UNDERSTANDING THE TRAVEL BEHAVIOR
OF THE ELDERLY ON OAHU

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ABSTRACT

Because Hawaii is expected to experience rapid growth in its population segment of people aged 65 and older, their travel needs and understanding their travel behavior is of increasing importance. A literature review of studies that focused on the travel behavior of older people suggested that the following factors affect travel behavior: age, gender, medical condition, ability to drive, cost of a trip, residential location (suburb vs. city), trip purpose, day of the week, time of day, income, and availability of a private vehicle. This thesis estimated two multinomial logit models of mode choice using data from the 1995 Household Interview Survey (HIS) which was conducted by the Oahu Metropolitan Planning Organization (OMPO). These models suggest being elderly has a negative effect toward drive, passenger and walk as compared with transit. In addition, being retired has a negative effect toward drive, passenger, walk and bike as compared with transit.
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LIST OF ABBREVIATIONS

CATI – computer-assisted telephone interviewing

CBD – central business district

DBEDT – State of Hawaii, Department of Business, Economic Development and Tourism

DTS – City and County of Honolulu, Department of Transportation Services

FARS – Fatality Analysis Reporting System of NHSTA

GES – General Estimates System of NHSTA

HIS – 1995 Household Interview Survey

IVTT – In-Vehicle Travel Time

MNL – Multinomial Logit

NHTSA – National Highway Traffic Safety Administration

NHTS – National Household Travel Survey

NPTS – Nationwide Personal Transportation Survey

OMPO – Oahu Metropolitan Planning Organization

OVTT – Out-of-Vehicle Travel Time

TAZ – Traffic Analysis Zone

TFMDP – Travel Forecasting Model Development Project
1.1 Background

Throughout this thesis, "elderly" or "seniors" will be defined as people aged 65 and older unless otherwise specified. In 1999, the elderly population of the United States was approximately 34.5 million, 12.7% of the total population. According to Kim and Ulfarsson (2004), the United States Census Bureau projects that by 2030, the elderly population of the United States will reach approximately 70 million, 20% of the total population.

Like the rest of the United States, Hawaii is expected to experience rapid growth in its elderly population according to the Hawaii State Department of Business, Economic Development and Tourism (DBEDT). Figure 1.1 shows the resident population of Hawaii as projected by the Hawaii State DBEDT in the State of Hawaii Data Book, 2004 Edition. These projections indicate the number of elderly Hawaii residents is expected to more than double, increasing from 160,211 (13.2% of the total population) in 2000 to 323,700 (19.9% of the total population) in 2030. Because the number of elderly Hawaii residents is expected to significantly increase in total number and become a larger proportion of the total population, their travel needs should be considered.
The Oahu Metropolitan Planning Organization (OMPO) and the City and County of Honolulu, Department of Transportation Services (DTS) conducted a study dated June 1980. This study was policy-oriented and national data were used to estimate transportation demands due to the lack of local data in 1980. Nevertheless, a brief description of the scope, conclusions and recommendations of this study is provided below since this was the only study found on the travel behavior of the elderly on Oahu (Elderly 1980).
The scope of this study included the following:

- identification of the transportation needs and demands of the elderly and handicapped,
- identification and description of existing transportation services for the elderly and handicapped,
- assessment of the gaps in the elderly and handicapped transportation services when compared to the needs,
- formulation of alternatives to achieving public transit system accessibility during the transition period from 1980 to 1988, and
- assessment of coordination needs for the elderly and handicapped transportation services.

The conclusions of this study were as follows.

- Information dissemination about the available modes of transportation for the elderly and handicapped should be undertaken in conjunction with the implementation of a coordinating body.
- The institutionalization of new organizational mechanisms for coordination should be considered only after additional feasibility studies are conducted.

The recommendations of this study were as follows.

- Improve information dissemination efforts for available modes of transportation for the elderly and handicapped.
- Establish an AdHoc Committee on elderly and handicapped transportation service coordination sponsored jointly by DTS, OMPO and Commission on the Handicapped and with the Service Providers Task Force as initial members.
- Support implementing actions relating to the operational aspects of elderly and handicapped transportation service.
The lack of previous studies on the travel behavior of the elderly on Oahu and in Hawaii, coupled with the projected increases of the proportion of this population segment, indicates there is a need to learn more about the travel needs and behavior of the elderly.

1.2 Objective

The objective of this thesis is to gain an understanding of the travel behavior of the elderly on the Island of Oahu, and compare the travel behavior of the elderly with the travel behavior of younger people.

1.3 Scope

This study includes:

- A review of literature related to the travel needs of older drivers and pedestrians, and the travel behavior of older people,

- an examination of the characteristics of the elderly on Oahu and a comparison of these results with conclusions of past studies,

- an estimated mode choice model for the general population of Oahu that considers age among other variables, and a comparison with the conclusions of past studies.

The remainder of this thesis is organized as follows:

- Chapter 2 reviews past studies on the needs of older drivers and the travel behavior of older people.

- Chapter 3 describes how the data used in this thesis were obtained and manipulated.

- Chapter 4 provides descriptive statistics on the sample data using weighted data. Some of these results are compared to the past studies in Chapter 2.

- Chapter 5 presents two estimated mode choice models using data for both elderly and non-elderly.

- Chapter 6 summarizes the conclusions and recommendations of this study.
CHAPTER 2
LITERATURE REVIEW

A review of literature about the transportation needs of older people revealed that there are two major issues that warrant attention. The first issue is related to the needs of older drivers. Age-related changes that can make driving difficult for older people are visual impairment, slowing of mental processes and diminished physical capabilities (Practitioner 1999). Burkhardt and McGavock (1999) state “current trends suggest that the percentages of older people who are drivers will significantly increase in the near future and that future old drivers will be driving more miles and taking more trips than today’s older drivers”. Because of age-related changes and the expected increase in older drivers, their needs are discussed in Section 2.1. The second issue and the focus of this study is the travel behavior of older people, which is discussed in Section 2.2.

2.1 Needs of Older Drivers

2.1.1 Difficulties for Older Drivers

Brainin (1980) observed drivers of various ages and found drivers aged 60 and older had problems making turns at intersections and at traffic signals while drivers aged 25 to 44 did not. Difficulty making left-turns was a result of insufficient caution and poor positioning on the road, and difficulty making right-turns was a result of failing to signal. Brainin also observed other errors committed by drivers which were failing to make a complete stop, poor vehicle positioning, abrupt stops at stop signs, abrupt stops at other locations, failure to stop when required, and lack of caution at traffic signals.
Furthermore, Benekohal (1992) conducted a survey of 664 senior drivers in Illinois. The respondents of this survey reported the following activities to become problematic as they got older:

- reading street signs in town,
- driving across an intersection,
- finding the beginning of a left-turn lane at an intersection,
- making a left-turn at an intersection,
- following pavement markings, and
- responding to traffic signals.

In addition, participants of a focus group consisting of 81 elderly drivers reported the following to be difficult due to age-related changes (Staplin, et al. 1997):

- turning head at skewed angles to view intersecting traffic,
- performing smooth turning movements at tight corners,
- avoiding raised concrete barriers such as channelizing islands in the rain and at night because of poor visibility,
- being in the correct lane such as a “turn only” lane of an intersection, approach due to poor maintenance of pavement markings or obstruction of roadside signs that inform drivers of intersection traffic patterns,
- seeing potential conflicts well and quickly enough to smoothly merge with traffic at the end of an auxiliary right-turn lane, and
- merging with traffic after crossing an intersection when a lane drop occurs near the intersection.

2.1.2 Accidents Involving Older Drivers

The *Older Driver Design Handbook: Recommendations and Guidelines* (1998) states that more than half of all fatal accidents involving drivers 80 years and older occur
at intersections compared to 24 percent or less for drivers 50 years and under. This indicates that older drivers have difficulty in situations involving complex speed and distance judgments under time constraints, the typical situation at intersections (Older Driver Design 1998).

Burkhardt and McGavock (1999) projected the number of annual traffic fatalities in the United States involving elderly drivers as shown in Figure 2.1. These estimates were calculated based on the ratio of current annual fatalities involving elderly drivers, which was obtained from the 1996 Motor Vehicle Crash Data from the National Highway Traffic Safety Administration's (NHTSA) Fatality Analysis Reporting System (FARS) and General Estimates System (GES), to vehicle miles driven by the elderly, which was obtained from the 1995 NPTS. This ratio was then applied to total annual mileage projections for elderly drivers, which were estimated by the authors of this study based on expected changes to lifestyles, patterns of residential development and driving behavior. According to Burkhardt and McGavock (1999), the number of projected annual elderly traffic fatalities shown in Figure 2.1 are considered conservative because they are based on the conservative estimate that the proportion of elderly drivers will grow by 5% in the next 35 years. Even these “conservative” figures indicate fatal accidents involving elderly drivers are expected to more than triple, from 7,078 for Year 1996 to 24,069 for Year 2030.
2.1.3 Measures to Accommodate Older Drivers

The Older Driver Highway Design Handbook (1998) was created to supplement existing design manuals and standards. The following recommendations, included in the handbook, accommodate older driver visual, mental and physical declines. Possible measures to accommodate visual declines are: bigger and brighter traffic signs, brighter pavement markings and delineation of curbs and medians, overhead placement of signs and signals, positive offset of left-turn lanes, advance warnings of locations with decreased sight distance, and increased use of highway lighting. Measures that can be taken to accommodate mental declines are: redundant signing, advanced preview distance of roadway curvature and intersection layout, positive guidance using signing of lane assignment and on or off ramp design, protected operations, limitation of the amount of information to be processed, increased perception-reaction time in design and operations,
and positive offset of left-turn lanes. Measures that can be taken to accommodate for physical declines are: eliminating skewed junctions, maintaining a 12-foot lane width, increasing perception-reaction time when calculating sight distance, enlarging turning radii at intersections, using parallel entrance ramp geometry, and lengthening acceleration lanes and merging or weaving areas (Older Driver Highway 1998).

2.2. Travel Behavior of Older People

The most common way of describing travel behavior is using the traditional four-step travel demand forecasting modeling process which consist of trip generation, trip distribution, mode choice and network assignment. Papacostas and Prevedouros (2001) identify the major components of travel behavior as: “the decision to travel for a given purpose (trip generation), the choice of destination (trip distribution), the choice of travel mode (mode choice), and the choice of route or path (network assignment).” Figure 2.2 illustrates the inputs and outputs of the travel-demand models for the major components of travel behavior.
Figure 2.2. Travel Demand Forecasting Process

Most studies of the travel behavior of older people were found to be of a descriptive nature. The following sections describe some of the conclusions of these descriptive studies with respect to the major components of travel behavior as previously discussed.

2.2.1 Trip Generation

2.2.1.1 Travel Frequency

Results from the 2001 National Household Travel Survey (NHTS) indicate elderly, especially females, make less trips per day than younger adults (Collia, et al. 2003). The same study found that people with a medical condition had a lower mean number of trips than people without a medical condition for both elderly and younger adults. As described by the authors, the 2001 NHTS is a household survey conducted from March 2001 to May 2001 that included approximately 9,000 elderly. Respondents were asked to complete a travel diary documenting their daily trips, which were considered to be a trip as long as the respondent went from one address to another regardless of distance traveled. Conclusions of the study by Collia, et al. (2003) that are cited in this thesis reflect data from the NHTS that has been weighted to produce national estimates. In addition, Meyer (1981) found that the older elderly living in Willimantic, Connecticut (age not specified) took fewer trips than the younger elderly.

Burkhardt (1999) reached the following conclusions based on 12 focus groups held in 1996 in Florida, Maine and Maryland with participants aged 70 and older. When older people reduce or cease driving, they take fewer trips or no trips. However, most people find a way to make necessary trips, even at higher costs. Family and friends are
often faced with providing transportation for a former driver, usually traveling according to the schedules of others. On the other hand, the Willimantic study found that whether or not the elderly drove did not have a significant impact on frequency of travel (Meyer 1981), which contradicts the previously described conclusion of Burkhardt (1999).

Rosenbloom (2001) studied 42 elderly people in Tucson, Arizona who stopped driving within one year after an initial interview. This study found that those who stopped driving had initially traveled substantially less than those who continued to drive.

In a study of seniors in the Baltimore region, three levels of travel need were determined. About 79% of seniors who live in suburban districts and 65% who live in the city are in the "Low Travel Need" group. People in the "Low Travel Need" group travel as they desire, do not rely on outside transportation assistance, do not have significant physical disabilities, support enhanced public transportation and would be interested in older driver programs. About 13% of seniors who live in suburban districts and 26% who live in the city are in the "Moderate Travel Need" group. People in the "Moderate Travel Need" group have trips that are moderate in frequency, rely on others for long distance travel, have mild physical disabilities, and have no license or have reduced driving. About 7% to 8% of the subjects in all districts are in the "High Travel Need" group. People in the "High Travel Need" group leave their homes infrequently, have a moderate to severe physical disability, and rely on others for short and long distance travel (Long, et al. 2001). In addition, Meyer (1981) concluded that elderly living in the small city of Willimantic, Connecticut leave their homes at approximately the same frequency as elderly living in metropolitan areas.
A study of elderly living in rural Vermont concluded that increased distance from a primary health care provider reduces utilization of medical care (Nemet and Bailey 2000).

2.2.1.2 Trip Purpose

Results from the Collia, et al. (2003) study indicate that elderly make a smaller percentage of trips for work, work-related purposes and for school than younger adults. This study also found that for all other trip purposes (shopping, family/personal business, religious, medical/dental, social/recreational and other), elderly make a greater percentage of trips than their younger counterparts.

Seventeen different trip purposes were identified in travel diaries kept by seniors in the Baltimore region. These trip purposes were separated into 5 groups as follows. Socialization comprised approximately 30% of trips, which included visiting friends and family (8%), dining out (7%), religious activities (7%), other social recreation (4%), school (2%), and senior center (2%). Shopping comprised approximately 27%, which included shopping (25%), and convenience store (2%). Miscellaneous trips comprised approximately 20%, which included other (18%), vacation (1%), and picking up and dropping off passengers (1%). Life-maintenance trips comprised approximately 16%, which included personal business (9%), and medical (7%). Employment trips comprised approximately 7%, which included work (5%), and work-related (2%) (Long, et al. 2001).
2.2.2 Day of the Week and Time of Day

2.2.2.1 Day of the Week

Travel frequency of seniors in the Baltimore region increased from Monday through Wednesday and then declined through Sunday with the maximum number of trips for seniors occurring on Wednesday and the minimum number of trips occurring on Sunday (Long, et al. 2001).

2.2.2.2 Time of Day

Results from the Collia, et al. (2003) study indicate travel for elderly peaks during the mid-day between 9:00 AM and 4:00 PM, while travel for younger adults show three distinct peaks: morning, lunch and after work. Time of day for recreational trips made by people aged 50 and older is discussed in Section 2.3.5.

2.2.3 Trip Length

Results from the Collia, et al. (2003) study indicate elderly males have shorter travel times and travel shorter distances than younger adult males. Similarly, elderly females have shorter travel times and travel shorter distances than younger adult females (Collia, et al. 2003). Furthermore, in his study using subjects in Florida, Maine and Maryland, Burkhardt (1999) concluded that when people aged 70 and older reduce or cease driving, they will travel shorter distances.

In the Baltimore study, approximately 93% of trips were beyond walking distance. 7% of trips had a distance of 3 blocks or less, 1% of trips were within the same building, and 2% on the same block (Long, et al. 2001).
2.2.4 Mode Choice

2.2.4.1 Older Drivers

Results from the Collia, et al. (2003) study indicate that elderly are less likely to consider themselves to be drivers than younger adults. The same study found that for both age groups, a lower percentage of females considered themselves to be drivers as compared to males. The Arizona study found that elderly driving cessation was greater among women, those with lower incomes, and people of color (Rosenbloom 2001). With respect to location, Meyer (1981) found that there is a higher proportion of elderly living in the small city of Willimantic, Connecticut who drive as compared to elderly living in metropolitan areas. However, this may be related to the higher availability of transit in metropolitan areas.

Generally speaking, these studies show that older people are less likely to drive than younger adults and females are less likely to drive than males. Whether a person lives in a suburb or metropolitan city may or may not affect their likelihood of driving.

2.2.4.2 Personal Vehicle vs. Other Modes

In his study, Burkhardt (1999) found that when people aged 70 and older reduce or cease driving, they may choose to use modes of travel besides a personal vehicle. Nevertheless, results from the Collia, et al. (2003) study indicate personal vehicle is the dominant mode of travel. Nearly 90 percent of trips for both younger adults and elderly were made using a personal vehicle. This same study found that use of alternative transportation by elderly who have to give up driving because of age-related difficulties is relatively low. Likewise, the Arizona study found three-quarters of the elderly who
stopped driving relied on car rides from others to meet their travel needs (Rosenbloom 2001).

In the Baltimore study, most seniors travel by automobile either as passengers or drivers, and use public transit to a limited degree (Long, et al. 2001). Approximately 92% of all trips taken by seniors were in automobiles, of which approximately 58% were comprised of driving alone, and approximately 34% of trips used ridesharing. About 5% of trips were made by way of non-motorized vehicles such as walking, wheeling or biking, and about 1% of trips were made by way of transit. Many seniors in this study regarded paratransit service as time consuming and unreliable, and safety when using public transportation was of concern. Seniors in Baltimore who travel out of their homes frequently were more likely to utilize a variety of modes to get around. Seniors in Baltimore who travel infrequently were almost exclusively dependent on family or friends for transportation. Also, the Baltimore study found age, county of residence, family composition, and employment characteristics had no significant influence on which travel modes were utilized (Long, et al. 2001).

The Willimantic study found elderly living in that small city are more dependent on private automobiles than elderly living in metropolitan areas even though there is a well established paratransit system. Use of this paratransit system in Willimantic by the elderly is minimal (Meyer 1981).

Chen, et al. (2004) conducted a stated preference survey that included elderly respondents in Sacramento, California. The results of this study indicated that it would be difficult to attract the elderly to a proposed ITS-enhanced paratransit service.
2.2.5 Other Issues

2.2.5.1 Medical Condition

Results from the Collia, et al. (2003) study indicate elderly were more likely than younger adults to have a medical condition that makes travel difficult. In both age groups, females had a slightly higher rate than males of reporting such a condition.

2.2.5.2 In-Place Retirement

The Baltimore study verified geographic mobility studies performed by the U.S. Census Bureau that found less than 10% of the elderly move after retirement. Instead, they tend to continue to reside in the place that they retire. According to the U.S. Census, in 1980 more elderly were living in suburban regions than in central cities for the first time in history. The 1990 Census indicated the continuation of this trend. This is important because it is a measure of the long-term spatial distribution of the elderly population, and travel related difficulties that may be a result of residential location (Long, et al. 2001).

2.3 Existing Models Used to Predict Travel Behavior of Older People

Review of the literature showed several kinds of models of various aspects of travel behavior that were dependent on attributes of the individual, household, neighborhood and available modes. Following are descriptions of these models and their findings.

2.3.1 A Mode Choice Example in the Puget Sound Region

Kim and Ulfarsson (2004) developed a multinomial logit (MNL) model with the coefficients shown in Table 2.1 to model the mode choice of the retired elderly in the
Puget Sound region of Washington State. Only home-based trips were considered for this study, and walking was used as the base case for this model.
Table 2.1. Estimation Results for a MNL Model of the Mode Choice of the Retired Elderly

<table>
<thead>
<tr>
<th>Variable</th>
<th>Private Car or Truck</th>
<th>Car/ Vanpool</th>
<th>Bus/ Paratransit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative Specific Constant</td>
<td>4.005(1.221)**</td>
<td>1.060(0.889)</td>
<td>2.633 (0.886)**</td>
</tr>
<tr>
<td>Personal Information:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of the person in years</td>
<td>-0.033(0.011)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of available vehicles</td>
<td>0.205(0.066)**</td>
<td></td>
<td>-1.494(0.328)**</td>
</tr>
<tr>
<td>Household Information:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator, 1 if household size is one person</td>
<td>0.935(0.273)**</td>
<td>-1.667(0.323)**</td>
<td></td>
</tr>
<tr>
<td>Indicator, 2 if household size is two person</td>
<td>-0.684(0.180)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator, 1 if household income ≥ $35,000</td>
<td>0.811(0.302)**</td>
<td>0.811(0.302)**</td>
<td>-1.193(0.541)</td>
</tr>
<tr>
<td>Indicator, 1 if 4+ years at current residence</td>
<td>0.576(0.139)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neighborhood Information:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator, 1 if five or fewer blocks from home to bus stop</td>
<td>-1.463(0.318)**</td>
<td>-1.463(0.318)**</td>
<td></td>
</tr>
<tr>
<td>Population density in block group, persons/sq. ft.</td>
<td>-1.677(462)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median housing value in block group</td>
<td>-4.33·10^6 (9.26·10^-7)**</td>
<td>-4.33·10^6 (9.26·10^-7)**</td>
<td></td>
</tr>
<tr>
<td>Percent households that moved to block group in last five years</td>
<td>-3.177(1.366)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent workers in block group commuting in a private vehicle</td>
<td>3.180(0.868)**</td>
<td>3.926(0.865)**</td>
<td></td>
</tr>
<tr>
<td>Trip Information:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total distance traveled during the day</td>
<td>0.019(0.010)</td>
<td>0.028(0.010)**</td>
<td>0.028(0.010)**</td>
</tr>
<tr>
<td>Minutes of activity time for this trip</td>
<td>0.008(0.003)*</td>
<td>0.008(0.003)*</td>
<td>0.008(0.003)*</td>
</tr>
<tr>
<td>Indicator, 1 if trip is part of a trip chain</td>
<td>0.385(0.119)**</td>
<td></td>
<td>1.428(0.473)**</td>
</tr>
<tr>
<td>Indicator, 1 if trip starts in AM peak: 8:00 AM-9:59 AM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator, 1 if trip starts midday: 10:00 AM-3:59 PM</td>
<td>-0.900(0.319)**</td>
<td>-0.900(0.319)**</td>
<td></td>
</tr>
<tr>
<td>Activity Purpose:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator, 1 if errand</td>
<td>0.206(0.116)</td>
<td>-1.188(0.517)*</td>
<td></td>
</tr>
<tr>
<td>Indicator, 1 if shopping</td>
<td></td>
<td>-1.536(0.541)**</td>
<td></td>
</tr>
<tr>
<td>Indicator, 1 if dining</td>
<td>-0.844(0.189)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator, 1 if recreational/personal</td>
<td>-1.303(0.367)**</td>
<td>-1.303(0.367)**</td>
<td>-1.303(0.367)**</td>
</tr>
<tr>
<td>Indicator, 1 if medical appointment</td>
<td>0.501(0.221)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log-likelihood for constants only</td>
<td>-1,637.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log-likelihood at convergence</td>
<td>-1,380.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\rho^2$</td>
<td>0.157</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted $\rho^2$</td>
<td>0.153</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of observations</td>
<td>1,825</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Standard errors in parentheses. Levels of significance: all greater than 90%; *: >95%; **: >99%.
Coefficients that weren't significant at the 90% level were restricted to zero and omitted from the table. The walk alternative is the base case with coefficients restricted at zero. Adjusted $\rho^2$ accounts for number of coefficients.

The remainder of this section describes the conclusions of the Washington State model (Kim and Ulfarsson 2004).

Retired elderly individuals are less likely to use a private vehicle as compared to other available modes. Single-person households are more likely to use private vehicles and less likely to use carpools and vanpools as compared with transit and walking. Similarly, two-person households are less likely to use carpools and vanpools as compared with the other three modes. In addition, retired elderly who have higher incomes are more likely to use private vehicles, carpool or vanpool and are less likely to use transit as compared with walking. Retired elderly are more likely to use transit if they live within five blocks from a bus stop. Population density has a negative effect on the likelihood of elderly retired people to drive.

Retired elderly who live in areas with high median housing values are less likely to use a private vehicle, carpool or vanpool. This is due to the housing values in the Puget Sound region, which are greatest in denser areas, and have greater access to transit and highest non-motorized accessibility.

In areas with a large turnover of residents, retired elderly are less likely to use transit. In addition, retired elderly and older are more likely to select private vehicle, carpool or vanpool in areas with a high percentage of workers who commute in a private vehicle. These findings may indicate that lifestyle in a neighborhood influences the travel behavior of the elderly in that neighborhood.

Retired elderly are more likely to use a private vehicle, carpool or vanpool, or transit relative to walking for longer trips. In addition, retired elderly are more likely to choose a motorized vehicle rather than walking for long activities.
Trips that are part of a trip chain are most likely to use carpools and vanpools. This indicates that retired elderly try to share rides with someone else who needs to go to another activity.

Retired elderly are more likely to use transit than other available modes for trips that start during the AM peak, and transit or walk for trips that start during the midday. This may indicate that these people try to avoid congestion during the AM peak and midday. In addition, retired elderly are less likely to use transit as compared to other available modes when going shopping or doing errands. These people are more likely to share a ride with others when chaining trips, doing errands, or going to a medical appointment, and prefer walking for recreational and personal trips.

2.3.2 Another Mode Choice Example – Transit vs. Paratransit in Sacramento, California

Franklin and Niemeier (1998) developed a binary logit model with the coefficients shown in Table 2.2 to model the decision to choose paratransit over transit by people in Sacramento, California who appeared to be aged 50 and older and/or have a visible physical disability. Transit was designated as the base case for this model (Franklin and Niemeier 1998).
Table 2.2. Coefficients and Elasticities for a Model of Transit vs. Paratransit in Sacramento, California

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Elasticity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant (adjusted for choice based sample)</td>
<td>7.890</td>
<td>0.395</td>
<td>19.976*</td>
<td></td>
</tr>
<tr>
<td>Indicator: Monthly Income=$750-999</td>
<td>-1.181</td>
<td>0.294</td>
<td>-4.015*</td>
<td>-0.079</td>
</tr>
<tr>
<td>Indicator: Monthly Income=$1,000-2,000</td>
<td>-1.848</td>
<td>0.265</td>
<td>-6.963*</td>
<td>-0.151</td>
</tr>
<tr>
<td>Indicator: Monthly Income&gt;$2,000</td>
<td>-4.110</td>
<td>0.758</td>
<td>-5.421*</td>
<td>-0.109</td>
</tr>
<tr>
<td>Sex (0=male, 1=female)</td>
<td>0.890</td>
<td>0.194</td>
<td>4.594*</td>
<td>0.402</td>
</tr>
<tr>
<td>Age (in 1995, by years)</td>
<td>-0.033</td>
<td>0.006</td>
<td>-5.750*</td>
<td>-1.612</td>
</tr>
<tr>
<td>Fare Difference ($)</td>
<td>-0.587</td>
<td>0.098</td>
<td>-6.005*</td>
<td>-0.161</td>
</tr>
</tbody>
</table>

N=1016
\( \rho^2=0.466 \)
\( \rho^2=0.458 \)
PCC=80.43%
\( LL(0)=-750.68 \)
\( LL(\beta)=-535.5 \)
*Pr(|t-stat|>|t|)<0.05

1Indicator variables used “Monthly Income=$0-749” as a base.

