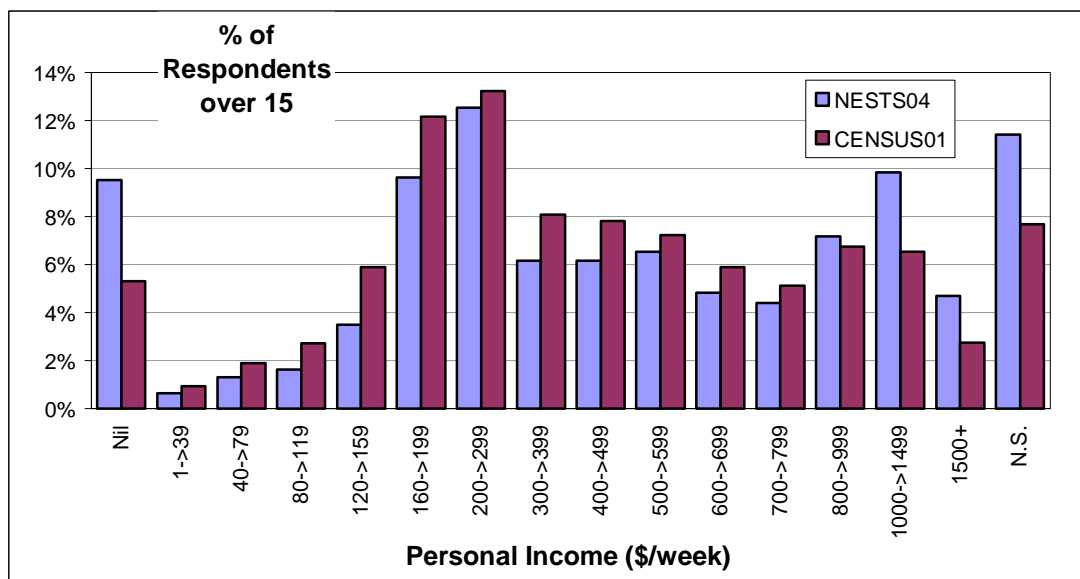
Employment Status	NESTS04	CENSUS01
Full-Time Work		
Male	43%	43%
Female	27%	27%
Part-Time Work		
Male	13%	13%
Female	21%	20%

The educational status of respondents in NESTS2004 and the Census is shown in Table 4.3. It can be seen that NESTS2004 provides a slight over-representation of students, compared to the Census.

**Table 4.3 Educational Status of Respondents in NESTS2004 and Census**

Educational Status	NESTS04	CENSUS01
Primary	8%	7%
Secondary	6%	5%
Tertiary	11%	10%

Income is often regarded as one of the more difficult “sensitive” questions in travel surveys, with many surveys reporting high non-response rates. The NESTS2004 results (for persons over 15, to be consistent with the Census) are shown in Figure 4.2, together with the 2001 Census results.

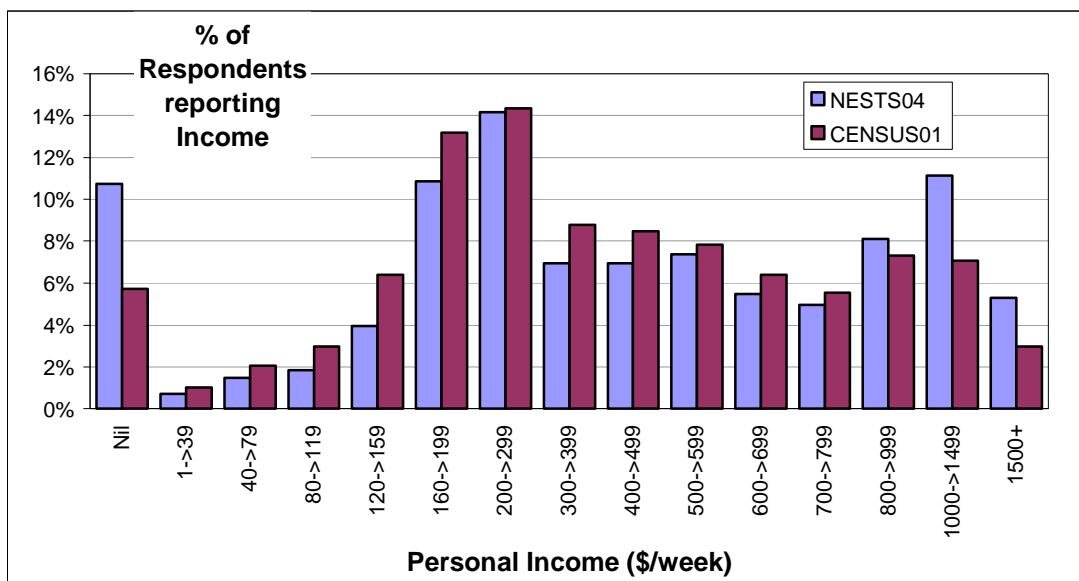


**Figure 4.2 Personal Weekly Income of Respondents over 15 Years of Age**



After deductive imputation has been applied to the NESTS2004 results (mainly imputation of the age pension for those who state they are age pensioners but do not give an income, and imputation of zero income not in employment and not on other pension or unemployment benefits), it can be seen that the NESTS2004 results are a reasonable approximation of the Census results. NESTS2004 has 11% Not Stated (after deductive imputation), compared to 7.5% for the Census. However, NESTS2004 has 9.5% zero income, compared to only 5% for the Census. This is probably because some people without an obvious source of income (salary, pension etc) in fact have another source of income (e.g. savings, investments) which they have not reported in NESTS2004.

