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**Collecting Data with GPS:  
Those who reject, and  
those who receive**

By

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**ABSTRACT:** Most surveys using GPS devices to collect data have focused on the device and its effectiveness for collecting reliable and accurate data. Another dimension to be considered with this form of data collection is whether the people who consent to carry the GPS devices differ from those who do not. Using active or passive GPS devices for data collection entails some degree of respondent burden. Even a passive device, must be carried by the respondent and be kept charged as necessary. In this paper, we test the hypothesis that there are statistically significant differences between GPS participants and non-participants and consider whether differences may introduce response bias to the GPS survey. The data are from the ongoing Sydney HTS and an associated project comparing the quality of personal travel data collected through the HTS with data collected through the use of GPS devices. Because the participants in the GPS study were recruited from those who already agreed to participate in the HTS, sociodemographic characteristics of both participants and non-participants are available. Identifying potential response bias will assist in developing specialised programs to encourage participation of those most likely to refuse, raising the response rate, and reducing the response bias.

**KEY WORDS:** *Non response, GPS, household travel survey, respondent burden, bias.*

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## 1. Introduction

To date most surveys undertaken using Global Positioning System (GPS) devices to collect data have focused on the actual device and its effectiveness for the collection of reliable and accurate data. However, there is another dimension to be considered with this form of data collection: are the people who consent to carry the GPS devices different, in some meaningful way, from those who do not consent? It appears that using either an active or passive GPS device for data collection involves some element of respondent burden. Even with the use of a passive device, the respondent still must remember to carry the device during the survey period, and keep the unit charged as necessary. This paper considers the characteristics of subjects who agree to undertake this burden, and examines differences between these ‘participants’ and ‘non-participants’.

The paper tests the hypothesis that there are statistically significant differences between GPS participants and GPS non-participants and considers whether these differences may introduce some level of response bias to the GPS survey process. The data used to test this hypothesis is from the New South Wales Roads and Traffic Authority’s ongoing Household Travel Survey (HTS) and an associated project conducted during 2003 and 2004 by the Institute of Transport Studies at the University of Sydney. This recent project compares the quality of personal travel data collected through the HTS with travel data collected through the use of GPS devices. Since the participants in the GPS study were recruited from those who had already agreed to participate in the HTS, it is possible to identify socio-demographic characteristics of both participants and non-participants.

The identification of potential response bias can help the researcher develop specialised programs to encourage the participation of those who are more likely to refuse. Targeting these groups and raising the response rate will subsequently reduce the response bias in the collected data.

## 2. Background: The HTS and GPS Studies

### *2.1 The Household Travel Survey*

The HTS is sponsored by the Roads and Traffic Authority (RTA) of NSW and conducted by the Transport and Population Data Centre (TPDC), a division of the NSW Department of Infrastructure, Planning and Natural Resources. Each year more than five thousand households in the Greater Sydney Metropolitan Region (see Appendix 1) are approached to participate in a face-to-face interview about their travel on one randomly allocated day of the week, referred to as the “Travel Day”. Sample selection is based on a three-stage clustered sampling model used by the Australian Bureau of Statistics (ABS), with no replacement sampling. The role of the Hunter Valley Research Foundation (HVRF) in the HTS is to provide a team of highly skilled interviewers to recruit the randomly selected households, as well as conduct post Travel Day interviews.

## 2.2 The GPS Study

In July 2003 the ITS approached the HVRF to pilot test the use of both in-vehicle and wearable GPS devices to collect data in respect of personal travel habits. This pilot study was undertaken during July and August 2003 in conjunction with the 2003/2004 HTS. The overall aim of the ITS was to compare Travel Day data collected in the Sydney Statistical Division (SSD) using GPS devices with data collected from the HTS to test the quality of the trip data.

The HVRF was responsible for:

1. Recruiting subjects (entire households or at least some household members) to participate in the study.
2. Explaining the objectives of the study.
3. Obtaining key data when initial contact was made with the household, such as addresses to which they were likely to travel on their Travel Day.
4. Reporting to the ITS the type of GPS device required for each subject, including delivery details.
5. Reporting to the ITS the subjects preferred post Travel Day interview method (i.e. either by telephone, mail or face-to-face).
6. Conducting any face-to-face post Travel Day interviews.

In addition, the HVRF interviewers attempted to recruit subjects from within each household to participate in the GPS pilot test if they met each of the following criteria:

- Had agreed to participate in the 2003/2004 HTS as a whole
- Were at least 15 years of age
- Could be recruited in adequate time to allow delivery of GPS units before their randomly assigned Travel Day
- Were likely to travel on their Travel Day
- Were willing to provide written consent to participate in the GPS pilot test (only one adult, aged at least 18 years, within the household was required to sign a consent form).