The remainder of this section describes the conclusions of the Sacramento model (Franklin and Niemeier 1998).

Travel time was eliminated as an insignificant variable, which suggests that older and disabled travelers do not attach great importance to trip length when deciding between transit and paratransit. Also, the coefficients for income were determined to be negative for each income category. One possible explanation is that respondents who are disabled are likely to have lower incomes and may require the services provided by paratransit. Another possible explanation is that higher income respondents have more choice of where they want to live and are able to choose locations closer to transit routes and therefore prefer to use transit over paratransit.

The coefficient for sex was determined to be positive, indicating that female respondents were more likely to choose paratransit over transit than male respondents. This may be because females are more concerned about the dangers associated with waiting at or walking to and from transit stops.
The coefficients for age and fare difference were determined to be negative. This indicates that older travelers would be less likely to choose paratransit over transit and all subjects would be more likely to choose paratransit over transit if the fare difference between the two modes was low.

2.3.3 Another Mode Choice Example in Rural Virginia

Stern (1993) developed a MNL model with the coefficients shown in Table 2.3 to model the mode choice of the elderly (age not specified) and disabled in rural Virginia. Following is a description of each available mode considered in this study, which used driving as the base case.

1. Flexible JAUNT: A door-to-door paratransit system providing service to Charlottesville and Albemarle County residents but not to the residents of outlying counties,

2. Fixed JAUNT: A fixed route system providing service between outlying counties and Charlottesville,

3. CTS: A bus system serving Charlottesville and a very few locations in Albemarle County near Charlottesville,

4. Accessible CTS: The CTS routes that are accessible to people in wheelchairs; two of the nine CTS routes are accessible,

5. Greene Transit: A system of vans providing Greene County residents with transportation service within the county and between the county and Charlottesville,

6. Taxi (available to everyone),

7. Driving (driving an automobile oneself),

8. Driven (driven by someone else in an automobile),

9. Walking (or using a wheelchair), and

10. Agency van (a number of local agencies that provide services to elderly and disabled people provide free transportation to agency activities).
Table 2.3. Extended Multinomial Logit Equations for a Mode Choice Example in Rural Virginia

<table>
<thead>
<tr>
<th>Variables&lt;sup&gt;c&lt;/sup&gt;</th>
<th>Demographic Variables</th>
<th>Model Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mode</strong>&lt;sup&gt;a&lt;/sup&gt;</td>
<td><strong>Constant</strong></td>
<td><strong>Female</strong></td>
</tr>
<tr>
<td>JAUNT&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-1.682&lt;sup&gt;*&lt;/sup&gt;</td>
<td>(0.666)</td>
</tr>
<tr>
<td>Bus&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-2.837&lt;sup&gt;*&lt;/sup&gt;</td>
<td>(0.877)</td>
</tr>
<tr>
<td>Greene</td>
<td>-2.149</td>
<td>(1.277)</td>
</tr>
<tr>
<td>Taxi</td>
<td>-6.021&lt;sup&gt;*&lt;/sup&gt;</td>
<td>(0.653)</td>
</tr>
<tr>
<td>Driven</td>
<td>-2.013&lt;sup&gt;*&lt;/sup&gt;</td>
<td>(0.630)</td>
</tr>
<tr>
<td>Walk</td>
<td>-2.995&lt;sup&gt;*&lt;/sup&gt;</td>
<td>(0.651)</td>
</tr>
<tr>
<td>Agency</td>
<td>-3.882&lt;sup&gt;*&lt;/sup&gt;</td>
<td>(0.629)</td>
</tr>
</tbody>
</table>

<sup>a</sup>Modes are described above.
<sup>b</sup>Bus includes fixed JAUNT, CTS and Accessible CTS.
<sup>c</sup>Numbers in parentheses are standard errors.
<sup>d</sup>Starred items are significant at the 5% level.


The remainder of this section describes the conclusions of the Virginia model (Stern 1998).

Among the elderly and disabled, women, blacks, single people, less educated people and people with walking problems are more likely to use the Flexible JAUNT paratransit system rather than drive. Moreover, gender has the greatest effect on the use of taxi and agency vans. Elderly and disabled females are more likely to use taxis and agency vans rather than drive. Also, education has the greatest negative effect on the use of JAUNT and agency vans. Less educated elderly and disabled people are more likely to use the Flexible JAUNT paratransit system and agency vans rather than drive.
Walking problems have the greatest negative effect on the use of buses and Greene County vans. Elderly and disabled people with walking problems are more likely to drive rather than use buses and the Greene County vans. Also, elderly and disabled people with walking problems are more likely to use taxis and the Flexible JAUNT paratransit system rather than drive. These results indicate elderly and disabled people with walking problems are more likely to use modes that provide door-to-door service rather than buses, which are not used frequently by elderly and disabled people with walking problems even though they are handicapped accessible.

2.3.4 Analysis of Elderly Mobility by Structural Equation Modeling

Kim (2003) developed the structural equation model with the parameters shown in Table 2.4 to model the mobility of retired elderly in the Puget Sound region of Washington State (Kim 2003).
The remainder of this section describes the conclusions of the Washington State structural equation model (Kim 2003).

Age, education level, possession of a driver’s license and the number of vehicles per driver were determined to be significantly associated with the urban form factor, which is the likelihood of living in an urban area. The urban form factor is not significantly associated with mobility. This implies that personal and household characteristics affect the mobility levels of the elderly.
Age was found to be negatively associated with the mobility factor, meaning the older a person is the more likely they are to stay at home. Also, elderly men were found to have higher levels of mobility than elderly women. Education level and possession of a driver's license is positively associated with mobility level. Transportation disability was found to be negatively associated with mobility level.

None of the variables shown in Table 2.4 were found to have a significant indirect effect on mobility level.

2.3.5 A Departure Time Choice Example

Okola (2003) used data from the 1995 Nationwide Personal Transportation Survey (NPTS) to create a discrete choice departure time choice model for recreational trips made by people aged 50 and older. A multinomial logit model was estimated for six departure time choices, which were early morning (12:00 am-6:59 am), morning peak (7:00 am-8:59 am), morning off-peak (9:00 am-11:59 am), afternoon off-peak (12:00 pm-3:59 pm), afternoon peak (4:00 pm-5:59 pm) and evening (6:00 pm-11:59 pm). This study concluded people aged 50 and older prefer departure times in the earlier part of the day, especially on weekdays for recreational trips.

2.3.6 A Lifestyle Cluster Analysis

Hildebrand (2003) developed and validated an activity-based travel model for the elderly (age not specified) using data from the Portland, Oregon Household Activity and Stated Preference Survey, conducted in 1994 and 1995. The final cluster solution identified the following six distinct lifestyle groups: Workers, Mobile Widows, Granny Flats, Mobility Impaired, Affluent Males and Disabled Drivers. These clusters were determined to have statistically significant differences in travel behavior and activity.
patterns. The socio-demographic variables used to identify the clusters were age, household vehicles, household income, household size, gender, possession of a driver's license, disabilities, head of household, parent of household head, and employment (Hildebrand 2003).
2.4. Summary of Literature Review

Descriptive statistics are useful in learning about the travel behavior of older people but they are only able to show the effects of variables on travel behavior within a limited context. Models are necessary to account for numerous factors and interactions that affect travel behavior. Age alone does not give a complete picture of the variables that influence travel behavior. Previous studies, both studies of the descriptive nature and studies that estimated models, have indicated the following major factors affect travel behavior.

- Age,
- gender,
- medical condition,
- ability to drive,
- cost of a trip,
- residential location (suburb vs. city),
- trip purpose,
- day of the week,
- time of day,
- income, and
- availability of a private vehicle.

In summary, previous studies indicated that elderly, especially females, travel less and are less likely to consider themselves to be drivers. In addition, elderly make less work and work-related trips than younger adults. Some elderly will take fewer trips or no
trips under certain circumstances after they reduce or cease driving due to visual, mental and physical declines. A medical condition is likely to result in less travel for both the elderly and younger adults. However, personal vehicle is the dominant mode of travel for adults aged 65 and older.
CHAPTER 3
DATA SOURCES

3.1 Overview of Study Location

Oahu is the most populated island in the State of Hawaii and Honolulu, the capital of Hawaii, is located on Oahu. Figure 3.1 shows a map of Hawaii, on which the star indicates where the central business district of Honolulu is situated.

Figure 3.1. Map of the State of Hawaii

Source: United States Census Bureau, Tiger Maps.

3.2 OMPO Travel Forecasting Model Development Project

The data used for this thesis include data for both elderly and non-elderly, and was collected by OMPO as part of their Travel Forecasting Model Development Project (TFMDP). The objective of this project was to produce “a state-of-the-art set of models suitable for forecasting travel patterns on the island of Oahu” (OMPO 2002). The 1995
Household Interview Survey (HIS), which entailed collecting household information and detailed travel information via one-day travel diaries for 4,060 households, was conducted as part of the TFMDP. As previously discussed, this was a stratified random sample as areas with transit use by large households that have vehicles were oversampled (OMPO 2002). The 1995 HIS data used for this thesis are used with permission from OMPO. A copy of the travel diary used for the 1995 HIS is included as Appendix A.

3.2.1 Data Collection Methodology

The procedures that were used for the 1995 Household Interview Survey are summarized below (OMPO 2002).

- Households on Oahu were selected to participate in the survey using random digit dialing. Initial telephone calls were made to ask basic questions about the household so data could be collected for households that would drop out of the study later.

- Selected households were sent a household information sheet and one travel diary for each household member to be filled out on an assigned day.

- A reminder telephone call was made to households to check if survey materials were received and to answer any questions the respondents had.

- On the day after the assigned travel day, travel information was retrieved by telephone using a computer-assisted telephone interviewing (CATI) system.

- Data were checked for consistency and accuracy. Clarification calls were made when necessary.

3.2.2. Description of Data Files

The 1995 HIS data received from OMPO were separated into five different files. The three files that were used for this thesis contained household, person and activity data. There were also two other files, one consisting of detailed vehicle information and
the other consisting of data used to geocode locations into latitude and longitude coordinates.

The household data file consists of information about each household, each of which are uniquely identified by a household number. The attributes of the households that were extracted from the household data file were 1994 household annual income and the number of vehicles available.

The person data file consists of information on each respondent, each of whom are uniquely identified by a household number and person number. The person attributes that were extracted from the person data file were year born, occupation, gender, whether they had a driver’s license and whether they had a disability. A person was considered to have a disability if they answered “Yes” to the question, “Do you have any disability that limits the type of transportation you can use?” (OMPO 1995).

The activity data file consists of information for each activity. The TFMDP considered an activity to be any stop to do something outside the home, no matter how long it took. Along with work and school, the following were considered to be activities: “dropping someone off or picking someone up, eating at a restaurant, visiting a dentist or doctor, shopping, stopping to buy gas and running errands” (OMPO 1995). Note that an activity does not refer to a trip. Instead, a person makes trips to and from activities. In the activity file, each activity is uniquely identified by a household number, person number and activity number. The attributes for each activity that were used for this thesis were purpose, traffic analysis zone (TAZ) where the activity took place, end time and travel mode used to get to the activity.
The structure of the household, person and activity data files are included as Appendix B.

In addition, networks that were used for the TFMDP for vehicles and transit were provided by OMPO. These networks consisted of sets of links and nodes. Every TAZ centroid was represented by a node. For the roadway network, attributes of the links included: facility type, distance, speed (free flow and congested), vehicle/mode restrictions, capacity and volume. Different volume delay functions were used depending on facility type to account for the effect of the volume to capacity ratio for each link. For the transit network, travel times were calculated based on headways between buses, network speeds, which were calculated based on a travel time function that relates estimated bus travel times on a link to highway speeds, estimated stops per mile, estimated proportion of buses stopping at each stop, and bus acceleration and deceleration characteristics. Transit link time factors were used to relate transit travel times to congested highway speeds. The roadway network links related to roadway segments whenever possible while the transit network was developed based on bus routes and connectivity to the underlying zone system. Unlike the roadway network, the transit network is more of an abstraction of the transit system than of the roadways on which the system operates.

3.3 Data Manipulation

Before the TFMDP data could be used for this thesis, calculations had to be made and data had to be rearranged. This section describes this process.

For the person data file, year born was used to calculate the age of each respondent in 1995. Occupation data were obtained by the 1995 HIS with the question,
"Which of the following best describes you? (check up to two options)” with one option being “Retired” (OMPO 1995). Therefore, the 1995 HIS data represented occupation with two variables. For this thesis, the data were manipulated so that only one variable was used to designate if a person was retired or not. If either of the two 1995 HIS data variables indicated the person was retired, they were considered to be retired. In all other cases, the person was considered to be not retired.

The data in the activity data file were rearranged so each line reflected information for each trip instead of each activity. The attributes for each trip were trip purpose, origin and destination TAZ, start time of travel, and travel mode used for the trip.

3.4 Household Weights

To expand the 1995 HIS data to reflect the travel behavior of the entire Island of Oahu, weights for each household were calculated by OMPO using the data as described below (OMPO 1995).

Data were weighted using an expansion factor so that survey data would reasonably match characteristics of Oahu’s population as a whole. The expansion factor for a household is equal to the inverse of the probability of being selected. The following equation was used to obtain a 1990 Expansion Factor for each household.

\[
1990 \text{ Expansion Factor} = \text{Line Factor} \times \text{Geographic Factor} \times \text{Demographic Factor} \times \text{Transit Factor}
\]

The Line Factor is dependent on how many voice phone lines are available to a household. The Geographic Factor was used to correct for geographic response biases and strategic oversampling in areas with transit use by large, car-owning households.
The Demographic Factor reflects the island-wide joint distribution of households by demographic information as reported in the 1990 Census. An iterative method was used to estimate a Transit Factor using data from the 1991 On-Board Survey to ensure that the sample reflects known levels of transit use on Oahu.

Since known data from 1990 and 1991 were used to obtain the 1990 Expansion Factor, an update factor was used to ensure that the sample matches the known 1995 geographic distribution of households as the following equation shows.

\[
1995 \text{ Expansion Factor} = 1990 \text{ Expansion Factor} \times \text{Update Factor}
\]
4.1. Validation of Household Weights

The analyses in this chapter apply household weights, which were obtained as described in Chapter 3, to the 1995 HIS data to reflect statistics for the entire population of the Island of Oahu. Table 4.1 shows a comparison of the population data for Honolulu County (Island of Oahu) using Census 2000 data and the weighted 1995 HIS data. For the weighted 1995 HIS data, the proportion of people in most of the age groups is relatively close to the Census 2000 data. The biggest differences are in the 25 to 44, 45 to 64, and 65 and over age groups. Possible reasons for these differences are due to the different years the data are for, Year 2000 for the census data and Year 1995 for the OMPO data. The aging of baby boomers may be reflected by the share of the age 25 to 44 group decreasing and the share of the age 45 to 64 group increasing from Year 1995 to Year 2000. In addition, the 1995 HIS data include a small percentage of people who refused to answer what year they were born and therefore the ages of these people could not be determined. Based on the United States Census Bureau’s Employment Status: 2000, Census 2000 Brief (2003), it appears that the Census 2000 data include military personnel who live in Hawaii but are not Hawaii residents, as does the OMPO data.
Table 4.1. Population Data for Honolulu County from Census 2000 Data and Number of People by Age from 1995 OMPO Data (Weighted)

<table>
<thead>
<tr>
<th>Age</th>
<th>% of Total</th>
<th>No. of People</th>
<th>% of Total</th>
<th>No. of People</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 18</td>
<td>23.8%</td>
<td>208525</td>
<td>23.7%</td>
<td>193937</td>
</tr>
<tr>
<td>18 to 24</td>
<td>10.1%</td>
<td>88492</td>
<td>10.6%</td>
<td>86355</td>
</tr>
<tr>
<td>25 to 44</td>
<td>30.6%</td>
<td>268104</td>
<td>34.0%</td>
<td>277955</td>
</tr>
<tr>
<td>45 to 64</td>
<td>22.0%</td>
<td>192754</td>
<td>20.0%</td>
<td>162967</td>
</tr>
<tr>
<td>65 and over</td>
<td>13.4%</td>
<td>117405</td>
<td>10.1%</td>
<td>82229</td>
</tr>
<tr>
<td>Refused</td>
<td>N/A</td>
<td>N/A</td>
<td>1.6%</td>
<td>13279</td>
</tr>
<tr>
<td>Other</td>
<td>N/A</td>
<td>N/A</td>
<td>0.0%</td>
<td>142</td>
</tr>
<tr>
<td>Total</td>
<td>99.9%</td>
<td>875280</td>
<td>100.0%</td>
<td>816863</td>
</tr>
</tbody>
</table>


4.2 Trip Generation

Table 4.2 shows the number of trips and average daily trips by age and gender. Males and females have approximately equal shares of the total trips and approximately the same average daily trips for the 18 to 64 age group. For the elderly, males make up a greater percentage of the total trips and have a greater number of average daily trips than females. In addition, males age 18 to 64 have a higher number of average daily trips than elderly males. Similarly, females age 18 to 64 have a higher number of average daily trips than elderly females. These findings are consistent with results from the 2001 National Household Travel Survey (NHTS), which indicate elderly, especially females, make less trips per day than younger adults (Collia, et al. 2003). Figure 4.1 shows a graph of the number of daily trips taken by age and gender.
Table 4.2. Number of Trips and Average Daily Trips by Age and Gender

<table>
<thead>
<tr>
<th>Age</th>
<th>Gender</th>
<th>Number of People</th>
<th>% of Subtotal</th>
<th>Number of Trips on Diary Day</th>
<th>% of Subtotal</th>
<th>Average Daily Trips Per Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 to 64</td>
<td>Male</td>
<td>261516</td>
<td>49.6%</td>
<td>853038</td>
<td>49.7%</td>
<td>3.26</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>265764</td>
<td>50.4%</td>
<td>865047</td>
<td>50.3%</td>
<td>3.25</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td>527280</td>
<td>100.0%</td>
<td>1718085</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>65 and Older</td>
<td>Male</td>
<td>38370</td>
<td>46.7%</td>
<td>108183</td>
<td>55.1%</td>
<td>2.82</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>43859</td>
<td>53.3%</td>
<td>88089</td>
<td>44.9%</td>
<td>2.01</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td>82229</td>
<td>100.0%</td>
<td>196272</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>609509</td>
<td>100.0%</td>
<td>1914357</td>
<td>100.0%</td>
<td>3.14</td>
</tr>
</tbody>
</table>

Figure 4.1. Number of Trips on Diary Day by Age and Gender

Table 4.3 shows the number of trips and average daily trips by age and disability. The number of disabled people is 1.9% of the younger age group and these people make 1.3% of the total trips. The number of disabled people is 11.2% of the elderly age group and these people make only 5.6% of the total trips. For both age groups, disabled people
have less average daily trips than people who are not disabled. This makes sense since it is more difficult for people with disabilities to travel and take part in activities. In addition, disabled people aged 18 to 64 have a higher number of average daily trips than elderly. Similarly, younger adults who are not disabled have a higher number of average daily trips than elderly who are not disabled. These findings are consistent with results from the 2001 National Household Travel Survey (NHTS), which indicate respondents with a medical condition had a lower mean number of trips than respondents without a medical condition for both elderly adults and younger adults (Collia, et al. 2003).

Table 4.3. Number of Trips and Average Daily Trips by Age and Disability

<table>
<thead>
<tr>
<th>Age</th>
<th>Disability</th>
<th>Number of People</th>
<th>% of Subtotal</th>
<th>Number of Trips on Diary Day</th>
<th>% of Subtotal</th>
<th>Average Daily Trips Per Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 to 64</td>
<td>disabled</td>
<td>10055</td>
<td>1.9%</td>
<td>23114</td>
<td>1.3%</td>
<td>2.30</td>
</tr>
<tr>
<td></td>
<td>not disabled</td>
<td>517041</td>
<td>98.1%</td>
<td>1694947</td>
<td>98.7%</td>
<td>3.28</td>
</tr>
<tr>
<td></td>
<td>refused</td>
<td>139</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>don't know</td>
<td>42</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0.00</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td>527277</td>
<td>100.0%</td>
<td>1718061</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>65 and Older</td>
<td>disabled</td>
<td>9181</td>
<td>11.2%</td>
<td>11040</td>
<td>5.6%</td>
<td>1.20</td>
</tr>
<tr>
<td></td>
<td>not disabled</td>
<td>73050</td>
<td>88.8%</td>
<td>185246</td>
<td>94.4%</td>
<td>2.54</td>
</tr>
<tr>
<td></td>
<td>refused</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>don't know</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>N/A</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td>82231</td>
<td>100.0%</td>
<td>196286</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>609508</td>
<td>100.0%</td>
<td>1914347</td>
<td>100.0%</td>
<td>3.14</td>
</tr>
</tbody>
</table>

*A person was designated as disabled if they responded "yes" and not disabled if they responded "no" to the question, "Do you have any disability that limits the type of transportation you can use?"

Table 4.4 shows the number of trips and average daily trips by possession of a driver’s license for people aged 65 and older. The number of people aged 65 and older who do not have a license is 30.3% of this cohort and these people make 16.4% of the total trips. People aged 65 and older without a license have less average daily trips than people who have a license. This is reasonable since it would be more difficult for a
person without a driver’s license to travel because they would need to find alternative modes of transportation. These findings are consistent with those of Burkhardt (1999), who concluded that people aged 70 and older will take fewer trips or no trips under certain circumstances after they reduce or cease driving.

Table 4.4. Number of Trips and Average Daily Trips by Possession of a Driver’s License for People Aged 65 and Older

<table>
<thead>
<tr>
<th></th>
<th>Number of People</th>
<th>% of Total</th>
<th>Number of Trips on Diary Day</th>
<th>% of Total</th>
<th>Average Daily Trips Per Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have a driver's license</td>
<td>57306</td>
<td>69.7%</td>
<td>164102</td>
<td>83.6%</td>
<td>2.86</td>
</tr>
<tr>
<td>Do not have a driver's license</td>
<td>24924</td>
<td>30.3%</td>
<td>32181</td>
<td>16.4%</td>
<td>1.29</td>
</tr>
<tr>
<td>Total</td>
<td>82230</td>
<td>100.0%</td>
<td>196283</td>
<td>100.0%</td>
<td>2.39</td>
</tr>
</tbody>
</table>

Table 4.5 shows the frequency of trip purposes by age. For the 18 to 64 age group, 36.0% of trips were work or work-related. For the 65 and older age group, 10.2% of trips taken were work or work-related. This is reasonable since older people are more likely to be retired and therefore have no need to make work or work-related trips, and consistent with results from the 2001 NHTS, which indicate that adults aged 65 and older make a lower percentage of trips for work, work-related purposes and for school than adults aged 19 to 64. Among all other trip purposes besides work or work-related trips, the largest share of trips for the 18 to 64 age group were trips made to pick up or drop off other people, and the largest share of trips for the 65 and older age group were trips made for shopping. This is reasonable since people aged 65 and older are less likely to have children and others in their household that need to be dropped off and picked up. Also, older people are more likely to be retired and have more leisure time for activities such as shopping.
Table 4.5. Number of Trips by Age and Trip Purpose*

<table>
<thead>
<tr>
<th>Trip Purpose</th>
<th>18 to 64</th>
<th></th>
<th></th>
<th>65 and Older</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>% of</td>
<td>% of</td>
<td>Number</td>
<td>% of</td>
<td>% of</td>
</tr>
<tr>
<td></td>
<td>of Trips</td>
<td>Subtotal</td>
<td>Total</td>
<td>of Trips</td>
<td>Subtotal</td>
<td>Total</td>
</tr>
<tr>
<td>Work or Work-Related:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work</td>
<td>359895</td>
<td>87.0%</td>
<td>36.0%</td>
<td>10976</td>
<td>86.2%</td>
<td>10.2%</td>
</tr>
<tr>
<td>Work-related</td>
<td>53615</td>
<td>13.0%</td>
<td></td>
<td>1754</td>
<td>13.8%</td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td>413510</td>
<td>100.0%</td>
<td></td>
<td>12730</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Picking up or dropping of other people</td>
<td>189043</td>
<td>25.7%</td>
<td></td>
<td>13214</td>
<td>11.8%</td>
<td></td>
</tr>
<tr>
<td>School</td>
<td>42344</td>
<td>5.8%</td>
<td></td>
<td>505</td>
<td>0.4%</td>
<td></td>
</tr>
<tr>
<td>Childcare</td>
<td>1478</td>
<td>0.2%</td>
<td></td>
<td>252</td>
<td>0.2%</td>
<td></td>
</tr>
<tr>
<td>Buying gas</td>
<td>13995</td>
<td>1.9%</td>
<td></td>
<td>1719</td>
<td>1.5%</td>
<td></td>
</tr>
<tr>
<td>Eating out</td>
<td>73885</td>
<td>10.1%</td>
<td></td>
<td>11583</td>
<td>10.3%</td>
<td></td>
</tr>
<tr>
<td>Shopping</td>
<td>145059</td>
<td>19.7%</td>
<td>64.0%</td>
<td>33547</td>
<td>29.8%</td>
<td>89.8%</td>
</tr>
<tr>
<td>Social activities or recreation</td>
<td>90786</td>
<td>12.4%</td>
<td></td>
<td>14150</td>
<td>12.6%</td>
<td></td>
</tr>
<tr>
<td>Volunteer work</td>
<td>6449</td>
<td>0.9%</td>
<td></td>
<td>3500</td>
<td>3.1%</td>
<td></td>
</tr>
<tr>
<td>Banking, medical or personal business</td>
<td>80083</td>
<td>10.9%</td>
<td></td>
<td>18862</td>
<td>16.8%</td>
<td></td>
</tr>
<tr>
<td>Off-island activities</td>
<td>17592</td>
<td>2.4%</td>
<td></td>
<td>1542</td>
<td>1.4%</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>74218</td>
<td>10.1%</td>
<td></td>
<td>13527</td>
<td>12.0%</td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td>734932</td>
<td>100.0%</td>
<td></td>
<td>112401</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1148442</td>
<td>100.0%</td>
<td></td>
<td>125131</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>Refused*</td>
<td>188</td>
<td></td>
<td></td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Don't know*</td>
<td>593</td>
<td></td>
<td></td>
<td>101</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Trips returning to home were excluded.