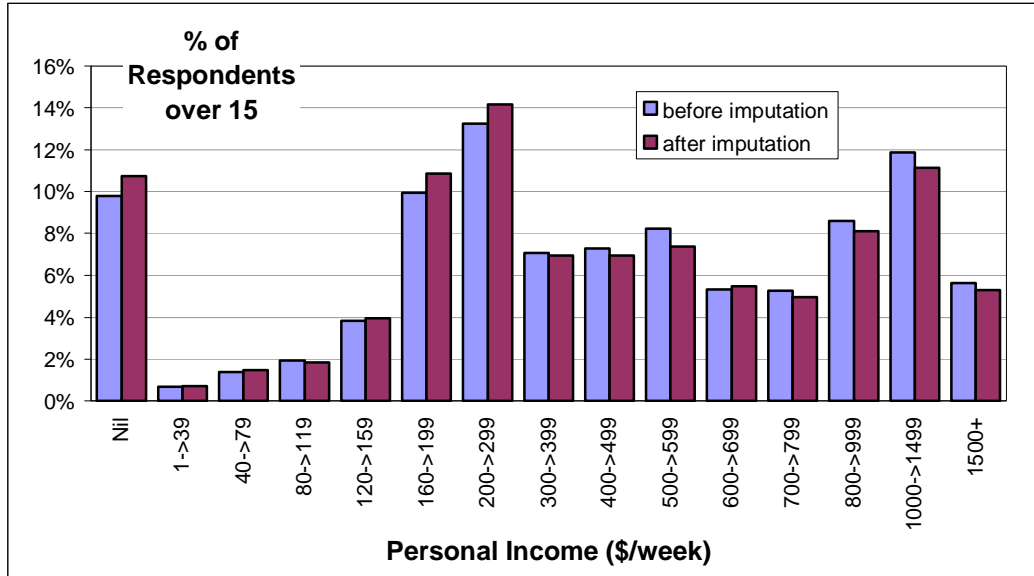
If one compares NESTS2004 with the Census only for those who report some form of income, as shown in Figure 4.3, then it can be seen that the agreement is fairly good.



**Figure 4.3 Personal Weekly Income of Respondents reporting Some Income**

The 11% Not Stated in NESTS2004 can be removed by applying hot-deck imputation, whereby missing income values are replaced with income values from similar respondents in the NESTS2004 data. The hot-deck imputation for NESTS2004 employed employment status, age and gender as the stratifying variables. A comparison of the personal income distribution before and after hot-deck imputation is shown in Figure 4.4. It can be seen that hot-deck imputation has slightly increased the proportion with income in the \$150-\$300 ranges and reduced the proportion with incomes above \$800/week.

The advantage of using hot-deck imputation after deductive imputation is that now every respondent has an income for subsequent analyses.



**Figure 4.4** Personal Weekly Income for NESTS2004 before and after the use of Hot-Deck Imputation

## 5 Unweighted Vehicle Results

Each household was asked a range of questions about all vehicles owned or garaged at their household on the night before their Travel Day. The unweighted results from the NESTS2004 Vehicle Questionnaire are presented in this section. The majority of the vehicles (92%) were privately owned, with 8% being company car and only 0.4% being government vehicles.

**Table 5.1** Ownership of Vehicle in NESTS2004

Ownership	% of Vehicles
Private	92%
Company	8%
Government	0.4%

Most of the vehicles were cars (84%) with another 7% being four-wheel-drive vehicles. Company (and government) vehicles were more likely to be 4WDs, utes or vans than were privately owned vehicles.

**Table 5.2** Type of Vehicle by Vehicle Ownership in NESTS2004

Vehicle Type	Vehicle Ownership		TOTAL
	Private	Company	
Car	87%	60%	84%
4WD	6%	15%	7%
Motorcycle	2%	0%	2%
Ute	2%	11%	3%
Van	2%	11%	3%
Truck	0%	2%	1%
Other	0%	2%	1%

Fords were the most popular make of vehicle, followed by Toyotas and Holdens. Toyotas were particularly popular as company vehicles.