Recruits who indicated that they expected to use only public transport on their Travel Day were assigned wearable GPS units. Those who expected to use both public transport and private vehicles were also assigned wearable units, while those who expected to use only private vehicles were assigned in-vehicle devices.

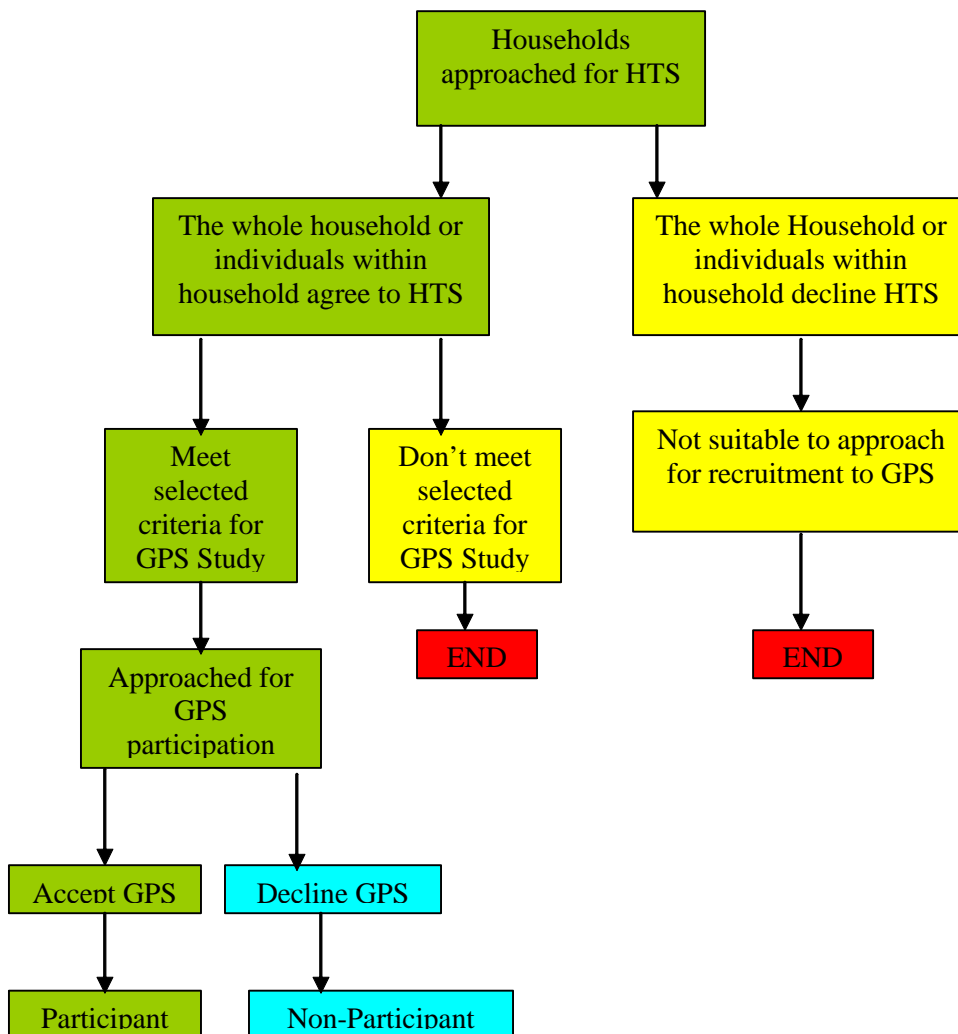
The ITS was responsible for:

1. Organising and coordinating delivery and pick up of GPS devices (or geo-loggers) to recruited subjects using an ITS-arranged courier.
2. Coordinating and conducting post Travel Day interviews either by telephone, Internet or mail.

The GPS pilot study used five HVRF interviewers who were allocated nine randomly selected HTS workloads (a workload contains seven households) within the SSD. Workloads were located in the Statistical Local Areas (SLAs) of Woronora; Waitara; Oran Park; Berala; Canley Heights; Gordon; Fairfield Heights; Mt Kuring-gai and

Westmead. If households within these workloads met the selected criteria they were approached for participation in the GPS pilot study. Those subjects (households or individuals) that were not recruited had either refused to participate or were not able to be contacted.

