Review and Analysis of the National Household Travel Survey

Final Report

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Prepared for:
The North Central Texas Council of Governments

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ETC Institute
Parsons Brinckerhoff
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Contents

Project Background

The North Central Texas Council of Governments (NCTCOG) serves as the Metropolitan Planning Organization (MPO) for 16 counties in North Central Texas. The objective of NCTCOG is to support their membership, made up of local governments and various public agencies, in the planning and implementation of a variety of regional development projects. Through this analytic effort, NCTCOG sought to conduct a comprehensive review of the 2009 National Household Travel Survey (NHTS) data collected from approximately 5,900 households located within the 12-county NCTCOG metropolitan planning area (MPA), with the goal of identifying the usefulness of these NHTS data for its regional transportation model.

The NHTS was first conducted for the Federal Highway Administration (FHWA) by the United States Census Bureau in 1969 as an in-person interview called the National Personal Travel Survey. Over the years, the survey has evolved from in-person to telephone survey methods, and has, at times, included a long-distance trip data collection component. The intent of this periodic national travel survey has been to provide information about trends in transportation system usage over time.

In 1990, the add-on program began with three state and/or regional agencies adding samples for their specific areas to the national sample. In 2001, the survey was renamed as the National Household Travel Survey. That year, the NHTS had nine add-on programs and collected a total of approximately 66,000 households. The 2009 NHTS began its 13-month-long data collection field period in April 2008. The 2009 survey consisted of a national sample of 25,000 households and 20 regional and state add-on areas of varying sizes, which added another 125,000 households—by far the largest effort undertaken in the history of the NHTS program. The Texas Department of Transportation (TxDOT) was the largest of the add-on regions to take part in the 2009 NHTS. The TxDOT sample size was 20,000 households.

To provide a comprehensive review and analysis of the NHTS data, Westat brought together an unparalleled team of experts in travel survey data collection, transportation data analysis and auditing, and transportation modeling that included Parsons Brinckerhoff, Dunbar Transportation Consulting and ETC Institute.

Task 1: Comprehensive Analysis of the 2009 National Household Travel Survey (NHTS)

Overview of task

Westat and their subcontractors (Westat) performed a comprehensive analysis of the sampling design, household recruitment methods, household contacting and re-contacting methods, and expansion weights for the 2009 NHTS. Westat led meetings with NCTCOG staff, including a webinar in which an overview of the NHTS processes and research for Task 1 memo was presented. The final Task 1 memo was developed to provide NCTCOG a comprehensive understanding of all aspects of the NHTS process from design to expansion, highlighting the aspects of the survey conducted in the North Central Texas region.

A list of deliverables for this task is provided in Appendix A. In addition to the products created specifically for this contract, Westat provided supporting documentation from the original NHTS.

Task 2: Defining Acceptable Survey Records and Data Checks

Overview of task

Westat provided NCTCOG with a comprehensive list of data checks for each NHTS data file (household, person, vehicle, trip and location); this list contained checks that had been performed during the creation of the original 2009 NHTS dataset as well as suggested checks for the dataset. From this list, Westat implemented five types of data checks; re-geocoding, non-response, range, interdependency and consistency. The objective of this activity was to establish the accuracy of the coded data and to determine the usefulness of the data based on the analysis used.

- Re-geocoding: The original NHTS data were batch and interactively geocoded using TeleAtlas database. The re-geocoding for the NCTCOG batch matched trip ends using the NAVTEQ database.
- Non-response edits were conducted and data with missing, refused or don't know responses were flagged.
- Range checks were applied to confirm the values in the data met the criteria for the individual variable.
- Interdependency checks were applied to confirm that variables were derived accurately.
- Consistency checks were implemented to verify that values of variable which appeared in multiple tables agreed across all tables.

The final Task 2 memo (NCTCOG-NHTS-Task 2-Check-Results-Memo-2013-06-19.pdf) provides an overview of the process engaged in the completion of Task 2, including the regeocoding of the NHTS trip ends.

A list of deliverables for this task is provided in Appendix A.

Task 4: Data Identification

Overview of task

During the process of conducting this study it became evident that Task 4 (data identification) should precede Task 3 (data imputation) in order of completion and that data identification would inform the imputation process.

The objective of this task was to examine the usability of NHTS data for development of regional travel demand models (TDMs) for the NCTCOG metropolitan area. The data usability for model development is primarily determined by examining three criteria, namely data completeness, data accuracy, and data consistency. The third, and perhaps the most critical criterion for model development, data consistency, was examined in this task.