Not included in Total.

4.3 Time of Day

Figure 4.2 shows the frequency of departure time choice for each age group. The shape of the graph is consistent with results from the 2001 NHTS, which indicate travel for adults aged 65 and older peaks during the mid-day and adults aged 19 to 64 show three distinct peaks: morning, lunch and after work (Collia, et al. 2003).
4.4 Mode Choice

Table 4.6 shows possession of a driver's license by age and gender. A higher proportion of males than females have a driver's license for the 18 to 64 age group. Similarly, a higher proportion of males than females have a driver's license for the 65 and older age group but this difference is more pronounced than for the younger age group. For both males and females, those aged 18 to 64 are more likely to have a license than those 65 and older. This is reasonable due to age-related changes that may cause driving to be difficult or not possible. These findings are consistent with results from the 2001 National Household Travel Survey (NHTS), which indicate adults aged 65 and older, especially females, are less likely to consider themselves to be drivers than adults aged 19 to 64. (Collia, et al. 2003). In addition, the results support a longitudinal study by Rosenbloom (2001) which found driving cessation was greater among women in Tucson, Arizona.

<table>
<thead>
<tr>
<th>Age</th>
<th>Gender</th>
<th>% of Total</th>
<th>% of Total</th>
<th>% of Total</th>
<th>Missing</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 to 64</td>
<td>Male</td>
<td>239321</td>
<td>91.5%</td>
<td>21757</td>
<td>8.3%</td>
<td>0.1%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>221731</td>
<td>83.4%</td>
<td>43655</td>
<td>16.4%</td>
<td>0.1%</td>
</tr>
<tr>
<td>65 and Older</td>
<td>Male</td>
<td>31442</td>
<td>81.9%</td>
<td>6928</td>
<td>18.1%</td>
<td>0.0%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>25865</td>
<td>59.0%</td>
<td>17994</td>
<td>41.0%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

Table 4.7 shows mode choice by age. For both the 18 to 64 age group and 65 and older age group, most trips are made by private vehicle as either a driver or passenger. A higher proportion of trips were made by driving for the 18 to 64 age group than for the 65 and older age group. These findings are consistent with results from the 2001 National Household Travel Survey (NHTS), which indicate adults aged 65 and older, especially females, are less likely to consider themselves to be drivers than adults aged 19 to 64. (Collia, et al. 2003). In addition, the results support a longitudinal study by Rosenbloom (2001) which found driving cessation was greater among women in Tucson, Arizona.
Household Travel Survey (NHTS), which indicate that the personal vehicle is the dominant mode of travel for adults aged 65 and older. In addition, the personal vehicle serving as the dominant mode of travel for the older age group is consistent with approximately 92% of trips taken by people aged 65 and older in the Baltimore region being by automobile either as passengers or drivers (Long, et al. 2001).

Table 4.7. Mode Choice by Age

<table>
<thead>
<tr>
<th>Mode Choice</th>
<th>18 to 64</th>
<th>% of Total</th>
<th>65 and Older</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Trips</td>
<td></td>
<td>Number of Trips</td>
<td></td>
</tr>
<tr>
<td>Walk or Wheelchair</td>
<td>140332</td>
<td>8.2%</td>
<td>18927</td>
<td>9.6%</td>
</tr>
<tr>
<td>The Bus</td>
<td>106445</td>
<td>6.2%</td>
<td>15815</td>
<td>8.1%</td>
</tr>
<tr>
<td>Passenger</td>
<td>209076</td>
<td>12.2%</td>
<td>34700</td>
<td>17.7%</td>
</tr>
<tr>
<td>Driver</td>
<td>1202985</td>
<td>70.0%</td>
<td>122332</td>
<td>62.3%</td>
</tr>
<tr>
<td>Bicycle</td>
<td>16505</td>
<td>1.0%</td>
<td>614</td>
<td>0.3%</td>
</tr>
<tr>
<td>Other*</td>
<td>42720</td>
<td>2.5%</td>
<td>3882</td>
<td>2.0%</td>
</tr>
<tr>
<td>Total</td>
<td>1718063</td>
<td>100.0%</td>
<td>196270</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

*Includes school bus, subscription bus, handi van, motorcycle, moped, taxi, other, refused, don't know and missing.

Table 4.8 shows the distribution of the travel modes used by people aged 65 and older who do not have a driver’s license. Traveling as a passenger had the greatest share (40.9%), followed by The Bus (27.6%) and walk or wheelchair (19.3%). The finding that many trips were taken as passengers is consistent with the findings of Rosenbloom (2001), which were that three-quarters of people aged 65 and older in Tucson, Arizona who stopped driving relied on car rides from others.
Table 4.8. Mode Choice for People Aged 65 and Older by Possession of a Driver’s License

<table>
<thead>
<tr>
<th></th>
<th>With a License</th>
<th>Without a License</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Trips</td>
<td>% of Total</td>
</tr>
<tr>
<td>Walk or Wheelchair</td>
<td>12725</td>
<td>7.8%</td>
</tr>
<tr>
<td>The Bus</td>
<td>6927</td>
<td>4.2%</td>
</tr>
<tr>
<td>Passenger</td>
<td>21555</td>
<td>13.1%</td>
</tr>
<tr>
<td>Driver</td>
<td>120496</td>
<td>73.4%</td>
</tr>
<tr>
<td>Bicycle</td>
<td>614</td>
<td>0.4%</td>
</tr>
<tr>
<td>Other†</td>
<td>1785</td>
<td>1.1%</td>
</tr>
<tr>
<td>Total</td>
<td>164102</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

*Includes school bus, subscription bus, handi van, motorcycle, moped, taxi, other, refused, don't know and missing.
CHAPTER 5
ESTIMATION OF A MULTINOMIAL LOGIT MODEL FOR MODE CHOICE

5.1 Introduction

Chapter 5 includes a description of logit models, assumptions that were made, and calculations that were performed using the data collected from OMPO's 1995 Household Interview Survey (HIS) and travel diaries. In addition, descriptive statistics of variables that were thought to have a possible significant effect on mode choice are included.

Finally, the results of two estimated mode choice logit models are discussed. The first model uses elderly and retired as separate variables while the second model uses elderly and retired as one variable (i.e. non-elderly, elderly and retired, and elderly and not retired). These models are intended to gain an understanding of travel behavior rather than predict future travel behavior. The purpose of estimating these models is to attempt to understand the mode choice of the elderly on Oahu, make comparisons with the results of Kim and Ulfarsson (2004), and serve as a possible basis for the development of more sophisticated models.

5.2 General Overview of Logit Models

The logit model is one of the most used qualitative choice models, and was chosen for this study because of its simplicity. The following description of the logit model is adapted from Train (1993). The utility obtained by decision maker \( n \) choosing alternative \( i \) from a set of \( J \) alternatives is expressed as:

\[
U_{in} = V_{in} + e_{in}
\]

where \( V_{in} \) is the part of the utility that is known by the researcher, and \( e_{in} \) is the part of the utility that is unknown by the researcher and is assumed to be a random variable. \( V_{in} \) is
dependent on the observed data and known or estimated parameters. The following equation shows how \( V_{in} \) depends on the following explanatory variables: the characteristics of the alternative \((z_{in})\), the observed characteristics of the decisionmaker \((s_{in})\), and a vector of parameters that are known or estimated \((\beta)\).

\[
V_{in} = V(z_{in}, s_{in}, \beta)
\]

The probability of choosing alternative \(i\) is expressed as:

\[
P_{in} = \frac{e^{V_{in}}}{\sum_{j \in J} e^{V_{jn}}}
\]

for all \(i\) in \(J_n\). A sketch of the logit curve is shown in Figure 5.1 below.

**Figure 5.1. Graph of the Logit Curve**

Source: Adapted from Train (1993).

Mode choice models were selected as the focus for this thesis and two multinomial logit models for mode choice were estimated. Other aspects of the travel behavior of the elderly such as trip generation, travel distance and departure time choice are possibilities for future research. Multinomial means that decision makers have more
than two choices, as opposed to a binomial logit model in which there are only two alternatives to choose from.

One property of the logit model is the independence from irrelevant alternatives property. The following equation shows the ratio of the choice probabilities between alternatives \( i \) and \( k \).

\[
\frac{P_{ik}}{P_{kn}} = \frac{\frac{e^{\gamma_i}}{\sum_{j \neq k} e^{\gamma_j}}}{\frac{e^{\gamma_k}}{\sum_{j \neq i} e^{\gamma_j}}} = \frac{e^{\gamma_i}}{e^{\gamma_k}} = e^{\gamma_i - \gamma_k}
\]

This ratio is dependent only on alternatives \( i \) and \( k \) and remains constant no matter what other alternatives there are available. The independence from irrelevant alternatives property could be inappropriate in certain situations. For example, if another alternative \( m \) is introduced that is similar to alternative \( i \), the ratio of the choice probabilities between alternatives \( i \) and \( k \) would remain the same according to the logit model. In actuality, we would expect a greater reduction in the proportion of people choosing alternative \( i \) than in the proportion of people choosing alternative \( k \).

5.3 Assumptions and Calculations

Section 3.2.2 describes the data files used for estimation, which include person, household, vehicle, and activity data. Section 3.3 describes how the data were manipulated. In addition, the following assumptions were made and calculations were performed in order to estimate the models in this chapter.

5.3.1 Excluded Observations

The original activity data file contained a total of 32,816 trips. Trips that could not be geocoded and therefore could not be assigned origin and destination traffic
analysis zones (TAZ) were excluded. In addition, trips for which there was only one available mode were excluded since these types of trips should not be used for model estimation. Off-island activities were excluded since they would not provide much information about mode choice since the primary mode for leaving and returning to the Island of Oahu is by airplane. Trips made by people younger than age 18 were also excluded to confine this study to adult lifestyles which probably differ from those younger than age 18. People younger than age 18 probably attend school and have a much lower probability of having a driver’s license than adults. Some other trips were not used to estimate models because they had invalid or missing information. A total of 17,737 trips were used to estimate the models in this thesis.

5.3.2 Availability of Modes

The models were estimated with the following five modes as choices: driver of a personal vehicle (referred to as drive), passenger in a personal vehicle (referred to as passenger), walk or wheelchair (referred to as walk), bicycle (referred to as bike) and The Bus (referred to as transit). Other modes, including school bus, subscription bus, Handivan, motorcycle, moped and taxi, were not considered for modeling because there were found to be not a significant number of trips for which these modes were used.

Drive was assumed to be an available choice only to those who have a driver’s license and at least one vehicle in their household. Passenger was assumed to be available to everyone. As explained in subsequent text, both the highway and transit networks used for OMPO’s Travel Forecasting Model Development Project (TFMDP) and previously described in Section 3.2.2 were used to obtain the travel distance and travel time for each trip. The highway network assumed walk was available for trips of
1.5 miles or less, and bike was available for trips of 3.5 miles or less. (OMPO 2002) The transit network classified each TAZ as either within or not within the walk access market to transit (OMPO 2002). These same assumptions for the availability of walk, bike and transit were used for this thesis. One exception was that a mode was designated as available if it was used to make a given trip even if the mode was initially thought to be unavailable. For example, if walk was used for a trip greater than 1.5 miles then walk was considered to be an available mode for that particular trip.

5.3.3 Trip Purpose

Out of the 16 trip purposes in the 1995 Household Interview Survey (HIS), shopping; banking, medical or personal business (referred to as personal); work, work-related, picking up or dropping someone off, school and childcare (referred to as work); and eating out were used for this thesis. Picking up or dropping someone off, school and childcare were grouped together with work and work-related trips because these trip purposes were thought to be similar in that they tend to need to be done by a specific person at a specific time of day. All other trip purposes were consolidated into a category called other. A complete list of the 16 trip purposes in the 1995 Household Interview Survey (HIS) is available in Appendix B.

5.3.4 Travel Distances and Travel Times

The loaded OMPO highway and transit networks, along with the origin and destination TAZ of each trip, were used to calculate the travel distance, in-vehicle travel time and auto terminal time for trips made by personal vehicle. For transit trips, the loaded highway and transit networks, and the origin and destination TAZ of each trip were used to calculate travel distance, in-vehicle travel time and out-of-vehicle travel
time. A loaded network means that users are being assigned to routes based on traffic conditions. The traffic assignment algorithm used by OMPO was based on minimum impedance measures. Travel distances and travel times for trips made by walking or biking were extracted from the loaded highway network. The TFMDP assumed a walk speed of 3 miles per hour and a bike speed of 7 miles per hour (OMPO 2002). This thesis uses these same assumptions for walk and bike speeds.

5.3.5 Time of Day

The reported start and end times of travel were used to determine whether a trip was made during the peak period of traffic, the off-peak period of traffic or in a transition between them. Whether a trip was made during the peak period of traffic or the off-peak period of traffic affected congestion, delay and traffic assignment, and therefore affected travel times. The TFMDP considered the peak period of traffic to be from 5:00 AM to 9:00 AM and from 2:00 PM to 6:00 PM, and the off-peak period of traffic to consist of all remaining time periods (OMPO 2002). This thesis uses these same assumptions for the peak and off-peak periods of traffic. For the purposes of this thesis, the average of peak and off-peak travel times were assigned to trips that were partially within the peak period of traffic and partially within the off-peak period of traffic. Taking an average travel time for these trips is reasonable since both peak and off-peak travel times are obtained from the OMPO highway and transit networks and are therefore approximate travel times.

5.3.6 Number of Transfers

The origin-destination transit paths generated by the OMPO transit network provided information on the number of transfers. For the purposes of this thesis, the
number of transfers was designated as either no transfers, or possibly one or more transfers.

5.3.7 Travel Cost

Travel cost for driving a private vehicle was calculated using travel distance and assuming $0.12 per mile. This assumed per mile cost was obtained from and therefore is consistent with the TFMDP assumptions (OMPO 2002). Passenger, walk and bike was considered to be free. The cost for transit was not incorporated into the models since it appeared that the TFMDP assumed a flat fare of $0.75 for the cost to use transit on Oahu.

5.3.8 Parking Cost

Values for parking cost in each zone were extracted from OMPO's highway network. It was assumed that the parking cost for a given trip would be equal to the average of the parking cost for the origin zone and the parking cost for the destination zone. For example if a respondent went from home to work and then returned home, and the zone in which they live did not have a parking cost associated with it, then half of the parking cost for the zone in which they work would be assigned to the home to work trip and the other half of the parking cost would be assigned to the work to home trip.

5.3.9 Household Weights

The data used to estimate the models discussed in this chapter were not weighted using the household weights described in Section 3.4. In other words, the data used to estimate the multinomial logit models for mode choice only account for the behavior of people who participated in the 1995 Household Interview Survey (HIS) travel diaries and were not weighted to account for the behavior of the entire population of the Island of Oahu. Although OMPO used a stratified random sample with some areas being
oversampled, there is no need to weight the data for the purpose of estimating the models since the sample was not selected based on mode choice.

5.4 Descriptive Statistics

Table 5.1 shows the number of trips made using each mode. The majority of trips were made by driving, followed by passenger, walk, transit and bike. This information is especially of interest since the models estimated in this thesis are mode choice models.

<table>
<thead>
<tr>
<th>Choice</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive</td>
<td>13636</td>
<td>76.9%</td>
</tr>
<tr>
<td>Passenger</td>
<td>2253</td>
<td>12.7%</td>
</tr>
<tr>
<td>Walk</td>
<td>912</td>
<td>5.1%</td>
</tr>
<tr>
<td>Bike</td>
<td>106</td>
<td>0.6%</td>
</tr>
<tr>
<td>Transit</td>
<td>830</td>
<td>4.7%</td>
</tr>
<tr>
<td>Total</td>
<td>17737</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table 5.2 shows other selected descriptive statistics for the sample. These frequencies are by the number of trips and not the number of people. The number of trips made by the elderly were 2,192 or 12.4% of the total number of trips, of which 1,652 of those trips were made by the retired elderly.

In general, the sample data consisted of slightly more trips made by females than trips made by males. Most trips were taken for work or other trip purposes. Most trips would not require any transfers if made by transit; and only 1.4% of the total trips were made by people with a disability.
Table 5.2. Descriptive Statistics by Number of Trips

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-64</td>
<td>15545</td>
<td>87.6%</td>
</tr>
<tr>
<td>65+</td>
<td>2192</td>
<td>12.4%</td>
</tr>
<tr>
<td><strong>Retired:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retired</td>
<td>2336</td>
<td>13.2%</td>
</tr>
<tr>
<td>Not Retired</td>
<td>15401</td>
<td>86.8%</td>
</tr>
<tr>
<td><strong>Age and Retired:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elderly and Retired</td>
<td>1652</td>
<td>75.4%</td>
</tr>
<tr>
<td>Elderly and Not Retired</td>
<td>540</td>
<td>24.6%</td>
</tr>
<tr>
<td><strong>Gender:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>8707</td>
<td>49.1%</td>
</tr>
<tr>
<td>Female</td>
<td>9030</td>
<td>50.9%</td>
</tr>
<tr>
<td><strong>Income:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ $19,999</td>
<td>1461</td>
<td>8.2%</td>
</tr>
<tr>
<td>$20,000 - $39,999</td>
<td>4464</td>
<td>25.2%</td>
</tr>
<tr>
<td>$40,000 - $59,999</td>
<td>4293</td>
<td>24.2%</td>
</tr>
<tr>
<td>≥ $60,000</td>
<td>7519</td>
<td>42.4%</td>
</tr>
<tr>
<td><strong>Trip Purpose:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shopping</td>
<td>1844</td>
<td>10.4%</td>
</tr>
<tr>
<td>Personal</td>
<td>1039</td>
<td>5.9%</td>
</tr>
<tr>
<td>Work</td>
<td>6149</td>
<td>34.7%</td>
</tr>
<tr>
<td>Eating Out</td>
<td>811</td>
<td>4.6%</td>
</tr>
<tr>
<td>Other</td>
<td>7894</td>
<td>44.5%</td>
</tr>
<tr>
<td><strong>Number of Transfers:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>9839</td>
<td>64.1%</td>
</tr>
<tr>
<td>Possibly 1 or more</td>
<td>5518</td>
<td>35.9%</td>
</tr>
<tr>
<td><strong>Disability:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disabled</td>
<td>242</td>
<td>1.4%</td>
</tr>
<tr>
<td>Not Disabled</td>
<td>17495</td>
<td>98.6%</td>
</tr>
</tbody>
</table>
5.5 Model Estimation Using Elderly and Retired as Separate Variables

The coefficients for a multinomial logit model for mode choice were estimated using variables as defined in Table 5.3 and the computer program NLOGIT.

Table 5.3. Variables Tested in Mode Choice Model

<table>
<thead>
<tr>
<th>Personal Information:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1 if aged 65 or older,</td>
</tr>
<tr>
<td></td>
<td>0 if aged 18 to 64</td>
</tr>
<tr>
<td>Retired</td>
<td>1 if retired,</td>
</tr>
<tr>
<td></td>
<td>0 otherwise</td>
</tr>
<tr>
<td>Gender</td>
<td>1 if male,</td>
</tr>
<tr>
<td></td>
<td>0 otherwise</td>
</tr>
<tr>
<td>Disability</td>
<td>1 if person has self-reported disability that limits transportation they can use,</td>
</tr>
<tr>
<td></td>
<td>0 otherwise</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Household Information:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Income:</td>
<td></td>
</tr>
<tr>
<td>Group 2</td>
<td>1 if annual household income $20,000 to</td>
</tr>
<tr>
<td></td>
<td>$39,999,</td>
</tr>
<tr>
<td></td>
<td>0 otherwise</td>
</tr>
<tr>
<td>Group 3</td>
<td>1 if annual household income $40,000 -</td>
</tr>
<tr>
<td></td>
<td>$59,999,</td>
</tr>
<tr>
<td></td>
<td>0 otherwise</td>
</tr>
<tr>
<td>Group 4</td>
<td>1 if annual household income ≥ $60,000</td>
</tr>
<tr>
<td></td>
<td>0 otherwise</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trip Information:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Trip Purpose:</td>
<td></td>
</tr>
<tr>
<td>Shopping</td>
<td>1 if trip purpose was shopping,</td>
</tr>
<tr>
<td></td>
<td>0 otherwise</td>
</tr>
<tr>
<td>Personal</td>
<td>1 if trip purpose was banking, medical</td>
</tr>
<tr>
<td></td>
<td>or personal business,</td>
</tr>
<tr>
<td></td>
<td>0 otherwise</td>
</tr>
<tr>
<td>Work</td>
<td>1 if trip purpose was work, work-related,</td>
</tr>
<tr>
<td></td>
<td>picking up or dropping someone off,</td>
</tr>
<tr>
<td></td>
<td>school and childcare,</td>
</tr>
<tr>
<td></td>
<td>0 otherwise</td>
</tr>
<tr>
<td>Eat Out</td>
<td>1 if trip purpose was eating out,</td>
</tr>
<tr>
<td></td>
<td>0 otherwise</td>
</tr>
</tbody>
</table>

| In-Vehicle Travel Time                     | in-vehicle travel time in $10^4$ minutes |
| Out-of-Vehicle Travel Time                | out-of-vehicle travel time in $10^2$ minutes |
| Auto Terminal Time                        | auto terminal time in $10^4$ minutes     |
| Number of Transfers                       | 1 if possibly one or more transfers,    |
|                                            | 0 otherwise                           |
| Travel Cost                                | travel cost in dollars                 |
| Parking Cost                               | parking cost in dollars                |
The model estimation results are shown in Table 5.4. "N/A" in Table 5.4 indicates that the variable is not applicable to that mode. For example, travel cost for all modes except drive are not applicable since we did not associate a cost for trips made by passenger, walk, bike or transit. As previously explained, the cost for transit was not incorporated into the models since it appeared that the TFMDP assumed a flat fare of $0.75 for the cost to use transit on Oahu. A more detailed table including P-values is included as Appendix C. Transit was used as the base case for this model and the results are described below.

5.5.1 Elderly

Because this model was estimated using data from both elderly and non-elderly, an elderly variable can be used to determine how being elderly affects mode choice. In contrast, Kim and Ulfarsson (2004) estimated a mode choice model with data from the elderly only and therefore could not make comparisons between the elderly and non-elderly. The model estimation results in Table 5.4 show being elderly, as opposed to being non-elderly, was found to have a statistically significant negative effect toward drive and walk as compared with transit. A negative effect indicates that users are less likely to choose a given mode if all other attributes for the decision maker and choices are equal. Decreased propensity toward drive and passenger is consistent with the findings of Kim and Ulfarsson (2004) who concluded that retired elderly individuals are less likely to use a private vehicle as compared to other available modes. Negative coefficients for drive and walk may be due to age-related physical deficiencies that limit the use of these modes.
In addition, being elderly was found to have a negative effect toward passenger as compared with transit. This may not be intuitive since Burkhardt (1999) concluded that family and friends are often faced with providing transportation for a former driver.

The elderly variable was eliminated from the bike utility function because it appeared that this variable would not be significant. This is probably due to a small number of elderly choosing to use bike.

5.5.2 Retired

Similar to the elderly variable, all the estimated coefficients for the retired variable were found to be negative. This indicates that being retired, as opposed to not being retired, has a statistically significant negative effect toward drive, walk and bike as compared with transit. In addition, being retired was found to have a negative effect toward passenger as compared with transit. The elderly and retired variables may be strongly correlated since older people are more likely to be retired than their younger counterparts. For this reason, Section 5.5 estimates a model with elderly and retired as one variable to account for age and retirement status.

5.5.3 Gender

Positive coefficients indicate being male, as compared to being female, has a positive effect toward drive, walk and bike as compared to transit. A negative coefficient for passenger indicates being male has a negative effect toward passenger as compared to transit.

5.5.4 Income

For all income groups, the same coefficient for drive and passenger was used because when the model was estimated with separate income coefficients for drive and
passenger, they were found not to be significantly different at the 90% confidence level. These coefficients for drive and passenger were determined to be positive, indicating that all income groups were more likely to choose being a driver or passenger rather than use transit if all else is equal. Note that the value of the income coefficient for drive and passenger increases for higher income groups. This is reasonable since households with higher incomes are more likely to have a personal vehicle available.

The walk coefficient for the highest income group ($\geq 60,000$) and the bike coefficient for the lowest income group ($20,000 - 39,999$) were determined to be positive. This indicates that having a household income $\geq 60,000$, as opposed to $0 - 19,999$, has a positive effect toward walk as compared to transit, and having a household income of $20,000 - 39,999$, as opposed to $0 - 19,999$, has a positive effect toward bike as compared to transit.

These results are consistent with the conclusions of Kim and Ulfarsson (2004) that retired elderly who have higher incomes are more likely to use private vehicles, carpool or van pool and are less likely to use transit as compared with walking. However, the income coefficients estimated using the 1995 HIS data is for the general population while the model estimated by Kim and Ulfarsson (2004) is for retired elderly only. This implies that income may affect the general population in the same way as the retired elderly.

The walk coefficient for the lowest and middle ($40,000 - 59,999$) income groups and bike coefficient for the highest and middle income groups were eliminated from the respective utility functions because they appeared not to be significant.
5.5.5 Trip Purpose

Shopping and personal trips carry positive effects toward driving. Shopping and eating out carry positive effects toward being a passenger, while work has a negative effect on being a passenger. Eating out has a positive effect on walking. All other coefficients for the other trip purposes were eliminated from the respective utility functions because they appeared not to be significant.

Kim and Ulfarsson (2004) concluded that retired elderly are less likely to use transit as compared to other available modes when going shopping or doing errands, and prefer walking for personal trips. This is consistent with the findings of the model estimated in Table 5.4, with the exception that the model for Oahu eliminated the walk coefficient for personal trips because it did not appear to be significant. This implies that trip purpose may affect the general population in a similar way as it does to the retired elderly since the model estimated by Kim and Ulfarsson (2004) is for retired elderly only.

