

Analyzing the 2012 California Household Travel Survey using R: Summary

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Chapter 1

Introduction

The 2010-12 CHTS, which resulted from a statewide, collaborative effort, enabled the collection of travel information from 42,560 Californian households. This rich dataset has helped update regional and statewide travel and will help update environmental models.

In 2014, the Institute of Transportation Studies at Irvine (ITS) and Caltrans initiated the “Enhancing the Value of the 2010-12 California Household Travel Survey (CHTS)” contract. This contract was motivated by the idea that potential value of the CHTS is not always well understood by Caltrans staff and that some Caltrans staff from the Office of Travel Forecasting and Analysis may benefit from updating their knowledge of statistical modeling to comfortably query CHTS data and to estimate some common transportation econometrics models.

The specific elements of the contract included the following deliverables:

1. a systematic diagnostic review of the 2010-12 CHTS database for unlikely observations;
2. a set of interviews with staff at Caltrans headquarters and visits to three selected Caltrans Districts to better understand how they could benefit from using 2010-12 CHTS data and to help promote its use in their work;
3. hands-on statistical training and consulting to selected Caltrans staff in the Office of Travel Forecasting and Analysis in Sacramento;
4. on-call statistical support to Caltrans staff from the Office of Travel Forecasting and Analysis; and
5. a reference book of useful statistical commands based on actual case studies to make it easier to put the 2010-12 CHTS to work for Caltrans staff.

The book you are reading now is the last of these deliverables. It provides numerous examples of how to perform various types of statistical analysis on the CHTS. In chapter 2, we discuss the computation of statistical weights for various subpopulations in the CHTS—a critical component of any analysis involving the CHTS. In chapter 3, we cover the creation of a “linked trip” dataset, which provides a means for analyzing CHTS data in a manner that is compatible with conventional 4-step, trip based models. Finally, chapter 4 describes the solution of a number of statistical queries that were answered under task 4 statistical support tasks.

Chapter 2

Calculating Weights

2.1 County Level Person Weights

This document explains how county-level weights are developed using the R statistical software for people who participated in the 2012 CHTS. The purpose of these weights is to scale up information provided by respondents to the population of each county based on the socio-economic variables listed below. The person level weights were developed at the county level. Users of these weights are cautioned that these weights should not be applied to lower-level geographies such as cities or zip codes. Similar weights can be developed for these geographies if they contain enough CHTS respondents.

2.1.1 Methodology

Person-level county weights are calculated by raking at the person level. These weights adjust the relative importance of responses to reflect the different probabilities of selecting respondents, and align the sample distributions to population distributions based on the 2010 Census. In particular, person-level weights were adjusted so that the sum of these weights equals known population totals for certain subgroups of the population of each county. Variables used for raking at the person level are:

- Hispanic Status (Hispanic, Non-Hispanic) - County-wide distribution;
- Ethnicity (White, African American, Asian, Other) - County-wide distribution;
- Age (less than 20 years, 20 - 24 years, 25 - 34 years, 35 - 54 years, 55 - 64 years, 65 years or older) - County -wide distribution;
- Employment Status (Part-time or full-time Employed, Not-employed)- County-wide distribution; and
- Gender (Male, Female)- County-wide distribution

After the raking procedure, very large weights are capped to be no more than five times the mean of weight. To check whether the new weights represent the total population of the counties, we perform

some random checks for different variables and the results show that the new weights align with the county populations.

We use this new county wide person weight to calculate the final trip weight which is an outcome of $\text{Trip Correction Factor (TCF)} * \text{New County Wide Person Weight}$.

2.2 County Level Household Weights

This document explains how to develop county-level household weights using the R statistical software for households who participated in the 2012 CHTS. The purpose of these weights is to scale up information provided by respondents to the population of each county based on the socio-economic variables listed below. Users of county-level household weights are cautioned that these weights should not be applied to lower-level geographies such as cities or zip codes. Similar weights can be developed for these geographies using the approach described below if they contain enough CHTS respondents.

2.2.1 Methodology

Household-level county weights are calculated by raking at the household level. These weights adjust the relative importance of responses to reflect the different probabilities of selection of CHTS respondents, and they align sample distributions to population distributions based on the 2010 Census. In particular, household weights were adjusted so that the sums of adjusted weights are equal to known population totals for some subgroups of the population of each county. Following NuStats' work for Caltrans, the variables used for raking at the household level are:

- Household size (1, 2, 3, 4 or more) - County wide distribution;
- Household income (Less than \$24,999, \$25,000 - \$49,999, \$50,000 - \$74,999, \$75,000-\$99,999, \$100,000-\$149,999, \$150,000 or above) - County wide distribution;
- Total number of workers in the household (0, 1, 2, 3 or more) - County wide distribution; and
- Total number of vehicles in the household (0, 1, 2, 3 or more) - County wide distribution.

After the raking procedure, very large weights are capped to be no more than five times the mean of weights. To check whether the new weights represent the total population of a county, we perform some random checks for different variables. The results show that the new weights align well with the population of the different counties.

2.3 Weights for Other Geographies

2.3.1 Overview

This section explains how person-level weights are developed for the City of Los Angeles (LA) using the R statistical software. The purpose of these weights is to scale up information provided by 2012 CHTS respondents to the population of City of Los Angeles based on the socio-economic variables listed below. Users of these weights are cautioned that these weights should not be applied to lower-level geographies such as zip codes.

2.3.2 Methodology

Weights are calculated by raking at the person level. These weights adjust the relative importance of responses to reflect the different probabilities of selection of respondents, and align the sample distributions to population distributions, based on the 2010 Census. In particular, the weights are adjusted so that the sums of adjusted weights are equal to known population totals for selected subgroups of the population of the City of Los Angeles. Since detailed sampling information is not available for the City of Los Angeles, we assume equal probability of selection. Variables used for raking at the person level are:

- Hispanic Status (Hispanic, Non-Hispanic)-LA City-wide distribution.
- Ethnicity (White, African American, Asian, Other)-LA City-wide distribution.
- Age (less than 20 years, 20 to 24 years, 25 to 34 years, 35 to 54 years, 55 to 64 years, 65 years or older)-LA City-wide distribution.
- Employment Status (Part-time or full-time Employed, Not-employed)-LA City-wide distribution
- Gender (Male, Female) - LA City-wide distribution

Following the raking procedure, very large weights are capped to be no more than five times the mean of weights. To check whether the new weights represent the total population of the City of Los Angeles, we perform some random checks for different variables and the results show that the new weights align well with the population of the City of Los Angeles. We use these new person weights to calculate the final trip weights from $\text{Trip Correction Factor (TCF)} * \text{New Person Weight of LA City}$.

2.4 Weights for Long Distance Trips

2.4.1 Overview

This document explains how county-level weights are developed for long distance trips using the R statistical software for people who participated in the 2012 CHTS. The purpose of these weights is to scale up information provided by respondents to the population of each county based on the socio-economic variables listed below. The person level weights are generated for long distance trips at county level. Long distance travel file did not properly identify the person identification number. So we have to rely on variable LNINI1 (person who made the trip) and there are 1310 missing observations. Users of these weights are cautioned that these weights should not be applied to lower-level geographies such as cities or zip codes. Similar weights can be developed for these geographies if they contain enough CHTS respondents.

2.4.2 Methodology

County wide Weights for Long distance trips are calculated by raking at the person level. These weights adjust the relative importance of responses to reflect the different probabilities of selecting respondents, and align the sample distributions to population distributions based on the 2010 Census. In particular, long distance person-level weights were adjusted so that the sum of these weights equals known population totals for certain subgroups of the population of each county. Variables used for raking at the person level are:

- Hispanic Status (Hispanic, Non-Hispanic) - County-wide distribution;
- Ethnicity (White, African American, Asian, Other) - County-wide distribution;
- Age (less than 20 years, 20 - 24 years, 25 - 34 years, 35 - 54 years, 55 - 64 years, 65 years or older) - County -wide distribution;
- Employment Status (Part-time or full-time Employed, Not-employed)- County-wide distribution; and
- Gender (Male, Female)- County-wide distribution

After the raking procedure, very large weights are capped to be no more than five times the mean of weight.

Chapter 3

Linked Trip Tables

3.1 Introduction

This document describes the method used to determine the linked trip table. The 2001 CHTS included a linked trip table with the following fields, for which we summarize how we anticipate computing comparable information from the CHTS 2011 data.