The methodology developed in the pilot study was adopted for the main GPS study which commenced in February 2004, and data collection continues infield to end in June 2004. The option of an Internet post Travel Day interview was offered to participants, and conducted by the ITS. Participants in the GPS main study to date (24 May 2004) were recruited from randomly selected households in the SLAs of Ashfield; Bankstown; Baulkham Hills; Blacktown; Camden; Canterbury; Concord; Drummoyne; Fairfield; Hawkesbury; Holroyd; Kogarah; Ku-ring-gai; Lane Cove; Leichhardt; Liverpool; Manly; Marrickville; North Sydney; Parramatta; Penrith; Pittwater; Randwick; Rockdale; South Sydney; Strathfield; Sutherland Shire; Sydney Inner; Warringah; Waverly; Willoughby; and Woollahra. The flow chart below summarises the selection process for participation in the GPS study:



RESPONSE RATE

Figure 1: Flowchart of Participants and Non-Participants in the GPS Study

To date, 89 households have met the selected criteria to be approached to participate in the GPS study (either the pilot or the main study): 48 have agreed to participate and 41 have declined, yielding a response rate of 53.9 per cent. There are a total of 82 *individual* participants, and 136 non-participants.

### 3. Hypothesis and Selected Literature Review

#### 3.1 Hypothesis

Socio-demographic data provided by participants and non-participants is used to test the hypothesis that there are statistically differences in the characteristics of each of these groups. The Pearson chi-square test was used to test for statistically significant differences in the distribution of specified characteristics in the two groups, at  $p \leq .05$ . Any differences will indicate some level of response bias which may be combated by the development of specific strategies aimed to recruit participants with the necessary characteristics who may be more likely to refuse to participate.

The relatively small sample size is noted. Therefore, results should be regarded as indicative only, and caution should be exercised in drawing inferences about the broader population. It is also noted that, while the HTS is based on a three-stage clustered sampling design and does not have systematic sampling errors, there is still the possibility of non-sampling error resulting from refusals to participate and the inability to contact selected households. However, the HTS data has been compared with 2001 Census data, and appears to be consistent in respect of the socio-demographic characteristics of age, sex, household size, and dwelling type.

#### 3.1.1 Selected Literature Review

A truly representative random sample should give everyone in the target population an equal chance of being represented. However, in almost every sample obtained there will be some element of non-response error. Many authors agree that not enough consideration is given to the effects of non-sampling error, which can compromise the quality of survey data (Biemer 2001; Lynn and Clarke 2002; Platek and Sarndal 2001).

Non-response error results when subjects in a selected sample frame refuse to participate in the study, or cannot be contacted to request their participation. These individuals may have given very different responses to the survey questions than those who actually participated. The differences between the group of actual respondents and those who did not participate should be taken into account if an effective evaluation of non-response is to occur. Loosveldt et al., (2004) notes, "...the evaluation of non-response errors are [is] a particularly important aspect of quality assessment".

If non-response differences are not taken into account there is the chance that certain social groups will be over-represented and policies developed accordingly (Michie and Marteau, 1999). Lynn and Clarke (2002) considered six separate and very different surveys and compared 'hard to get' respondents (those interviewed after their initial refusal and those interviewed after initial non-contact) with 'easy to get' respondents (those recruited on first contact). In all six surveys they found the hard to get

respondents to be younger, more likely to be in employment, and more likely to be from smaller households, therefore suggesting that these characteristics were possibly under-represented in the selected samples. “Unless the characteristics of the response and non-response segments are similar, error will clearly be introduced” (Thomas, 1972).

Some surveys use Census or labour force data to estimate whether the characteristics of their sample population are indicative of the general survey population, because there is rarely information available about the characteristics of survey non-participants unless special interviews with non-participants are conducted (Loosveldt et al., 2004). DeMaio (1980) examined the demographic characteristics of refusers, as well as their verbatim comments. These comments data were classified into several categories to provide a descriptive analysis of the most important reasons for refusal. They included invasion of privacy, past experience, not mandatory, privacy act or advance letter cited, other authority cited, no authority cited and ‘other’ reasons.

Non-response bias has implications for the development of appropriate field strategies to combat this type of bias. In addition to weighting (Barton, 2001), non-response reduction strategies may assure respondent co-operation (Bowling, 1997; Lynn and Clarke, 2002; Malhortra, et al., 1996). Once implemented they can improve survey response and therefore data quality. DeMaio (1980) agrees that studies of refusals not only help determine what biases exist, but knowledge about them will suggest appeals and procedures to reduce their number.