**Table 5.3 Top 10 Makes of Vehicle by Vehicle Ownership in NESTS2004**

Vehicle Make	Vehicle Ownership		TOTAL
	Private	Company	
Ford	21%	23%	21%
Toyota	18%	30%	19%
Holden	12%	9%	12%
Mitsubishi	7%	2%	7%
Mazda	7%	4%	7%
Nissan	5%	5%	5%
Honda	5%	0%	4%
Hyundai	2%	1%	4%
Subaru	2%	0%	2%
Daewoo	2%	2%	2%

Whereas the top make of vehicle (Ford) made up 21% of the vehicle fleet, the distribution of models was much more widespread, with the most popular model (Falcon) making up only 8% of the total, followed by Commodores, Corollas and Magnas.

**Table 5.4 Top 10 Models of Vehicle by Vehicle Ownership in NESTS2004**

Vehicle Model	Vehicle Ownership		TOTAL
	Private	Company	
Falcon	6%	4%	8%
Commodore	5%	3%	5%
Corolla	5%	3%	5%
Magna	5%	3%	5%
Camry	5%	0%	4%
Laser	2%	0%	2%
Excel	2%	0%	2%
Pulsar	2%	2%	2%
Astra	2%	0%	2%
Lancer	2%	1%	2%

The distribution of vehicle ages, in total, was relatively uniform over the past 15 years. However, company vehicles were much more likely to be under 5 years old (67%) compared to private vehicles (21%). The average age of a company vehicle was only five years (with a median age of two years), whereas the average age of a private vehicle was 11 years (with a median age of 10 years).

**Table 5.5 Year of Vehicle by Vehicle Ownership in NESTS2004**

Year	Vehicle Ownership		TOTAL
	Private	Company	
2004	1%	8%	1%
2003	5%	23%	6%
2002	5%	20%	7%
2001	6%	8%	6%
2000	5%	13%	5%
2000-04	21%	67%	25%
1995-99	27%	17%	26%
1990-94	21%	4%	20%
1985-89	16%	4%	15%
1980-85	9%	2%	8%
pre-1980	6%	2%	6%

The majority of all vehicles (58%) were 4-cylinder vehicles, with another 31% being 6-cylinder vehicles. However, company vehicles were more likely to be 6-cylinder vehicles (49%) than 4-cylinder vehicles (41%).

**Table 5.6 Number of Vehicle Cylinders by Vehicle Ownership in NESTS2004**

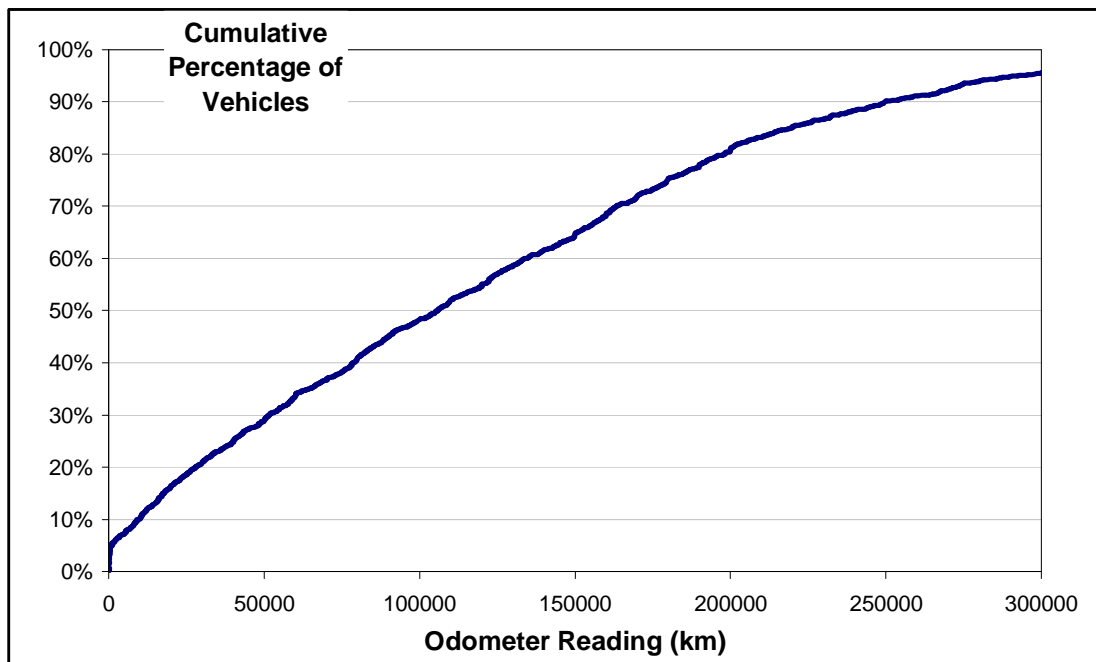
Cylinders	Vehicle Ownership		TOTAL
	Private	Company	
1	0%	0%	0%
2	1%	0%	1%
3	1%	0%	1%
4	61%	41%	58%
5	0%	2%	0%
6	30%	49%	31%
8	3%	5%	3%

Most vehicles used petrol (94%), with relatively few using LPG gas (5%) or diesel (3%). These percentages do not sum to 100% because some vehicles used more than one type of fuel.