Table 3.1: Mapping between 2001 and 2011 linked trip data

CHTS.2001	CHTS.2011
Sampn	SAMPN
PerNo	PERNO
DayNo	N/A
Source_Act	To be computed from ACTNO
Dest_Act	To be computed from ACTNO
Source_PlaNo	To be computed from PLANO
Dest_PlaNo	To be computed from PLANO
Source_LocNo	N/A
Dest_LocNo	N/A
DType	Unknown values in {1,2}
MODE	Interpreted as mode of longest distance trip in set of linked trips
MAPPED_MODE	Definition unclear. Values: in {S,W,L,D,I,B,P,T,A,O}
TripType	Mapping between conventional 4-step model trip ends: {HW,HS,OO,WO,H0}
Dep_Hr	Departure hour: DEP_HR
Dep_Min	Departure minute: DEP_MIN
Arr_Hr	Arrival hour: ARR_HR
Arr_Min	Arrival minute: ARR_MIN
TrpDur	Total duration of all linked trips combined
IgnoredActDur	Duration of all ignored activities (those with APURP=c(21,22))
VehAvail	Whether a vehicle is available for this trip. It's unclear if we can compute this
VehNo	Household vehicle used for trip (if any)

CHTS.2001	CHTS.2011
Party	Number of people on the linked trip. We will assume this refers to the primary trip
DOM_WDWGT	Day of month weekday weight? Unclear whether there is a 2011 analogue
DOM_WEWGT	Day of month weekend weight? Unclear whether there is a 2011 analogue
DOM_SDWGT	Day of month ? weight? Unclear whether there is a 2011 analogue
DOM_AWDWGT	Day of month ? weight? Unclear whether there is a 2011 analogue
DOM_ASDWGT	Day of month ? weight? Unclear whether there is a 2011 analogue
Orig_DOM_AWDWGT	Original(?) Day of month ? weight? Unclear whether there is a 2011 analogue
Orig_DOM_WEWGT	Original(?) Day of month ? weight? Unclear whether there is a 2011 analogue
PHASE	?

3.2 Methodological Overview

In the 2001 CHTS, linked trips were defined as follows:

For the purposes of the 2000-2001 California Statewide Travel Survey the definition of a “linked” trip is when a person changes travel mode to reach the “real” destination, or when a driver makes a stop to serve a passenger (drop off or pick up) on the way to the actual or ultimate destination. In a linked trip, the trip to the location where the travel mode change or serve passenger occurs is combined (or linked) with the trip continuing from this location to the ultimate destination. A linked trip may include more than one stop to change travel mode or serve a passenger.

To recreate a table of linked trips for the 2010 CHTS dataset, we performed a number of steps. Before summarizing these steps below, we will clarify some definitions.

First, for the purposes of this discussion, a non-linked trip describes a single person’s movement from one place to another. In the 2010 CHTS dataset, every non-linked trip has a single record (place) in the PLACE table.

Second, for the purposes of this discussion, a non-linked trip purpose is characterized by the purposes of the activities performed at the place to which the trip takes the individual. A person will have one or more activities associated with each place. Each activity is characterized by a record (activity) in the ACTIVITY table. Thus, there is potential for a trip to have multiple trip purposes depending on the number and purposes of the activities performed at the destination place.

3.2.1 Identifying linked trips

By the definitions above, any trip whose purpose is a linkable purpose (either a mode switch or a pick-up/drop off activity) should be “linked” to the trip following it. Though there may be more

than one **activity** at a given **place**, we assume that if any of those activities have a linkable purpose then the trip should be linked to the following trip.

Our method for creating linked trips creates a unique index (linked trip number: **LTNO**) for each group of trips. Very generally, we order the activities reported for each person and increment a the **LTNO** every time a linked-trip without a linkable purpose is observed. This defines a mapping between unlinked trips (i.e. places) and linked trips.

3.2.2 Linked trip MODE (Identifying the principal trip)

For a linked trip, we need some heuristic to determine which mode is most important and should be called the mode for that trip. Our assumption is that that trip with the longest distance from the set of trips in a linked trip should be the one whose mode is associated with the linked trip. To compute this, we rank (order) the unlinked trips that make up each linked trip and select the longest one as the principal trip.

We use the MODE of this trip, as well as various other trip-related characteristics, to describe the corresponding attribute of the linked trip.

3.2.3 Linked trip origin and destination

In the 2001 linked trip table, there are records of the origin place and activity for every linked trip. We also compute this for the 2011 dataset by selecting the last **place** and **activity** of the prior linked trip grouping as the origin **place** and **activity** for a given linked trip.

There are also linked trip destinations to produce. We defined the linked trip destination as the *first activity* at the last **place** traveled to in the linked trip.

As an illustration consider this trip/activity sequence:

1. Start at home
2. Perform personal activities
3. Drive to child's school
4. Drop off child
5. Drive to work
6. Perform work activity
7. Eat lunch
8. Perform work activity
9. Drive to soccer field
10. Pick up child
11. Drive home
12. Prepare dinner
13. Eat dinner

This will be converted into two linked trips:

1. LTNO=1, From [1,1] (home, personal activities) to [3,1] (work, work activity)

2. LTNO=2, From [3,3] (work, work activity) to [5,1] (home, prepare dinner)

Places 2 and 4 will be attached to LTNO = 2 and 4 respectively.

3.2.4 Trip type (or purpose)

The trip purposes reported for linked trips in 2001 are designed to map the activity-based reporting of the CHTS onto more conventional trip purpose definitions typical in transportation planning:

- **HO:** Home-based other trips
- **HS:** Home-based shopping trips
- **HW:** Home-based work trips
- **OO:** Other-other trips
- **WO:** Work-based other trips

Recall that trips in the `place` table do not have purposes assigned and, instead, trip purposes must be inferred from the activities performed at the destination. Thus, our first step was to define a mapping between `place,activity` purpose combinations at the linked trip ends and the four-step trip purpose definitions above (Home, Shop, Work, and Other).

We approached this using a hierarchy of factors. The first is that since we know the home location of every person, then if a trip-end (origin or destination) occurs at that location, then that trip-end is HOME by definition.

The second hierarchy is used to determine WORK, SHOP, and OTHER purposes. In this case, we defined a mapping between activity purposes and four-step trip purposes. However, when there is more than one `activity` reported at a `place`, we need to select the most important activity at that location as the purpose. Following convention in transportation planning, we rank trip purposes in the following order of importance:

1. Home
2. Work
3. Shop
4. Other

Thus, if a given place has activities with both WORK and SHOP purposes (according to our activity-purpose to trip-purpose mapping), we characterize that trip-end as being a WORK purpose. Similarly, if a given place has activities with both SHOP and OTHER purposes, we assign it a SHOP purpose.

Once we characterize the trip-end purpose for each PLACE in the dataset, we can construct the purpose for every linked trip by simply combining the trip-ends and mapping them to four-step trip types using the following hierarchy:

1. Any trip with a HOME trip-end is a home-based trip regardless of origin and destination (HS, HW, HO)
2. Any trip without a HOME trip-end but with a WORK trip-end is a work-based other trip (WO)

3. Any trip without a HOME or WORK trip-end is an other-other trip (OO)

There are some edge cases involving looping trips from home to home (HH) or work to work (WW) that are made possible by the linked-trip definition. For example, it is perfectly reasonable that someone drives from home, drops a child at school, and returns home. This is a linked trip from home to home with the same origin and destination. We chose to leave these in the linked trip table as they may have relevance for policy analysis even though by conventional definitions they are a trip from and to the same location. An analyst may choose to explode these specific linked trips back into their constituent un-linked trips to capture travel demand that would otherwise go unanalyzed.

3.2.5 Linked Trip Statistics

In the last step of our linked-trip computation, we compute various linked-trip statistics by selecting the relevant value from the principal (longest leg) of the linked-trip, or by aggregating across all trips making up the linked trip. The relevant values are as follows:

- **ltmode**: The mode of the principal trip
- **ltTCF**: The trip correction factor of the principal trip
- **dTCF**: The trip correction factor of the last (destination) trip
- **tripdist**: The distance traveled across all legs of the linked trip
- **tripdur**: The travel time across all legs of the linked trip (not including activity durations)
- **ignoredactdur**: The amount of time spent performing ignored pick-up/drop-off or mode change activities during the linked trip
- **MAXTR**: The maximum number of travelers across all legs of a linked trip
- **MINTR**: The minimum number of travelers across all legs of a linked trip
- **DEP_HR**: The departure hour from the origin of this linked trip
- **DEP_MIN**: The departure minute from the origin of this linked trip
- **ARR_HR**: The arrival hour to the destination of this linked trip
- **ARR_MIN**: The arrival minute to the destination of this linked trip

Chapter 4

Data Analysis Requests

The following sections provide R solutions to the questions asked by various districts during the course of the project.

4.1 Data Request for Santa Cruz County

4.1.1 Question

This question asked for the following information for Santa Cruz county:

1. Trips by Mode
2. Modal split for driving alone
3. Trip distance by Mode
4. Trip duration by Mode
5. Trips by Purpose
6. Work trips by mode

4.1.2 Summary and Methodology

In this sub-section, We learn how to generate tables by mode for the following: total number of trips, total trip distance, average trip distance, total trip duration, average trip duration, and total number of trips for driving alone. To calculate the “drive alone” numbers we extract data for total travelers and drivers of cars, trucks, or motorcycles. We also generate tables for the total number of trips by trip purpose and for work trips by mode. Here, we actually generate tables for the total number of trips by activity purpose since the trip purpose is given in the database as the activity purpose and although many trips are associated with more than one activity, We consider each activity as a trip. We only consider the work trips . We generate every table for both trips originating in and ending in Santa Cruz County. We use the new county wide weights of Santa Cruz County to generate weighted results for trips that originated in Santa Cruz County and statewide weights to generate weighted results for trips that originated outside of Santa Cruz County.