Therefore, it was decided that our analysis of GPS non-respondents would also include analysis of refusal comments collected by the interviewer at the time of the initial refusal, in addition to comparing the socio-demographic variables. This provides information about sources of non-response error.

## 4. Results

Chi-square analysis indicates that there were no statistically significant differences between participants and non-participants in the GPS study in respect of their age, sex, marital status, student or work status, or whether they had a fixed place of work. However, *significant differences* were determined in respect of their country of birth, household type, educational facility attended, income, whether they held a driver’s licence and household size.

Almost two-thirds of participants were aged between 21 and 50, as shown in Table 1. The chi-square level of significance for age is 0.221, indicating no significant difference between those accepting and those rejecting the GPS. Interestingly, however, 15-20 year olds appeared less likely to accept the GPS devices, while those 41-50 years old seemed more likely to do so. Otherwise, few differences are apparent in Table 1.

Table 2 shows that males and females were equally represented in the GPS study. While it may appear that men were slightly less likely to decline, and women slightly more likely to decline, the chi-square significance level is 0.713, indicating no significant difference in acceptance of the GPS.

*Table 1: Accept or Decline by Age*

Age of Participant	Accepted GPS	Declined GPS
15-20 years	4.9%	16.9%
21-30 years	22.0%	22.1%
31-40 years	19.5%	15.4%
41-50 years	23.2%	16.9%
51-60 years	15.9%	14.7%
Over 60 years	14.6%	13.2%
Undisclosed	0.0%	0.7%
<b>Total</b>	<b>100% (82 participants)</b>	<b>100% (136 non-participants)</b>

*Table 2: Accept or Decline by Gender*

Gender of Participant	Accepted GPS	Declined GPS
Female	50.0%	51.5%
Male	50.0%	47.8%
Undisclosed	0.0%	0.7%
<b>Total</b>	<b>100% (82 participants)</b>	<b>100% (136 non-participants)</b>

As shown in Table 3, the majority of participants were either married (63 per cent) or had never been married (24 per cent). Although those in de facto relationships or separated appeared somewhat more likely to accept the GPS devices, and those who were divorced, or never married appeared more likely to decline the GPS, the chi-square level of significance is 0.152 indicating these differences in acceptance or rejection are not significant.

*Table 3: Accept or Decline by Marital Status*

Marital Status	Accepted GPS	Declined GPS
Married	63.4%	64.0%
De Facto	7.3%	2.9%
Separated	3.7%	0.0%
Divorced	0.0%	1.5%
Widowed	1.2%	1.5%
Never Married	24.4%	29.4%
Undisclosed	0.0%	0.7%
<b>Total</b>	<b>100% (82 participants)</b>	<b>100% (136 non-participants)</b>

Students comprised approximately 20 per cent of all participants, as shown in Table 4. While students seemed more likely to decline, and non-students to accept, the differences are not statistically significant, as shown by a chi-square level of significance of 0.596.

*Table 4: Accept or Decline by Student Status*

Respondent	Accepted GPS	Declined GPS
Student	18.8%	21.8%
Not Student	81.3%	78.2%
<b>Total</b>	<b>100% (80 participants)</b>	<b>100% (119 non-participants)</b>



Table 5 shows that the majority of participants were employed (79 per cent). Though the percentage of workers gave the impression they are more likely to accept GPS devices, and non-workers to decline, again the differences are not significant, the chi-square significance level being 0.1.

*Table 5: Accept or Decline by Work Status*

Respondent	Accepted GPS	Declined GPS
Worker	78.8%	68.1%
Non-Worker	21.3%	31.9%
Total	100% (80 participants)	100% (119 non-participants)

Around two-thirds of participants had a fixed place of work (66 per cent), as shown in Table 6. Once more, the differences are not significant (with the chi-square significance level being 0.08), suggesting that those with a fixed place of work were not more likely to accept GPS devices than those with no fixed place of work.

*Table 6: Accept or Decline by Fixed Place Of Work*

Respondent	Accepted GPS	Declined GPS
Fixed Place of Work	65.8%	53.1%
No Fixed Place Of Work	34.2%	46.9%
Total	100% (79 participants)	100% (113 non-participants)

Table 7 shows that a significantly higher proportion of GPS participants were Australian born: 65 per cent compared with 55 per cent of non-participants. In addition, a relatively high proportion of participants were from the English-speaking countries of England (9 per cent compared with 2 per cent of non-participants) and New Zealand (6 per cent compared with 1 per cent of non-participants). A relatively large proportion of non-participants were from 'other' countries, including Indonesia, Cambodia, Thailand, Vietnam, China and India. The chi-square level of significance is 0.007.