5.5.6 In-Vehicle Travel Time

The in-vehicle travel time coefficient for all modes is negative, which is reasonable since longer travel times make each mode less desirable. For both the elderly and non-elderly, walk had the greatest negative coefficient and transit had the least negative coefficient. This makes sense since walking is less likely to be used for long trips. These results are consistent with the findings of Kim and Ulfarsson (2004) that retired elderly are more likely to use a private vehicle, carpool or vanpool, or transit relative to walking for longer trips. Like income and trip purpose, in-vehicle travel time may affect the general population in a similar way as it does to the retired elderly.
For the elderly, the same in-vehicle travel time coefficient for drive and passenger was used because when the model was estimated with separate coefficients for drive and passenger, they were found not to be significantly different at the 90% confidence level. In contrast, the in-vehicle travel time coefficients for drive and passenger were found to be significantly different at the 90% confidence level and therefore the model was estimated with separate variables for the non-elderly.

A T-test was conducted to see if the in-vehicle travel time coefficients were significantly different for the elderly and non-elderly. It was determined that the coefficients for all modes were significantly different at the 90% confidence level except for transit.

5.5.7 Out-of-Vehicle Travel Time

The out-of-vehicle travel time coefficient for transit is negative for both the elderly and non-elderly, which is reasonable since longer travel times make transit less desirable. For both age groups out-of-vehicle travel time had a greater negative effect on choosing transit than in-vehicle travel time. Also, out-of-vehicle travel time had a greater negative effect on the elderly than for the non-elderly.

A T-test was conducted to see if the out-of-vehicle travel time coefficients for transit were significantly different for the elderly and non-elderly. It was determined that the coefficients were significantly different at the 90% confidence level.

5.5.8 Auto Terminal Time

Auto Terminal Time was found to have a negative effect toward drive and passenger. This is as expected since additional travel time makes personal vehicle less attractive. The same coefficient for drive and passenger was used because when the
model was estimated with separate auto terminal time coefficients for drive and passenger, they were found not to be significantly different at the 90% confidence level.

5.5.9 Number of Transfers

The number of transfers was found to have a negative effect toward transit. This is as expected since transfers are not convenient and more transfers makes transit less attractive.

5.5.10 Travel Cost

Travel cost was determined to have a negative effect toward driving for both the non-elderly and elderly. This is as expected since high travel cost makes driving less attractive. Travel cost had a greater negative effect on the elderly than for the non-elderly.

5.5.11 Parking Cost

Like travel cost, parking cost was determined to have a negative effect on driving. This is as expected since high cost to park a vehicle makes driving less attractive.

5.5.12 Economic Value of Time

The economic value of time was obtained by using a ratio of the estimated coefficients for in-vehicle travel time and travel cost for driving. Below is a sample calculation that was used to find the economic value of time for the non-elderly.

\[-0.045 \times \frac{60 \text{ minutes}}{\text{minutes}} \times \frac{1 \text{ hour}}{1 \text{ hour}} = 9.28 \text{ per hour}\]

\[-\frac{0.291}{\text{dollars}}\]

The economic value of time was calculated as $9.28 per hour for the non-elderly and $9.55 per hour for the elderly in 1995 dollars. According to the Bureau of Labor
Statistics Inflation Calculator, this is equal to present economic values of time for the non-elderly and elderly of $12.10 per hour and $12.45 per hour, respectively. These results suggest that the elderly and non-elderly place similar value on their time.
Table 5.4. Coefficients for an Estimated Multinomial Logit Model for Mode Choice Using Elderly and Retired as Separate Variables\textsuperscript{b,c}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Drive</th>
<th>Passenger</th>
<th>Walk</th>
<th>Bike</th>
<th>Transit\textsuperscript{d}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative Specific Constant</td>
<td>1.529 (0.131)</td>
<td>-0.175 (0.134)\textsuperscript{d}</td>
<td>3.098 (0.164)</td>
<td>-2.450 (0.314)</td>
<td>N/A</td>
</tr>
<tr>
<td>Elderly</td>
<td>-0.424 (0.256)</td>
<td>-0.386 (0.262)\textsuperscript{d}</td>
<td>-0.778 (0.395)</td>
<td>--</td>
<td>N/A</td>
</tr>
<tr>
<td>Retired</td>
<td>-0.342 (0.161)</td>
<td>-0.187 (0.167)\textsuperscript{c}</td>
<td>-0.444 (0.234)</td>
<td>-1.812 (0.516)</td>
<td>N/A</td>
</tr>
<tr>
<td>Gender</td>
<td>0.620 (0.084)</td>
<td>-0.423 (0.090)</td>
<td>0.392 (0.122)</td>
<td>1.690 (0.241)</td>
<td>N/A</td>
</tr>
<tr>
<td>Income:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income 2</td>
<td>0.854 (0.098)</td>
<td>--</td>
<td>0.679 (0.209)</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Income 3</td>
<td>1.232 (0.104)</td>
<td>--</td>
<td>--</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Income 4</td>
<td>1.670 (0.112)</td>
<td>0.496 (0.130)</td>
<td>--</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Trip Purpose:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shopping</td>
<td>0.367 (0.109)</td>
<td>0.506 (0.117)</td>
<td>--</td>
<td>--</td>
<td>N/A</td>
</tr>
<tr>
<td>Personal</td>
<td>0.359 (0.099)</td>
<td>--</td>
<td>--</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Work</td>
<td>--</td>
<td>-0.490 (0.061)</td>
<td>--</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Eat Out</td>
<td>--</td>
<td>0.761 (0.101)</td>
<td>0.435 (0.165)</td>
<td>--</td>
<td>N/A</td>
</tr>
<tr>
<td>In-Vehicle Travel Time (minutes):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Elderly</td>
<td>-0.045 (0.010)</td>
<td>-0.065 (0.009)</td>
<td>-0.157 (0.007)</td>
<td>-0.057 (0.015)</td>
<td>-0.008 (0.005)</td>
</tr>
<tr>
<td>Elderly</td>
<td>-0.070 (0.025)</td>
<td>-0.160 (0.019)</td>
<td>-0.092 (0.036)</td>
<td>-0.014 (0.013)\textsuperscript{f}</td>
<td></td>
</tr>
<tr>
<td>Out-of-Vehicle Travel Time (minutes):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Elderly</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>-0.047 (0.005)</td>
</tr>
<tr>
<td>Elderly</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>-0.069 (0.013)</td>
</tr>
<tr>
<td>Auto Terminal Time (minutes)</td>
<td>-0.114 (0.010)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Transfers</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>-0.380 (0.110)</td>
</tr>
<tr>
<td>Travel Cost (dollars):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Elderly</td>
<td>-0.291 (0.096)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Elderly</td>
<td>-0.440 (0.097)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Parking Cost (dollars)</td>
<td>-0.174 (0.025)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

N = 17,737

\textsuperscript{a}Transit was considered to be the base case.

\textsuperscript{b}Standard errors in parentheses.

\textsuperscript{c}See Appendix C for T-statistic and P-value. Level of significance is greater than 90% unless otherwise specified.

\textsuperscript{d}Level of significance is greater than 80%.

\textsuperscript{e}Level of significance is greater than 70%.

\textsuperscript{f}Level of significance is greater than 60%.
5.6 Model Estimation Using Elderly and Retired as One Variable

The coefficients for another multinomial logit model for mode choice were estimated as shown in Table 5.5. A more detailed table including P-values is included as Appendix C. The difference between this model and the first model presented in Table 5.4 is that the model in Table 5.5 uses variables for elderly and retired, and elderly and not retired instead of considering elderly, and retired as separate variables. Like the first model, this model is intended to gain an understanding of travel behavior rather than predict future travel behavior. As in the first model, transit was used as the base case.

5.6.1 Elderly and Retired

The coefficients that related to elderly were consistent with the first model in that age was found to have a negative effect toward drive, passenger and walk as compared with transit. However, this model differed from the first model in that being elderly appeared to have a negative effect on bike. In the first model the elderly variable was eliminated from the bike utility function because it appeared not to be significant.

For the elderly and retired, walk was determined to be the least attractive mode all else being equal. For the elderly and not retired, drive was determined to be the least attractive mode all else being equal. This is surprising since people who are not retired would be expected to have a greater travel need and therefore drive more than those who are retired.

5.6.2 In-Vehicle Travel Time

Like the first model, the in-vehicle travel time coefficient for all modes is negative, which is reasonable. Another thing that is consistent with the first model is that for both the non-elderly and elderly, retired and not retired, transit had the least negative
coefficient. In addition, for the non-elderly, and elderly and not retired, walk had the greatest negative coefficient. Unlike the first model, bike has the greatest negative coefficient for the retired elderly.

A T-test was conducted to see if the in-vehicle travel time coefficients were significantly different for the retired elderly and not retired elderly. It was determined that only the coefficients for passenger and walk were significantly different at the 90% confidence level.

5.6.3 Out-of-Vehicle Travel Time

Like the first model, the out-of-vehicle travel time coefficient for transit is negative for the non-elderly and elderly, retired and not retired, which is reasonable. Also consistent with the first model is that for the non-elderly and elderly, retired and not retired, out-of-vehicle travel time had a greater negative effect on choosing transit than in-vehicle travel time. Also, out-of-vehicle travel time had the greatest negative effect on the not retired elderly and the least negative effect on the non-elderly.

A T-test was conducted to see if the out-of-vehicle travel time coefficients for transit were significantly different for the retired elderly and not retired elderly. It was determined that the coefficients were significantly different at the 90% confidence level.

5.6.4 Other Variables

The remaining variables were found to have coefficients that did not change very much from what was originally estimated and shown in Table 5.4.

5.6.5 Economic Value of Time

As previously described, the economic value of time was obtained by using a ratio of the estimated coefficients for in-vehicle travel time and travel cost for driving. The
economic value of time was calculated as $9.12 per hour for the non-elderly, $15.11 per hour for the retired elderly and $4.20 per hour for the not retired elderly in 1995 dollars. According to the Bureau of Labor Statistics Inflation Calculator, this is equal to present economic values of time for the non-elderly, retired elderly, and not retired elderly of $11.89 per hour, $19.70 per hour, and $5.48 per hour, respectively. The value of time for the non-elderly is close to that calculated using the first model. The value of time for the non-elderly being greater than the value of time for the not retired elderly is reasonable since the non-elderly would be expected to have less free time and therefore place a higher value on their time. It was not expected that the value of time for the retired elderly would be much higher than the value of time for the non-elderly. However, the economic value of time for the retired elderly was calculated using a coefficient for travel cost that was not significant at the 90% confidence level.

5.7 Independence From Irrelevant Alternatives Property

Preliminary tests for the independence from irrelevant alternatives indicate that the models estimated in this chapter failed. Further research might attempt to estimate a nested multinomial logit model for mode choice. However, this more advanced modeling is beyond the scope of this thesis.
Table 5.5. Coefficients for an Estimated Multinomial Logit Model for Mode Choice
Using Elderly and Retired as One Variable<sup>b,c</sup>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Drive</th>
<th>Passenger</th>
<th>Walk</th>
<th>Bike</th>
<th>Transit&lt;sup&gt;g&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative Specific</td>
<td>1.501 (0.132)</td>
<td>-0.195 (0.134)&lt;sup&gt;d&lt;/sup&gt;</td>
<td>3.055 (0.164)</td>
<td>-2.618 (0.326)</td>
<td>N/A</td>
</tr>
<tr>
<td>Constant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elderly Retired</td>
<td>-0.493 (0.254)</td>
<td>-0.399 (0.255)&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-1.151 (0.419)</td>
<td>-0.242 (0.873)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>N/A</td>
</tr>
<tr>
<td>Elderly Not Retired</td>
<td>-1.595 (0.613)</td>
<td>-1.235 (0.620)&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-1.085 (0.826)&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-0.465 (1.168)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>N/A</td>
</tr>
<tr>
<td>Gender</td>
<td>0.618 (0.084)</td>
<td>-0.412 (0.090)</td>
<td>0.389 (0.122)</td>
<td>1.646 (0.240)</td>
<td>N/A</td>
</tr>
<tr>
<td>Income:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income 2</td>
<td>0.853 (0.098)</td>
<td></td>
<td></td>
<td>0.641 (0.209)</td>
<td>N/A</td>
</tr>
<tr>
<td>Income 3</td>
<td>1.221 (0.104)</td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Income 4</td>
<td>1.668 (0.112)</td>
<td>0.507 (0.130)</td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Trip Purpose:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shopping</td>
<td>0.365 (0.109)</td>
<td>0.508 (0.117)</td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Personal</td>
<td>0.358 (0.099)</td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Work</td>
<td>-0.496 (0.061)</td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Eat Out</td>
<td>-0.757 (0.101)</td>
<td>0.433 (0.165)</td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>In-Vehicle Travel Time (minutes):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Elderly</td>
<td>-0.045 (0.010)</td>
<td>-0.065 (0.009)</td>
<td>-0.157 (0.007)</td>
<td>-0.049 (0.015)</td>
<td>-0.008 (0.005)</td>
</tr>
<tr>
<td>Elderly Retired</td>
<td>-0.071 (0.032)</td>
<td>-0.058 (0.027)</td>
<td>-0.143 (0.021)</td>
<td>-0.172 (0.079)</td>
<td>-0.007 (0.015)&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Elderly Not Retired</td>
<td>-0.093 (0.073)&lt;sup&gt;c&lt;/sup&gt;</td>
<td>-0.168 (0.067)</td>
<td>-0.251 (0.052)</td>
<td>-0.149 (0.082)</td>
<td>-0.045 (0.038)&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Out-of-Vehicle Travel Time (minutes):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Elderly</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>-0.047 (0.005)</td>
</tr>
<tr>
<td>Elderly Retired</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>-0.055 (0.013)</td>
</tr>
<tr>
<td>Elderly Not Retired</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>-0.177 (0.048)</td>
</tr>
<tr>
<td>Auto Terminal Time</td>
<td>-0.114 (0.010)</td>
<td></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>(minutes)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfers</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>-0.380 (0.110)</td>
</tr>
<tr>
<td>Travel Cost (dollars):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Elderly</td>
<td>-0.296 (0.096)</td>
<td></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Elderly Retired</td>
<td>-0.282 (0.302)&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Elderly Not Retired</td>
<td>-1.329 (0.502)</td>
<td></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Parking Cost (dollars)</td>
<td>-0.174 (0.025)</td>
<td></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

N= 17,737

* Transit was considered to be the base case.
* Standard errors in parentheses.
* See Appendix C for T-statistic and P-value. Level of significance is greater than 90% unless otherwise specified.
* Level of significance is greater than 80%.
* Level of significance is greater than 70%.
* Level of significance is greater than 60%.
* Level of significance is greater than 30%.
5.8 Sensitivity Analysis

Previous sections presented the interpretation of the estimation results for the two discrete choice models developed in this thesis. In general, the analysis of the signs of the coefficients and their relative magnitudes indicated that the results are intuitively correct. This section further illustrates the advantage of developing models, as opposed to simply relying on descriptive statistics, with the help of several figures created for particular individuals using the multinomial logit equation described in Section 5.2. Actual use of discrete choice models for prediction requires the aggregation of predictions over the population of interest, which is beyond the scope of this research. Still, it is hoped that the visualization of the implied trade-offs between explanatory variables in certain situations will better illustrate the models and some of their features that could potentially be used in policy analysis. All the following graphs were created by changing one variable while keeping all the other variables constant. When observing these graphs one must realize that in most situations this is not possible over a wide range of values since a significant change, for example, in the travel time of a mode may imply a change in the travel times of other modes.

The first model, which used elderly and retired as separate variables, was used to create all the figures in this section. Figure 5.2 shows the effect of changes in in-vehicle travel time (IVTT) for the drive and passenger modes on the probabilities of choosing drive, walk and transit. This scenario is for three male individuals (a non-elderly, a not retired elderly, and a retired elderly) who engage on a very short trip with an IVTT of about 1 minute for the transit mode. The travel time for bike and walk was assumed to be 4 and 10 minutes, respectively. It was also assumed that the individuals belong to
income category 3 (annual household income between $40,000 and $59,999), the trip purpose is work-related, the transit out-of-vehicle travel time (OVTT) is 5 minutes and no transfers are required, the auto terminal time is 6 minutes, the drive out of pocket travel cost is about $0.25 (in 1995 dollars), and the parking costs are $2.00. This scenario was selected to illustrate the case of a very short trip in which walking is a viable alternative. In order to make the figure less cluttered, the passenger and bike modes are not shown (the probabilities of those modes for this particular example are within the range of 0.03 to 0.05).

Figure 5.2 clearly shows the decline of the probability of driving as the travel time increases for all three individuals. At the same time, the probability of walking increases with increases in the drive IVTT whereas the probability of choosing transit increases only slightly. This implies little competition between the transit and drive modes for such short trips.

Figure 5.2 also illustrates the effect of being elderly and retired. As will be seen later, in general, being elderly decreases the probability of the drive mode. However, in this particular case being elderly and not retired increases it while it decreases the probability of walking and increases the probability of choosing transit. These results are intuitive. The elderly may have more problems walking so the decrease in probability translates into increases for the two other modes. For elderly retired the decrease in the probability of walking with respect to the same probability for the elderly not retired is even higher though the difference between retired and not retired is less than the difference between elderly and non-elderly. Notice that for the higher drive IVTTs the curves for the drive mode cross each other.
Since the main focus of this thesis is on the elderly behavior, the retired effect will not be considered in the rest of the illustrations.

Figure 5.3 shows the effect of changes in IVTT for the drive and passenger modes on the probabilities of choosing drive, passenger, bike and transit. This scenario is for two male individuals (a non-elderly and an elderly) who engage on a trip with about 10 minutes of IVTT for the transit mode or 25 minutes by bicycle (for such a trip, the probability of walking is negligible). It was assumed that the individuals belong to income category 3 (annual household income between $40,000 and $59,999), the trip purpose is work-related, the transit OVTI is 10 minutes and no transfers are required, the
auto terminal time is 6 minutes, the drive out of pocket travel cost is $0.50 (in 1995 dollars), and the parking costs are $2.00.

In this case, reductions in auto travel time below about 10 minutes for the non-elderly individual produce only minor increases in the probabilities of drive and passenger. Increases of up to about 10 minutes do not produce significant decreases in the same probabilities. It takes a considerable increase in auto travel time for the reduction in the probabilities of drive and passenger and the corresponding increase in the probability of choosing transit to be noteworthy. It should be remembered though that such a significant increase in the auto IVTT would probably also be associated with a increase in transit IVTT, which is not really considered in the graph and so real changes may be even less important than the ones shown in the figure.

Figure 5.3 shows that the effect of being elderly is really more substantial than that of auto IVTT. As one would expect, the elderly have a lower probability of driving and a higher probability of being a passenger or using transit than younger people. The bike probability increases with higher auto IVTT but the values are really low, which is consistent with the database from which the model was developed.
Figure 5.3. Example 2 - Effect of Changes in In-Vehicle Travel Time for Drive and Passenger on Mode Choice Probabilities (medium length trip)

The same trends are found on longer trips as illustrated in Figure 5.4 which shows the effect of changes in IVTT for the drive and passenger modes on the probabilities of choosing drive, passenger and transit probabilities. This scenario is for two male individuals (a non-elderly and an elderly) who engage on a trip with about 40 minutes of IVTT for the transit mode. The individuals belong to income category 3 (annual household income between $40,000 and $59,999), the trip purpose is work-related, the transit OVTT is 30 minutes and no transfers are required, the auto terminal time is 6 minutes, the drive out of pocket travel cost is $0.50 (in 1995 dollars), and the parking costs are $2.00.

The predicted probabilities or shares (if all individuals were identical and all the trips had the same characteristics) are affected more substantially for longer auto IVTT.
The predicted effect of being an elderly is also more significant and increases with the increases in auto IVTT.

Figure 5.4. Example 3 - Effect of Changes in In-Vehicle Travel Time for Drive and Passenger on Mode Choice Probabilities (long trip)

The analysis with the scenarios corresponding to Figures 5.3 and 5.4 were repeated but by looking at the effect of the transit IVTT. Figure 5.5 shows the effect of changes in IVTT for the transit modes on the probabilities of choosing drive, passenger, bike and transit. This scenario is for two male individuals (a non-elderly and an elderly) who engage on a trip with about 10 minutes of IVTT for the drive and passenger modes or 25 minutes by bicycle. It was assumed that the individuals belong to income category 3 (annual household income between $40,000 and $59,999), the trip purpose is work-related, the transit OVTT is 10 minutes and no transfers are required, the auto terminal
time is 6 minutes, the drive out of pocket travel cost is $0.70 (in 1995 dollars), and the parking costs are $2.00.

As shown in Figure 5.5, it was found the probabilities are relatively insensitive to changes in the transit IVTT for trips with auto IVTT of about 10 minutes. The age effect is similar to the one discussed before.

Figure 5.5. Example 4 - Effect of Changes in In-Vehicle Travel Time for Transit on Mode Choice Probabilities (medium trip)

Figure 5.6 shows the effect of changes in IVTT for the transit modes on the probabilities of choosing drive, passenger and transit. This scenario is for two male individuals (a non-elderly and an elderly) who engage on a trip with about 40 minutes of IVTT for the drive and passenger modes. The individuals belong to income category 3 (annual household income between $40,000 and $59,999), the trip purpose is work-
related, the transit OVTT is 30 minutes and no transfers are required, the auto terminal time is 6 minutes, the drive out of pocket travel cost is $1.50 (in 1995 dollars), and the parking costs are $2.00.

Again, the transit IVTT does seem to have an effect but it does not affect the probabilities substantially. The age effect is similar to the one discussed before but it is more pronounced, much more than the effect of the transit IVTT.

Figure 5.6. Example 5 - Effect of Changes in In-Vehicle Travel Time for Transit on Mode Choice Probabilities (long trip)

Figure 5.7 shows the effect of changes in out-of-vehicle travel time (OVTT) for the transit mode on the probabilities of choosing drive, passenger and transit. This scenario is for two male individuals (a non-elderly and an elderly) who engage on a trip with about 40 minutes of IVTT for the auto, passenger and transit modes. The
individuals belong to income category 3 (annual household income between $40,000 and $59,999), the trip purpose is work-related, no transfers are required, the auto terminal time is 6 minutes, the drive out of pocket travel cost is $1.50 (in 1995 dollars), and the parking costs are $2.00.

As illustrated in Figure 5.7, the estimated model indicates that the transit OVTI has a substantial effect on the choice between drive, passenger and transit. Naturally, increasing the transit OVTI increases the probabilities of choosing drive or passenger and decreases the probability of choosing transit. It is noteworthy to see the different effects that a reduction in transit OVTI has on the probabilities for the elderly and the non-elderly.

Figure 5.7. Example 6 - Effect of Changes in Out-of-Vehicle Travel Time for Transit on Mode Choice Probabilities
Finally, Figures 5.8 and 5.9 show the effect of changes in out of pocket cost for drive on the mode choice probabilities. These scenarios are for two male individuals (a non-elderly and an elderly who belong to income category 3 (annual household income between $40,000 and $59,999), the trip purpose is work-related, no transfers are required, the auto terminal time is 6 minutes, and the parking costs are $2.00. Figure 5.8 assumes a 10-minute IVTT for the auto, passenger modes, and transit modes or 25 minutes by bicycle. Figure 5.9 assumes a 40-minute IVTT for the auto, passenger, and transit modes.

As one would expect, costs seem to have a significant effect on mode choices for a 10-minute trip and for a 40-minute trip respectively. As a reference to interpret the figures, it should be mentioned that reasonable out of pocket costs in 1995 dollars for the trips shown in Figures 5.8 and 5.9 were $0.50 and $2.00, respectively. As before, being an elderly reduces the probability of choosing drive and increases the probability of being a passenger or choosing transit. The effect of age is again substantial, about the same order of magnitude as the out of pocket costs and increases with the trip length (i.e., if we compare the two figures). Unfortunately, the effect of the transit fare cannot be determined from this model since the fare was fixed.
Figure 5.8. Example 7 - Effect of Changes in Travel Cost for Drive on Mode Choice Probabilities (medium trip)
In summary, the effect of the elderly variable is generally quite significant when compared with other variables that are usually considered in transportation planning studies. Thus, more attention should be paid to this subject given the trends in population aging. Notice that this does not necessarily imply that the aging of the population will produce dramatic changes in the shares of the different transportation modes. As was illustrated in the previous figures, the effects of most variables are significant but relatively mild. For reasonable values of the input variables, the predicted probabilities are consistent with observed mode shares.
CHAPTER 6
CONCLUSIONS AND RECOMMENDATIONS

The number of elderly Hawaii residents is expected to more than double from 2000 to 2030. In addition, they elderly is projected to become a larger proportion of the total population of Hawaii during the next 25 years. Therefore, their travel needs should be considered. However, a literature review revealed only one previous study on the travel behavior of the elderly on Oahu, which is dated 1980 and was conducted by the Oahu Metropolitan Planning Organization (OMPO) and the City and County of Honolulu, Department of Transportation Services (DTS). This 1980 study used national data to estimate transportation demands due to the lack of local data. The objective of this thesis is to gain an understanding of the travel behavior of the elderly on the Island of Oahu, and compare the travel behavior of the elderly with the travel behavior of younger people.

There are two major issues about the transportation needs of the elderly of which the first is the needs of older drivers and the second is the travel behavior of the elderly. The Older Driver Highway Design Handbook (1998) was created to address the needs of older drivers and is intended to supplement existing design manuals and standards. A review of literature about the travel behavior of the elderly indicated that there are previous studies both of the descriptive nature and studies that estimated models. These studies indicated the following factors may influence travel behavior: age, gender, medical condition, ability to drive, cost of a trip, residential location (suburb vs. city), trip purpose, day of the week, time of day, income, and availability of a private vehicle.
In general, elderly travel less, and make less work and work-related trips than younger adults. Some elderly will take fewer trips or no trips under certain circumstances with medical conditions likely to result in less travel. However, personal vehicle was found to be the dominant mode of travel for adults aged 65 and older.

Person, household and activity data files from OMPO’s 1995 Household Interview Survey, which was conducted as part of their Travel Forecasting Model Development Project and included detailed travel information collected via one-day travel diaries for 4,060 households, was used for this thesis. First, the OMPO data had to be manipulated to join the person, household and activity data. In addition, travel distances and travel times were extracted from the loaded OMPO highway and transit networks. A loaded network means that users are being assigned to routes based on traffic conditions and minimum impedance algorithms. Data were weighted to reflect the entire population of Oahu and descriptive statistics indicated that for both the elderly and non-elderly, most trips were made by private vehicle as either a driver or passenger. Also, a higher proportion of trips made by the non-elderly were made by driving as compared to the elderly.