4.1.3 Results

Table 4.1: Mode Code

Code	Mode	Code	Mode
1	Walk	16	Express Bus/Commuter Bus
2	Bike	17	Premium Bus
3	Wheelchair/Mobility Scooter	18	School Bus
4	Other Non-Motorized	19	Public Transit Shuttle
5	Auto/Van/Truck Driver	20	Air BART/LAX Fly Away
6	Auto /Van/Truck Passenger	21	Dial-a-Ride/Paratransit
7	Carpool/Vanpool	22	Amtrak Bus
8	Motorcycle/Scooter/Moped	23	Other Bus
9	Taxi/Hired Car/Limo	24	BART,Metro Red/Purple Line
10	Rental Car/Vehicle	25	ACE, Amtrak, Cal train
11	Private shuttle	26	Metro
12	Greyhound Bus	27	Street Car/Cable Car
13	Plane	28	Other Rail
14	Other Private Transit	29	Ferry / Boat
15	Local Bus,Rapid Bus		

Table 4.2: Activity Purpose Code

Code	Purpose	Code	Purpose
1	Personal Activities	21	Change Type Of Transportation/Transfer
2	Preparing Meals/Eating	22	Pickup/Drop Off Passenger(S)
3	Hosting Visitors/Entertaining Guests	23	Drive Through Meals
4	Exercise	24	Drive Through Other (ATM, Bank)
5	Study/Schoolwork	25	Work-Related
6	Work For Pay At Home Using	26	Service Private Vehicle
7	Using Computer/Telephone/Cell Or Smart Phone	27	Routine Shopping
8	All Other Activities At My Home	28	Shopping For Major Purchases
9	Work/Job Duties	29	Household Errands
10	Training	30	Personal Business
11	Meals At Work	31	Eat Meal at Restaurant/Diner
12	Work-Sponsored Social Activities	32	Health Care
13	Non-Work Related Activities	33	Civic/Religious Activities
14	Exercise/Sports	34	Outdoor Exercise
15	Volunteer Work/Activities	35	Indoor Exercise
16	All Other Work-Related Activities At My Work	36	Entertainment
17	In School/Classroom/Laboratory	37	Social/Visit Friends/Relatives
18	Meals At School/College	38	Other
19	After School Sports/Physical Activity	39	Loop Trip
20	All Other After School Related Activities	99	Don't Know/Refused

Table 4.3: Total number of trips originating in Santa Cruz County

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	3,035	523,006	58.90	53.42
Auto /Van/Truck Passenger	1,096	239,190	21.27	24.43
Walk	624	138,456	12.11	14.14
Bike	218	30,820	4.23	3.15
Local Bus,Rapid Bus	48	13,170	0.93	1.35
Carpool/Vanpool	38	12,281	0.74	1.25
School Bus	26	9,885	0.50	1.01
Motorcycle/Scooter/Moped	24	4,029	0.47	0.41
Other Non-Motorized	10	3,237	0.19	0.33
Dial-a-Ride/Paratransit	2	1,122	0.04	0.11
Wheelchair/Mobility Scooter	8	933	0.16	0.10
Plane	1	678	0.02	0.07
Express Bus/Commuter Bus	4	645	0.08	0.07
Other Bus	5	506	0.10	0.05
Rental Car/Vehicle	5	338	0.10	0.03
Taxi/Hired Car/Limo	5	323	0.10	0.03
Street Car/Cable Car	2	263	0.04	0.03
Other Private Transit	1	139	0.02	0.01
Private shuttle	1	104	0.02	0.01
Total	5,153	979,123	100.00	100.00

Table 4.4: Modal split (drive alone) of trips originating in Santa Cruz County

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	2,173	358,744	98.55	98.74
Motorcycle/Scooter/Moped	23	3,842	1.04	1.06
Carpool/Vanpool	6	590	0.27	0.16
Rental Car/Vehicle	3	163	0.14	0.04
Total	2,205	363,339	100.00	100.00

Table 4.5: Trip distance (mi) by mode for trips originating in Santa Cruz County

Mode	Trip Dist UW	Trip Dist W	Percent UW	Percent W	Avg Dist UW	Avg Dist W
Auto/Van/Truck Driver	24,964	3,695,031	68.20	62.64	8.23	7.06
Auto /Van/Truck Passenger	9,329	1,659,613	25.48	28.13	8.51	6.94
Carpool/Vanpool	549	135,335	1.50	2.29	14.45	11.02
Plane	178	120,795	0.49	2.05	178.23	178.23
Local Bus, Rapid Bus	272	78,838	0.74	1.34	5.67	5.99
Walk	338	67,696	0.92	1.15	0.54	0.49
Bike	379	54,163	1.04	0.92	1.74	1.76
School Bus	109	34,547	0.30	0.59	4.18	3.49
Motorcycle/Scooter	184	17,235	0.50	0.29	7.65	4.28
Express Bus/Commuter Bus	95	11,033	0.26	0.19	23.76	17.11
Rental Car/Vehicle	106	8,446	0.29	0.14	21.18	25.01
Dial-a-Ride/Paratransit	9	4,854	0.02	0.08	4.33	4.33
Street Car/Cable Car	33	4,343	0.09	0.07	16.51	16.51
Private shuttle	31	3,241	0.09	0.05	31.14	31.14
Other Non-Motorized	6	1,559	0.02	0.03	0.65	0.48
Other Bus	8	985	0.02	0.02	1.62	1.95
Taxi/Hired Car/Limo	9	587	0.02	0.01	1.82	1.82
Other Private Transit	3	425	0.01	0.01	3.06	3.06
Wheelchair/Mobility Scooter	2	225	0.01	0.00	0.24	0.24
Total	36,605	5,898,948	100.00	100.00	333.52	320.91

Table 4.6: Trip duration (min) by mode for trips originating in Santa Cruz County

Mode	Trip Dur UW	Trip Dur W	Percent UW	Percent W	Avg Dur UW	Avg Dur W
Auto/Van/Truck Driver	61,145	9,174,425	61.55	56.12	20.15	17.54
Auto /Van/Truck Passenger	21,607	4,011,792	21.75	24.54	19.71	16.77
Walk	8,077	1,534,130	8.13	9.38	12.94	11.08
Bike	3,743	495,391	3.77	3.03	17.17	16.07
Local Bus,Rapid Bus	1,425	383,709	1.43	2.35	29.69	29.14
Carpool/Vanpool	1,098	290,541	1.11	1.78	28.89	23.66
School Bus	794	244,981	0.80	1.50	30.54	24.78
Motorcycle/Scooter	520	74,361	0.52	0.45	21.67	18.46
Other Non-Motorized	115	31,573	0.12	0.19	11.50	9.76
Express Bus/Commuter Bus	176	21,096	0.18	0.13	44.00	32.72
Plane	30	20,333	0.03	0.12	30.00	30.00
Rental Car/Vehicle	196	14,541	0.20	0.09	39.20	43.07
Street Car/Cable Car	102	13,412	0.10	0.08	51.00	51.00
Wheelchair/Mobility Scooter	102	12,918	0.10	0.08	12.75	13.85
Other Bus	68	7,735	0.07	0.05	13.60	15.30
Private shuttle	59	6,141	0.06	0.04	59.00	59.00
Dial-a-Ride/Paratransit	10	5,608	0.01	0.03	5.00	5.00
Taxi/Hired Car/Limo	75	4,838	0.08	0.03	15.00	15.00
Other Private Transit	5	693	0.01	0.00	5.00	5.00
Total	99,347	16,348,215	100.00	100.00	466.81	437.18

Table 4.7: Total number of work trips (APURP=9) for trips originating in Santa Cruz County