**Table 5.7 Type of Fuel Used in NESTS2004**

Fuel Type	% of Vehicles
Petrol	94%
Gas	5%
Diesel	3%

In addition to asking about the characteristics of each vehicle, respondents were asked to provide the current odometer reading for each vehicle. This information was provided for 86% of vehicles, and the cumulative distribution of the odometer readings is shown in Figure 5.1.

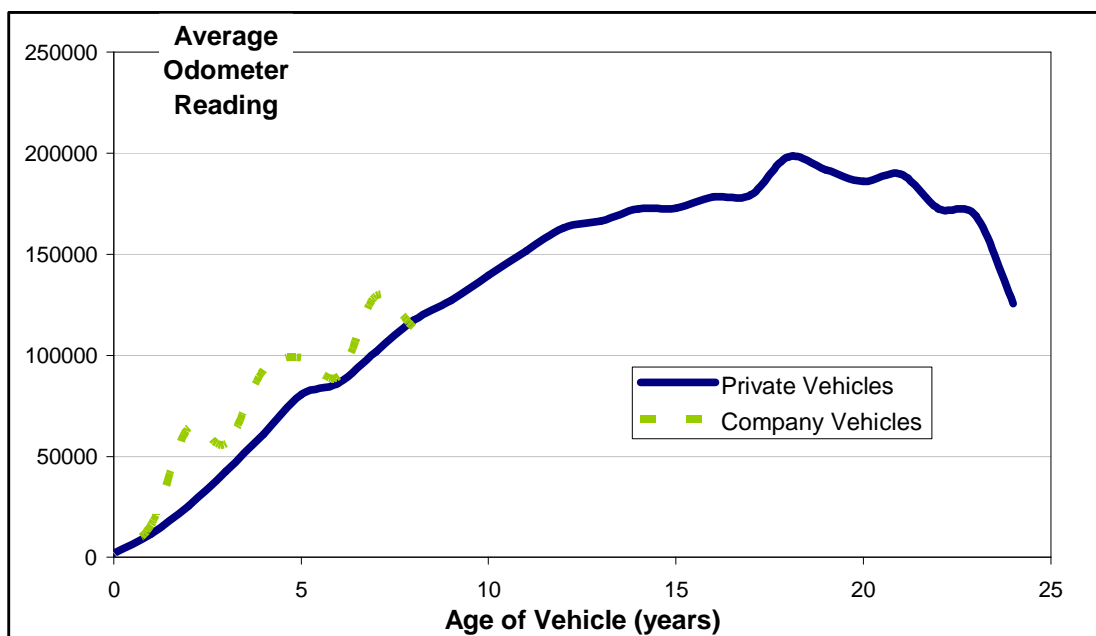


**Figure 5.1 Cumulative Distribution of untrimmed Odometer Readings**

The distribution is relatively smooth, with two outstanding features. Firstly, about 5% of readings are very small (less than 500 km). While some of these readings might be valid (for a very new vehicle), the majority are obviously mistakes where the respondent has given the trip-meter reading (rather than the odometer reading) or where they have given the kilometres travelled on the Travel Day (rather than the current odometer reading). Secondly, about 5% of readings are greater than 300,000

kms. While most of these would be valid readings (especially for older vehicles), it was clear that some of these readings (for relatively young vehicles) are mistaken readings involving juxtaposition of digits or inclusion of the tenths of kilometres found on some vehicle odometers. To avoid the possibility of these very high or very low values affecting the subsequent analyses, the odometer readings were 5% trimmed, with the bottom and top 5% of readings being ignored.

To check the overall reasonableness of these odometer readings, the average odometer reading (using the 5% trimmed data) was calculated as a function of the age of the vehicle, for private and company vehicles, as shown in Figure 5.2. Three features of the graph are worth noting. Firstly, for the private vehicles, the odometer reading rises fairly uniformly per year up to a vehicle age of about 11 years (the average age) at a rate of about 14,000 km per year, which is approximately the average annual kilometres for passenger vehicles in Victoria, as recorded in the ABS Survey of Motor Vehicle Usage. Secondly, beyond this age, the kilometres per extra year of vehicle age rises at a decreasing rate, reaching a maximum average kilometres travelled of about 200,000 at age 20. Beyond this age the average odometer reading starts to fall. This finding has been observed in other studies of vehicle use, and is caused by the scrapping of older vehicles with higher kilometrage, leaving only the older vehicles with relatively lower kilometrage. Thirdly, for the limited age range of company vehicles, it can be seen that the average annual kilometres is higher than for private vehicles of the same age.