The data needs to be more consistent for the development of advanced tour-based and activity-based models (ABMs) since modeling is undertaken at a disaggregate level. Time and space continuum must also be maintained in ABMs, unlike in traditional trip-based models. Furthermore, modeling household interactions and joint activity participation requires ensuring consistency across multiple person responses further increasing the data consistency needs. The analysis for this task was undertaken assuming that the NHTS data would be used for the development of an ABM, with the underlying idea being that the stringent data consistency conditions can be relaxed appropriately for relatively simpler tour-based and trip-based models. Certain attributes apply to all types of models, for example trip departure time, destination, purpose or activity type, and mode, among others. Missing household and person attributes is not a critical hindrance to the development of ABMs since missing explanatory variables can be handled easily within discrete as well as continuous choice models without discarding the records; therefore, the main focus of this task was identifying records with missing and inconsistent travel and activity attributes.

The results of this task are presented in Task 4 Technical Memo FINAL.pdf (see Appendix A for the list of datasets provided with this memo. Specific recommendations resulting from the findings of this task included the definition of criteria to be used to identify records to be included in the reweighting task.

At this stage, records included in the final NCTCOG dataset were limited to those with weekday travel dates and where 100 percent of household members completed the travel portion of the diary; completing the travel portion of the diary included persons who traveled, officially confirmed that they did not travel, were less than 5 years old so no travel was reported, or were reported as out of the country. Travel dates on national holidays and over Thanksgiving and Christmas breaks were also excluded. Table 1 provides the list of days that were excluded from the final dataset. The total number of travel days in the final NCTCOG dataset is 239. After this analytic stage, 3,273 households remained in the NCTCOG dataset.

Table 1: NHTS travel dates excluded from the NCTCOG final dataset

Holiday	Start Date	End Date	# Weekdays Excluded
Memorial Day	5/26/2008	5/26/2008	1
Labor Day	9/1/2008	9/1/2008	1
Columbus Day	10/13/2008	10/13/2008	1
Election Day	11/4/2008	11/4/2008	1
Veteran's Day	11/11/2008	11/11/2008	1
Martin Luther King Day	1/19/2009	1/19/2009	1
Presidents Day	2/16/2009	2/16/2009	1
Good Friday	4/10/2009	4/10/2009	1
Memorial Day	5/25/2009	5/25/2009	1
Thanksgiving	11/27/2008	11/28/2008	2
Winter Break	12/22/2008	1/2/2009	10
Total			**21**

Task 3: Data Imputation

Overview of task

The objective of this task was to impute data for missing demographic data. The expectation was that some of the invalidated or incomplete data fields could be reasonably imputed and used, rather than discarding these households. However, through the completion of Task 4 it was determined that the only demographic variable used by modelers that would require imputation was household income.

Because income is such an important analytic variable NCTCOG wanted to ensure that any imputation would provide valid values. There are many ways to impute data. Considering timing and cost, Westat recommended using a hot deck imputation procedure. At the request of NCTCOG, Westat performed a test of the hot deck methodology proposed to impute income for the 220 households (out of 3,273) that did not provide a response to the survey question. This section describes that imputation test.

Hot deck imputation is a procedure in which the value from a respondent is duplicated to replace the missing value of a non-respondent from the same survey. Because the imputed values are actual respondents' values, hot deck imputation has the valuable property that imputed values are always feasible values. The most common form of hot deck is to cross classify auxiliary variables into imputation classes and perform the imputation within classes. This is the imputation form used by WESDECK.

WESDECK is a customized imputation program developed at Westat. It is a variant of the hot deck method of imputation. Hot deck imputation is a technique where cases with missing values for specific variables have the "holes" in their records filled in with values from other cases. For brevity, the value for a specific case of a specific variable is referred to as an "item." Using that term, missing items are replaced with reported items from other cases. The case that contributes the reported item is referred to as the donor. The class of cases that contribute items is referred to collectively as "potential donors." The case with the missing item is referred to as the recipient.

The success of hot deck imputation in part depends on whether or not there exists available auxiliary variables that are sufficiently correlated with the variable that needs to be imputed and whether there exists sufficient number of donors relative to the number of recipients in each imputation cell.