Activity Purpose	Obs UW	Obs W	Pct UW	Pct W
Personal Activities	1,485	280,672	22.84	22.36
Preparing Meals/Eating	531	100,917	8.17	8.04
Routine Shopping	561	95,907	8.63	7.64
Pickup/Drop Off Passenger(S)	307	86,155	4.72	6.86
Work/Job Duties	437	85,202	6.72	6.79
Social/Visit Friends/Relatives	339	56,737	5.21	4.52
Change Type Of Transportation/Transfer	211	55,971	3.24	4.46
Eat Meal at Restaurant/Diner	295	53,365	4.54	4.25
All Other Activities At My Home	248	52,322	3.81	4.17
In School/Classroom/Laboratory	126	40,277	1.94	3.21
Using Computer/Telephone/Cell Or Smart Phone	207	37,173	3.18	2.96
Outdoor Exercise	225	32,927	3.46	2.62
Household Errands	149	28,338	2.29	2.26
Work-Related	156	27,084	2.40	2.16
Loop Trip	166	22,907	2.55	1.82
Study/Schoolwork	55	19,367	0.85	1.54
Indoor Exercise	96	18,892	1.48	1.50
Personal Business	119	18,886	1.83	1.50
Entertainment	113	15,647	1.74	1.25
Meals At Work	73	14,947	1.12	1.19
Work For Pay At Home Using	63	14,377	0.97	1.15
Health Care	88	13,291	1.35	1.06
Other	61	10,559	0.94	0.84
Civic/Religious Activities	62	9,643	0.95	0.77
Service Private Vehicle	61	8,550	0.94	0.68
Drive Through Meals	40	8,301	0.62	0.66
Meals At School/College	25	6,937	0.38	0.55
Shopping For Major Purchases	39	5,385	0.60	0.43
All Other After School Related Activities	22	5,326	0.34	0.42
Exercise	30	5,027	0.46	0.40
Hosting Visitors/Entertaining Guests	35	4,936	0.54	0.39
After School Sports/Physical Activity	13	4,121	0.20	0.33
Non-Work Related Activities	11	3,861	0.17	0.31
Drive Through Other (ATM, Bank)	17	3,399	0.26	0.27
Don't Know/Refused	8	2,812	0.12	0.22
All Other Work-Related Activities At My Work	8	1,359	0.12	0.11
Exercise/Sports	6	1,221	0.09	0.10

Activity Purpose	Obs UW	Obs W	Pct UW	Pct W
Work-Sponsored Social Activities	5	1,014	0.08	0.08
Volunteer Work/Activities	9	883	0.14	0.07
Training	1	620	0.02	0.05
Total	6,503	1,255,317	100.00	100.00

Table 4.8: Total number of trips by activity purpose for trips originating in Santa Cruz County

Mode	Obs UW	Obs W	Pct UW	Pct W
Auto/Van/Truck Driver	350	66,959	80.09	78.59
Walk	30	6,129	6.86	7.19
Auto /Van/Truck Passenger	19	5,076	4.35	5.96
Bike	23	3,654	5.26	4.29
Carpool/Vanpool	11	2,978	2.52	3.49
Motorcycle/Scooter/Moped	3	369	0.69	0.43
Rental Car/Vehicle	1	38	0.23	0.04
Total	437	85,202	100.00	100.00

Table 4.9: Total number of trips ending in Santa Cruz County

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	3,037	519,091	58.70	53.06
Auto /Van/Truck Passenger	1,100	239,063	21.26	24.44
Walk	624	138,508	12.06	14.16
Bike	218	30,820	4.21	3.15
Local Bus,Rapid Bus	49	14,199	0.95	1.45
Carpool/Vanpool	40	12,546	0.77	1.28
School Bus	26	9,460	0.50	0.97
Motorcycle/Scooter/Moped	27	4,300	0.52	0.44
Other Non-Motorized	10	3,237	0.19	0.33
Plane	2	1,903	0.04	0.19
Dial-a-Ride/Paratransit	2	1,122	0.04	0.11
Express Bus/Commuter Bus	5	1,005	0.10	0.10
Wheelchair/Mobility Scooter	8	933	0.15	0.10
Rental Car/Vehicle	10	518	0.19	0.05
Other Bus	5	506	0.10	0.05
Taxi/Hired Car/Limo	5	323	0.10	0.03
Street Car/Cable Car	2	263	0.04	0.03
ACE, Amtrak, Cal train	1	211	0.02	0.02
Other Private Transit	1	139	0.02	0.01
Amtrak Bus	1	105	0.02	0.01
Private shuttle	1	77	0.02	0.01
Total	5,174	978,324	100.00	100.00

Table 4.10: Modal split (drive alone) of trips ending in Santa Cruz County

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	2,173	353,290	98.46	98.65
Motorcycle/Scooter/Moped	24	4,016	1.09	1.12
Carpool/Vanpool	6	634	0.27	0.18
Rental Car/Vehicle	4	190	0.18	0.05
Total	2,207	358,129	100.00	100.00

Table 4.11: Trip distance (mi) by mode for trips ending in Santa Cruz County

Mode	Trip Dist UW	Trip Dist W	Percent UW	Percent W	Avg Dist UW	Avg Dist W
Plane	7,915	9,369,321	15.84	59.34	3,957.29	4,924.34
Auto/Van/Truck Driver	26,397	3,832,389	52.85	24.27	8.69	7.38
Auto /Van/Truck Passenger	11,219	1,781,041	22.46	11.28	10.20	7.45
Carpool/Vanpool	1,072	359,449	2.15	2.28	26.80	28.65
Local Bus, Rapid Bus	309	114,700	0.62	0.73	6.30	8.08
Rental Car/Vehicle	1,356	77,280	2.71	0.49	135.57	149.32
Walk	338	67,696	0.68	0.43	0.54	0.49
Bike	379	54,163	0.76	0.34	1.74	1.76
Motorcycle/Scoot	547	48,710	1.09	0.31	20.25	11.33
School Bus	113	34,405	0.23	0.22	4.36	3.64
Express Bus/Commuter Bus	126	22,003	0.25	0.14	25.24	21.89
ACE, Amtrak, Cal train	48	10,090	0.10	0.06	47.89	47.89
Dial-a-Ride/Para	9	4,854	0.02	0.03	4.33	4.33
Street Car/Cable Car	33	4,343	0.07	0.03	16.51	16.51
Amtrak Bus	27	2,842	0.05	0.02	26.98	26.98
Private shuttle	34	2,565	0.07	0.02	33.51	33.51
Other Non-Motorized	6	1,559	0.01	0.01	0.65	0.48
Other Bus	8	985	0.02	0.01	1.62	1.95
Taxi/Hired Car/Limo	9	587	0.02	0.00	1.82	1.82
Other Private Transit	3	425	0.01	0.00	3.06	3.06
Wheelchair/Mobil Scooter	2	225	0.00	0.00	0.24	0.24
Total	49,950	15,789,631	100.00	100.00	4,333.60	5,301.09

Table 4.12: Trip duration (min) by mode for trips ending in Santa Cruz County

Mode	Trip Dur UW	Trip Dur W	Percent UW	Percent W	Avg Dur UW	Avg Dur W
Auto/Van/Truck Driver	61,858	9,175,099	58.37	51.39	20.37	17.68
Auto /Van/Truck Passenger	23,910	4,236,257	22.56	23.73	21.74	17.72
Walk	8,077	1,535,092	7.62	8.60	12.94	11.08
Plane	700	816,979	0.66	4.58	350.00	429.39
Carpool/Vanpool	1,786	569,532	1.69	3.19	44.65	45.40
Bike	3,743	495,391	3.53	2.77	17.17	16.07
Local Bus,Rapid Bus	1,505	456,515	1.42	2.56	30.71	32.15
School Bus	751	233,768	0.71	1.31	28.88	24.71
Motorcycle/Scooter	949	112,224	0.90	0.63	35.15	26.10
Rental Car/Vehicle	1,818	82,396	1.72	0.46	181.80	159.20
Express Bus/Commuter Bus	227	41,966	0.21	0.24	45.40	41.76
Other Non-Motorized	115	31,573	0.11	0.18	11.50	9.76
Street Car/Cable Car	102	13,412	0.10	0.08	51.00	51.00
Wheelchair/Mobility Scooter	102	12,918	0.10	0.07	12.75	13.85
ACE, Amtrak, Cal train	60	12,643	0.06	0.07	60.00	60.00
Other Bus	68	7,735	0.06	0.04	13.60	15.30
Dial-a-Ride/Paratransit	10	5,608	0.01	0.03	5.00	5.00
Private shuttle	73	5,589	0.07	0.03	73.00	73.00
Taxi/Hired Car/Limo	75	4,838	0.07	0.03	15.00	15.00
Amtrak Bus	34	3,581	0.03	0.02	34.00	34.00
Other Private Transit	5	693	0.00	0.00	5.00	5.00
Total	105,968	17,853,809	100.00	100.00	1,069.67	1,103.16

Table 4.13: Total number of work trips (APURP=9) for trips ending in Santa Cruz County