*Table 7: Accept or Decline by Country of Birth*

Country of Birth	Accepted GPS	Declined GPS
Australia	64.6%	55.1%
England	8.5%	1.5%
Scotland	0.0%	1.5%
Italy	0.0%	0.0%
Greece	0.0%	0.0%
New Zealand	6.1%	1.5%
Vietnam	1.2%	2.9%
Other	19.5%	36.8%
Undisclosed	0.0%	0.7%
Total	100% (82 participants)	100% (136 non-participants)

Table 8 shows that the highest proportion of participants comprised couples with children aged between 0 and 14 (35 per cent, significantly higher than 15 per cent of non-participants), followed by couples only (22 per cent, compared with 16 per cent of non-participants). In contrast, the largest single group of non-participants was couples living with their unmarried children aged 15 and over (28 per cent, compared with 21 per cent of non-participants). The differences in this case are highly significant, with a chi-square level of significance of less than 0.000.

*Table 8: Accept or Decline by Household Type*

Household Type	Accepted GPS	Declined GPS
Person Living Alone	3.7%	2.2%
Couple Only	22.0%	16.2%
Couple living with their unmarried children 15 yrs and over	20.7%	27.9%
Couple living with children 0-14 yrs	35.4%	15.4%
Couple living with their children 0-14 yrs and unmarried children 15yrs and over	0.0%	12.5%
One Person living with their unmarried children 15 yrs and over	2.4%	3.7%
One Person living with children 0-14 yrs	3.7%	0.7%
One Person living with their children 0-14 yrs and unmarried children 15yrs and over	2.4%	0.0%
Other Household	9.8%	21.3%
<b>Total</b>	<b>100% (82 participants)</b>	<b>100% (136 non-participants)</b>

As shown in Table 9, a large proportion of participants attended University (53 per cent compared with 23 per cent of non-participants), followed by those who attended TAFE or some 'Other' College (47 per cent, compared with 19 per cent of non-participants). A significantly higher proportion of non-participants attended Secondary School (50 per cent compared with 0 per cent of participants). Differences are statistically significant in this case, also, with a chi-square significance level of 0.003.

*Table 9: Accept or Decline by Educational Facility*

Educational Facility	Accepted GPS	Declined GPS
Secondary School	0.0%	50.0%
TAFE/Other College	46.7%	19.2%
University	53.3%	23.1%
	0.0%	7.7%
<b>Total</b>	<b>100% (15 participants)</b>	<b>100% (26 non-participants)</b>

A higher proportion of GPS participants had income ranges of \$10,400 - \$15,599 (15 per cent compared with 6 per cent of non-participants) and \$52,000 - \$77,999 (15 per cent compared with 7 per cent), as shown in Table 10. In contrast, a relatively high proportion of non-participants had no personal income (17 per cent compared with 4 per cent of participants). The chi-square level of significance is 0.003, indicating a highly significant difference between income and acceptances or declines.

*Table 10: Accept or Decline by Income*

Income	Accepted GPS	Declined GPS
1. No Personal Income	3.8%	16.8%
2. \$1-\$2,079/yr	0.0	0.0
3. \$2,080-\$4,159/yr	0.0	0.8%
4. \$4,160-\$6,239/yr	1.3%	4.2%
5. \$6,240-\$8,319/yr	2.5%	2.5%
6. \$8,320-\$10,399/yr	2.5%	6.7%
7. \$10,400-\$15,599/yr	15.0%	5.9%
8. \$15,600-\$20,799/yr	7.5%	12.6%
9. \$20,800-\$25,999/yr	10.0%	3.4%
10. \$26,000-\$31,199/yr	3.8%	10.1%
11. \$31,200-\$36,399/yr	3.8%	2.5%
12. \$36,400-\$41,599/yr	8.8%	2.5%
13. \$41,600-\$51,999/yr	11.3%	4.2%
14. \$52,000-\$77,999/yr	15.0%	6.7%
15. \$78,000 or More/yr	8.8%	8.4%
16. Don't Know	5.0%	10.9%
17. Refused	1.3%	1.7%
Total	100% (80 participants)	100% (119 non-participants)

Table 11 shows that most participants and non-participants held a driver's licence (90 per cent and 72 per cent respectively). However, a significantly higher proportion of non-participants did not hold a driver's licence (28 per cent compared with 10 per cent of participants). The chi-square level of significance is 0.002, indicating a highly significant difference.