Unweighted data were then formatted to input to the computer program NLOGIT and two multinomial logit models for mode choice were estimated. These results of the model estimation are described below. A negative effect indicates that users are less likely to choose a given mode.

- Being elderly was found to have a negative effect toward drive, passenger and walk as compared with transit.

- Being retired was found to have a negative effect toward drive, passenger, walk and bike as compared with transit.
• For trips with longer travel times, walking was found to be the least preferred mode and transit was found to be the most preferred mode for both the elderly and non-elderly.

• Out-of-vehicle travel time had a greater negative effect on choosing transit than in-vehicle travel time for both the elderly and non-elderly, but had a greater negative effect on the elderly than for the non-elderly.

• Using a model with retired and elderly as separate variables, the economic value of time was calculated as $9.28 per hour for the non-elderly and $9.55 per hour for the elderly in 1995 dollars. This is equal to economic values of time for the non-elderly and elderly of $12.10 per hour and $12.45 per hour, respectively.

• Walk was determined to be the least attractive mode for retired elderly, and for not retired elderly, drive was determined to be the least attractive mode with respect to age and retirement status.

• Using a model with elderly and retired as one variable, the economic value of time was calculated as $9.12 per hour for the non-elderly, $15.11 per hour for the retired elderly and $4.20 per hour for the not retired elderly in 1995 dollars. This is equal to present economic values of time for the non-elderly, retired elderly, and not retired elderly of $11.89 per hour, $19.70 per hour, and $5.48 per hour, respectively.

Future research could estimate a nested multinomial logit model to eliminate the problem of the independence from irrelevant alternatives property.
REFERENCES


Oahu Metropolitan Planning Organization, Household Travel Survey One-Day Diary, 1995.

Oahu Metropolitan Planning Organization, Travel Forecasting Model Development Project data files.


United States Census Bureau, Census 2000 Data.


United States Census Bureau, Tiger Maps.
APPENDIX A
TRAVEL DIARY USED FOR THE 1995 HOUSEHOLD INTERVIEW SURVEY

TravelCount
Oahu Metropolitan Planning Organization

1995
Household Travel Survey
One-Day Diary
for
WEDNESDAY

Your diary date: ___________________________
month day

Your name: ________________________________

Your month and year of birth: _____________________________
month year

Are you (check one): □ male □ female

Your Information Counts
No matter how much or how little you travel, YOU ARE IMPORTANT. You
are one of the few people selected to help us understand travel patterns on Oahu.
Questions?
call
XXX-XXXX

Mahalo!
for agreeing to take part in this
important study for the
Oahu Metropolitan Planning Organization

Your Information Counts!

No matter how much or how little you travel, YOU ARE IMPORTANT! You are one of the few people selected to help us understand travel patterns on Oahu.

By completing this one-day diary, you will be providing information that will help make improvements in transportation on the island. Please fill out the diary as completely as possible. Each member of your household must complete a diary on the same day. Please have an adult fill out diaries for small children and infants. All the information you fill in on these forms will be kept completely confidential. Your privacy is VERY important to us!
Instructions

1. Complete Section 1, Individual Information, starting on page 4.
2. If you are a student or in day-care, complete Section 2, Student/Day-Care Information, which also starts on page 4.
3. If you are employed, complete Section 3, Worker/Job Information, starting on page 6.
4. During your assigned Diary Day, you can use the Memory Jogger on the next page to keep track of your activities. Then, at the end of your Diary Day, turn to page 13 and fill out the Activity Pages, which ask:
   - The activity
   - What time the activity started and stopped
   - The name of the place and the address where the activity happened
   - How you traveled to the activity location
5. Every time you stop to do something outside your home, no matter how long it takes, it's a separate activity. The following are examples:
   - Dropping someone off or picking someone up
   - Eating at a restaurant
   - Visiting a dentist or doctor
   - Shopping
   - Stopping to buy gas
   - Running errands (bank, ATM machine, dry cleaners, etc.)
6. If you leave the Island of Oahu, check "Off-Island activities." Consider everything you do off the island as one activity. Report the time you start and finish your "off-island activities." Be sure to write in how you got off the island, either "airplane" or "boat." Continue filling out Activity Pages in the diary if you return to Oahu on your diary day.
7. Activities you do in your home that are job-related should be recorded separately from your other at-home activities.
8. Work with other members of your household to complete the two-sided Household/Vehicle Information Form, included in the packet of survey materials. Be sure to record the odometer reading for each vehicle at the beginning and end of your assigned Diary Day.
9. When you have completed your diary, place it with the completed diaries from other members of your household near the telephone. We will call you to collect the information. Do not mail the diaries back to us.

Mahalo!
Remember, if you need help or have questions, call the hotline at [XXX-XXXX]
<table>
<thead>
<tr>
<th>#</th>
<th>Start Time</th>
<th>Activity</th>
<th>Location</th>
<th>Stop Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3:00am</td>
<td>At Home</td>
<td>Home</td>
<td>7:45am</td>
</tr>
<tr>
<td>2</td>
<td>7:50am</td>
<td>School drop-off</td>
<td>Lincoln Elementary</td>
<td>7:55am</td>
</tr>
<tr>
<td>3</td>
<td>8:20am</td>
<td>At Work</td>
<td>Bishop Square</td>
<td>11:15am</td>
</tr>
<tr>
<td>4</td>
<td>11:55am</td>
<td>Lunch meeting</td>
<td>Campus Center</td>
<td>1:15pm</td>
</tr>
<tr>
<td>5</td>
<td>1:50pm</td>
<td>Run errand</td>
<td>Liberty House</td>
<td>2:00pm</td>
</tr>
<tr>
<td>6</td>
<td>2:10pm</td>
<td>At Work</td>
<td>Bishop Square</td>
<td>5:30pm</td>
</tr>
<tr>
<td>7</td>
<td>3:40pm</td>
<td>At Meeting</td>
<td>Amfac Building</td>
<td>4:45pm</td>
</tr>
<tr>
<td>8</td>
<td>4:55pm</td>
<td>At Work</td>
<td>Bishop Square</td>
<td>5:30pm</td>
</tr>
<tr>
<td>9</td>
<td>6:10pm</td>
<td>Grocery Shopping</td>
<td>Enchanted Lake Safeway</td>
<td>8:25pm</td>
</tr>
<tr>
<td>10</td>
<td>6:30pm</td>
<td>Dinner</td>
<td>Friends' house</td>
<td>9:00pm</td>
</tr>
<tr>
<td>11</td>
<td>9:30pm</td>
<td>At Home</td>
<td>Home</td>
<td>3:00am</td>
</tr>
</tbody>
</table>

Do not include travel as an activity.
**MEMORY JOGGER**

Please fill out during the DIARY DAY

<table>
<thead>
<tr>
<th>#</th>
<th>Start Time</th>
<th>Activity</th>
<th>Location</th>
<th>Stop Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3:00am</td>
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<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Section 1: Individual Information

1. Do you have any disability that limits the type of transportation you can use?
   - Yes
   - No, go to 3

2. If yes, what type of disability?
   - Visual or blind
   - Hearing impaired or deaf
   - Cane or walker
   - Wheelchair non-transferable
   - Wheelchair transferable
   - Other (specify): ________________________________

3. Which of the following best describes you? (Check up to TWO options)
   - Child/Infant not enrolled in school or day-care
   - Child/Infant enrolled in day-care
   - Full-time student
   - Part-time student
   - Employed full-time (30 hours or more per week)
   - Employed part-time (less than 30 hours per week)
   - Self-employed full-time (30 hours or more per week)
   - Self-employed part-time (less than 30 hours per week)
   - Retired
   - Full-time homemaker
   - Unemployed, but looking for work
   - Unemployed, not seeking work
   - Go to page 10 if Child/Infant, to page 6 if employed, to page 9 if retired.

Section 2: Student/Day-Care Information

4. What type of school or day-care are you enrolled in? (Check one. If enrolled in both school and day-care, check school only.)
   - Day-care
   - Pre-school
   - Kindergarten or Elementary school (includes grades K-6)
   - Secondary school (includes grades 7-12)
   - Vocational or Technical school
   - College or University

5. Name of your school or day-care: (If enrolled in both school and day-care, write in name of school only.)
   - School or day-care: ________________________________

6. Address of your school or day-care:

   ___________________________________________________
7. How many days per week do you go to this school or day-care?

\[ \text{days per week} \]

8. Did you go to this school or day-care on the diary day?
   - [ ] No
   - [ ] Yes, go to 10

9. If no, why not? (check one)
   - [ ] Sick
   - [ ] Family emergency
   - [ ] Spring break
   - [ ] I didn't have any classes scheduled
   - [ ] School didn't hold classes
   - [ ] Other (specify): ______________________

10. From the list of transportation choices below, choose one that you use most often to get to school or day-care. Pick the one you use for the greatest amount of time during your trip to school or day-care.

   - [ ] Walk or wheelchair
   - [ ] TheBus
   - [ ] School bus
   - [ ] Subscription bus (private, paid subscriptions only)
   - [ ] HandiVan
   - [ ] Passenger in car, van, light truck or truck
   - [ ] Driver of car, van, light truck or truck
   - [ ] Motorcycle
   - [ ] Moped
   - [ ] Taxi
   - [ ] Bicycle
   - [ ] Other (specify): ______________________

11. If you are a high school or college student, how much does it cost you to park your vehicle at school? (If you do not drive, please estimate how much it would cost.)

   \[ \$ \]

   - [ ] per hour
   - [ ] per day
   - [ ] per week
   - [ ] per month
   - [ ] per quarter
   - [ ] per semester
   - [ ] per school year

If you are employed, continue on page 6.
Otherwise, go to 44 on page 9.
Section 3: Worker/Job Information

12 Is your main employer:
   □ Private company  □ Myself
   □ Government  □ Other (specify):

13 Which activity best describes your main job? (check one):
   □ Agriculture/Fishing
   □ Construction
   □ Manufacturing
   □ Transportation/Communication/Utilities
   □ Wholesale trade
   □ Retail trade
   □ Finance/Insurance/Real Estate
   □ Hotel
   □ Restaurant
   □ Personal Services
   □ Repair and Business Services
   □ Health Services
   □ Other Professional Services
   □ Education
   □ Public Administration/Public Safety
   □ Entertainment/Recreation
   □ Military
   □ Other (specify):

14 Of the jobs listed below, which one best describes your occupation? (check one):
   □ Executive, administrative or managerial
   □ Professional or technical (engineer, teacher, etc.)
   □ Technician or related support
   □ Sales
   □ Production, craft & repair/machine operator, assembler or Inspector
   □ Private household, protective service or other service
   □ Farming, forestry or fishing
   □ Administrative support or clerical
   □ Transportation or material moving (vehicle operator, construction or laborer)
   □ Other (specify):

15 Name of your main employer:
   Company: ____________________________ or
   □ I am self-employed

16 Address of your main workplace:
   ____________________________
   □ My main workplace is my home

17 How long have you been working at your main job? □ Less than one year ______ years

18 Did you work at your main job location on your diary day?
   □ No  □ Yes, go to 19  
   If no, why not?
   □ Sick  □ Regular day off
   □ Compressed work week day off  □ Vacation or Holiday
   □ Family emergency  □ Worked second job
   □ Went to different location for business reasons
   □ Went to school  □ Other (specify):

19 On average, how many days per week do you work at your main job?
   ____________________________ days per week
If your main workplace is your home, go to 35 on page 8.

20 On average, how many days per week do you work at home for your main job instead of going to your workplace? Sometimes this is called telecommuting.

<table>
<thead>
<tr>
<th>days per week</th>
</tr>
</thead>
</table>

21 From the list of transportation choices below, choose the one that you use most often to get to your main job. Pick the one you use for the greatest amount of time during your trip to this job.

- Walk or wheelchair
- TheBus
- School bus
- Subscription bus (private, paid subscriptions only)
- HandVan
- Passenger in car, van, light truck or truck
- Driver of car, van, light truck or truck
- Motorcycle
- Moped
- Taxi
- Bicycle
- Other (specify): __________________________

22 If you travel in a private vehicle, how many other people travel with you to work?

| people |

23 Do you usually need a vehicle at work for business purposes?  □ Yes  □ No

24 How much does it cost you to park your vehicle at work? (If you do not drive, please estimate how much it would cost.)

<table>
<thead>
<tr>
<th>per hour</th>
<th>per day</th>
<th>per week</th>
<th>per month</th>
<th>per quarter</th>
<th>per semester</th>
</tr>
</thead>
</table>

25 Where do you or would you park your vehicle at work?

- In a parking lot or garage at work
- In a parking lot or garage off-site
- On the street
- I would never drive to work (Go to 27 )

26 How long in minutes do you or would you walk from this parking area to work?

| minutes |

27 Does your employer offer to pay for all or part of the cost of bus passes?

- Yes, all or part
- No, go to 28

28 What does it cost you to buy a bus pass?

| per month |

□ Don't know
At your main job do you work a schedule or shift that changes on a regular basis?

☐ Yes  ☐ No, my schedule is usually about the same (Go to 36)

How often does the shift change? (check one and skip to 39)

☐ Every week  ☐ Every quarter
☐ Every month  ☐ Other interval (specify):

What time do you typically START work at your main job?

☐ am  ☐ pm

What time do you typically END work at your main job?

☐ am  ☐ pm

Are your start and stop times at your main job about the same every day?

☐ Yes, go to 36
☐ No

How much can your main job's start time vary from the usual start time? (check one)

☐ Up to 15 minutes or less
☐ Up to 30 minutes or less
☐ Up to 60 minutes or less
☐ Up to 2 hours or less
☐ Other (specify): __________

How much can your main job's end time vary from the usual end time? (check one)

☐ Up to 15 minutes or less
☐ Up to 30 minutes or less
☐ Up to 60 minutes or less
☐ Up to 2 hours or less
☐ Other (specify): __________

Do you have more than one job? (check one)

☐ Yes  ☐ No, go to 42

Name of your second employer:

Company: __________________________

☐ My second job is self-employment

Is your second employer:

☐ A private company  ☐ Myself
☐ Government  ☐ Other (specify): __________

Address of your second workplace:

☐ My second workplace is my home
35 Which activity best describes your second job? (check one)
- Agriculture/Fishing
- Construction
- Manufacturing
- Transportation/Communication/Utilities
- Wholesale trade
- Retail trade
- Finance/Insurance/Real Estate
- Hotel
- Restaurant
- Personal Services
- Repair and Business Services
- Health Services
- Other Professional Services
- Education
- Public Administration/Public Safety
- Entertainment/Recreation
- Military
- Other (specify): ____________________________

36 Of the jobs listed below, which one best describes your second job? (check one)
- Executive, administrative or managerial
- Professional or technical (engineer, teacher, etc.)
- Technician or related support
- Sales
- Production, craft & repair/machine operator, assembler or inspector
- Private household, protective service or other service
- Farming, forestry or fishing
- Administrative support or clerical
- Transportation or material moving (vehicle operator, construction or laborer)
- Other (specify): ____________________________

37 On average, how many days per week do you work at your second job?
- ______ days per week

38 On average, how many days per week do you work at home for your second job instead of going to your workplace? Sometimes this is called telecommuting.
- ______ days per week

39 What time do you typically START work at your second job? (check am or pm)
- ______ am
- ______ pm
- It varies a lot

40 What time do you typically END work at your second job? (check am or pm)
- ______ am
- ______ pm
- It varies a lot

41 What was the name of your previous main employer?
- Company: ____________________________
- No previous employer

42 Was your previous main employer:
- A private company
- Myself
- Government
- Other (specify): ____________________________

43 What was the zip code and/or community of your previous main job?
- _______ and/or
- Previous main job not in the state of Hawaii

44 In what year did you leave your previous main job?
- _______
Example

Below is an example to show you how to record your activities during your Diary Day. This page has been completed for Activity 4 from the example Memory Jogger on page 2.

### Activity 4

1. **What was the next thing you did? (check ONE only)**
   - At home activities
   - Work at home or second job
   - All other at home (cooking, sleep)
   - Picking up or dropping off other people
   - At that workplace
   - At that school
   - At another location (specify)
   - Off-island activities

2. **Other activities away from home**
   - Work
   - School (including college or university)
   - Church (day school or after school care)
   - Eating out
   - Shopping
   - Social activities or Recreation
   - Volunteer work
   - Racing, Medical or Personal Business
   - Other (specify)

3. **What time did you:**
   - Start this activity? 11:55
   - Stop this activity? 1:15

4. **Where were you?**
   - At home
   - At my work
   - At my school
   - At another location (specify)

5. **What was the next thing you did? (check ONE only)**
   - At home activities
   - Work at home (first or second job)
   - All other at home (cooking, sleep)
   - Picking up or dropping off other people
   - At that workplace
   - At that school
   - At another location (specify)
   - Off-island activities

6. **Other activities away from home**
   - Work
   - School (including college or university)
   - Church (day school or after school care)
   - Eating out
   - Shopping
   - Social activities or Recreation
   - Volunteer work
   - Racing, Medical or Personal Business
   - Other (specify)

7. **How many other people traveled with you all the way to this new location?**
   - 1 person

8. **How many of these were members of your household? (don’t count yourself)**
   - 0 people

9. **How did you get to this new location?**
   - Walk or Wheelchair
   - TheBus
   - School bus
   - Suburban bus, public transportation
   - Motorcycle
   - Bicycle
   - Car
   - Rail
   - Other (specify)

1. The person went to a lunch meeting, so the activity is work-related.
2. The person was at the meeting from 11:55 a.m. until 1:15 p.m.
3. The activity was not at a shopping mall or shopping center, so the person skipped this question.
4. The activity was at a new location, so the person filled out the address.
5. One other person went to the meeting. This other person was not a member of the same household.
6. Both people took TheBus to the meeting.
Bus or HandiVan

What bus route(s) did you use to make this trip?

<table>
<thead>
<tr>
<th>#1</th>
<th>#2</th>
<th>#3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Where did you board the first bus?

Hotel and Bishop

How did you get to the first bus stop?

- Train
- Walk
- Van passenger
- Vehicle driver
- Bicycle

How did you pay your fare?

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
<td></td>
</tr>
<tr>
<td>No fare paid</td>
<td>(check here if applicable)</td>
</tr>
<tr>
<td>Other (specify):</td>
<td></td>
</tr>
</tbody>
</table>

Where did you get off the last bus?

University and Seaview

How did you get from the last bus to your final destination?

- Train
- Walk
- Van passenger
- Vehicle driver
- Bicycle

Private Vehicle

Did you use one of the vehicles listed on the Vehicle Form for this trip?

- Yes
- No

Were you dropped off?

- Yes
- No

Where was the vehicle parked?

- Co-parking
- Home driveway/parking garage
- Business parking lot
- Other (specify):

If this place was not your main job or your school, how much did parking cost you? (check as many as apply)

<table>
<thead>
<tr>
<th>Description</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free</td>
<td></td>
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<tr>
<td>100</td>
<td></td>
</tr>
<tr>
<td>200</td>
<td></td>
</tr>
<tr>
<td>300</td>
<td></td>
</tr>
<tr>
<td>400</td>
<td></td>
</tr>
<tr>
<td>Over 400</td>
<td></td>
</tr>
</tbody>
</table>

Taxi

How much was the fare, including tip?

- $ _ _ _ _

Will you be reimbursed?

- Yes
- No

Walk/Wheelchair/Bicycle

How far did you travel in blocks or miles?

- Blocks
- Miles

STOP! Was this the last activity of your day?

If yes, go to page 40. If no, check that the time you finished this activity and the time you started the next activity are correct. The time between activities should be your travel time. Please turn the page and tell us about your next activity.

7 They first rode the #1 bus and then transferred to the #6 bus to get to the meeting. They got on the #1 bus at the corner of Hotel and Bishop Streets. They walked to that bus stop. The person paid the bus fare with a monthly pass. Both people got off the #6 bus at the corner of University and Seaview. They walked from the bus stop to the meeting at Campus Center.
HINTS on How to Fill Out Your One-Day Diary

Do not include travel as an activity.

When recording ACTIVITIES, do not include travel to and from the places you go to as an activity.

Walking and jogging are at-home activities.

Walking for exercise, jogging in your neighborhood, and walking the dog are AT HOME ACTIVITIES.

- Do you drive for a living?

If your work involves constant travel - truck driver, traveling sales person, mail delivery - record all stops for work as one on-going "work" activity. If you stop for lunch or personal errands during your work day, record these as separate activities.

Buying gas, banking, etc. are activities.

If you stop to buy gas, mail letters, do some banking at an ATM, or make any other brief stop in your day, please fill out an Activity Page about it.

Record how you get to each activity.

If you take public transit (TheBus, HandiVan, a school bus, or a subscription bus) for any part of your trip, choose that in 6 on the Activity Page. If you take only other types of transportation, choose the type you used for the longest time on that trip. Then complete Section 7, 8, 9 or 10 on the Activity Page as directed.

Check your travel time.

If you travel to a new location between activities, the time between one activity's stop time and the next activity's start time should equal your travel time. If you don't travel between activities, one activity's stop time and the next activity's start time should be the same.
Activity 1

1. What were you doing at 3 a.m.? (check ONE only)

At home activities
☐ Work at home (for main or second job)
☐ All other at home (including sleep)

Picking up or dropping off other people
☐ At their workplace
☐ At their school
☐ At another location (specify): ____________

☐ Off-island activities

Other activities away from home
☐ Work
☐ Work-related
☐ School (including College or University)
☐ Childcare (day care or after school care)
☐ Buying gas
☐ Eating out
☐ Shopping
☐ Social activities or Recreation
☐ Volunteer work
☐ Errand, Medical or Personal Business
☐ Other (specify): ________________

2. Where were you?

☐ At my home
☐ At my main job
☐ At my second job
☐ At my school
☐ At another location

3. What time did you stop this activity?

☐ [ ] am
☐ [ ] pm

4. STOP! Was this the last activity of your day?

If yes, go to page 40. If no, check that the time you finished this activity and the time you start the next activity are correct. The time between activities should be your travel time. Please turn the page and tell us about your next activity.
**Activity 2**

1. **What was the next thing you did?** (check **ONE** only)
   - At home activities
     - Work at home (for main or second job)
     - All other at home (including sleep)
   - Picking up or dropping off other people
     - At their workplace
     - At their school
     - At another location (specify): _______________________
   - Off-island activities
     - Other activities away from home
     - Work
     - Work-related
     - School (including College or University)
     - Childcare (day care or after school care)
     - Buying gas
     - Eating out
     - Shopping
     - Social activities or Recreation
     - Volunteer work
     - Banking, Medical or Personal Business
     - Other (specify): _______________________

2. **What time did you:**
   - start this activity? ____________ am/pm
   - stop this activity? ____________ am/pm

3. **If you were at a shopping mall or center:**
   - How many stores did you go into in the mall or shopping center? ____________
   - Did you eat at the mall or shopping center? __Yes__ __No__

4. **Where were you?**
   - Same place as last activity (Go to 1)
   - At my home
   - At my main job
   - At my second job
   - At my school
   - At another location (Complete shaded area) ____________

5. **How many other people traveled with you all the way to this new location?** (don't count yourself)
   - How many of these were members of your household? (don't count yourself) ____________

6. **How did you get to this new location?** Choose One
   - Go to Section ____________
   - Walk or Wheelchair ____________
   - TheBus ____________
   - School bus ____________
   - Subscription bus (private, paid subscriptions only) ____________
   - HandiVan ____________
   - Passenger in car, van, light truck or truck ____________
   - Driver of car, van, light truck or truck ____________
   - Motorcycle ____________
   - Moped ____________
   - Taxi ____________
   - Bicycle ____________
   - Other (specify): ________________________

14
Bus or HandiVan

What bus route(s) did you use to make this trip?

[ ] first bus  [ ] second bus  [ ] third bus

Where did you board the first bus?

How did you get to the first bus stop?

[ ] Taxi  [ ] Walk  [ ] Vehicle passenger  [ ] Vehicle driver  [ ] Bicycle

How did you pay your fare?

[ ] Pass  [ ] What kind of pass was it?  [ ] Monthly  [ ] Student  [ ] Senior citizen/handicapped  [ ] Other (specify):

[ ] Cash  [ ] No fare paid (school bus/free shuttle)  [ ] Other (specify):

[ ] Other (specify):

Where did you get off the last bus?

How far did you travel in blocks or miles?

[ ] Taxi  [ ] Walk  [ ] Vehicle passenger  [ ] Vehicle driver  [ ] Bicycle

How did you get from the last bus to your final destination?

[ ] Taxi  [ ] Walk  [ ] Vehicle passenger  [ ] Vehicle driver  [ ] Bicycle

11 STOP! Was this the last activity of your day?

If yes, go to page 40. If no, check that the time you finished this activity and the time you start the next activity are correct. The time between activities should be your travel time. Please turn the page and tell us about your next activity.

Private Vehicle

Did you use one of the vehicles listed on the Vehicle Form for this trip?

[ ] No  [ ] Yes → Make  Model

Were you dropped off?

[ ] No  [ ] Yes (Go to 13)

Where was the vehicle parked?

[ ] On-street parking  [ ] Home driveway/carport/garage  [ ] Parking structure  [ ] Valet parked  [ ] Street-level parking lot  [ ] Other (specify):

If this place was not your main job or your school, how much did parking cost you? (check as many as apply)

[ ] Free  [ ] Validation  [ ] Reimbursed by employer  [ ] Paid $ __________

Taxi

How much was the fare, including tip? $ __________

Will you be reimbursed?