Activity Purpose	Obs UW	Obs W	Pct UW	Pct W
Personal Activities	2,967	274,657	32.71	22.02
Routine Shopping	583	100,938	6.43	8.09
Preparing Meals/Eating	1,058	100,278	11.66	8.04
Pickup/Drop Off Passenger(S)	304	85,515	3.35	6.86
Work/Job Duties	410	76,922	4.52	6.17
Change Type Of Transportation/Transfer	212	58,207	2.34	4.67
Eat Meal at Restaurant/Diner	305	57,022	3.36	4.57
Social/Visit Friends/Relatives	388	55,261	4.28	4.43
All Other Activities At My Home	370	50,157	4.08	4.02
In School/Classroom/Laboratory	134	41,153	1.48	3.30
Using Computer/Telephone/Cell Or Smart Phone	339	35,996	3.74	2.89
Outdoor Exercise	233	32,473	2.57	2.60
Household Errands	145	28,520	1.60	2.29
Work-Related	150	27,025	1.65	2.17
Loop Trip	216	23,601	2.38	1.89
Indoor Exercise	102	19,815	1.12	1.59
Study/Schoolwork	76	19,175	0.84	1.54
Personal Business	139	18,669	1.53	1.50
Entertainment	126	15,696	1.39	1.26
Meals At Work	74	14,971	0.82	1.20
Work For Pay At Home Using	114	13,805	1.26	1.11
Health Care	89	13,559	0.98	1.09
Other	75	10,906	0.83	0.87
Civic/Religious Activities	68	10,082	0.75	0.81
Drive Through Meals	41	8,803	0.45	0.71
Service Private Vehicle	56	7,732	0.62	0.62
Meals At School/College	25	6,978	0.28	0.56
All Other After School Related Activities	25	5,588	0.28	0.45
Hosting Visitors/Entertaining Guests	65	5,317	0.72	0.43
Shopping For Major Purchases	35	4,831	0.39	0.39
Exercise	65	4,381	0.72	0.35
After School Sports/Physical Activity	15	4,257	0.17	0.34
Non-Work Related Activities	9	3,606	0.10	0.29
Drive Through Other (ATM, Bank)	16	3,359	0.18	0.27
Don't Know/Refused	8	2,812	0.09	0.23
All Other Work-Related Activities At My Work	12	1,998	0.13	0.16
Exercise/Sports	5	1,083	0.06	0.09
Volunteer Work/Activities	12	954	0.13	0.08

Activity Purpose	Obs UW	Obs W	Pct UW	Pct W
Training	1	620	0.01	0.05
Work-Sponsored Social Activities	3	615	0.03	0.05
Total	9,070	1,247,335	100.00	100.00

Table 4.14: Total number of trips by activity purpose for trips ending in Santa Cruz County

Mode	Obs UW	Obs W	Pct UW	Pct W
Auto/Van/Truck Driver	315	59,699	78.75	77.61
Walk	30	6,129	7.50	7.97
Auto /Van/Truck Passenger	22	5,026	5.50	6.53
Bike	23	3,654	5.75	4.75
Carpool/Vanpool	7	2,045	1.75	2.66
Motorcycle/Scooter/Moped	3	369	0.75	0.48
Total	400	76,922	100.00	100.00

4.2 Data Request for Del Norte County

4.2.1 Question

This question asked for the following information for Del Norte county:

1. Trips by Mode
2. Modal split for driving alone
3. Trip distance by Mode
4. Trip duration by Mode
5. Trips by Purpose
6. Work trips by mode

4.2.2 Summary and Methodology

In this subsection We generate tables by mode for total number of trips, total trip distance, average trip distance, total trip duration, average trip duration, and total number of trips for driving alone. To calculate the drive alone numbers we extract data for total travelers and drivers of cars, trucks, or motorcycles . We also generate tables for the total number of trips by trip purpose and for work trips by mode. More specifically, we generate tables for total number of trips by activity purpose since the trip purpose is given in the database as activity purpose and there is more than one activity in many single trips. We consider each activity as a trip and only consider the work trips. We generate every table for both trips originating in and ending in Del Norte County. We use the new county wide weights for Del Norte County to generate weighted results for trips that originated in Del Norte County and statewide weights to generate weighted results for trips that originated outside of Del Norte County.

4.2.3 Results

Table 4.15: Mode Code

Code	Mode	Code	Mode
1	Walk	16	Express Bus/Commuter Bus
2	Bike	17	Premium Bus
3	Wheelchair/Mobility Scooter	18	School Bus
4	Other Non-Motorized	19	Public Transit Shuttle
5	Auto/Van/Truck Driver	20	Air BART/LAX Fly Away
6	Auto /Van/Truck Passenger	21	Dial-a-Ride/Paratransit
7	Carpool/Vanpool	22	Amtrak Bus
8	Motorcycle/Scooter/Moped	23	Other Bus
9	Taxi/Hired Car/Limo	24	BART,Metro Red/Purple Line
10	Rental Car/Vehicle	25	ACE, Amtrak, Cal train
11	Private shuttle	26	Metro
12	Greyhound Bus	27	Street Car/Cable Car
13	Plane	28	Other Rail
14	Other Private Transit	29	Ferry / Boat
15	Local Bus,Rapid Bus		

Table 4.16: Activity Purpose Code

Code	Purpose	Code	Purpose
1	Personal Activities	21	Change Type Of Transportation/Transfer
2	Preparing Meals/Eating	22	Pickup/Drop Off Passenger(S)
3	Hosting Visitors/Entertaining Guests	23	Drive Through Meals
4	Exercise	24	Drive Through Other (ATM, Bank)
5	Study/Schoolwork	25	Work-Related
6	Work For Pay At Home Using	26	Service Private Vehicle
7	Using Computer/Telephone/Cell Or Smart Phone	27	Routine Shopping
8	All Other Activities At My Home	28	Shopping For Major Purchases
9	Work/Job Duties	29	Household Errands
10	Training	30	Personal Business
11	Meals At Work	31	Eat Meal at Restaurant/Diner
12	Work-Sponsored Social Activities	32	Health Care
13	Non-Work Related Activities	33	Civic/Religious Activities
14	Exercise/Sports	34	Outdoor Exercise
15	Volunteer Work/Activities	35	Indoor Exercise
16	All Other Work-Related Activities At My Work	36	Entertainment
17	In School/Classroom/Laboratory	37	Social/Visit Friends/Relatives
18	Meals At School/College	38	Other
19	After School Sports/Physical Activity	39	Loop Trip
20	All Other After School Related Activities	99	Don't Know/Refused

Table 4.17: Total number of trips originating in Del Norte County

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	758	57,420	66.26	55.15
Auto /Van/Truck Passenger	285	33,523	24.91	32.20
Walk	59	9,006	5.16	8.65
School Bus	17	2,365	1.49	2.27
Motorcycle/Scooter/Moped	8	956	0.70	0.92
Rental Car/Vehicle	4	299	0.35	0.29
Local Bus,Rapid Bus	2	220	0.17	0.21
Plane	4	190	0.35	0.18
Bike	7	137	0.61	0.13
Total	1,144	104,116	100.00	100.00

Table 4.18: Modal split (drive alone) of trips originating in Del Norte County

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	536	36,719	98.53	97.46
Motorcycle/Scooter/Moped	8	956	1.47	2.54
Total	544	37,675	100.00	100.00

Table 4.19: Trip distance (mi) by mode for trips originating in Del Norte County

Mode	Trip Dist UW	Trip Dist W	Percent UW	Percent W	Avg Dist UW	Avg Dist W
Auto /Van/Truck Passenger	5,926	1,831,549	34.18	60.37	20.79	54.64
Auto/Van/Truck Driver	7,643	922,303	44.08	30.40	10.08	16.06
Plane	2,951	213,509	17.02	7.04	737.73	1,123.56
Rental Car/Vehicle	650	48,630	3.75	1.60	162.52	162.52
Walk	46	9,852	0.27	0.32	0.79	1.09
School Bus	74	5,266	0.42	0.17	4.33	2.23
Motorcycle/Scoot	17	2,120	0.10	0.07	2.07	2.22
Bike	28	429	0.16	0.01	3.96	3.13
Local Bus, Rapid Bus	4	386	0.02	0.01	1.76	1.76
Total	17,339	3,034,045	100.00	100.00	944.04	1,367.20

Table 4.20: Trip duration (min) by mode for trips originating in Del Norte County

Mode	Trip Dur UW	Trip Dur W	Percent UW	Percent W	Avg Dur UW	Avg Dur W
Auto /Van/Truck Passenger	8,777	2,137,212	33.56	57.29	30.80	63.75
Auto/Van/Truck Driver	14,329	1,330,131	54.80	35.66	18.90	23.16
Walk	710	97,355	2.72	2.61	12.03	10.81
Rental Car/Vehicle	960	71,814	3.67	1.93	240.00	240.00
School Bus	448	41,743	1.71	1.12	26.35	17.65
Plane	502	30,212	1.92	0.81	125.50	158.98
Motorcycle/Scooter	130	13,627	0.50	0.37	16.25	14.25
Bike	274	6,127	1.05	0.16	39.14	44.73
Local Bus,Rapid Bus	20	2,196	0.08	0.06	10.00	10.00
Total	26,150	3,730,416	100.00	100.00	518.98	583.34

Table 4.21: Total number of work trips (APURP=9) for trips originating in Del Norte County