**Figure 5.2 Average Odometer Reading as a function of Vehicle Age**

It was noted earlier that about 5% of readings were very low and clearly in error. Another problem with the odometers readings was where respondents rounded off their odometer reading. While the overall magnitude of these readings is probably satisfactory (and has been used on the construction of Figure 5.2 above), they will be of little use in calculating kilometres travelled during the week when they are compared with another (potentially rounded-off) odometer reading at the end of the week. As an indication of rounding-off, any odometer reading that was an exact multiple of 1000 km was assumed to be rounded-off. Approximately 30% of all

readings fell into this category. This left 65% of the odometer readings useful for the estimation of weekly kilometres (after removing the very low and the rounded-off readings). A more complete analysis of the weekly kilometres, derived from the follow-up odometer survey, is provided later in this report.

## 6 Unweighted Stops Results

The unweighted results from the NESTS2004 Stops Questionnaire are presented in this section for persons aged 5 or more. While the reconstruction of the Travel Diaries for persons under 5 has been performed to obtain the population estimates of travel for the region, they have not been included in the data used for the before and after surveys to evaluate the TravelSmart project, since those under 5 have no decision-making power for independent travel that might be influenced by TravelSmart. In addition, while the Stops file has been converted into a Trips file to obtain the population estimates of travel for the region, the Trips file is not used in the TravelSmart evaluation, since the Trips file loses valuable information about feeder modes for public transport trips, including a substantial proportion of non-motorised mode travel. Therefore, all the TravelSmart evaluation is based on the information in the Stops file for those aged 5 and above.

The average number of Stops per Day per Person (aged 5 or more) is 3.79, with 25% of people making no Stops on their Travel Day. The distribution of Stops per Day per Person is shown in Figure 6.1, together with the results for VATS (1994-96) for the same group of 168 CCDs. For VATS, the average stops per person per day was 3.58, with 24% of respondents making no trips on their Travel Day. It therefore appears that NESTS2004 is measuring stops with approximately the same level of precision as in VATS.

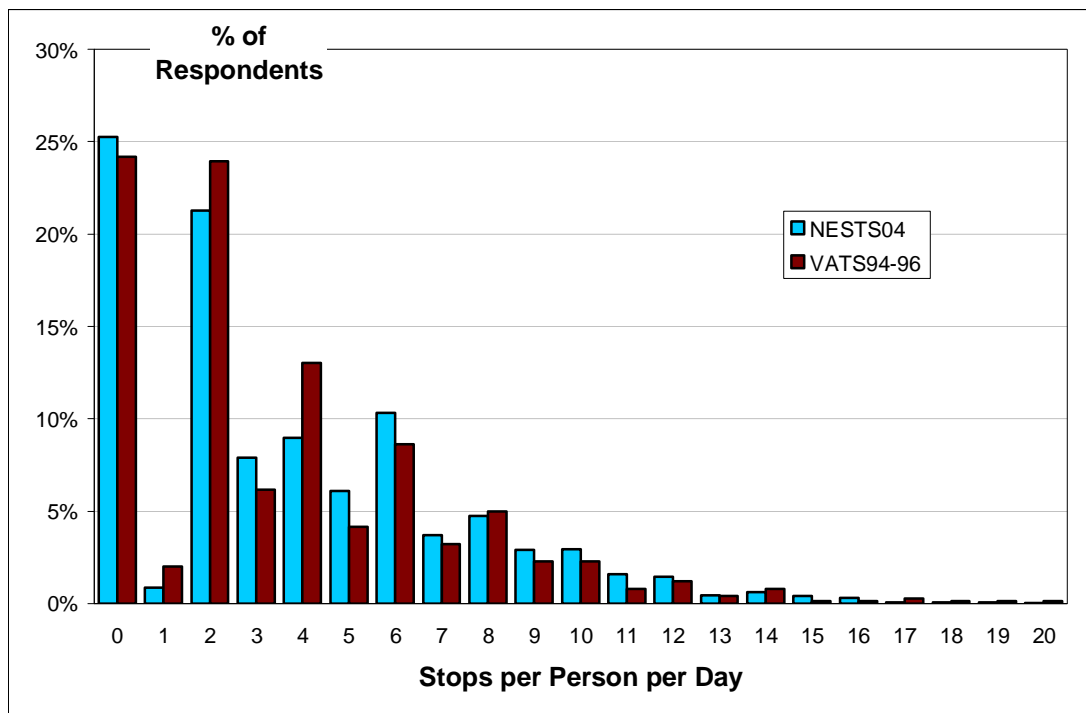


Figure 6.1 Number of Stops per day per Person (aged 5 or more)

The types of destination place visited during the day are shown in Table 6.1. Residences (including the respondents home), transport locations (such as bus stops and train stations), shops and workplaces are the most commonly visited locations.

**Table 6.1 Destination Places of Stops**

Destination Place	% of Stops
Transport Location	22%
Residence	35%
Workplace	11%
Natural Feature	1%
Educational Venue	7%
Shop	13%
Personal Business Venue	3%
Social Venue	5%
Recreational Venue	2%
Other	2%

The reasons why these places are visited are shown in Table 6.2. Going home, change mode, buying something and work-related purposes are the main reasons for making trips.