[ ] Yes  [ ] No

Walk/Wheelchair/Bicycle

How far did you travel in blocks or miles?

circle one

blocks

miles
### Activity 3

**1. What was the next thing you did? (check ONE only)**
- Work at home (for main or second job)
- All other at home (including sleep)
- Picking up or dropping off other people
  - At their workplace
  - At their school
  - At another location (specify):
- Off-work activities
- Other activities away from home
  - Work
  - Work-related
  - School (including college or university)
  - Children (day care or after school care)
  - Buying gas
  - Eating out
  - Shopping
  - Social activities or recreation
  - Volunteer work
  - Banking, Medical or Personal Business
  - Other (specify):

**2. What time did you:**
- start this activity? [ ] am [ ] pm
- stop this activity? [ ] am [ ] pm

**3. If you were at a shopping mall or center:**
- How many stores did you go into in the mall or shopping center? [ ] stores
- Did you eat at the mall or shopping center? [ ] Yes [ ] No

**4. Where were you?**
- Same place as last activity (Go to 11)
- At my home
- At my main job
- At my second job
- At my school
- At another location (specify):

**5. How many other people traveled with you all the way to this new location?**
- How many of these were members of your household? __________ people
  (don't count yourself)

**6. How did you get to this new location?**
- Choose One
  - Walk or Wheelchair
  - TheBus
  - School bus
  - Subscription bus (private, paid subscriptions only)
  - HandiVan
  - Passenger in car, van, light truck or truck
  - Driver of car, van, light truck or truck
  - Motorcycle
  - Moped
  - Taxi
  - Bicycle
  - Other (specify): [ ]
7. **Bus or HandiVan**

What bus route(s) did you use to make this trip?
- [ ] First bus
- [ ] Second bus
- [ ] Third bus

Where did you board the first bus?

How did you get to the first bus stop?
- [ ] Taxi
- [ ] Walk
- [ ] Vehicle passenger
- [ ] Vehicle driver
- [ ] Bicycle

How did you pay your fare?
- [ ] Pass: What kind of pass was it?
- [ ] Monthly
- [ ] Student
- [ ] Senior citizen/ handicapped
- [ ] Other (specify):
- [ ] Cash
- [ ] No fare paid (school bus/free shuttle)
- [ ] Other (specify):

Where did you get off the last bus?

How did you get from the last bus to your final destination?
- [ ] Taxi
- [ ] Walk
- [ ] Vehicle passenger
- [ ] Vehicle driver
- [ ] Bicycle

8. **Private Vehicle**

Did you use one of the vehicles listed on the Vehicle Form for this trip?
- [ ] No
- [ ] Yes

Make:

Model:

Were you dropped off?
- [ ] No
- [ ] Yes (Go to 11)

Where was the vehicle parked?
- [ ] On-street parking
- [ ] Home driveway/garage
- [ ] Parking structure
- [ ] Visitor parked
- [ ] Street-level parking lot
- [ ] Other (specify):

If this place was not your main job or your school, how much did parking cost you? (Check as many as apply)
- [ ] Free
- [ ] Validated
- [ ] Reimbursed by employer
- [ ] Paid $

9. **Taxi**

How much was the fare, including tip?

$__

Will you be reimbursed?
- [ ] Yes
- [ ] No

10. **Walk/Wheelchair/Bicycle**

How far did you travel in blocks or miles?

Blocks:

Miles:

11. **STOP! Was this the last activity of your day?**

If yes, go to page 40.

If no, check that the time you finished this activity and the time you start the next activity are correct. The time between activities should be your travel time. Please turn the page and tell us about your next activity.
Activity 4

1. What was the next thing you did? (check ONE only)
   - At home activities
   - Work at home (for main or second job)
   - All other at home (including sleep)
   - Picking up or dropping off other people
     - At their workplace
     - At their school
     - At another location (specify):
   - Off-site activities
   - Work
   - Work-related
   - School (including College or University)
   - Childcare (day care or after school care)
   - Buying gas
   - Eating out
   - Shopping
   - Social activities or Recreation
   - Volunteer work
   - Banking, Medical or Personal Business
   - Other (specify):

2. What time did you:
   - start this activity? \(
   - stop this activity? \( \)

3. If you were at a shopping mall or center:
   - How many stores did you go into in the mall or shopping center? \( \)
   - Did you eat at the mall or shopping center? Yes □ No □

4. Where were you?
   - Same place as last activity (Go to 11)
   - At my home
   - At my main job
   - At my second job
   - At my school
   - At another location (Complete shaded area) \( \)

5. How many other people traveled with you all the way to this new location? (don't count yourself) \( \) people

6. How did you get to this new location? Choose One
   (If you used bus or HandiVan, choose first. If not, choose the one you used for the longest time on the trip.)
   - Walk or Wheelchair
   - TheBus
   - School bus
   - Subscription bus (private, paid subscriptions only)
   - HandiVan
   - Passenger in car, van, light truck or truck
   - Driver of car, van, light truck or truck
   - Motorcycle
   - Moped
   - Taxi
   - Bicycle
   - Other (specify): \( \)

Go to Section

10
7 Bus or HandiVan

What bus route(s) did you use to make this trip?

☐ First bus ☐ Second bus ☐ Third bus

Where did you board the first bus?

How did you get to the first bus stop?

☐ Taxi ☐ Walk ☐ Vehicle passenger ☐ Vehicle driver ☐ Bicycle

How did you pay your fare?

☐ Pass → What kind of pass was it? ☐ Monthly ☐ Cash ☐ Student ☐ No fare paid (school bus/free shuttle) ☐ Other (specify): ☐ Other (specify):

8 Private Vehicle

Did you use one of the vehicles listed on the Vehicle Form for this trip?

☐ No ☐ Yes ➔ Make: _____________________________

Were you dropped off? ☐ No ☐ Yes (Go to 8)

Where was the vehicle parked?

☐ On-street parking ☐ Home driveway/carport/garage ☐ Street-level parking lot ☐ Parking structure ☐ Valet parked ☐ Other (specify):

If this place was not your main job or your school, how much did parking cost you? (check as many as apply)

☐ Free ☐ Validated ☐ Reimbursed by employer ☐ Paid $ _____________________________

9 Taxi

How much was the fare, including tip? $ ___________

Will you be reimbursed? ☐ Yes ☐ No

10 Walk/Wheelchair/Bicycle

How far did you travel in blocks or miles?

☐ blocks: _______ ☐ miles: _______

11 STOP! Was this the last activity of your day?

If yes, go to page 40. If no, check that the time you finished this activity and the time you start the next activity are correct. The time between activities should be your travel time. Please turn the page and tell us about your next activity.
Activity 5

1. What was the next thing you did? (check ONE only)
   - At home activities
     - Work at home (for main or second job)
     - All other at home (including sleep)
   - Picking up or dropping off other people
     - At their workplace
     - At their school
     - At another location (specify):
   - Off-island activities
   - Other activities away from home
     - Work
     - Work-related
     - School (including College or University)
     - Childcare (day care or after school care)
     - Buying gas
     - Eating out
     - Shopping
     - Social activities or Recreation
     - Volunteer work
     - Banking, Medical or Personal Business
     - Other (specify):

2. What time did you:
   - start this activity? ___ am ___ pm
   - stop this activity? ___ am ___ pm

3. If you were at a shopping mall or center:
   - How many stores did you go into in the mall or shopping center? ___ stores
   - Did you eat at the mall or shopping center? Yes  No

4. Where were you?
   - Same place as last activity (Go to 11)
   - At home
   - At my main job
   - At my second job
   - At my school
   - At another location (Complete shaded area) ___

5. How many other people traveled with you all the way to this new location? ___ people
   - How many of these were members of your household? ___ people
   - (don't count yourself)

6. How did you get to this new location? Choose One
   (If you used bus or HandiVan, choose that. If not, choose the one you used for the longest time on the trip.)
   - Walk or Wheelchair
   - TheBus
   - School bus
   - Subscription bus (private, paid subscriptions only)
   - HandiVan
   - Passenger in car, van, light truck or truck
   - Driver of car, van, light truck or truck
   - Motorcycle
   - Moped
   - Taxi
   - Bicycle
   - Other (specify): ___

   Go to Section ___
7 Bus or HandiVan

What bus route(s) did you use to make this trip?

[ ] first bus
[ ] second bus
[ ] third bus

Where did you board the first bus?

How did you get to the first bus stop?

[ ] Taxi
[ ] Walk
[ ] Vehicle passenger
[ ] Vehicle driver
[ ] Bicycle

How did you pay your fare?

[ ] Pass→What kind of pass was it? →
[ ] Monthly
[ ] Student
[ ] Senior citizen/ handicapped
[ ] Other (specify):
[ ] Cash
[ ] No fare paid (school bus/free shuttle)
[ ] Other (specify):

Where did you get off the last bus?

How did you get from the last bus to your final destination?

[ ] Taxi
[ ] Walk
[ ] Vehicle passenger
[ ] Vehicle driver
[ ] Bicycle

8 Private Vehicle

Did you use one of the vehicles listed on the Vehicle Form for this trip?

[ ] No  [ ] Yes -> Make ______________ Model ______________

Were you dropped off?

[ ] No  [ ] Yes (Go to 9)

Where was the vehicle parked?

[ ] On-street parking
[ ] Home driveway/carport/garage
[ ] Street-level parking lot
[ ] Parking structure
[ ] Valet parked
[ ] Other (specify):

If this place was not your main job or your school, how much did parking cost you? (check as many as apply)

[ ] Free
[ ] Validated
[ ] Reimbursed by employer
[ ] Paid $ __________

9 Taxi

How much was the fare, including tip?

$ __________

Will you be reimbursed?

[ ] Yes  [ ] No

10 Walk/Wheelchair/Bicycle

How far did you travel in blocks or miles?

[ ] blocks
[ ] miles

11 STOP! Was this the last activity of your day?

If yes, go to page 40.

If no, check that the time you finished this activity and the time you start the next activity are correct. The time between activities should be your travel time. Please turn the page and tell us about your next activity.
**Activity 6**

1. **What was the next thing you did?** *(check ONE only)*
   - At home activities
     - Work at home (for main or second job)
     - All other at home (including sleep)
   - Picking up or dropping off other people
     - At their workplace
     - At their school
     - At another location (specify):
   - Off-island activities
     - Work
     - Work-related
     - School (Including College or University)
     - Childcare (day care or after school care)
     - Buying gas
     - Eating out
     - Shopping
     - Social activities or Recreation
     - Volunteer work
     - Banking, Medical or Personal Business
     - Other (specify):

2. **What time did you:**
   - start this activity? [ ] am [ ] pm
   - stop this activity? [ ] am [ ] pm

3. **If you were at a shopping mall or center:**
   - How many stores did you go into in the mall or shopping center? [ ]
   - Did you eat at the mall or shopping center? [ ] Yes [ ] No

4. **Where were you?**
   - Same place as last activity (Go to 11)
   - At my home
   - At my main job
   - At my second job
   - At my school
   - At another location (Complete shaded area)

5. **How many other people traveled with you all the way to this new location?**  [ ] people
   - How many of these were members of your household?  [ ] people
   - (don't count yourself)

6. **How did you get to this new location?**
   - Choose One
   - Walk or Wheelchair
   - TheBus
   - School bus
   - Subscription bus (private, paid subscriptions only)
   - HandiVan
   - Passenger in car, van, light truck or truck
   - Driver of car, van, light truck or truck
   - Motorcycle
   - Moped
   - Taxi
   - Bicycle
   - Other (specify): [ ]
7 Bus or HandiVan
What bus route(s) did you use to make this trip?
- first bus
- second bus
- third bus

Where did you board the first bus?
- OISIbus
- I I _ bus
- I _ bus

How did you get to the first bus stop?
- Taxi
- Walk
- Vehicle passenger
- Vehicle driver
- Bicycle

How did you pay your fare?
- Pass
- Cash
- No fare paid (school bus/free shuttle)
- Other (specify):

8 Private Vehicle
Did you use one of the vehicles listed on the Vehicle Form for this trip?
- No
- Yes

Were you dropped off?
- No
- Yes (Go to 1)

Where was the vehicle parked?
- On-street parking
- Home driveway/carport/garage
- Street-level parking lot
- Other (specify):

If this place was not your main job or your school, how much did parking cost you? (check as many as apply)
- Free
- Validated
- Reimbursed by employer
- Paid $ __________

9 Taxi
How much was the fare, including tip? $ __________
Will you be reimbursed?
- Yes
- No

10 Walk/Wheelchair/Bicycle
How far did you travel in blocks or miles?

11 STOP! Was this the last activity of your day?
If yes, go to page 40.
If no, check that the time you finished this activity and the time you start the next activity are correct. The time between activities should be your travel time. Please turn the page and tell us about your next activity.

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## Activity 7

1. **What was the next thing you did?** *(check ONE only)*
   - At home activities
     - Work at home (for main or second job)
     - All other at home (including sleep)
   - Picking up or dropping off other people
     - At their workplace
     - At their school
     - At another location (specify): __________________________
   - Off-island activities
     - Work
     - Work-related
     - School (including College or University)
     - Childcare (day care or after school care)
     - Buying gas
     - Eating out
     - Shopping
     - Social activities or Recreation
     - Volunteer work
     - Banking, Medical or Personal Business
     - Other (specify): __________________________

2. **What time did you:**
   - start this activity? __________ am/pm
   - stop this activity? __________ am/pm

3. **If you were at a shopping mall or center:**
   - How many stores did you go into in the mall or shopping center? __________
   - Did you eat at the mall or shopping center? Yes ☐ No ☐

4. **Where were you?**
   - Same place as last activity (Go to 11)
   - At my home
   - At my main job
   - At my second job
   - At my school
   - At another location (Complete shaded area) __________

5. **How many other people traveled with you all the way to this new location?**
   - How many of these were members of your household? (don't count yourself) __________ people

6. **How did you get to this new location?** Choose One
   - Walk or Wheelchair
   - TheBus
   - School bus
   - Subscription bus (private, paid subscriptions only)
   - HandiVan
   - Passenger in car, van, light truck or truck
   - Driver of car, van, light truck or truck
   - Motorcycle
   - Moped
   - Taxi
   - Bicycle
   - Other (specify): __________________________

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24
7 Bus or HandiVan
What bus route(s) did you use to make this trip?
- [ ] first bus
- [ ] second bus
- [ ] third bus

Where did you board the first bus?
- [ ] L....![ bus
- [ ] seambus
- [ ] o;m
- [ ] bus

How did you get to the first bus stop?
- [ ] Taxi
- [ ] Walk
- [ ] Vehicle passenger
- [ ] Vehicle driver
- [ ] Bicycle

How did you pay your fare?
- [ ] Pass ➔ What kind of pass was it?
  - [ ] Monthly
  - [ ] Student
  - [ ] Senior citizen/ handicapped
  - [ ] Other (specify):
- [ ] Cash
- [ ] No fare paid (school bus free shuttle)
- [ ] Other (specify):

Where did you get off the last bus?
- [ ] ...
- [ ] ...
- [ ] ...
- [ ] ...

How did you get from the last bus to your final destination?
- [ ] Taxi
- [ ] Walk
- [ ] Vehicle passenger
- [ ] Vehicle driver
- [ ] Bicycle

8 Private Vehicle
Did you use one of the vehicles listed on the Vehicle Form for this trip?
- [ ] No
- [ ] Yes ➔

Make
Model

Were you dropped off?
- [ ] No
- [ ] Yes (Go to 9)

Where was the vehicle parked?
- [ ] On-street parking
- [ ] Home driveway/garage
- [ ] Street-level parking lot
- [ ] Parking structure
- [ ] Valet parked
- [ ] Other (specify):

If this place was not your main job or your school, how much did parking cost you? (check as many as apply)
- [ ] Free
- [ ] Validated
- [ ] Reimbursed by employer
- [ ] Paid $

9 Taxi
How much was the fare, including tip?

$ 

Will you be reimbursed?
- [ ] Yes
- [ ] No

10 Walk/Wheelchair/Bicycle
How far did you travel in blocks or miles?

blocks
miles

11 STOP! Was this the last activity of your day?

If yes, go to page 40.
If no, check that the time you finished this activity and the time you start the next activity are correct. The time between activities should be your travel time. Please turn the page and tell us about your next activity.
Activity 8

1. What was the next thing you did? (check ONE only)
   - At home activities
     - Work at home (for main or second job)
     - All other at home (including sleep)
   - Picking up or dropping off other people
     - At their workplace
     - At their school
     - At another location (specify):
   - Off-site activities
     - Work
     - Work-related
     - School (including College or University)
     - Childcare (day care or after school care)
     - Buying gas
     - Eating out
     - Shopping
     - Social activities or Recreation
     - Volunteer work
     - Banking, Medical or Personal Business
     - Other (specify):

2. What time did you:
   - start this activity? am
   - stop this activity? pm

3. If you were at a shopping mall or center:
   - How many stores did you go into in the mall or shopping center? stores
   - Did you eat at the mall or shopping center? Yes No

4. Where were you?
   - Same place as last activity (Go to 1)
   - At my home
   - At my main job
   - At my second job
   - At my school
   - At another location (Complete shaded area)

5. How many other people traveled with you all the way to this new location? people
   - How many of these were members of your household? people

6. How did you get to this new location? Choose One
   (If you used bus or HandiVan, choose that. If not, choose the one you used for the longest time on the trip.)
   - Walk or wheelchair
   - TheBus
   - School bus
   - Subscription bus (private, paid subscriptions only)
   - HandiVan
   - Passenger in car, van, light truck or truck
   - Driver of car, van, light truck or truck
   - Motorcycle
   - Moped
   - Taxi
   - Bicycle
   - Other (specify):

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7 **Bus or HandiVan**

What bus route(s) did you use to make this trip?

- [ ] first bus
- [ ] second bus
- [ ] third bus

Where did you board the first bus?

How did you get to the first bus stop?

- [ ] Taxi
- [ ] Walk
- [ ] Vehicle passenger
- [ ] Vehicle driver
- [ ] Bicycle

How did you pay your fare?

- [ ] Pass
- [ ] Cash
- [ ] No fare paid (school bus/free shuttle)
- [ ] Other (specify):

8 **Private Vehicle**

Did you use one of the vehicles listed on the Vehicle Form for this trip?

- [ ] No
- [ ] Yes

Were you dropped off?

- [ ] No
- [ ] Yes (Go to 11)

Where was the vehicle parked?

- [ ] On-street parking
- [ ] Home driveway/garage
- [ ] Street-level parking lot
- [ ] Parking structure
- [ ] Valet parked
- [ ] Other (specify):

If this place was not your main job or your school, how much did parking cost you? (check as many as apply)

- [ ] Free
- [ ] Validated
- [ ] Reimbursed by employer
- [ ] Paid $

9 **Taxi**

How much was the fare, including tip?

-

Will you be reimbursed?

- [ ] Yes
- [ ] No

10 **Walk/Wheelchair/Bicycle**

How far did you travel in blocks or miles?

- [ ] blocks
- [ ] miles

11 **STOP! Was this the last activity of your day?**

If yes, go to page 40.

If no, check that the time you finished this activity and the time you start the next activity are correct. The time between activities should be your travel time. Please turn the page and tell us about your next activity.
Activity 9

1. What was the next thing you did? (check ONE only)
   - At home activities
   - Work at home (for main or second job)
   - All other at home (including sleep)
   - Picking up or dropping off other people
     - At their workplace
     - At their school
     - At another location (specify):
   - Off-island activities
   - Other activities away from home
     - Work
     - Work-related
     - School (including College or University)
     - Childcare (day care or after school care)
     - Buying gas
     - Eating out
     - Shopping
     - Social activities or Recreation
     - Volunteer work
     - Banking, Medical or Personal Business
     - Other (specify):

2. What time did you:
   - start this activity? __________ am/pm
   - stop this activity? __________ am/pm

3. If you were at a shopping mall or center:
   - How many stores did you go into in the mall or shopping center?
     __________ stores
   - Did you eat at the mall or shopping center? □ Yes □ No

4. Where were you?
   - Same place as last activity (Go to 11)
   - At my home
   - At my main job
   - At my second job
   - At my school
   - At another location (Complete shaded area)

5. How many other people traveled with you all the way to this new location? (don't count yourself)
   __________ people
   How many of these were members of your household? (don't count yourself)
   __________ people

6. How did you get to this new location?
   Choose One
   □ Walk or Wheelchair
   □ TheBus
   □ School bus
   □ Subscription bus (private, paid subscriptions only)
   □ Handi-Van
   □ Passenger in car, van, light truck or truck
   □ Driver of car, van, light truck or truck
   □ Motorcycle
   □ Maped
   □ Taxi
   □ Bicycle
   □ Other (specify): __________ □
**7 Bus or HandiVan**

What bus route(s) did you use to make this trip?

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>first bus</td>
<td>second bus</td>
<td>third bus</td>
</tr>
</tbody>
</table>

Where did you board the first bus?

<p>| | | | | |</p>
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</thead>
<tbody>
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</tr>
</tbody>
</table>

How did you get to the first bus stop?

- Taxi
- Walk
- Vehicle passenger
- Vehicle driver
- Bicycle

How did you pay your fare?

- Pass
- What kind of pass was it?
  - Monthly
  - Student
  - Faculty/Staff
  - Senior citizen/handicapped
  - Other (specify):

Where did you get off the last bus?

<p>| | | | | | | |</p>
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<thead>
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</tr>
</tbody>
</table>

How did you get from the last bus to your final destination?

- Taxi
- Walk
- Vehicle passenger
- Vehicle driver
- Bicycle

**8 Private Vehicle**

Did you use one of the vehicles listed on the Vehicle Form for this trip?

- No
- Yes

Make Model

Where were you dropped off?

- No
- Yes (Go to 9)

Where was the vehicle parked?

- On-street parking
- Home driveway/garage
- Street-level parking lot
- Parking structure
- Valet parked
- Other (specify):

If this place was not your main job or your school, how much did parking cost you? (check as many as apply)

- Free
- Validated
- Reimbursed by employer
- Paid $ __________

**9 Taxi**

How much was the fare, including tip? $ __________

Will you be reimbursed? Yes No

**10 Walk/Wheelchair/Bicycle**

How far did you travel in blocks or miles?

<table>
<thead>
<tr>
<th>blocks</th>
<th>miles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**STOP! Was this the last activity of your day?**

If yes, go to page 40. If no, check that the time you finished this activity and the time you start the next activity are correct. The time between activities should be your travel time. Please turn the page and tell us about your next activity.
Activity 10

1 What was the next thing you did? (check ONE only)
- At home activities
- Work at home (for main or second job)
- All other at home (including sleep)
- Picking up or dropping off other people
  - At their workplace
  - At their school
  - At another location (specify):
  - Other (specify):

2 What time did you:
  - start this activity?
  - stop this activity?

3 If you were at a shopping mall or center:
  - How many stores did you go into in the mall or shopping center?
  - Did you exit at the mall or shopping center?

4 Where were you?
- Same place as last activity (Go to 1)
- At my home
- At my main job
- At my second job
- At my school
- At another location (Complete shaded area)

5 How many other people traveled with you all the way to this new location? (don't count yourself)

6 How did you get to this new location? Choose One
- Walk or Wheelchair
- TheBus
- School bus
- Subscription bus (private, paid subscriptions only)
- HandiVan
- Passenger in car, van, light truck or truck
- Driver of car, van, light truck or truck
- Motorcycle
- Moped
- Taxi
- Bicycle
- Other (specify):

30
7 Bus or HandiVan

What bus route(s) did you use to make this trip?

<table>
<thead>
<tr>
<th>First bus</th>
<th>Second bus</th>
<th>Third bus</th>
</tr>
</thead>
</table>

Where did you board the first bus?

How did you get to the first bus stop?

- Taxi
- Walk
- Vehicle passenger
- Vehicle driver
- Bicycle

How did you pay your fare?

- Pass
- Cash
- No fare paid (school bus/shuttle)
- Other (specify):

8 Private Vehicle

Did you use one of the vehicles listed on the Vehicle Form for this trip?

- No
- Yes

Make

Model

Wore you dropped off?

- No
- Yes (Go to 1)

Where was the vehicle parked?

- On-street parking
- Home driveway/carport/garage
- Street-level parking lot
- Parking structure
- Valet parked
- Other (specify):

If this place was not your main job or your school, how much did parking cost you? (check as many as apply)

- Free
- Validated
- Reimbursed by employer
- Paid $ __________

9 Taxi

How much was the fare, including tip?

$ __________

Will you be reimbursed?

- Yes
- No

10 Walk/Wheelchair/Bicycle

How far did you travel in blocks or miles?

blocks

miles

11 STOP! Was this the last activity of your day?

If yes, go to page 40.

If no, check that the time you finished this activity and the time you start the next activity are correct. The time between activities should be your travel time. Please turn the page and tell us about your next activity.
Activity 11

1. What was the next thing you did? (check ONE only)
   - At home activities
     - Work at home (for main or second job)
     - All other at home (including sleep)
     - Picking up or dropping off other people
       - At their workplace
       - At their school
       - At another location (specify):
       - Off-island activities
         - Other activities away from home
           - Work
           - Work-related
           - School (including College or University)
           - Childcare (day care or after school care)
           - Buying gas
           - Eating out
           - Shopping
           - Social activities or Recreation
           - Volunteer work
           - Banking, Medical or Personal Business
           - Other (specify):

2. What time did you:
   - start this activity? __ __ __ am
   - stop this activity? __ __ __ pm

3. If you were at a shopping mall or center:
   - How many stores did you go into in the mall or shopping center? ______ stores
   - Did you eat at the mall or shopping center? □ Yes □ No

4. Where were you?
   - □ Same place as last activity (Go to 1)
   - □ At my home
   - □ At my main job
   - □ At my second job
   - □ At my school
   - □ At another location (Complete shaded area)

5. How many other people traveled with you all the way to this new location? ______ people
   - How many of these were members of your household? ______ people

6. How did you get to this new location?
   (Choose One)
   - Walk or Wheelchair
   - TheBus
   - School bus
   - Subscription bus (private, paid subscriptions only)
   - HandiVan
   - Passenger in car, van, light truck or truck
   - Driver of car, van, light truck or truck
   - Motorcycle
   - Moped
   - Taxi
   - Bicycle
   - Other (specify): ____________________________
7 Bus or HandiVan
What bus route(s) did you use to make this trip?
- first bus
- second bus
- third bus

Where did you board the first bus?

How did you get to the first bus stop?
- Taxi
- Walk
- Vehicle passenger
- Vehicle driver
- Bicycle

How did you pay your fare?
- Pass
- Cash
- No fare paid (school bus, free shuttle)
- Other (specify):

Did you use one of the vehicles listed on the Vehicle Form for this trip?
- Yes
- No

Where were you dropped off?
- Yes
- No (Go to 8)

Where was the vehicle parked?
- On-street parking
- Home driveway/garage
- Street-level parking lot
- Other (specify):

If this place was not your main job or your school, how much did parking cost you? (check as many as apply)
- Free
- Validated
- Reimbursed by employer
- Paid $ ____________

8 Private Vehicle

9 Taxi

How much was the fare, including tip? $ ____________

Will you be reimbursed? □ Yes □ No

10 Walk/Wheelchair/Bicycle

How far did you travel in blocks or miles? ____________ blocks

STOP! Was this the last activity of your day?
If yes, go to page 40.