Activity Purpose	Obs UW	Obs W	Pct UW	Pct W
Personal Activities	323	32,987	22.97	24.00
Routine Shopping	135	14,654	9.60	10.66
Pickup/Drop Off Passenger(S)	80	12,651	5.69	9.20
Preparing Meals/Eating	118	12,190	8.39	8.87
Eat Meal at Restaurant/Diner	51	11,421	3.63	8.31
Work/Job Duties	121	7,165	8.61	5.21
Social/Visit Friends/Relatives	59	4,477	4.20	3.26
Change Type Of Transportation/Transfer	42	4,372	2.99	3.18
In School/Classroom/Laboratory	37	4,293	2.63	3.12
All Other Activities At My Home	46	4,276	3.27	3.11
Service Private Vehicle	32	2,987	2.28	2.17
Using Computer/Telephone/Cell Or Smart Phone	32	2,653	2.28	1.93
Loop Trip	31	2,492	2.20	1.81
Work-Related	40	2,110	2.84	1.54
Personal Business	21	2,051	1.49	1.49
Outdoor Exercise	28	2,044	1.99	1.49
Meals At School/College	11	1,811	0.78	1.32
Household Errands	38	1,743	2.70	1.27
Drive Through Meals	19	1,370	1.35	1.00
Other	13	1,359	0.92	0.99
Entertainment	13	1,130	0.92	0.82
Health Care	19	1,055	1.35	0.77
Civic/Religious Activities	24	981	1.71	0.71
Study/Schoolwork	8	958	0.57	0.70
Work For Pay At Home Using	7	780	0.50	0.57
After School Sports/Physical Activity	4	676	0.28	0.49
All Other After School Related Activities	5	657	0.36	0.48
Meals At Work	12	431	0.85	0.31
Indoor Exercise	8	370	0.57	0.27
Exercise	5	324	0.36	0.24
Don't Know/Refused	4	296	0.28	0.22
Hosting Visitors/Entertaining Guests	8	235	0.57	0.17
Volunteer Work/Activities	5	151	0.36	0.11
Exercise/Sports	1	109	0.07	0.08
Non-Work Related Activities	2	74	0.14	0.05
Shopping For Major Purchases	2	68	0.14	0.05
All Other Work-Related Activities At My Work	1	24	0.07	0.02
Drive Through Other (ATM, Bank)	1	21	0.07	0.02

Activity Purpose	Obs UW	Obs W	Pct UW	Pct W
Total	1,406	137,446	100.00	100.00

Table 4.22: Total number of trips by activity purpose for trips originating in Del Norte County

Mode	Obs UW	Obs W	Pct UW	Pct W
Auto/Van/Truck Driver	113	6,532	93.39	91.17
Auto /Van/Truck Passenger	6	520	4.96	7.26
Plane	1	97	0.83	1.35
Bike	1	15	0.83	0.21
Total	121	7,165	100.00	100.00

Table 4.23: Total number of trips ending in Del Norte County

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	756	55,960	66.96	57.73
Auto /Van/Truck Passenger	279	28,230	24.71	29.12
Walk	59	9,006	5.23	9.29
School Bus	17	2,365	1.51	2.44
Motorcycle/Scooter/Moped	8	956	0.71	0.99
Local Bus,Rapid Bus	2	220	0.18	0.23
Bike	7	137	0.62	0.14
Plane	1	63	0.09	0.07
Total	1,129	96,937	100.00	100.00

Table 4.24: Modal split (drive alone) of trips ending in Del Norte County

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	537	36,675	98.53	97.46
Motorcycle/Scooter/Moped	8	956	1.47	2.54
Total	545	37,632	100.00	100.00

Table 4.25: Trip distance (mi) by mode for trips ending in Del Norte County

Mode	Trip Dist UW	Trip Dist W	Percent UW	Percent W	Avg Dist UW	Avg Dist W
Auto/Van/Truck Driver	6,274	482,948	53.63	52.80	8.30	8.63
Auto /Van/Truck Passenger	3,402	296,712	29.08	32.44	12.19	10.51
Plane	1,855	117,027	15.86	12.79	1,854.99	1,854.99
Walk	46	9,852	0.40	1.08	0.79	1.09
School Bus	74	5,266	0.63	0.58	4.33	2.23
Motorcycle/Scoot	17	2,120	0.14	0.23	2.07	2.22
Bike	28	429	0.24	0.05	3.96	3.13
Local Bus,Rapid Bus	4	386	0.03	0.04	1.76	1.76
Total	11,699	914,741	100.00	100.00	1,888.39	1,884.55

Table 4.26: Trip duration (min) by mode for trips ending in Del Norte County

Mode	Trip Dur UW	Trip Dur W	Percent UW	Percent W	Avg Dur UW	Avg Dur W
Auto/Van/Truck Driver	13,071	938,960	61.16	53.38	17.29	16.78
Auto /Van/Truck Passenger	6,547	648,148	30.63	36.85	23.47	22.96
Walk	710	97,355	3.32	5.53	12.03	10.81
School Bus	448	41,743	2.10	2.37	26.35	17.65
Motorcycle/Scooter	130	13,627	0.61	0.77	16.25	14.25
Plane	172	10,851	0.80	0.62	172.00	172.00
Bike	274	6,127	1.28	0.35	39.14	44.73
Local Bus, Rapid Bus	20	2,196	0.09	0.12	10.00	10.00
Total	21,372	1,759,007	100.00	100.00	316.54	309.17

Table 4.27: Total number of work trips (APURP=9) for trips ending in Del Norte County

Activity Purpose	Obs UW	Obs W	Pct UW	Pct W
Personal Activities	741	25,761	35.29	21.30
Pickup/Drop Off Passenger(S)	82	13,862	3.90	11.46
Routine Shopping	131	11,148	6.24	9.22
Preparing Meals/Eating	225	10,670	10.71	8.82
Work/Job Duties	120	7,059	5.71	5.84
Eat Meal at Restaurant/Diner	53	4,960	2.52	4.10
Social/Visit Friends/Relatives	76	4,730	3.62	3.91
Outdoor Exercise	32	4,371	1.52	3.61
In School/Classroom/Laboratory	37	4,293	1.76	3.55
Change Type Of Transportation/Transfer	34	3,852	1.62	3.18
All Other Activities At My Home	90	2,972	4.29	2.46
Other	45	2,691	2.14	2.22
Using Computer/Telephone/Cell Or Smart Phone	69	2,668	3.29	2.21
Service Private Vehicle	29	2,506	1.38	2.07
Loop Trip	38	2,492	1.81	2.06
Work-Related	41	1,874	1.95	1.55
Personal Business	22	1,841	1.05	1.52
Meals At School/College	11	1,811	0.52	1.50
Household Errands	38	1,743	1.81	1.44
Drive Through Meals	18	1,255	0.86	1.04
Entertainment	28	1,132	1.33	0.94
Health Care	12	1,091	0.57	0.90
Civic/Religious Activities	24	981	1.14	0.81
Study/Schoolwork	12	958	0.57	0.79
Work For Pay At Home Using	16	798	0.76	0.66
After School Sports/Physical Activity	4	676	0.19	0.56
All Other After School Related Activities	5	657	0.24	0.54
Meals At Work	12	431	0.57	0.36
Indoor Exercise	8	370	0.38	0.31
Exercise	16	324	0.76	0.27
Don't Know/Refused	5	296	0.24	0.24
Hosting Visitors/Entertaining Guests	14	235	0.67	0.19
Volunteer Work/Activities	5	151	0.24	0.12
Exercise/Sports	1	109	0.05	0.09
Non-Work Related Activities	2	74	0.10	0.06
Shopping For Major Purchases	2	68	0.10	0.06
All Other Work-Related Activities At My Work	1	24	0.05	0.02
Drive Through Other (ATM, Bank)	1	21	0.05	0.02
Total	2,100	120,957	100.00	100.00

Table 4.28: Total number of trips by activity purpose for trips ending in Del Norte County

Mode	Obs UW	Obs W	Pct UW	Pct W
Auto/Van/Truck Driver	113	6,524	94.17	92.41
Auto /Van/Truck Passenger	6	520	5.00	7.37
Bike	1	15	0.83	0.22
Total	120	7,059	100.00	100.00

4.3 Long Distance Trips Questions

In this subsection, we generate tables for number of non-commute, long distance trips by trip mode for counties in the following geographic areas:

- District 1 - Del Norte, Humboldt, Lake, Mendocino
- District 2 - Lassen, Modoc, Plumas, Shasta, Siskiyou, Tehama, Trinity
- District 3 - Butte, Colusa, El Dorado, Glenn, Nevada, Placer, Sacramento, Sierra, Sutter, Yolo, Yuba
- District 4 - Alameda, Contra Costa, Marin, Napa, San Mateo, San Francisco, Santa Clara, Solano, Sonoma
- District 5 - Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz
- Southern California - Fresno, Madera, Kings, Tulare, Kern, Los Angeles, Orange, San Diego, Imperial, Ventura, Riverside and a portion of San Bernardino
- District 9 - Inyo, Mono and the rest of San Bernardino County.