**Table 6.2 Destination Purposes of Stops**

Destination Purpose	% of Stops
Change Mode	21%
Accompany	1%
Buy Something	11%
Pickup/deliver Something	2%
Chauffeur	6%
Education	4%
Work	11%
Go Home	28%
Personal Business	4%
Social	9%
Recreational	3%
Other	0%

The modes used to get to these destinations are shown in Table 6.3, along with the corresponding figures from VATs 1994-96.

**Table 6.3 Mode of Transport Used on Trip Stages**

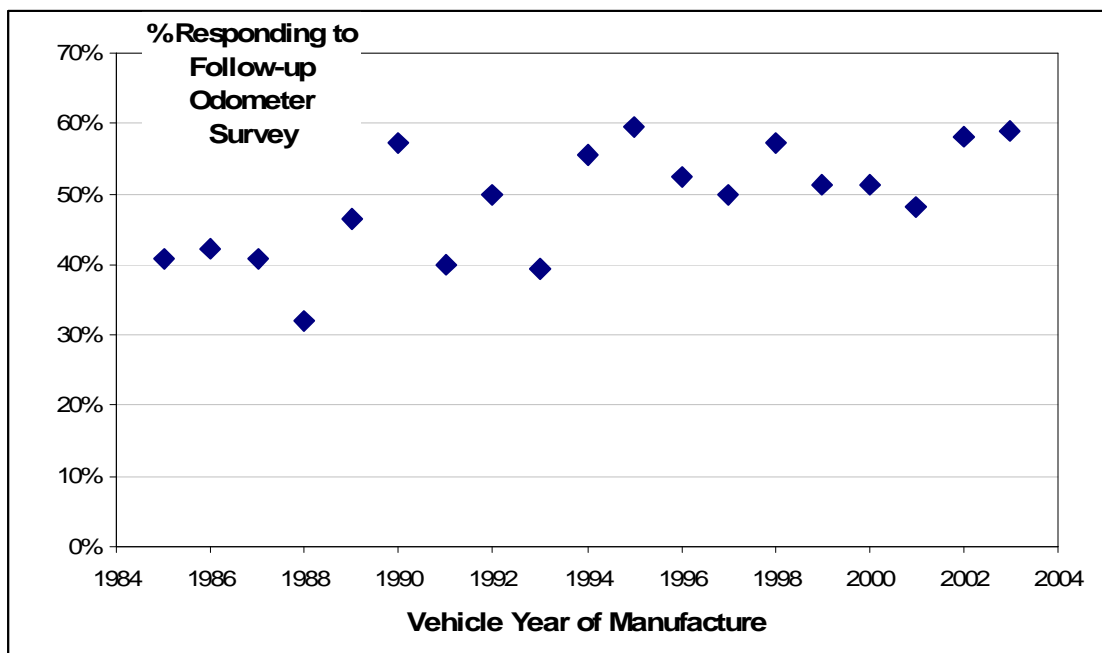
Mode of Transport	% of Stops	
	NESTS04	VATS94-96
Vehicle Driver	38%	34%
Vehicle Passenger	15%	20%
Motorcycle	0%	0%
Walking	32%	35%
Bicycle	3%	1%
Taxi	0%	0%
Train	4%	3%
Tram	5%	3%
School Bus	0%	0%
Public Bus	2%	3%
Other	0%	0%

It can be seen that the private car is the dominant form of transport, with 53% of stops being served by private car. This is similar to the overall result from VATS (54%), but NESTS04 has a higher proportion of these stops as a car driver, compared to as a car passenger. The proportion of stops by public transport is slightly higher in NESTS04 (11%) than in VATS (9%), while the proportion by non-motorised transport is very similar (35% cf 36%) but with a higher proportion by bicycle in NESTS04 (3% cf. 1%). Overall, however, the modal share results appear not to have changed significantly over the past 10 years in Darebin, with the possible exception of an increase in car driver trips.

## 7 Odometer Survey Results

Those households providing useful odometer readings in the questionnaire survey were contacted again a week later with a postcard survey, asking them to provide a second odometer reading for each vehicle so that the weekly VKT could be calculated. The unweighted results from the NESTS2004 Odometer Survey are presented in this section.