The imputation test included the following steps:

1. The NCTCOG randomly selected 50 records from the dataset with valid household income values and blanked out household income for 50 records. NCTCOG only provided details for each household record which were necessary for the hot deck imputation.
2. Westat ran WESDECK to impute household income for these records and provided the imputed values to NCTCOG.
3. NCTCOG then reviewed and compared the imputed results against the actual values for each of the 50 records.

In evaluating the results, NCTCOG recoded the original and imputed household income values to reflect household income categories that were going to be used in the raking or expansion process. These are presented in Table 2.

Table 2: Imputation test variables

Housing Income Raking Categories	NHTS Household Income Categories	description
1	1	< $5,000
	2	$5,000 - $9,999
	3	$10,000 - $14,999
	4	$15,000 - $19,999
	5	$20,000 - $24,999
2	6	$25,000 - $29,999
	7	$30,000 - $34,999
	8	$35,000 - $39,999
	9	$40,000 - $44,999
	10	$45,000 - $49,999
3	11	$50,000 - $54,999
	12	$55,000 - $59,999
	13	$60,000 - $64,999
	14	$65,000 - $69,999
	15	$70,000 - $74,999
4	16	$75,000 - $79,999
	17	$80,000 - $99,999
5	18	> = $100,000

Imputation was conducted twice. In the first run, the donor pools were formed by doing a cross-classification of these variables.

- Household ownership (owner or renter)
- Household size (1, 2, 3, 4, 5 or more)
- Number of workers (1 or less, 2, 3 or more), and
- Number of vehicles (1 or less, 2, 3, 4 or more).

The first run of the imputation test resulted in only 20 out of the 50 imputed test records (40 percent) matching the actual household income category.

In an attempt to improve the match rate, we ran a second test using the same predictor variables with household life cycle inserted between household size and number of workers in the household.

- Household ownership (owner or renter)
- Household size (1, 2, 3, 4, 5 or more)

- Life cycle (HHs with no children or retirees, HHs with at least one child under 21, and HHs with no children and at least one retiree),
- Number of workers (1 or less, 2, 3 or more), and
- Number of vehicles (1 or less, 2, 3, 4 or more).

The results of this run were actually worse than the first run. Only 17 out of the 50 test records (34 percent) matched the actual household income values. Consequently the client decided not to impute for household income. The 220 records that were missing household income were dropped from the final data set, so it contained a total of 3,053 records.

Task 5: Reweighting of the Survey Data

Overview of task

The objective of this task was to evaluate the need for reweighting the NHTS data for North Central Texas region. The evaluation included determining which level of geography and Census product should be used to create the new weights to more current control totals.

An advantage of reweighting the data was that the raking could be refined or restricted to the 12 counties comprising the NCTCOG MPA. The original NHTS weighting procedure used population totals for the whole state of Texas, so there is no guarantee that the weighted estimates for the NHTS sample in North Central Texas accurately reflect the population of North Central Texas for the characteristics used in the raking step. By restricting the reweighting to the NCTCOG region, we would be assured that the sample results for the characteristics using in raking accurately reflect the population of the region.

Background of the NHTS Weighting

Westat statisticians are extremely familiar with 2009 NHTS dataset. Westat developed the sample design and calculated survey weights as prescribed by FHWA for the original dataset. The 2009 NHTS was a list-assisted random-digit-dial (RDD) sample design survey in which the objective was to yield an equal probability sample of households with landline telephones. This national sample was then supplemented with sample in 20 additional areas including the whole state of Texas. Two independent sample frames were used at the sampling stage, the national and the add-on region. Because of the integrated nature of the state/national sample design, the weighting procedure used to compute survey weights was complex. In addition to the typical steps employed in weighting procedures—construction of base weights, adjustments for nonresponse, and expansions of household and person weights to independent demographic population totals (often referred to as iterative proportional fitting (IPF) or "raking")—compositing and weight trimming steps were also implemented.

Compositing is a statistical procedure that allows for combining of two samples (the national and state samples in the case of NHTS) to result in a single set of weights that allow data from different samples to be combined and analyzed together. The composite adjustment appropriately rescales the weights for both samples to reflect pooling of the data.

Westat provided FHWA with an initial set of weights that were used by a select team of transportation planners to test key public transit estimates. Westat and FHWA worked together to identify areas in which the original weights could be enhanced to provide more precise estimates of transit use. Raking dimensions were refined, and a sophisticated trimming process was implemented in the final survey weights.