4.3.1 Summary and Methodology

We generate weighted and unweighted tables for trips originating in and ending in the above districts, using the long distance recall survey data. Note that in the long distance recall survey, trips 50 miles or longer are classified as long distance trips. We exclude work trips to calculate non-commute trips and use the new countywide long distance weights described previously to generate weighted results.

4.3.2 Results

Table 4.29: Modal split of trips originating in District 1

Long Distance Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	1,244	352,212	69.69	59.57
Plane	217	114,620	12.16	19.39
Auto /Van/Truck Passenger	199	58,109	11.15	9.83
Rental Car/Vehicle	38	18,075	2.13	3.06
Carpool/Vanpool	7	11,549	0.39	1.95
Ferry / Boat	7	8,595	0.39	1.45
Greyhound Bus	7	7,164	0.39	1.21
Motorcycle/Scooter/Moped	14	4,017	0.78	0.68
ACE, Amtrak, etc	9	3,974	0.50	0.67
School Bus	6	2,714	0.34	0.46
Taxi/Hired Car/Limo	4	2,401	0.22	0.41
Other Private Transit	7	1,461	0.39	0.25
Other Rail	5	1,357	0.28	0.23
Bike	5	1,100	0.28	0.19
Don't Know/Refused	2	875	0.11	0.15
Public Transit Shuttle	4	856	0.22	0.14
Amtrak Bus	3	631	0.17	0.11
Local Bus,Rapid Bus	2	471	0.11	0.08
Private shuttle	1	360	0.06	0.06
BART,Metro Red/Purple Line	1	273	0.06	0.05
Express Bus/Commuter Bus	1	206	0.06	0.03
Other Bus	1	192	0.06	0.03
Other Non-Motorized	1	NA	0.06	NA
NA	1,785	591,210	100.00	100.00

Table 4.30: Modal split of trips originating in District 2

Long Distance Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	1,615	320,420	72.78	61.52
Plane	179	94,778	8.07	18.20
Auto /Van/Truck Passenger	300	64,439	13.52	12.37
Rental Car/Vehicle	37	14,005	1.67	2.69
Greyhound Bus	9	8,744	0.41	1.68
Motorcycle/Scooter/Moped	20	5,299	0.90	1.02
Carpool/Vanpool	8	2,896	0.36	0.56
Other Bus	1	2,551	0.05	0.49
Taxi/Hired Car/Limo	5	2,145	0.23	0.41
Private shuttle	8	1,945	0.36	0.37
Other Private Transit	8	804	0.36	0.15

Long Distance Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Don't Know/Refused	2	666	0.09	0.13
ACE, Amtrak, etc	2	420	0.09	0.08
Walk	5	414	0.23	0.08
Other Rail	2	313	0.09	0.06
Public Transit Shuttle	1	267	0.05	0.05
School Bus	11	227	0.50	0.04
Bike	2	218	0.09	0.04
Amtrak Bus	2	186	0.09	0.04
Dial-a-Ride/Paratransit	1	93	0.05	0.02
Local Bus, Rapid Bus	1	25	0.05	0.00
NA	2,219	520,854	100.00	100.00

4.4 Travel Statistics along the SR-1 Corridor

4.4.1 Summary and Methodology

The purpose of this subsection is to show how 2012 CHTS data can be used to generate useful statistics in a corridor provided enough CHTS observations are available in that corridor. We used ArcGIS 10.2 to select the households located within 1 km buffer of each side of selected portion of SR 1 corridor (San Francisco Golden Gate Bridge to Pacifica). We used Open street map and California road network GIS map (downloaded from <http://www.dot.ca.gov/hq/tsip/gis/datalibrary/#Highway>) for GIS operations. We imported the x-y coordinates of the location of CHTS household respondents to ArcMap and converted it into a shapefile. We then created a 1 Km buffer around the SR 1 corridor. Next we did a intersect operation in ArcGIS to sub set the sample of respondents who reside within 1 km of the corridor. We found 269 household respondents (622 person respondents) including 98 GPS respondents within 1 km on each side of the SR1 (San Francisco Golden Gate Bridge to Pacifica). The size of this sample is sufficient to generate tables by mode for 1) total number of trips; 2) total trip duration; 3) average trip duration; 4) total trip distance; and 5) average trip distance. We also created tables for the total number of trips by trip purpose (task 6) and for work trips by mode (task 7). We generated tables for total number of trips by activity purpose since the trip purpose is given in the database as activity purpose and there is more than one activity in many single trips. We considered each activity as a trip. We only considered work trips. We generated every table for both unweighted and weighted results using countywide weights for the latter.

4.4.2 Results

Table 4.31: Modal split through the SR1 corridor

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	1,093	403,822	39.89	36.92
Walk	852	376,079	31.09	34.38

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto /Van/Truck Passenger	412	157,507	15.04	14.40
Local Bus,Rapid Bus	115	52,023	4.20	4.76
BART,Metro	70	30,450	2.55	2.78
Metro	50	20,440	1.82	1.87
Bike	53	20,132	1.93	1.84
Private shuttle	13	5,810	0.47	0.53
Other Rail	6	4,059	0.22	0.37
Street Car	17	4,008	0.62	0.37
ACE, Amtrak etc	12	3,574	0.44	0.33
Motorcycle	6	2,825	0.22	0.26
Carpool/Vanpool	7	2,617	0.26	0.24
Rental Car/Vehicle	6	2,579	0.22	0.24
School Bus	10	2,330	0.36	0.21
Express Bus	4	1,267	0.15	0.12
Taxi/Hired Car/Limo	5	1,174	0.18	0.11
Plane	3	851	0.11	0.08
Ferry / Boat	2	836	0.07	0.08
Other Private Transit	1	678	0.04	0.06
Other Non-Motorized	2	604	0.07	0.06
Public Transit Shuttle	1	214	0.04	0.02
Total	2,740	1,093,880	100.00	100.00

Table 4.32: Total trip duration of trips through the SR1 corridor

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	20,844	7,190,358	45.86	43.62
Walk	7,892	3,070,543	17.36	18.63
Auto /Van/Truck Passenger	7,597	2,944,186	16.71	17.86
Local Bus,Rapid Bus	2,096	868,893	4.61	5.27
BART,Metro	1,660	724,006	3.65	4.39
Metro	1,028	385,428	2.26	2.34
ACE, Amtrak etc	974	314,632	2.14	1.91
Bike	807	240,351	1.78	1.46
School Bus	680	149,291	1.50	0.91
Rental Car/Vehicle	277	123,525	0.61	0.75
Private shuttle	197	87,210	0.43	0.53
Plane	325	84,216	0.71	0.51
Street Car	313	68,329	0.69	0.41
Carpool/Vanpool	170	57,601	0.37	0.35
Express Bus	143	40,038	0.31	0.24
Other Rail	38	38,203	0.08	0.23

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Motorcycle	135	30,996	0.30	0.19
Taxi/Hired Car/Limo	145	25,912	0.32	0.16
Ferry / Boat	36	15,120	0.08	0.09
Public Transit Shuttle	70	14,964	0.15	0.09
Other Non-Motorized	23	6,896	0.05	0.04
Other Private Transit	5	3,389	0.01	0.02
Total	45,455	16,484,087	100.00	100.00

Table 4.33: Total trip distance of trips through the SR1 corridor

Mode	Distance Unweighted	Distance Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	6,934	2,337,936	49.77	49.63
Auto /Van/Truck Passenger	2,008	661,425	14.41	14.04
Plane	1,997	567,419	14.34	12.05
BART,Metro	798	362,839	5.73	7.70
ACE, Amtrak etc	658	218,963	4.72	4.65
Local Bus,Rapid Bus	380	160,636	2.72	3.41
Walk	341	140,169	2.45	2.98
Metro	238	91,439	1.71	1.94
Rental Car/Vehicle	130	56,271	0.93	1.19
Bike	83	21,901	0.59	0.46
Private shuttle	45	17,087	0.32	0.36
Carpool/Vanpool	69	16,054	0.50	0.34
Street Car	62	13,556	0.45	0.29
School Bus	42	10,426	0.30	0.22
Taxi/Hired Car/Limo	70	9,857	0.50	0.21
Motorcycle	32	8,246	0.23	0.18
Express Bus	26	6,793	0.19	0.14
Other Rail	5	5,603	0.04	0.12
Ferry / Boat	4	1,792	0.03	0.04
Public Transit Shuttle	8	1,755	0.06	0.04
Other Non-Motorized	1	362	0.01	0.01
Other Private Transit	0	236	0.00	0.00
Total	13,931	4,710,766	100.00	100.00