*Table 11: Accepted or Declined by Driver's Licence*

Description	Accepted GPS	Declined GPS
Current Driver's Licence	90.0%	72.3%
No Driver's Licence	10.0%	27.7%
Total	100% (80 participants)	100% (119 non-participants)

The highest proportion of participants comprised two person households (67 per cent compared with 42 per cent of non-participants), as shown in Table 12. In contrast, the largest single group of non-participants was four person households (24 per cent, compared with 4 per cent of participants). The difference was not statistically significant, with a chi-square level of significance of 0.053.

*Table 12: Accept or Decline by Household Size*

Household Size	Accepted GPS	Declined GPS
1 person	12.5%	9.8%
2 persons	66.7%	41.5%
3 persons	14.6%	19.5%
4 persons	4.2%	24.4%
5 persons	0.0%	2.4%
6 persons	2.1%	2.4%
Total No. Households	100% (48 Households)	100% (41 Households)
Mean Household Size	2.2	2.8

The borderline degree of significance of the chi-square is noted. The mean household size among participants was 2.2 persons, while the mean household size among non-participants was 2.8 persons. Analysis of variance provides an F statistic with 0.010 significance, suggesting that household size is a distinguishing characteristic of participants and non-participants.

Figure 2 presents the results of coding refusal comments that were originally taken down verbatim by the interviewer at the initial approach of the subject to participate in the GPS study. The three main reasons for refusal were (1) The burden of participating; (2) The fact they had already agreed to the HTS was enough of a burden; and (3) Invasion of privacy. A detailed list of refusal comments can be found in Appendix 2.

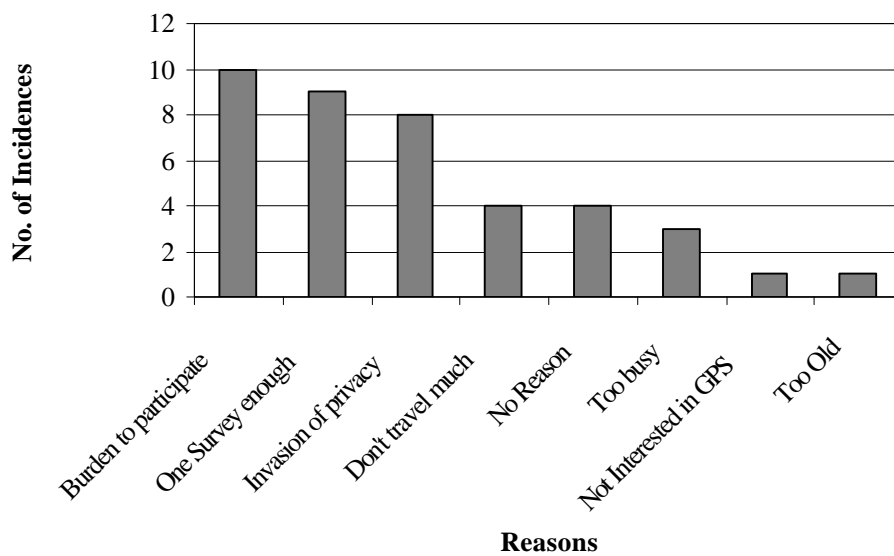


Figure 2: Refusal Comments Collected at Initial Contact

## 5. Summary

The results in this paper are in no way conclusive, nor should we assume that they are mutually exclusive. Nevertheless, statistically significant differences between participants and non-participants in the GPS study were found in six of the twelve socio-demographic characteristics considered: country of birth, household type, educational facility attended, income, whether they held a driver's licence, and household size.

Therefore, among GPS participants there may be an under-representation of:

- People from non-English speaking countries. Because these subjects agreed to participate in the HTS, language difficulties are not likely to influence their decision to opt out of the GPS study. In addition, language difficulties were not recorded in any of the refusal comments. Perhaps reasons for

declining the GPS study involve other cultural issues that will require further investigation.

- Couple households with older children. Perhaps these families are more mobile, thus harder to recruit.
- Secondary school students. It is possible that undertaking the GPS study in addition to the HTS would be an added burden for this group, many of whom would be trying to finalise their secondary school education in preparation for college or University admission.
- Low-income earners, a group more likely to undertake public transport travel. This may also explain the over-representation of subjects who hold a driver's licence in the sample. We know that the offer of participation in the GPS study was either accepted or declined before GPS devices were assigned and, therefore, has nothing to do with the type of device assigned (in-vehicle or wearable).
- Household size. The smaller proportion of larger families in the sample may suggest that they are more difficult to recruit, but this would require further investigation.