Weight trimming is an adjustment procedure that involves detecting and reducing extremely large weights. "Extremely large weights" generally refer to large sampling weights that were not anticipated in the design of the sample. Unusually large weights are likely to produce large sampling variances for statistics of interest, especially when the large weights are associated with sample cases reflective of rare or atypical characteristics. To reduce the impact of these large weights on variances, weight reduction methods are typically employed.

The weight trimming procedure used for the enhanced NHTS weights was implemented iteratively with the expansion or raking process so that the trimmed portions of the weights were redistributed across all the remaining weights. As a result, the final weights achieve consistency with the known population distributions without any excessively large survey weights.

Reweighting of the NCTCOG dataset

In the reweighting task, survey weights were developed for four types of analytic units associated with the NHTS NCTCOG sample – household weights, person weights, vehicle weights, and trip weights – to permit inference to the corresponding target populations.

In addition to the survey weights, replicate weights were developed for each type of analytic unit as well. The replicate weights are used to calculate the variances of survey estimates using the jackknife replication method. The methods used to derive these weights were aimed at reflecting the features of the sample design, so that when the jackknife variance estimation procedure is implemented, approximately unbiased estimates of sampling variance are obtained. In addition, the various weighting procedures were repeated on each set of replicate weights to appropriately reflect the impact of the weighting adjustments on the sampling variance of a survey estimate.

The overall steps in the weighting process were as follows:

- Construction of base weights—the base weights are the reciprocals of the telephone frame sampling rates;
- Household-level nonresponse adjustments;
- Household-level raking and trimming;
- Person-level raking and trimming;
- Computation of vehicle weights and trip weights.

These are essentially the same weighting steps carried out for the 2009 NHTS but with important modifications. The first modification involved the calculation of the household base weight. In the 2009 NHTS, the household base weights were calculated for the year-long NHTS dataset which took quarter

and sample type (national sample versus Texas add-on sample) into account. To simplify the process for the reweighting, we pooled all samples together regardless of quarter and sample type. As a result of this simplification, the need to carry out a composite adjustment to combine the various samples was no longer needed.

In the 2009 NHTS weighting procedures, a household was defined as useable if at least 50% of the eligible adults completed the retrieval interview. For the reweighting of the NCTCOG sample, a "usable" household was redefined as all household members aged five and older completing the retrieval interview. With the new definition of "usable" household, person nonresponse is not possible. As a result, the person-level non-response adjustment task used for the 2009 NHTS weighting was not necessary for the reweighting of the NCTCOG dataset.

The most significant change to the weighting procedure involved the use of a different set of characteristics for the household- and person-level raking adjustments. The choice of the new characteristics was to adequately and specifically reflect characteristics associated with travel behavior in North Central Texas.

The household-level raking characteristics used for the reweighting task included the number of household workers, number of household vehicles, household size, household income, and county of residence. The specific raking cells and control totals[1] used at the household level are shown in Appendix B.

The person-level raking characteristics used for the reweighting task included age and gender by county of residence. The specific raking cells and control totals[2] used at the person level are shown in Appendix C.

Task 6: Table Summaries

Overview of task

Presentation and interpretation of results through tabulation and graphs of survey data can reveal the trends of households and individual trip makers in the region. Task 6 included data tabulation and reporting from broad and detailed perspectives. Customary tabulations that offer socioeconomic snapshots and trip-making characteristics of the region are provided. Appendix A, Task 6 contains the list of tables provided.

Also included in Task 6 is the preparation of this summary report providing an overview of the entire project and presenting key summary tables and discussion.

Findings

As detailed in the summaries of Tasks 1 through 5, the goal of this project was to evaluate the usefulness of the NHTS dataset for the NCTCOG MPA Travel Demand Model (TDM). To meet the needs of the

[1] 2006 – 2011 five year ACS data used.
[2] 2006 – 2011 five year ACS data used.

TDM, the original NHTS dataset was subset to include records that fill the requirements of the model, including among other things the removal of weekends and holidays from the dataset. The following section of this report will provide a high-level presentation of key tables[3]. This section will also provide observations about the NCTCOG region data, some comparisons of the NCTCOG dataset to the original NHTS dataset[4] and considerations for the region moving forward.

A note about the tables and dataset: There may be some discrepancies between the sum of the weighted data found in the database and the values provided in the table summaries. The discrepancies are all less than 0.3% and some are just 0.01% off.