Table 4.34: Total purpose splits for trips through the SR1 corridor

Purpose	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Change Type Of Transportation/Transfer	544	243,196	12.34	18.53
Personal Activities	1,251	231,564	28.37	17.64
Work/Job Duties	254	108,442	5.76	8.26
Preparing Meals/Eating	468	89,085	10.61	6.79
Routine Shopping	233	79,403	5.28	6.05
Pickup/Drop Off Passenger(S)	181	74,607	4.10	5.68
All Other Activities At My Home	184	47,325	4.17	3.61
Eat Meal at Restaurant/Diner	117	44,628	2.65	3.40
Social/Visit Friends/Relatives	102	39,216	2.31	2.99
Work-Related	78	38,910	1.77	2.96
Using Computer/Telephone/Cell	163	35,837	3.70	2.73
Outdoor Exercise	84	33,174	1.90	2.53
In School/Classroom/Laboratory	77	29,879	1.75	2.28
Meals At Work	49	23,639	1.11	1.80
Household Errands	76	23,065	1.72	1.76
Personal Business	56	20,767	1.27	1.58
Drive Through Meals	31	19,404	0.70	1.48
Loop Trip	73	17,700	1.66	1.35
Civic/Religious Activities	37	14,783	0.84	1.13
Indoor Exercise	46	12,766	1.04	0.97
Entertainment	44	10,897	1.00	0.83
Study/Schoolwork	36	10,217	0.82	0.78
Health Care	37	9,242	0.84	0.70
Other	27	7,891	0.61	0.60
Work For Pay At Home	33	7,794	0.75	0.59
Service Private Vehicle	22	6,502	0.50	0.50
Meals At School/College	16	6,451	0.36	0.49
Shopping For Major Purchases	16	5,932	0.36	0.45
All Other Work-Related Activities	9	4,583	0.20	0.35
Drive Through Other (ATM, Bank)	3	2,378	0.07	0.18
All Other After School Activities	7	2,353	0.16	0.18
Hosting Visitors	13	2,331	0.29	0.18
After School Sports/Physical Activity	6	2,137	0.14	0.16
Exercise/Sports	4	1,811	0.09	0.14
Volunteer Work/Activities	5	1,590	0.11	0.12
Non-Work Related Activities	4	1,398	0.09	0.11
Training	4	1,089	0.09	0.08
Exercise	18	342	0.41	0.03

Purpose	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Work-Sponsored Social Activities	1	184	0.02	0.01
Don't Know/Refused	1	142	0.02	0.01
Total	4,410	1,312,657	100.00	100.00

Table 4.35: Travel mode for work trips through the SR1 corridor

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	137	55,462	54.58	51.14
Walk	91	43,476	36.25	40.09
Auto /Van/Truck Passenger	9	4,208	3.59	3.88
Bike	8	1,880	3.19	1.73
Motorcycle	1	1,110	0.40	1.02
Private shuttle	1	876	0.40	0.81
Ferry / Boat	2	800	0.80	0.74
Rental Car/Vehicle	1	506	0.40	0.47
Carpool/Vanpool	1	124	0.40	0.11
Total	251	108,442	100.00	100.00

4.5 Travel Statistics along the SR-17 Corridor

4.5.1 Summary and Methodology

In this subsection, we show how 2012 CHTS data can be used to generate useful statistics in the SR-17 corridor. This is another illustration of how to put the 2012 CHTS data for Caltrans. Steps of this analysis are similar to those for the analysis of the SR-1. We found 74 household respondents (177 person respondents) including 8 GPS respondents within a 1 km buffer on each side of the SR-17. To delineate the SR-17 corridor, we relied on Caltrans' definition. We generated tables by mode for: total number of trips, total trip duration, average trip duration, total trip distance, and average trip distance. We also generated tables for the total number of trips by trip purpose and for work trips by mode. For these, we generated tables for total number of trips by activity purpose since trip purpose is given in the data as activity purpose and there is more than one activity for many single trips. We considered each activity as a trip. For work trips, we only considered work/job duties. We generated every table for both weighted and unweighted results. We used countywide weights to generate weighted results.

4.5.2 Results

Table 4.36: Modal split through the SR17 corridor

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	338	64,163	57.00	49.09
Auto /Van/Truck Passenger	112	29,522	18.89	22.58
Walk	76	25,434	12.82	19.46
Bike	38	5,527	6.41	4.23
Carpool/Vanpool	10	3,724	1.69	2.85
Express Bus/Commuter Bus	3	658	0.51	0.50
Rental Car/Vehicle	10	607	1.69	0.46
School Bus	1	462	0.17	0.35
Taxi/Hired Car/Limo	1	425	0.17	0.33
Local Bus,Rapid Bus	2	105	0.34	0.08
Other Bus	1	47	0.17	0.04
Plane	1	41	0.17	0.03
Total	593	130,714	100.00	100.00

Table 4.37: Total trip duration of trips through the SR17 corridor

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	6,768	982,746	55.82	51.87
Auto /Van/Truck Passenger	1,837	360,908	15.15	19.05
Walk	774	231,006	6.38	12.19
Carpool/Vanpool	329	114,769	2.71	6.06
Bike	671	112,665	5.53	5.95
Express Bus/Commuter Bus	190	40,607	1.57	2.14
Rental Car/Vehicle	1,389	32,550	11.46	1.72
Taxi/Hired Car/Limo	20	8,498	0.16	0.45
School Bus	10	4,619	0.08	0.24
Plane	75	3,071	0.62	0.16
Local Bus,Rapid Bus	47	2,442	0.39	0.13
Other Bus	15	708	0.12	0.04
Total	12,125	1,894,589	100.00	100.00

Table 4.38: Total trip distance of trips through the SR17 corridor

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	2,499	355,648	52.07	55.67
Auto /Van/Truck Passenger	791	143,486	16.49	22.46

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Carpool/Vanpool	180	54,911	3.74	8.59
Express Bus/Commuter Bus	94	20,296	1.96	3.18
Bike	103	19,112	2.14	2.99
Plane	463	18,955	9.65	2.97
Rental Car/Vehicle	615	14,542	12.81	2.28
Walk	37	9,175	0.76	1.44
Taxi/Hired Car/Limo	4	1,592	0.08	0.25
Local Bus,Rapid Bus	14	722	0.29	0.11
School Bus	1	439	0.02	0.07
Other Bus	0	0	0.00	0.00
Total	4,799	638,879	100.00	100.00

Table 4.39: Total purpose splits for trips through the SR17 corridor

Purpose	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Personal Activities	291	26,307	27.87	15.90
Pickup/Drop Off Passenger(S)	51	16,733	4.89	10.11
All Other Activities At My Home	38	11,316	3.64	6.84
Preparing Meals/Eating	111	11,312	10.63	6.84
Social/Visit Friends/Relatives	45	10,090	4.31	6.10
Change Type Of Transportation/Transfer	27	9,656	2.59	5.84
Work/Job Duties	49	9,529	4.69	5.76
Routine Shopping	54	9,464	5.17	5.72
Using Computer/Telephone/Cell	41	6,916	3.93	4.18
In School/Classroom/Laboratory	17	6,317	1.63	3.82
Eat Meal at Restaurant/Diner	33	6,072	3.16	3.67
Loop Trip	44	4,722	4.21	2.85
Work-Related	24	4,027	2.30	2.43
Health Care	12	2,906	1.15	1.76
Study/Schoolwork	12	2,469	1.15	1.49
Outdoor Exercise	26	2,394	2.49	1.45
Don't Know/Refused	5	2,295	0.48	1.39
Household Errands	15	2,268	1.44	1.37
Meals At Work	13	2,051	1.25	1.24
Shopping For Major Purchases	4	1,830	0.38	1.11
Personal Business	12	1,813	1.15	1.10
Service Private Vehicle	9	1,646	0.86	0.99
Drive Through Meals	7	1,616	0.67	0.98
Indoor Exercise	12	1,544	1.15	0.93
Meals At School/College	2	1,234	0.19	0.75
Work For Pay At Home	17	1,194	1.63	0.72

Purpose	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
After School Sports/Physical Activity	3	1,152	0.29	0.70
Exercise	6	1,112	0.57	0.67
All Other Work-Related Activities	3	977	0.29	0.59
Hosting Visitors	15	806	1.44	0.49
Non-Work Related Activities	2	759	0.19	0.46
Other	25	749	2.39	0.45
Training	1	620	0.10	0.37
All Other After School Activities	2	473	0.19	0.29
Entertainment	9	430	0.86	0.26
Exercise/Sports	2	393	0.19	0.24
Volunteer Work/Activities	1	120	0.10	0.07
Drive Through Other (ATM, Bank)	1	61	0.10	0.04
Civic/Religious Activities	2	46	0.19	0.03
Work-Sponsored Social Activities	1	43	0.10	0.03
Total	1,044	165,466	100.00	100.00

Table 4.40: Travel mode for work trips through the SR17 corridor

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	36	6,504	73.47	68.26
Carpool/Vanpool	2	1,014	4.08	10.64
Bike	4	916	8.16	9.62
Walk	4	667	8.16	7.00
Auto /Van/Truck Passenger	1	274	2.04	2.88
Rental Car/Vehicle	2	153	4.08	1.60
Total	49	9,529	100.00	100.00