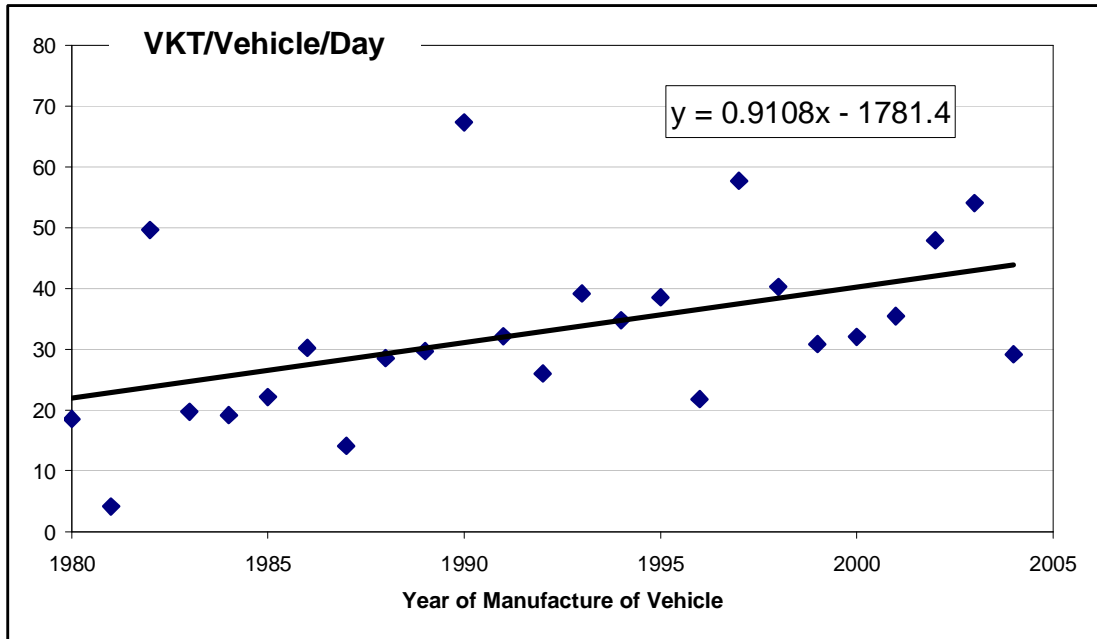
Of the 941 vehicles for which a useful odometer reading was obtained in the initial survey, replies to the postcard follow-up survey were obtained from 480 vehicles (51%). Figure 7.1 shows the variation in this response rate by the age of the vehicle, where it can be seen that higher response rates were obtained for newer vehicles.



**Figure 7.1 Response to Follow-up Odometer Survey by Age of Vehicle**

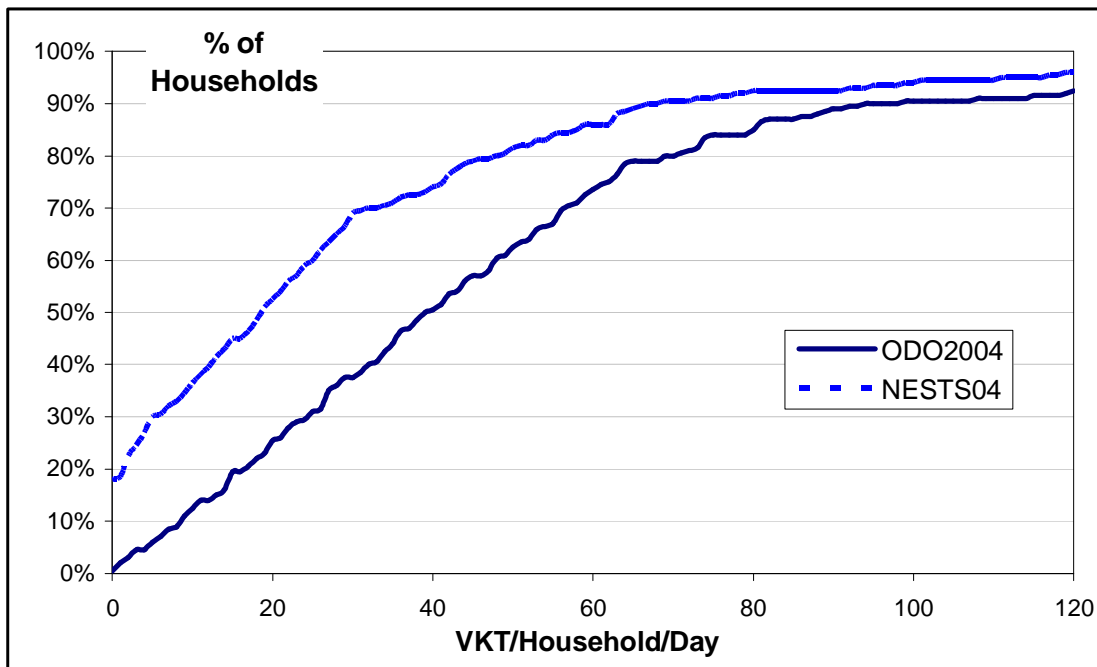
Figure 5.2 above had shown that older vehicles perhaps travel less kilometres, with the marginal increase in VKT slowing as the age of the vehicle increased. This finding is confirmed by examining the actual VKT per vehicle per day (as measured in the odometer follow-up survey) as a function of the age of the vehicle, as shown in Figure 7.2. It can be seen that new vehicles travel about 45 km/day, decreasing to about 20 km/day as the vehicle ages to about 25 years of age.