These discrepancies are the result of the data processing package (STATPAC) used to create the summary tables. STATPAC creates a new database when the weighting factors are applied. A requirement is that the database cannot have partial records, and therefore all numbers were rounded to the nearest integer. As a result the number of records in the weighted database will almost never perfectly match the sum of the weighting factors, but the results are statistically equivalent.

When making comparisons between the NHTS and the NCTCOG data, it is important to consider the differences in the composition of each dataset. The modifications made to the NHTS dataset to meet the analytic objectives of the NCTCOG MPA TDM are discussed in detail in Tasks 3 through 5. Those included eliminating weekend travel, holidays, removing households where less than 100 percent of all household members reported their travel and discarding those households failing to report income. While the desire to compare the observations of the regional to the national data is strong, this should be done with caution as the differences in the two data sources are not comparable and should not be taken at face value.

A comparison of overall trip rates and trips by household size between the original NHTS to the subset NCTCOG datasets is presented in Table 3 and shows an average of 2.24 more daily trips per household in the NCTCOG dataset than in the NHTS dataset. The exclusion of weekend and holiday travel days alone could explain the difference in overall trips per household[5]. While trips rates in one and two person households are similar across datasets, three plus person households made 2.61 to 6.57 more daily trips on average in the NCTCOG dataset. This too could be a product of the exclusion of weekend travel days. Larger households with children may create more weekday trips related to the children's activities, trips that are not made by traditional one and two person households.

[3] All tables and figures present weighted data.
[4] When possible, comparative NHTS data is included in this report.
[5] The trips for the 2009 NHTS represents 365 travel days, the NCTCOG data represents 239 travel days.

Table 3: Trips per household by household size

		Household Size					
		1	2	3	4	5+	Total
NCTCOG	Total Number of Day Trips	1,780,543	4,760,543	4,833,597	6,896,274	4,954,141	23,225,099
	Households	570,287	693,461	393,523	382,061	226,135	2,265,467
	Average Number of Day Trips Per Household	**3.12**	**6.86**	**12.28**	**18.05**	**21.91**	**10.25**
NHTS	Total Number of Day Trips	118,421,000	260,553,000	175,068,000	199,687,000	152,592,000	906,321,000
	Households	31,741,000	37,728,000	18,104,000	15,584,000	9,945,000	113,102,000
	Average Number of Day Trips Per Household	**3.73**	**6.91**	**9.67**	**12.81**	**15.34**	**8.01**

Source for NHTS data: Federal Highway Administration, 2009 National Household Travel Survey (NHTS)

The percentage of daily trips by trip purpose[6] for the NCTCOG region is presented in Figure 1. Table 4 shows the number and percentage of daily trips by trip purpose. Home-based other (HBO) and non-home-based (NHB) trips comprise more than half the daily trips in the NCTCOG region (58.1 percent). Home-based work trips (HBW) make up 13.6 percent of all trips, less than the home-based shopping (HBSHOP) trips (17.7 percent). Table 5 presents the NCTCOG region data for primary trip purpose by tour showing that work trips represent 25.8% of trips. When considering trip purpose by tour, the percentage of work tours is nearly twice (25.8 percent) as high as the trip based percentage of work trips (13.6 percent). This discrepancy would indicate that higher percentages of HBO and NHB trips occur as part of a work tour.