If no, check that the time you finished this activity and the time you start the next activity are correct. The time between activities should be your travel time. Please turn the page and tell us about your next activity.
Activity 12

1. What was the next thing you did? (check ONE only)
   - At home activities
   - Work at home (for main or second job)
   - All other at home (including sleep)
   - Picking up or dropping off other people
     - At their workplace
     - At their school
     - At another location (specify): _______________________
   - Off-island activities
   - Other activities away from home
     - Work
     - Work-related
     - School (including College or University)
     - Childcare (day care or after school care)
     - Buying gas
     - Eating out
     - Shopping
     - Social activities or Recreation
     - Volunteer work
     - Banking, Medical or Personal Business
     - Other (specify): _______________________

2. What time did you:
   - start this activity? ______ am  ______ pm
   - stop this activity? ______ am  ______ pm

3. If you were at a shopping mall or center:
   - How many stores did you go into in the mall or shopping center? ______
   - Did you eat at the mall or shopping center?  [ ] Yes  [ ] No

4. Where were you?
   - [ ] Same place as last activity (Go to 1)
   - [ ] At my home
   - [ ] At my main job
   - [ ] At my second job
   - [ ] At my school
   - [ ] At another location (Complete shaded area)
     - __________________________________________

5. How many other people traveled with you all the way to this new location? ______
   - (don't count yourself)

6. How many of these were members of your household? ______
   - (don't count yourself)

6. How did you get to this new location? Choose One
   - (If you used bus or HandVan, choose bus. If not, choose the one you used for the longest time on the trip.)
     - Walk or Wheelchair
     - TheBus
     - School bus
     - Subscription bus (private, paid subscriptions only)
     - HandVan
     - Passenger in car, van, light truck or truck
     - Driver of car, van, light truck or truck
     - Motorcycle
     - Moped
     - Taxi
     - Other (specify): _______________________.

34
7 Bus or HandiVan

What bus route(s) did you use to make this trip?

- [ ] First bus
- [ ] Second bus
- [ ] Third bus

Where did you board the first bus?

- [ ] Park
- [ ] Private residence

How did you get to the first bus stop?

- [ ] Taxi
- [ ] Walk
- [ ] Bus stop
- [ ] Vehicle passenger
- [ ] Vehicle driver
- [ ] Bicycle

How did you pay your fare?

- [ ] Pass
- [ ] Cash
- [ ] No fare paid (school bus/shuttle)
- [ ] Other (specify): [ ]

8 Private Vehicle

Did you use one of the vehicles listed on the Vehicle Form for this trip?

- [ ] No
- [ ] Yes

Were you dropped off?

- [ ] No
- [ ] Yes

Where was the vehicle parked?

- [ ] On-street parking
- [ ] Home driveway/carport/garage
- [ ] Parking structure
- [ ] Street-level parking lot
- [ ] Valet parked
- [ ] Other (specify): [ ]

If this place was not your main job or your school, how much did parking cost you? (check as many as apply)

- [ ] Free
- [ ] Validated
- [ ] Reimbursed by employer
- [ ] Paid

9 Taxi

How much was the fare, including tip? $.

Will you be reimbursed?

- [ ] Yes
- [ ] No

10 Walk/Wheelchair/Bicycle

How far did you travel in blocks or miles?

- [ ] Blocks
- [ ] Miles

11 STOP! Was this the last activity of your day?

If yes, go to page 40.

If no, check that the time you finished this activity and the time you start the next activity are correct. The time between activities should be your travel time. Please turn the page and tell us about your next activity.
For more than 12 activities

Please use this space to keep track of all activities beyond the 12 recorded in this diary.
For more than 12 activities

Please use this space to keep track of all activities beyond the 12 recorded in this diary.
For more than 12 activities

Please use this space to keep track of all activities beyond the 12 recorded in this diary.
For more than 12 activities

Please use this space to keep track of all activities beyond the 12 recorded in this diary

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</tbody>
</table>
This concludes your One-Day Diary

- Please go back over your MEMORY JOGGER and diary to be sure you included all of your activities.

- In the next few days, you will receive a telephone call to collect this information.

- Be sure to record the ending odometer reading for any vehicles on the household/vehicle form.

- Please place your survey materials near the telephone so they will be handy when we call.
Mahalo Nui Loa!
Your Information Counts
XXX-XXXX
START

Start using your One-Day Diary
at 3 a.m. on

Wednesday

FINISH

Finish using your One-Day Diary
at 3 a.m. on

Thursday
APPENDIX B

METADATA FOR THE HOUSEHOLD, PERSON AND ACTIVITY DATA FILES

HLD.INF

-> SYSFILE INFO 'v:\proj\hi23009a\his\delivery\hld.sav'.

-- SYSFILE INFO --

File v:\proj\hi23009a\his\delivery\hld.sav
Created: 30 Jan 97 15:04:36 - 57 variables and 4,060 cases

File Type: SPSS Data File
N of Cases: 4060
Total # of Defined Variable Elements: 69
Data Are Not Weighted
Data Are Compressed
File Contains Case Data

Variable Information:

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>Household ID</td>
</tr>
<tr>
<td>HHWT3H</td>
<td>Household weight (4060)</td>
</tr>
<tr>
<td>DAY_O_WK</td>
<td>Assigned day of the week for survey</td>
</tr>
<tr>
<td>BOOKS</td>
<td>Number of booklets</td>
</tr>
<tr>
<td>Q5A</td>
<td>Had the materials by the phone</td>
</tr>
</tbody>
</table>

Value Label

- 1 Monday
- 2 Tuesday
- 3 Wednesday
- 4 Thursday
- 5 Friday

- 1 Yes
- 2 Yes, but call back later
- 3 No, never received package
- 4 No, received incomplete package
- 5 No, refused to fill out diaries
- 6 No, haven't filled out diaries yet

Page 1
Q58
Returned with the materials
Format: F1
Value | Label
-----|------
1     | Yes
2     | No

Q19
Different household member numbers
Format: F1
Value | Label
-----|------
1     | Off island during the day
2     | No longer living at this address
3     | Other permanent deduction in HH size
4     | New household member born
5     | New household member moved in
6     | Other permanent addition to HH size
7     | Refused
8     | Don't know

Q26
Number commercial vehicles at your home
Format: F2
Value | Label
-----|------
98    | Refused
99    | Don't know

Q18
Number of household members
Format: F2

Q25
1994 household annual income
Format: F2
Value | Label
-----|------
1     | < $10,000
2     | $10,000 to $19,999
3     | $20,000 to $29,999
4     | $30,000 to $39,999
5     | $40,000 to $49,999
6     | $50,000 to $59,999
7     | $60,000 to $74,999
8     | $75,000 to $99,999
9     | $100,000 or more
98    | Refused
99    | Don't know

Q6
Number of vehicles
Format: F2

Q4A
Willing to participate
Format: F1
Value | Label
-----|------
1     | Yes, have materials
2     | No, still unwilling to participate
Q4B What is the main reason that you will not participate in the activity?
Format: FL

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Forms are too complicated or confusing</td>
</tr>
<tr>
<td>2</td>
<td>Forms request too much information</td>
</tr>
<tr>
<td>3</td>
<td>Forms take too much time to complete</td>
</tr>
<tr>
<td>4</td>
<td>Can not get other family members to participate</td>
</tr>
<tr>
<td>5</td>
<td>Other</td>
</tr>
<tr>
<td>6</td>
<td>I travel too little to make a difference</td>
</tr>
<tr>
<td>7</td>
<td>I travel too much to track my activities</td>
</tr>
<tr>
<td>8</td>
<td>Refused to give reason for non-participation</td>
</tr>
<tr>
<td>9</td>
<td>Do not know</td>
</tr>
</tbody>
</table>

Q4C Please think again about your decision not to participate.
Format: FL

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes, will do study</td>
</tr>
<tr>
<td>2</td>
<td>No, still refuses</td>
</tr>
</tbody>
</table>

Q4D Does your work involve constant travel?
Format: FL

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<tr>
<th>Value</th>
<th>Label</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
</tr>
</tbody>
</table>

Q4E Will you participate, 2nd time?
Format: FL

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes, will do study</td>
</tr>
<tr>
<td>2</td>
<td>No, still refuses</td>
</tr>
</tbody>
</table>

Q4F Will you participate, 3rd time?
Format: FL

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes, will do study</td>
</tr>
<tr>
<td>2</td>
<td>No, still refuses</td>
</tr>
</tbody>
</table>

Q27 Finished recording activities
Format: FL

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

Q28 Remembered the activities
Format: FL

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
</tr>
</tbody>
</table>
HLD. INF

1 OK/Can remember/Willing to continue
2 Can't remember
8 Refused

Q29 Household participation
Format: F1
Value Label
1 Yes, will do study
2 No, still unwilling to participate

Q30B Households that only travel a little
Format: F1
Value Label
1 Yes, will do study
2 No, still unwilling to participate

INTV_ID Interviewer ID
Format: A4
39-42

HCOMMUN Home community
Format: A20
43-62

Q23CNTY Last home county or country
Format: A20
63-82

DWLSTCOM Last home community
Format: A20
83-102

FRLNGOTH Other language spoken
Format: A10
103-112

DWLTYOTH Other home dwelling type
Format: A10
113-122

OWNTYOTH Other home tenure
Format: A10
123-132

DWLTYLSO Other last home dwelling type
Format: A10
133-142

ETHNIOTH Other ethnicity
Format: A13
143-155

CITYLAST Last home city
Format: A15
156-170

DWLSTST Last home state
Format: A2
171-172

RU18PLUS Are you 18 or older?
Format: F1
Value Label
1 Yes
2 No

HOMEZIP Home zipcode
Format: F5
174-178
### DIARYDAY
**Diary day**  
Format: F1  
<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Monday</td>
</tr>
<tr>
<td>2</td>
<td>Tuesday</td>
</tr>
<tr>
<td>3</td>
<td>Wednesday</td>
</tr>
<tr>
<td>4</td>
<td>Thursday</td>
</tr>
<tr>
<td>5</td>
<td>Friday</td>
</tr>
</tbody>
</table>

### WILLING
**Are you willing to participate?**  
Format: F1  
<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
</tr>
</tbody>
</table>

### NONENGL
**Is a language other than English spoken in your home?**  
Format: F1  
<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
</tr>
<tr>
<td>9</td>
<td>Do not know</td>
</tr>
</tbody>
</table>

### FRGNLANG
**What is this language?**  
Format: F1  
<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tagalog</td>
</tr>
<tr>
<td>2</td>
<td>Ilocano</td>
</tr>
<tr>
<td>3</td>
<td>Chinese (Cantonese)</td>
</tr>
<tr>
<td>4</td>
<td>Chinese (Mandarin)</td>
</tr>
<tr>
<td>5</td>
<td>Japanese</td>
</tr>
<tr>
<td>6</td>
<td>Spanish</td>
</tr>
<tr>
<td>7</td>
<td>Korean</td>
</tr>
<tr>
<td>8</td>
<td>Other</td>
</tr>
<tr>
<td>9</td>
<td>Refused</td>
</tr>
</tbody>
</table>

### ETHNICITY
**Which of the following best describes your ethnicity?**  
Format: F2  
<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hawaiian/part</td>
</tr>
<tr>
<td>2</td>
<td>Japanese</td>
</tr>
<tr>
<td>3</td>
<td>Chinese</td>
</tr>
<tr>
<td>4</td>
<td>Filipino</td>
</tr>
<tr>
<td>5</td>
<td>Korean</td>
</tr>
<tr>
<td>6</td>
<td>Caucasian</td>
</tr>
<tr>
<td>7</td>
<td>Mixed</td>
</tr>
<tr>
<td>8</td>
<td>Hispanic</td>
</tr>
<tr>
<td>9</td>
<td>Other</td>
</tr>
<tr>
<td>98</td>
<td>Refused</td>
</tr>
<tr>
<td>99</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

### DWELLTYP
**Do you live in**  
*Page 5*
HLD. INF

Value   Label
1  Single-family detached house or single family house attached
2  Multi-family house with at least 3 units, townhouse
3  Building with at least three apartments
4  Maids quarter, converted garage
5  Hotel/motel
6  Group quarters
7  Other
8  Refused
9  Don't know

EXPGUEST  Expect guest on diary day?
Format: F1

Value   Label
1  Yes
2  No
8  Refused
9  Don't know

YRMOVEIN  Year that you moved in to your current dwelling
Format: F2

Value   Label
98  Refused
99  Don't know

LASTOAHU  Last home on Oahu?
Format: F1

DWLTYLST  Dwelling Type that you last lived in
Format: F2

Value   Label
1  Single-family detached house, or single-family house attached
2  Multi-family house with at least 3 units, townhouse
3  Building with at least three apartments
4  Maids quarter, converted garage
5  Hotel/Motel
6  Group quarters
7  Other
8  Refused
9  Don't know

TENURLST  Last home tenure
Format: F1

Value   Label
1  Rent/lease
2  Own/buying
3  Other
8  Refused
9  Don't know

ZIPLAST  Last home zipcode
Format: F5

Page 6
<table>
<thead>
<tr>
<th>TENURE</th>
<th>Home tenure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>Label</td>
</tr>
<tr>
<td>1</td>
<td>Rent/lease</td>
</tr>
<tr>
<td>2</td>
<td>Own/buying</td>
</tr>
<tr>
<td>3</td>
<td>Other</td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WHYMOVE1</th>
<th>Main reason your household moved to your current home</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>Label</td>
</tr>
<tr>
<td>1</td>
<td>Job-related move</td>
</tr>
<tr>
<td>2</td>
<td>Schooling-related move</td>
</tr>
<tr>
<td>3</td>
<td>Wanted to move closer to town</td>
</tr>
<tr>
<td>4</td>
<td>Required larger living space</td>
</tr>
<tr>
<td>5</td>
<td>Required smaller living space</td>
</tr>
<tr>
<td>6</td>
<td>Retirement</td>
</tr>
<tr>
<td>7</td>
<td>Childcare-related</td>
</tr>
<tr>
<td>8</td>
<td>Combined households</td>
</tr>
<tr>
<td>9</td>
<td>Divorce</td>
</tr>
<tr>
<td>10</td>
<td>Had been renting, wanted to buy</td>
</tr>
<tr>
<td>11</td>
<td>Had owned, wanted to rent</td>
</tr>
<tr>
<td>12</td>
<td>Other</td>
</tr>
<tr>
<td>98</td>
<td>Refused</td>
</tr>
<tr>
<td>99</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WHYMOVE2</th>
<th>Other reason for moving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>Label</td>
</tr>
<tr>
<td>1</td>
<td>Job-related move</td>
</tr>
<tr>
<td>2</td>
<td>Schooling-related move</td>
</tr>
<tr>
<td>3</td>
<td>Wanted to move closer to town</td>
</tr>
<tr>
<td>4</td>
<td>Required larger living space</td>
</tr>
<tr>
<td>5</td>
<td>Required smaller living space</td>
</tr>
<tr>
<td>6</td>
<td>Retirement</td>
</tr>
<tr>
<td>7</td>
<td>Childcare-related</td>
</tr>
<tr>
<td>8</td>
<td>Combined households</td>
</tr>
<tr>
<td>9</td>
<td>Divorce</td>
</tr>
<tr>
<td>10</td>
<td>Had been renting, wanted to buy</td>
</tr>
<tr>
<td>11</td>
<td>Had owned, wanted to rent</td>
</tr>
<tr>
<td>12</td>
<td>Other</td>
</tr>
<tr>
<td>98</td>
<td>Refused</td>
</tr>
<tr>
<td>99</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NPHONES</th>
<th>Number of phone numbers to your household</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>NPHDATA</th>
<th>Number of data phone lines in your household</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>PHSHARE</th>
<th>Share phone with other hld?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>Label</td>
</tr>
<tr>
<td>0</td>
<td>Shared with other households</td>
</tr>
<tr>
<td>1</td>
<td>Not shared with other households</td>
</tr>
</tbody>
</table>

Page 7
HLD. INF

1 Yes
2 No
8 Refused
9 Don't know

NSHARHH Number of hld share phone with
Format: F2

NUNITS Number of dwelling units in your complex
Format: F2

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>98</td>
<td>Refused</td>
</tr>
<tr>
<td>99</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

HHWT5H Household weight (3709)
Format: F8.4

RECOVER Household retrieval status
Format: F1

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
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<tbody>
<tr>
<td>0</td>
<td>Regular</td>
</tr>
<tr>
<td>1</td>
<td>Soft conversion</td>
</tr>
</tbody>
</table>

TAZ761 Household's TAZ
Format: F3
PER_INF

-> SYSFILE INFO 'V:\PROJ\HI23009A\his\delivery\per.sav'.

-- SYSFILE INFO --

File v:\proj\hi23009a\his\delivery\per.sav
Created: 30 Jan 97 15:03:31 - 80 variables and 10,598 cases

File Type: SPSS Data File
N of Cases: 10598
Total # of Defined Variable Elements: 90
Data Are Not Weighted
Data Are Compressed
File Contains Case Data

Variable Information:

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
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</thead>
<tbody>
<tr>
<td>ID</td>
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</tr>
<tr>
<td>HHWT3H</td>
<td>6-13</td>
</tr>
<tr>
<td>PERNUM</td>
<td>14-15</td>
</tr>
<tr>
<td>HADRFLAG</td>
<td>16</td>
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<tr>
<td>SCNMFLAG</td>
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Variable Information continued:

<table>
<thead>
<tr>
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<tbody>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Person 1 in HH</td>
</tr>
<tr>
<td>2</td>
<td>Person 2 in HH</td>
</tr>
<tr>
<td>3</td>
<td>Person 3 in HH</td>
</tr>
<tr>
<td>4</td>
<td>Person 4 in HH</td>
</tr>
<tr>
<td>5</td>
<td>Person 5 in HH</td>
</tr>
<tr>
<td>6</td>
<td>Person 6 in HH</td>
</tr>
<tr>
<td>7</td>
<td>Person 7 in HH</td>
</tr>
<tr>
<td>8</td>
<td>Person 8 in HH</td>
</tr>
<tr>
<td>9</td>
<td>Person 9 in HH</td>
</tr>
<tr>
<td>10</td>
<td>Person 10 in HH</td>
</tr>
<tr>
<td>11</td>
<td>Person 11 in HH</td>
</tr>
<tr>
<td>12</td>
<td>Person 12 in HH</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Complete address given</td>
</tr>
<tr>
<td>2</td>
<td>Cross streets given</td>
</tr>
<tr>
<td>5</td>
<td>refused</td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

Page 1
### PER-INF

<table>
<thead>
<tr>
<th>Value</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Name given</td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

#### SCCOMNTY
School Community
Format: A20

#### SADRFLAG
School address flag
Format: F1

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Complete address</td>
</tr>
<tr>
<td>2</td>
<td>Cross streets</td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

#### WLNMFLAG
Main job address Name Flag
Format: F1

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Self employed - Home</td>
</tr>
<tr>
<td>2</td>
<td>Self employed - Not home</td>
</tr>
<tr>
<td>7</td>
<td>Other (Co. name given)</td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

#### HMCOMNTY
Home community
Format: A20

#### W1ADRFLG
Main job address flag
Format: F1

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Complete address</td>
</tr>
<tr>
<td>2</td>
<td>Cross streets</td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

#### W1COMNTY
Main job address - Community
Format: A20

#### W1ZIP
Main job address - ZIP Code
Format: F5

#### W2NMFALG
Second job address name flag
Format: F1

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Self employed - Home</td>
</tr>
<tr>
<td>2</td>
<td>Self employed - Not home</td>
</tr>
<tr>
<td>7</td>
<td>Other (Co. name given)</td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

#### W2COMNTY
Second job community
Format: A20
PER.INF

W2ADRFLG  Second job address flag  107
Format: F1

Value  Label
1  Complete address
2  Cross streets
8  Refused
9  Don't know

W3NMFLAG  Previous main job address name flag  108
Format: F1

Value  Label
1  No previous employer
7  Name Given
8  Refused
9  Don't know

W3COMNTY  Previous job community  109-128
Format: A20

COV_MNTH  Month on front of diary  129-130
Format: F2

Value  Label
1  January
2  February
3  March
4  April
5  May
6  June
7  July
8  August
9  September
10  October
11  November
12  December
99  Don't know

COV_DATE  Date on diary  131-132
Format: F2

PERQ1  Have disability limits Trans you can use  133
Format: F1

Value  Label
1  Yes
2  No
8  Refused
9  Don't know

PERQ2A1  Visual or blind  134
Format: F1

Value  Label
1  Yes
<table>
<thead>
<tr>
<th>Question</th>
<th>Description</th>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERQ2A2</td>
<td>Hearing impaired or deaf</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>PERQ2A3</td>
<td>Cane or walker</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>PERQ2A4</td>
<td>Wheelchair nontransferable</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>PERQ2A5</td>
<td>Wheelchair transferable</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>PERQ2A6</td>
<td>Filler Column</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PERQ2A7</td>
<td>Filler Column</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PERQ2A8</td>
<td>Other</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>PERQ2A9</td>
<td>Refused</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>PERQ2A10</td>
<td>Don't know</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>PERQ3A1</td>
<td>Which of the following best describes you</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Value</td>
<td>Label</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 Child not in school</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 Child in day-care</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 Full-time student</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### PERQ3A2

Which of the following best describes you?

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Child not in school</td>
</tr>
<tr>
<td>2</td>
<td>Child in day-care</td>
</tr>
<tr>
<td>3</td>
<td>Full-time student</td>
</tr>
<tr>
<td>4</td>
<td>Part-time student</td>
</tr>
<tr>
<td>5</td>
<td>Employed Full-time (30+ Hrs)</td>
</tr>
<tr>
<td>6</td>
<td>Employed Part-time</td>
</tr>
<tr>
<td>7</td>
<td>Self-employed Full-time</td>
</tr>
<tr>
<td>8</td>
<td>Self-employed Part-time</td>
</tr>
<tr>
<td>9</td>
<td>Retired</td>
</tr>
<tr>
<td>10</td>
<td>Full-time homemaker</td>
</tr>
<tr>
<td>11</td>
<td>Unemployed, looking for work</td>
</tr>
<tr>
<td>12</td>
<td>Unemployed, not seeking work</td>
</tr>
<tr>
<td>98</td>
<td>Refused</td>
</tr>
<tr>
<td>99</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

### PERQ4

Type of school or day-care enrolled in

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Day-care</td>
</tr>
<tr>
<td>2</td>
<td>Pre-school</td>
</tr>
<tr>
<td>3</td>
<td>Elementary K-6</td>
</tr>
<tr>
<td>4</td>
<td>Secondary 7-12</td>
</tr>
<tr>
<td>5</td>
<td>Vocational/Technical</td>
</tr>
<tr>
<td>6</td>
<td>College/University</td>
</tr>
<tr>
<td>7</td>
<td>Adult School</td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

### PERQ7

Days per week go to this school/day-care

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>One day</td>
</tr>
<tr>
<td>2</td>
<td>Two days</td>
</tr>
<tr>
<td>3</td>
<td>Three days</td>
</tr>
<tr>
<td>4</td>
<td>Four days</td>
</tr>
<tr>
<td>5</td>
<td>Five days</td>
</tr>
<tr>
<td>6</td>
<td>Six days</td>
</tr>
<tr>
<td>7</td>
<td>Seven days</td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

### PERQ8

Go to school/day-care on the diary day

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

Format: F2, F1, or F1
<table>
<thead>
<tr>
<th>PERQ9</th>
<th>Why not go to school/day-care diary day</th>
<th>151</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>Label</td>
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</tr>
<tr>
<td>1</td>
<td>Sick</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Family emergency</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Spring break</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>No class scheduled</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>School didn't hold class</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Refused</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Don't know</td>
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</tbody>
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<table>
<thead>
<tr>
<th>PERQ10</th>
<th>Most often used Trans Mode to school</th>
<th>152-153</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>Label</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Walk/Wheelchair</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>The bus</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>School bus</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Subscription bus</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Handivan</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Passenger in vehicle</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Driver of vehicle</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Motorcycle</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Moped</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Taxi</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Bicycle</td>
<td></td>
</tr>
<tr>
<td>97</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>98</td>
<td>Refused</td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Don't know</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>PERQ11A</th>
<th>How much do you pay to park (Per...)</th>
<th>154</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>Label</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Free</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Per hour</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Per day</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Per week</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Per month</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Per quarter</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Per semester</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Per school year</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Refused/Don't know</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PERQ11B</th>
<th>How much do you pay to park ($ figure)</th>
<th>155-160</th>
</tr>
</thead>
<tbody>
<tr>
<td>Format</td>
<td>F6.2</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PERQ12</th>
<th>Is your main employer</th>
<th>Page 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>Label</td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>---------------------------</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Private company</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Government</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Self-employed</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Don’t know</td>
<td></td>
</tr>
</tbody>
</table>

**PERQ13 Industry of main job**

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Agriculture</td>
</tr>
<tr>
<td>2</td>
<td>Construction</td>
</tr>
<tr>
<td>3</td>
<td>Manufacturing</td>
</tr>
<tr>
<td>4</td>
<td>Trans/Comm/Util</td>
</tr>
<tr>
<td>5</td>
<td>Wholesale trade</td>
</tr>
<tr>
<td>6</td>
<td>Retail trade</td>
</tr>
<tr>
<td>7</td>
<td>Finance/Insurance</td>
</tr>
<tr>
<td>8</td>
<td>Hotel</td>
</tr>
<tr>
<td>9</td>
<td>Restaurant</td>
</tr>
<tr>
<td>10</td>
<td>Personal services</td>
</tr>
<tr>
<td>11</td>
<td>Repair/business services</td>
</tr>
<tr>
<td>12</td>
<td>Health services</td>
</tr>
<tr>
<td>13</td>
<td>Other Pro services</td>
</tr>
<tr>
<td>14</td>
<td>Education</td>
</tr>
<tr>
<td>15</td>
<td>Public Admin/Safety</td>
</tr>
<tr>
<td>16</td>
<td>Entertainment/Recreation</td>
</tr>
<tr>
<td>17</td>
<td>Military</td>
</tr>
<tr>
<td>97</td>
<td>Other</td>
</tr>
<tr>
<td>98</td>
<td>Refused</td>
</tr>
<tr>
<td>99</td>
<td>Don’t know</td>
</tr>
</tbody>
</table>