**Figure 7.2 VKT/Vehicle/Day by Age of Vehicle**

The odometer survey is one way of measuring VKT. Another way is by means of the travel diary completed by each respondent. By estimating the total distance travelled as a car driver by each household, an estimate of total VKT per household per day can be obtained. This can then be compared with the total VKT for all vehicles in a household as estimated by the odometer survey. The cumulative distributions of these two measures of VKT are shown in Figure 7.3, while some summary statistics are provided in Table 7.1 (for the 5% trimmed distributions).



**Figure 7.3 Cumulative Distributions of VKT/Household/Day from Odometer and Diary Surveys**

**Table 7.1 VKT/Household/Day Statistics from Odometer and Diary Surveys**

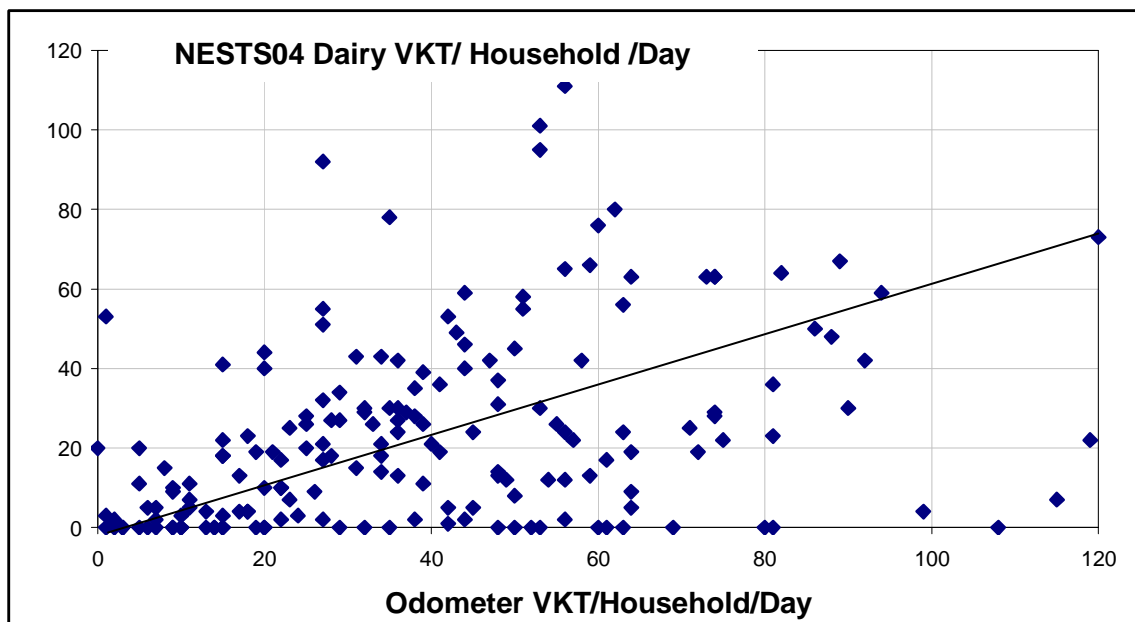
	ODO2004	NESTS04
Average VKT/Household/Day	44	25
Median VKT/Household/Day	39	19
S.D. VKT/Household/Day	29	24
CoV VKT/Household/Day	0.64	0.97

Figure 7.3 shows that the NESTS2004 travel diary VKT results are lower than the odometer survey results. This is due to at least two reasons. Firstly, the travel diary VKT estimates are based on straight-line distances between origin and destination, whereas the odometer distances are actual distances. Depending on the network configuration, it is known from previous studies in Melbourne that the actual distance is about 35% longer than the straight-line distance. Secondly, it is possible that not all vehicle trips are recorded in the travel diaries, leading to an under-reporting of VKT in the diaries. Table 7.1 confirms the differences in average and median VKT/household/day between the odometer and diary surveys.

Figure 7.3 also illustrates another major difference between the distributions of VKT. Whereas only 1% of households reported zero kilometres travelled in a household vehicle during the week in the odometer survey, 18% of households reported no VKT on their Travel Day in the diary survey (even though they may have been used on other days of the week).

Finally, Table 7.1 highlights the difference in VKT variability between the two types of survey. As indicated by the Coefficient of Variation (CoV), the odometer survey (which measures VKT across a week) has significantly less variation between households than the diary survey (which measures VKT on a single travel day). This has implications for the ability to detect a specific difference in VKT in a before and after survey situation.

The VKT measured in both surveys may be compared further by plotting the values measured for each household by each method, as shown in Figure 7.4.



**Figure 7.4 VKT/Household/Day from Odometer and Diary Surveys**

It can be seen that while there is a general correlation between the two measures, the correlation is far from perfect. Many households have zero VKT in the one-day travel diary, but significant average daily VKT in the odometer survey. Conversely, many households have high VKT in their travel diary on their travel day, but lower average daily VKT across the entire week. Given the differences in measurement of VKT, both measures should be used in making any comparisons between the before and after surveys.