Figure 1: NCTCOG Region trips by trip purpose

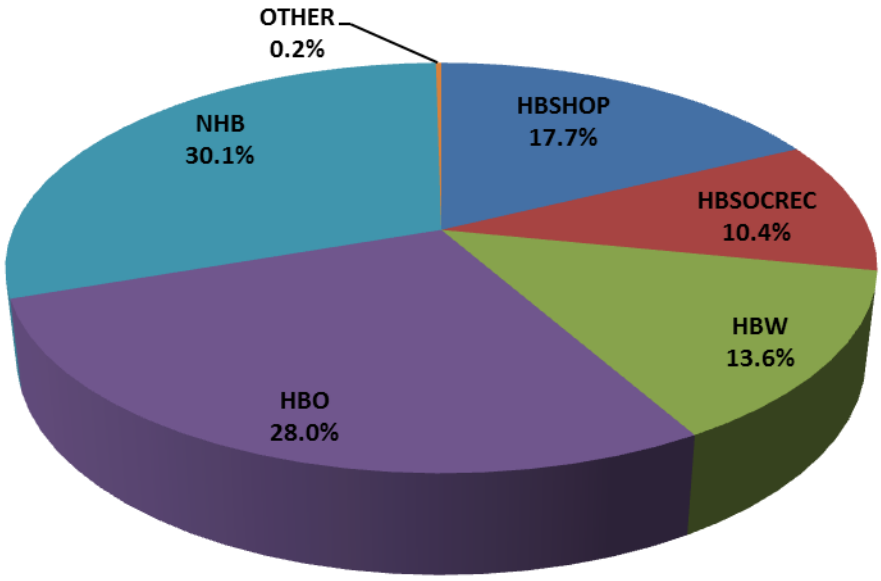


Table 4: NCTCOG Region number and percentage of trips by trip purpose

Trip Purpose	Trips	Percentage of all trips
HBSHOP	4,119,162	17.7%
HBSOCREC	2,422,552	10.4%
HBW	3,152,175	13.6%
HBO	6,493,848	28.0%
NHB	6,981,546	30.1%
OTHER	55,816	0.2%
	23,225,099	100.0%

[6] HBSHOP = home-based shopping; HBSOCREC = home-based social/recreational; HBW = home-based work; HBO = home-based other; NHB = non-home-based; OTHER = not able to categorize.

Table 5: NCTCOG Region trip purpose by tour

Purpose	Number of Tours	Percentage of Tours
Home	487	5.0%
Work	**2,516**	**25.8%**
University	114	1.2%
School	812	8.3%
Escorting	975	10.0%
Shopping	1,479	15.2%
Maintenance	1,108	11.4%
Eating Out	540	5.5%
Visiting	368	3.8%
Discretionary	1,364	14.0%
TOTAL	**9,763**	**100.0%**

Figure 2 presents the NCTCOG region trips by purpose and household size and shows that larger households, those with five or more household members, make fewer HBW trips than they do all other types of trips. Similar findings are seen in the NHTS tips by purpose and household size (see Figure 3). This could be due to making stops to run errands, or drop off children at school on the way to the workplace. The percentages of HBSOREC trips vary little across household size in both samples. Overall, the trip purpose patterns are similar across both datasets.