It is possible that the reasons provided for non-participation in the GPS study were excuses rather than real reasons. However, the three most frequently cited reasons (respondent burden; already participating in the HTS is enough of a burden; and privacy concerns) may provide a starting point for extracting the actual reason(s) for refusal. The field strategies to increase participation from under-represented groups should identify incentives to participate and develop means by which respondent burden is reduced and privacy concerns alleviated.

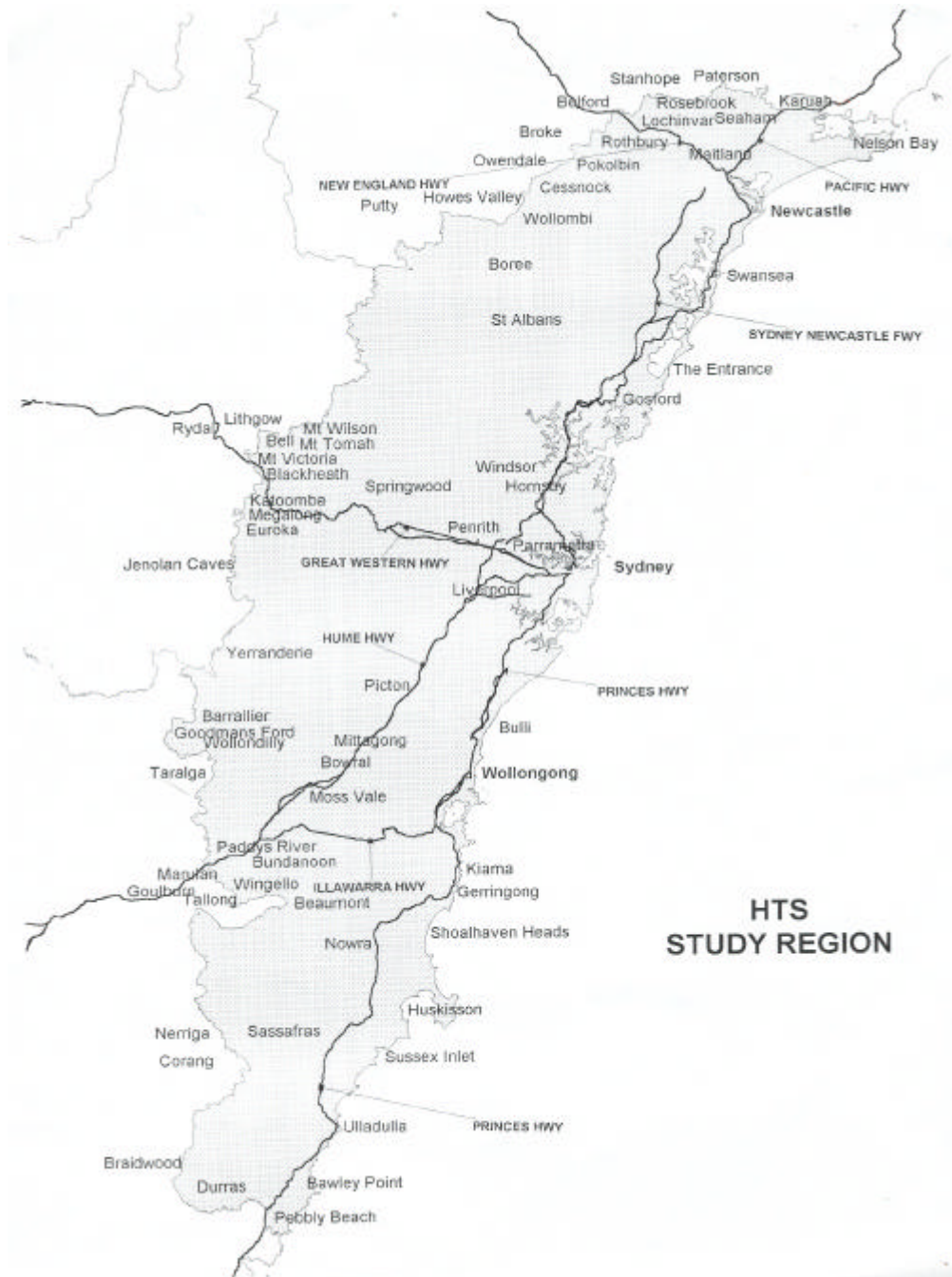
For instance:

- As cultural differences (not language difficulties) were attributed to people from non-English speaking countries as the main reason for opting out of the GPS study, these differences would need to be specifically established before strategies could be developed to reduce non-response. In this case, the interviewer would need to ask the respondent at the time of refusal, what incentive would have convinced the respondent to participate.
- While couple households with older children are more mobile, thus harder to recruit, scheduling of interviewer calling times would need to be undertaken, to increase the interviewer's chances of catching these selected participants at home.
- In respect of secondary school students, it is possible that 'Gatekeepers' (the first person to speak with the interviewer on the doorstep, not necessarily the student) are refusing on behalf of this group. If this was the case, the interviewer could ask to speak with the student directly, or suggest calling at a more convenient time for the selected participant to undertake survey questioning.
- Low-income earners, a group more likely to use public transport, may be influenced to undertake the survey if offered some incentive. If not a cash incentive, some type of free public transport pass or ticket may suffice.
- Larger families may also require some flexibility in arranging suitable calling times for the interviewer to explain or undertake survey questioning.

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## APPENDIX 1



Source: Hunter Valley Research Foundation

## APPENDIX 2

Sample No.	Suburb	Reason for refusal	HVRF Code
261064	Baulkham Hills	People did not want to be locked into set arrangements, Too busy	1
460965	Chatswood	No time to do it properly but thought it was an interesting concept	1
360384	Oran Park	Did not have time; family very busy	1
261067	Baulkham Hills	Did not want to be bothered	2
361392	Fairfield West	Too much hassle and 01 not willing to accept for other householders	2
461006	Kensington	Students – 01 thought they would forget or lose device and all are very busy	2
261184	Mount Vernon	01 would have taken device, but would be in hospital on td; 02 said it would be too much hassle; 03 said the device was 'too daggy' to wear; 01 would not accept on behalf of 04/05 who were not home	2
261191	Stanhope Gardens	Going on a harbour cruise on travel day – did not want baggage	2
261194	Stanhope Gardens	Did not want to be bothered – have visitors at the moment	2
261196	Stanhope Gardens	Respondents are musicians and did not want to be carrying around additional equipment	2
461045	Randwick	Thought it would be too difficult regardless of explaining its simplicity	2
461086	Neutral Bay	Could not be bothered	2
360417	Canley Vale	Too much of a hassle	2
261105	Pendle Hill	Did not travel much – could not be convinced to participate	3
261115	Claremont Meadows	01 felt the whole thing was a waste of time and money and felt they would not be useful to the GPS study as they wouldn't be travelling far	3
261154	Pendle Hill	Unsure about GPS – did not proceed on the grounds that they did not travel much	3
260262	Waitara	Elderly, unlikely to travel	3
261111	Claremont Meadows	Invasion of privacy	4
361357	Rossmore	Privacy concerns	4
560754	Drummoyne	Don't like the idea of wearing a tracker at uni'	4
560755	Drummoyne	Don't like the idea of someone knowing where I am	4
260245	Berala	Too intrusive	4
260244	Berala	Don't go anywhere, too intrusive	4
260264	Waitara	Don't like idea of GPS – not interested	4
360414	Canley Vale	Too invasive and poor English	4
460986	Waverton	One survey is enough; too much 'big brother'	5
560714	Balmain	One survey is enough	5
461067	Darling Point	Respondent only wanted to do one survey and did not like the idea of a tracker	5
560752	Drummoyne	Thought one survey at a time was enough	5
560757	Drummoyne	One survey is more than enough	5



**Collecting Data with GPS: Those Who Reject, and Those Who Receive**  
Hawkins & Stopher

Sample No.	Suburb	Reason for refusal	HVRF Code
560775	Sydney	Only wanted to do one survey	5
461087	Neutral Bay	One survey at a time is all I can cope with	5
260267	Waitara	Not interested, will just stick to the HTS	5
260376	Mt Ku-Ring-Gai	Too busy. Also involved in another survey and think that is enough	5
261186	Mount Vernon	Would not give reason 'I just don't want to'	6
560753	Drummoyne	I'll leave it up to you to work out why I won't do it'!	6
360383	Oran Park	Son did not want parents to participate	6
460283	Gordon	I know what they're doing now, but I don't want to take part.	6
560774	Sydney	Were not interested in GPS	7
260265	Waitara	Too old to try new technology, not interested	8

**KEY FOR HVRF CODES**

<i>Reason</i>	<b>Code</b>
Too busy	1
Burden to participate	2
Don't travel much	3
Invasion of privacy	4
One survey enough	5
No reason	6
Not interested	7
Too old	8