**PERQ14 Occupation of main job**

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Exec/Admin/Manager</td>
</tr>
<tr>
<td>2</td>
<td>Professional/Technical</td>
</tr>
<tr>
<td>3</td>
<td>Technicians/related support</td>
</tr>
<tr>
<td>4</td>
<td>Sales</td>
</tr>
<tr>
<td>5</td>
<td>Production/Assembly</td>
</tr>
<tr>
<td>6</td>
<td>Private HH/Protective</td>
</tr>
<tr>
<td>7</td>
<td>Farming/Forestry/Fishing</td>
</tr>
<tr>
<td>8</td>
<td>Admin Support/Clerical</td>
</tr>
<tr>
<td>9</td>
<td>Trans/Material moving</td>
</tr>
<tr>
<td>97</td>
<td>Other</td>
</tr>
<tr>
<td>98</td>
<td>Refused</td>
</tr>
<tr>
<td>99</td>
<td>Don’t know</td>
</tr>
</tbody>
</table>

**PERQ17 Length of time at main job**

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Less than 1 year</td>
</tr>
<tr>
<td>98</td>
<td>Refused</td>
</tr>
<tr>
<td>99</td>
<td>Don’t know</td>
</tr>
</tbody>
</table>
### PERQ18 Work at main job location on diary day

**Format:** F1  

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

### PERQ18A Why not work main job location D. day

**Format:** F2  

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sick</td>
</tr>
<tr>
<td>2</td>
<td>Regular day off</td>
</tr>
<tr>
<td>3</td>
<td>Compressed work week day off</td>
</tr>
<tr>
<td>4</td>
<td>Vacation or holiday</td>
</tr>
<tr>
<td>5</td>
<td>Family emergency</td>
</tr>
<tr>
<td>6</td>
<td>Worked second job</td>
</tr>
<tr>
<td>7</td>
<td>Different location for business</td>
</tr>
<tr>
<td>8</td>
<td>Went to school</td>
</tr>
<tr>
<td>97</td>
<td>Other</td>
</tr>
<tr>
<td>98</td>
<td>Refused</td>
</tr>
<tr>
<td>99</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

### PERQ19 Average days per week work main job

**Format:** F1  

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>One day</td>
</tr>
<tr>
<td>2</td>
<td>Two days</td>
</tr>
<tr>
<td>3</td>
<td>Three days</td>
</tr>
<tr>
<td>4</td>
<td>Four days</td>
</tr>
<tr>
<td>5</td>
<td>Five days</td>
</tr>
<tr>
<td>6</td>
<td>Six days</td>
</tr>
<tr>
<td>7</td>
<td>Seven days</td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

### PERQ20 In what type of building is main job

**Format:** F1  

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hotel</td>
</tr>
<tr>
<td>2</td>
<td>Office building</td>
</tr>
<tr>
<td>3</td>
<td>Retail/Commercial building</td>
</tr>
<tr>
<td>4</td>
<td>Factory/Warehouse</td>
</tr>
<tr>
<td>5</td>
<td>Community building</td>
</tr>
<tr>
<td>6</td>
<td>Other building type</td>
</tr>
<tr>
<td>7</td>
<td>No building, work in field</td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

### PERQ21 Avg days per week telecomm to main job

**Format:** F2  

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

Page 8
PERQ22  Most often used Trans Mode to main job
Format: F2
Value | Label
--- | ---
0 | None/Never
1 | One day
2 | Two days
3 | Three days
4 | Four days
5 | Five days
6 | Six days
7 | Seven days
97 | Other
98 | Refused
99 | Don’t know

PERQ23  Number of others that travel with you
Format: F1
Value | Label
--- | ---
0 | None
1 | One
2 | Two
3 | Three
4 | Four
5 | Five
6 | Six
7 | Seven or more
8 | Refused
9 | Don’t know

PERQ24  Usually need vehicle at work for business
Format: F1
Value | Label
--- | ---
1 | Yes
2 | No
8 | Refused
9 | Don’t know

PERQ25A  How much do you pay to park (Per...)
Format: F1
Value | Label
--- | ---
Page 9
<table>
<thead>
<tr>
<th>PERQ25B</th>
<th>HOW much do you pay to park ($ figure)</th>
<th>Format: F6.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>Label</td>
<td>Value</td>
</tr>
<tr>
<td>0</td>
<td>Free</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>Per hour</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Per day</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Per week</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Per month</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Per quarter</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Per semester</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>Other</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
<td>9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PERQ26</th>
<th>where do you park your vehicle at work</th>
<th>Format: F1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>Label</td>
<td>Value</td>
</tr>
<tr>
<td>1</td>
<td>Lot/Garage at work</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Lot/Garage off site</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>On the street</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Never drive to work</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
<td>9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PERQ27</th>
<th>How long in minutes walk from car to work</th>
<th>Format: F2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>Label</td>
<td>Value</td>
</tr>
<tr>
<td>98</td>
<td>Refused</td>
<td>98</td>
</tr>
<tr>
<td>99</td>
<td>Don't know</td>
<td>99</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PERQ28</th>
<th>Employer offer pay all/part of bus pass</th>
<th>Format: F1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>Label</td>
<td>Value</td>
</tr>
<tr>
<td>1</td>
<td>Yes, all or part</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
<td>9</td>
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<table>
<thead>
<tr>
<th>PERQ29B</th>
<th>What does it cost to buy a bus pass</th>
<th>Format: F6.2</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>PERQ30A</th>
<th>Main job shift/schedule change regularly</th>
<th>Format: F1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>Label</td>
<td>Value</td>
</tr>
<tr>
<td>1</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
<td>9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PERQ30B</th>
<th>How often does shift/schedule change</th>
<th>Format: F1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>Label</td>
<td>Value</td>
</tr>
<tr>
<td>1</td>
<td>Every week</td>
<td>1</td>
</tr>
<tr>
<td>Code</td>
<td>Label</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>--------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Every month</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Every quarter</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
<td></td>
</tr>
</tbody>
</table>

**PERQ31** Typical start time of main job  
*Format: F4*

**PERQ32** Typical end time of main job  
*Format: F4*

**PERQ33** How much can main job start time vary  
*Format: F1*

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Start time can't vary</td>
</tr>
<tr>
<td>1</td>
<td>15 Min or less</td>
</tr>
<tr>
<td>2</td>
<td>16 to 30 Minutes</td>
</tr>
<tr>
<td>3</td>
<td>31 to 60 Minutes</td>
</tr>
<tr>
<td>4</td>
<td>60 to 120 Minutes</td>
</tr>
<tr>
<td>7</td>
<td>Other</td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

**PERQ34** How much can main job end time vary  
*Format: F1*

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>End time can't vary</td>
</tr>
<tr>
<td>1</td>
<td>15 Min or less</td>
</tr>
<tr>
<td>2</td>
<td>16 to 30 Minutes</td>
</tr>
<tr>
<td>3</td>
<td>31 to 60 Minutes</td>
</tr>
<tr>
<td>4</td>
<td>60 to 120 Minutes</td>
</tr>
<tr>
<td>7</td>
<td>Other</td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

**PERQ35** Do you have more than one job  
*Format: F1*

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

**PERQ36A** Is your second employer...  
*Format: F1*

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Private company</td>
</tr>
<tr>
<td>2</td>
<td>Government</td>
</tr>
<tr>
<td>3</td>
<td>Self-employed</td>
</tr>
<tr>
<td>7</td>
<td>Other</td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

**PERQ38** Industry of second job  
*Page 11*
### PERQ39 Occupation of second job

**Format:** F2

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Executive/Administrator</td>
</tr>
<tr>
<td>2</td>
<td>Professional/Technical</td>
</tr>
<tr>
<td>3</td>
<td>Technicians/Related support</td>
</tr>
<tr>
<td>4</td>
<td>Sales</td>
</tr>
<tr>
<td>5</td>
<td>Production/Assembly</td>
</tr>
<tr>
<td>6</td>
<td>Private/Protection</td>
</tr>
<tr>
<td>7</td>
<td>Farming/Forestry/Fishing</td>
</tr>
<tr>
<td>8</td>
<td>Admin Support/Clerical</td>
</tr>
<tr>
<td>9</td>
<td>Trans/Material moving</td>
</tr>
<tr>
<td>97</td>
<td>Other</td>
</tr>
<tr>
<td>98</td>
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</tr>
<tr>
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### PERQ40 Average days per week worked second job

**Format:** F2

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<tbody>
<tr>
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<tr>
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<td>Six days</td>
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<td>Seven days</td>
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<td>97</td>
<td>Other</td>
</tr>
<tr>
<td>98</td>
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</tr>
<tr>
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</tbody>
</table>

### PERQ41 In what type of building is second job

**Format:** F1

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<tbody>
<tr>
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<tr>
<td>2</td>
<td>Construction</td>
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<td>3</td>
<td>Manufacturing</td>
</tr>
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<td>4</td>
<td>Trans/Comm/Util</td>
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<tr>
<td>5</td>
<td>Wholesale trade</td>
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<td>6</td>
<td>Retail trade</td>
</tr>
<tr>
<td>7</td>
<td>Finance/Insurance</td>
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<tr>
<td>8</td>
<td>Hotel</td>
</tr>
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<td>9</td>
<td>Restaurant</td>
</tr>
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<td>10</td>
<td>Personal services</td>
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<td>11</td>
<td>Repair/Business services</td>
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<td>12</td>
<td>Health services</td>
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<td>13</td>
<td>Other Pro services</td>
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<tr>
<td>14</td>
<td>Education</td>
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<tr>
<td>15</td>
<td>Public Admin/Safety</td>
</tr>
<tr>
<td>16</td>
<td>Entertainment/Recreation</td>
</tr>
<tr>
<td>17</td>
<td>Military</td>
</tr>
<tr>
<td>97</td>
<td>Other</td>
</tr>
<tr>
<td>98</td>
<td>Refused</td>
</tr>
<tr>
<td>99</td>
<td>Don't know</td>
</tr>
</tbody>
</table>
PERQ42 Avg days per week telecomm to second job

Value Label
0 None/Never
1 One day
2 Two days
3 Three days
4 Four days
5 Five days
6 Six days
7 Seven days
97 Other
98 Refused
99 Don't know

PERQ43 Typical start time of second job

PERQ44 Typical end time of second job

PERQ45 Was your previous main employer...

Value Label
1 Private company
2 Government
3 Self-employed
7 Other
8 Refused
9 Don't know

PERQ47 In what year did you leave previous job

Value Label
98 Refused
99 Don't know

LICENSE Person has driver's license

Value Label
1 Yes
2 No
8 Refused
9 Don't know
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<th>Format</th>
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</thead>
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<td>Person 1's relationship to respondent</td>
<td>F1</td>
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<tr>
<td>Value</td>
<td>Label</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Refused/Don't know</td>
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</tr>
<tr>
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<td>Self</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Spouse</td>
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</tr>
<tr>
<td>3</td>
<td>Son/Daughter</td>
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</tr>
<tr>
<td>4</td>
<td>Mother/Father</td>
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</tr>
<tr>
<td>5</td>
<td>Brother/Sister</td>
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<tr>
<td>6</td>
<td>Grandparent</td>
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</tr>
<tr>
<td>7</td>
<td>Live-in help</td>
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<td>8</td>
<td>Roommate/Other non-related</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Other related</td>
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</tr>
<tr>
<td>YEARBORN</td>
<td>Birth year for person</td>
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<tr>
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<td>Label</td>
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<tr>
<td>9999</td>
<td>Don't know/Refused</td>
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<tr>
<td>SEX</td>
<td>Gender of person</td>
<td>F1</td>
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<tr>
<td>Value</td>
<td>Label</td>
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<tr>
<td>1</td>
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<td>2</td>
<td>Female</td>
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</tr>
<tr>
<td>HHWT5H</td>
<td>Household weight (3709)</td>
<td>F8.4</td>
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<tr>
<td>RECOVER</td>
<td>Household retrieval status</td>
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<td>1</td>
<td>Soft conversion</td>
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</tr>
<tr>
<td>HOMEZIP</td>
<td>Person's Home ZIP code</td>
<td>F5</td>
</tr>
<tr>
<td>SCHLZIP</td>
<td>Person's School ZIP code</td>
<td>F5</td>
</tr>
<tr>
<td>W2ZIP</td>
<td>Person's Secondary Job ZIP code</td>
<td>F5</td>
</tr>
<tr>
<td>W3ZIP</td>
<td>Person's Previous Job ZIP code</td>
<td>F5</td>
</tr>
<tr>
<td>TAZHM</td>
<td>Person's Home TAZ (761)</td>
<td>F3</td>
</tr>
<tr>
<td>TAZSC</td>
<td>Person's School TAZ (761)</td>
<td>F3</td>
</tr>
<tr>
<td>TAZW1</td>
<td>Person's Main Job TAZ (761)</td>
<td>F3</td>
</tr>
</tbody>
</table>
PERSON

TAZW2  Person's Second Job TAZ (761)  275-277
Format: F3
-> SYSFILE INFO 'v:\proj\hi23009a\his\delivery\act.sav'.

File v:\proj\hi23009a\his\delivery\act.sav
Created:  30 Jan 97 15:16:20 - 67 variables and 43,414 cases

File Type:  SPSS Data File

N of Cases:  43414
Total # of Defined Variable Elements:  93
Data Are Not Weighted
Data Are Compressed
File Contains Case Data

Variable Information:

<table>
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</thead>
<tbody>
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<td>ID</td>
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<tr>
<td></td>
<td>Format: F5</td>
</tr>
<tr>
<td>HHWT3H</td>
<td>Household weight (4060)</td>
</tr>
<tr>
<td></td>
<td>Format: F8.4</td>
</tr>
<tr>
<td>PERNUM</td>
<td>Person number</td>
</tr>
<tr>
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<tr>
<td>ACTNUM</td>
<td>Activity number</td>
</tr>
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<td></td>
<td>Format: F2</td>
</tr>
<tr>
<td>ACTPURP</td>
<td>Activity purpose</td>
</tr>
<tr>
<td></td>
<td>Format: F2</td>
</tr>
</tbody>
</table>

Value  Label
1      Work at home
2      Other at home
3      P-up/D-off work
4      P-up/D-off school
5      P-up/D-off other
6      Off-island Acts.
7      Work
8      Work-related
9      School
10     Childcare
11     Buying gas
12     Eating out
13     Shopping
14     Social Acts./Recreation
15     Volunteer work
16     Personal business
97     Other
98     Refused
99     Don't know
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>STRT_TIME</td>
<td>Activity starting time</td>
<td>F4</td>
</tr>
<tr>
<td>END_TIME</td>
<td>Activity ending time</td>
<td>F4</td>
</tr>
<tr>
<td>LOC_FLAG</td>
<td>Location name flag</td>
<td>F1</td>
</tr>
<tr>
<td>ADDRFLAG</td>
<td>Address flag</td>
<td>F1</td>
</tr>
<tr>
<td>Q74</td>
<td>Where did you do this activity</td>
<td>F1</td>
</tr>
<tr>
<td>Q73A</td>
<td>Confirm location at 3A.M.</td>
<td>F1</td>
</tr>
<tr>
<td>Q73B</td>
<td>Got back to Oahu by the end of the day</td>
<td>F1</td>
</tr>
<tr>
<td>Q79</td>
<td>Was that the last activity?</td>
<td>F1</td>
</tr>
</tbody>
</table>

**Value Label**

- **LOC_FLAG**
  - 1: Private residence
  - 7: Business/Store/Place
  - 8: Refused
  - 9: Don't know

- **ADDRFLAG**
  - 1: Complete address known/given
  - 2: Cross streets known/given
  - 8: Refused
  - 9: Don't know

- **Q74**
  - 1: Home
  - 2: Main job location
  - 3: Second job location
  - 4: School/Daycare
  - 7: Other location
  - 8: Refused
  - 9: Don't know

- **Q73A**
  - 1: Yes
  - 2: No

- **Q73B**
  - 1: Yes
  - 2: No
  - 8: Refused
  - 9: Don't know

- **Q79**
  - 1: Yes
ACT.INF

Q80 Confirm person at the one location all day
Format: F1
Value   Label
1   Yes
2   No
8   Refused
9   Don't know

DIRYDATE Confirmed diary date
Format: F2

Q81A Did anything on the way to work
Format: F1
Value   Label
1   Yes
2   No
8   Refused
9   Don't know

Q81B Did anything on the way to the new activity
Format: F1
Value   Label
1   Yes
2   No
8   Refused
9   Don't know

Q81C How did you leave oahu
Format: F1
Value   Label
1   Air
2   Boat
3   Other
8   Refused
9   Don't know

Q82 What time did you start the activity
Format: F4

Q83 Took so long to get there from the last location
Format: F4
Value   Label
1
2

Q84 At a shopping mall or center
Format: F1
Value   Label

Page 3
Q85 How many stores did you go into
Format: F2
Value Label
98 Refused
99 Don't know

Q86 Eat at the shopping mall or center
Format: F1
Value Label
1 Yes
2 No
8 Refused
9 Don't know

Q87 Where did you do this new activity
Format: F1
Value Label
1 Same as last Act.
2 Home
3 Main job location
4 Second job location
5 School/Daycare
7 Other
8 Refused
9 Don't know

Q91 How many other people traveled with you
Format: F2
Value Label
98 Refused
99 Don't know

Q91A How many household members
Format: F2
Value Label
98 Refused
99 Don't know

Q92 Travel mode
Format: F2
Value Label
1 Walk/Wheelchair
2 The Bus
3 School bus
4 Subscription bus
<table>
<thead>
<tr>
<th>ACT.INF</th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Handivan</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Passenger</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Driver</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Motorcycle</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Moped</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Taxi</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Bicycle</td>
<td></td>
</tr>
<tr>
<td>97</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>98</td>
<td>Refused</td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Don't know</td>
<td></td>
</tr>
</tbody>
</table>

| Q93A            | First bus route  | 59-61|
| Q93B            | Second bus route | 62-64|
| Q93C            | Third bus route  | 65-67|
| BUS1FLAG        | Bus 1 Flag       | 68   |

<table>
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<tr>
<th>Value</th>
<th>Label</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Place name only given</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Place &amp; intersection given</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Intersection only given</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
<td></td>
</tr>
</tbody>
</table>

| B1COMNTY     | Community of the bus boarding place       | 69-88|
| B1ZIP        | ZIP code of the bus boarding place        | 89-93|

| Q95          | Travel mode to the first bus stop          | 94   |

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<tbody>
<tr>
<td>1</td>
<td>Taxi</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Walk</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Vehicle passenger</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Vehicle driver</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Bicycle</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
<td></td>
</tr>
</tbody>
</table>

| Q96          | How did you pay                            | 95   |

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<td>2</td>
<td>Cash</td>
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<td>3</td>
<td>No fare paid</td>
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<td>8</td>
<td>Refused</td>
<td></td>
</tr>
<tr>
<td>9</td>
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</tbody>
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| Q96A         | Type of pass                               | 96   |

Page 5
<table>
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<td>Monthly</td>
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<td>Value Label</td>
<td>Student</td>
<td>Other</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sr Citizen/Handicapped</td>
<td>Refused</td>
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<tr>
<td></td>
<td></td>
<td>Don't know</td>
<td></td>
</tr>
<tr>
<td>BUS2FLAG</td>
<td>Bus 2 flag</td>
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<td>Place &amp; intersection given</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intersection only given</td>
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</tr>
<tr>
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<tr>
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<td>Community of the getting off place</td>
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<td>Place &amp; intersection given</td>
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</tr>
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<td></td>
<td></td>
<td>Don't know</td>
<td></td>
</tr>
<tr>
<td>B2ZIP</td>
<td>ZIP code of the getting off place</td>
<td>Value Label</td>
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<td>Place &amp; intersection given</td>
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<td>Refused</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Don't know</td>
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</tr>
<tr>
<td>Q98</td>
<td>Travel mode from the last bus to destination</td>
<td>Value Label</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Format: F1</td>
<td>Taxi</td>
<td>Walk</td>
</tr>
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<td></td>
<td></td>
<td>Vehicle passenger</td>
<td>Vehicle driver</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bicycle</td>
<td>Refused</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Don't know</td>
<td></td>
</tr>
<tr>
<td>Q99</td>
<td>Used listed vehicle</td>
<td>Value Label</td>
<td></td>
</tr>
<tr>
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<td>Format: F1</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Refused</td>
<td>Don't know</td>
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<td>Vehicle number</td>
<td>Value Label</td>
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<td>Don't know</td>
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<tr>
<td>Q100</td>
<td>Were you dropped off</td>
<td>Value Label</td>
<td></td>
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<tr>
<td></td>
<td>Format: F1</td>
<td>Refused</td>
<td>Don't know</td>
</tr>
</tbody>
</table>
ACT.INF

1 Yes
2 No
8 Refused
9 Don't know

Q100A Where was the vehicle parked 128
Format: F1

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<th>Value</th>
<th>Label</th>
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<tbody>
<tr>
<td>1</td>
<td>On street parking</td>
</tr>
<tr>
<td>2</td>
<td>Home driveway/garage</td>
</tr>
<tr>
<td>3</td>
<td>Street-level parking lot</td>
</tr>
<tr>
<td>4</td>
<td>Parking structure</td>
</tr>
<tr>
<td>5</td>
<td>Valet parked</td>
</tr>
<tr>
<td>6</td>
<td>Vehicle idle/not parked</td>
</tr>
<tr>
<td>7</td>
<td>Other</td>
</tr>
<tr>
<td>8</td>
<td>Refused</td>
</tr>
<tr>
<td>9</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

Q100B1 How much was the parking 129
Format: F1

<table>
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<tr>
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<tr>
<td>2</td>
<td>Validated</td>
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<tr>
<td>3</td>
<td>Reimbursed by employer</td>
</tr>
<tr>
<td>4</td>
<td>Paid something</td>
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<tr>
<td>8</td>
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Q100B2 Cost of the parking 130-136
Format: F7.2

Q101 Taxi fare, including the tip 137-143
Format: F7.2

Q102 Will it be reimbursed 144
Format: F1

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Q103A1 How far did you travel 145-147
Format: F3

Q103A2 Blocks or miles 148
Format: F1

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Q104 Activity ending time 149-152
Page 7
Q105 Last activity

Value | Label
------|------
1 | Yes
2 | No
8 | Refused
9 | Don’t know

Q105A Lasted till 3A.M.

Value | Label
------|------
1 | Yes
2 | No
8 | Refused
9 | Don’t know

OTHERACT Other activity purpose, specified

Format: A69

HHWT5H Household weight (3709)

Format: FB.4

RECOVER Household retrieval status

Format: F1

Value | Label
------|------
0 | Regular
1 | Soft conversion

TAZAC Activity TAZ (761)

Format: F3

TAZBB Bus boarding TAZ (761)

Format: F3

TAZBA Bus alighting TAZ (761)

Format: F3

HHWT5HPA Trip weight

Format: FB.4
**Table C.1. Coefficients for an Estimated Multinomial Logit Model for Mode Choice Using Elderly and Retired as Separate Variables**

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<tr>
<th>Variable</th>
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<th>Bike</th>
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*Note: All VTT except transit have 3.164, therefore all except transit are significantly different at the 90% confidence level. Transit is significantly different at the 90% confidence level.*
Table C.4. Coefficients for an Estimated Multinomial Logit Model

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N= 17,737
*a*Transit was considered to be the base case.
*b*These variables were combined for Drive and Passenger.

Table C.5. T-Statistic for Non-Elderly vs. Not Retired Elderly

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All IVTT except drive and transit have \( t > 1.645 \), therefore transit OVTT is significant.

Table C.6. T-Statistic for Non-Elderly vs. Retired Elderly

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<th>Bike</th>
<th>Transit</th>
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<td>N/A</td>
<td>N/A</td>
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All IVTT except transit have \( t > 1.645 \), therefore transit OVTT is significant.

Table C.7. T-Statistic for Not Retired Elderly vs. Retired Elderly

<table>
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<th></th>
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<th>Bike</th>
<th>Transit</th>
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<tbody>
<tr>
<td>In-Vehicle Travel Time</td>
<td>1.096</td>
<td>2.268</td>
<td>4.333</td>
<td>1.137</td>
<td>1.094</td>
</tr>
<tr>
<td>Out-of-Vehicle Travel Time</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>3.004</td>
</tr>
</tbody>
</table>

All IVTT except drive, bike and transit have \( t > 1.645 \), therefore transit OVTT is significant.

Table C.8. Economic Value of Time (per hour)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Elderly</td>
<td>$ 9.12</td>
</tr>
<tr>
<td>Elderly and Retired</td>
<td>$ 15.11</td>
</tr>
<tr>
<td>Elderly and Not Retired</td>
<td>$ 4.20</td>
</tr>
</tbody>
</table>
### Logit Model for Mode Choice Using Elderly and Retired as One Variable

<table>
<thead>
<tr>
<th></th>
<th>Walk</th>
<th>Bike</th>
<th>Transit*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
<td>Standard Error</td>
<td>T-Statistic</td>
<td>P-Value</td>
</tr>
<tr>
<td>3.055</td>
<td>0.164</td>
<td>18.684</td>
<td>0.0000</td>
</tr>
<tr>
<td>-1.151</td>
<td>0.419</td>
<td>-2.749</td>
<td>0.0060</td>
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<tr>
<td>-1.085</td>
<td>0.826</td>
<td>-1.315</td>
<td>0.1886</td>
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<tr>
<td>0.389</td>
<td>0.122</td>
<td>3.198</td>
<td>0.0014</td>
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<td></td>
<td></td>
<td></td>
<td>N/A</td>
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<tr>
<td>-</td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
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<tr>
<td>0.433</td>
<td>0.165</td>
<td>2.625</td>
<td>0.0087</td>
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<tr>
<td>-0.157</td>
<td>0.007</td>
<td>-21.194</td>
<td>0.0000</td>
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<tr>
<td>-0.143</td>
<td>0.021</td>
<td>-6.851</td>
<td>0.0000</td>
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<tr>
<td>-0.251</td>
<td>0.053</td>
<td>-4.855</td>
<td>0.0000</td>
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<td>N/A</td>
<td>-0.047</td>
<td>0.005</td>
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<td>N/A</td>
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<td>N/A</td>
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<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

As t>1.645, therefore all except drive and transit are significantly different at the 90% confidence level.

Significantly different at the 90% confidence level.

45, therefore all except transit are significantly different at the 90% confidence level.

Significantly different at the 90% confidence level.

As t>1.645, therefore all except drive, bike and transit are significantly different at the 90% confidence level.

Significantly different at the 90% confidence level.