Figure 2: NCTCOG region trips by purpose and household size

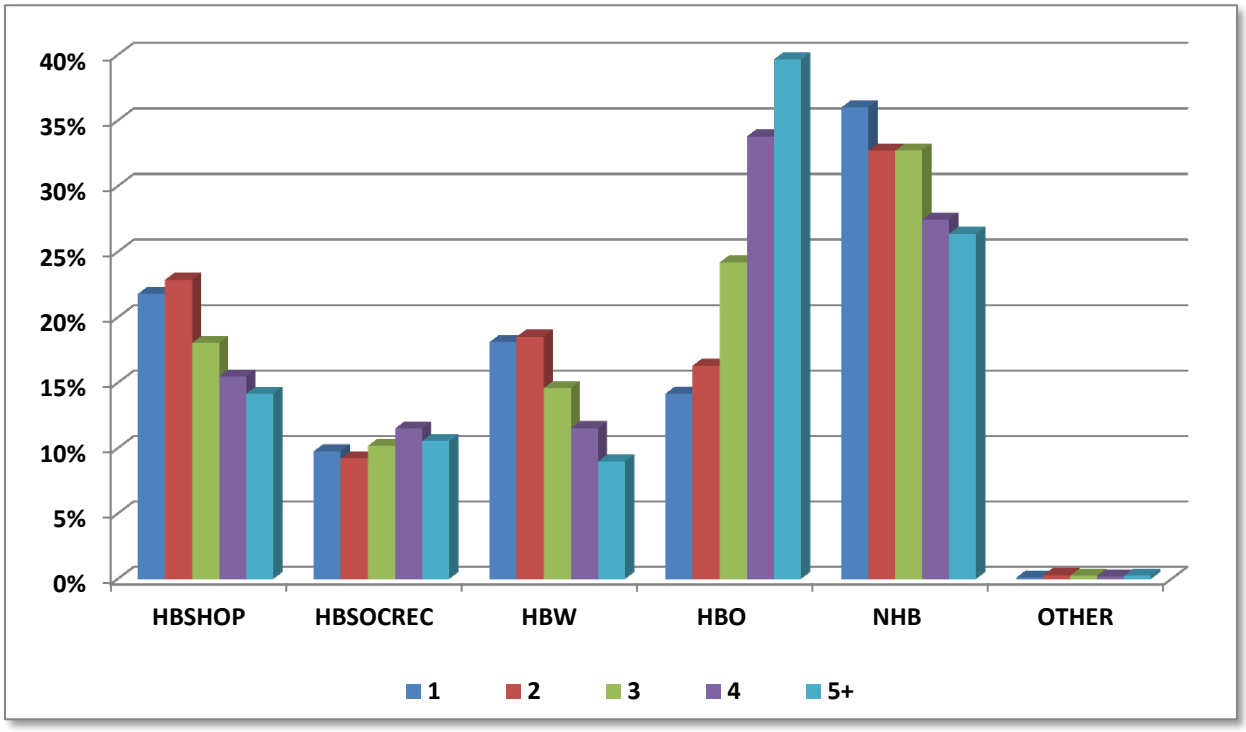
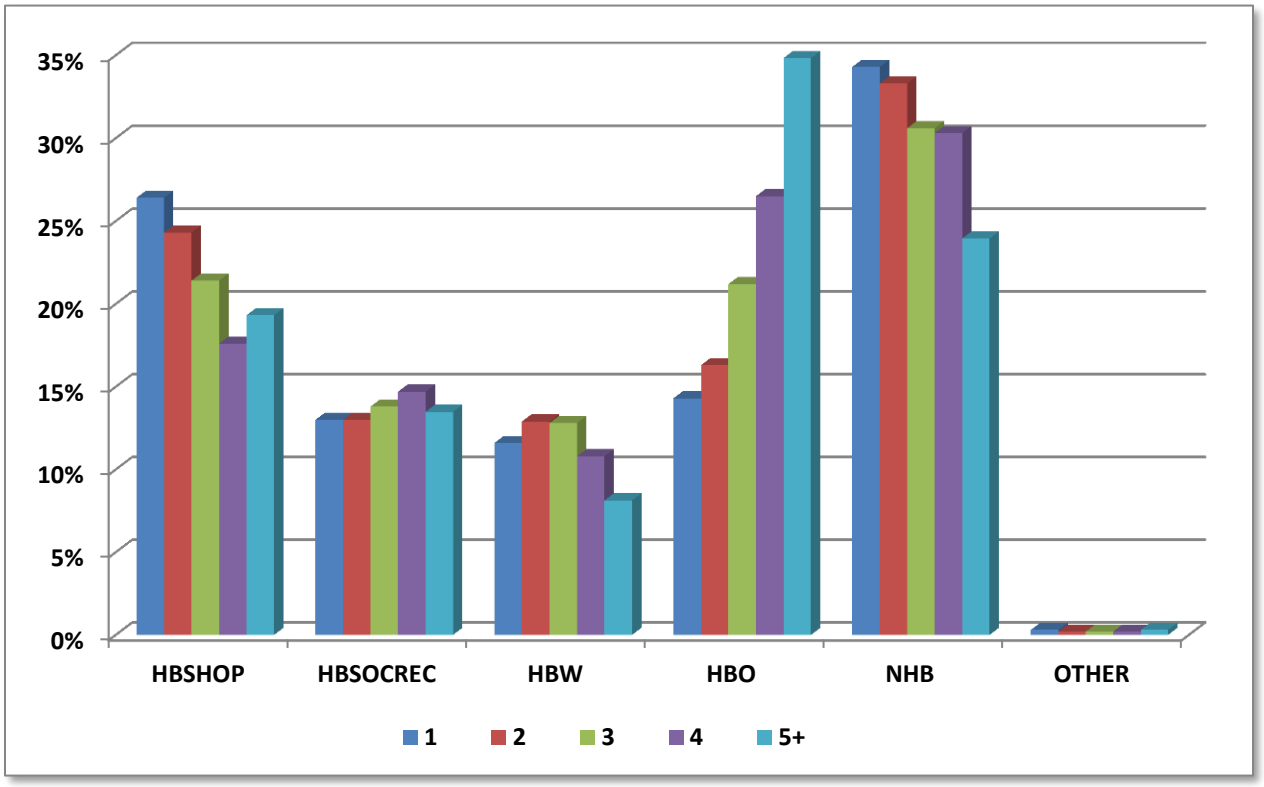


Figure 3: NHTS trips by purpose and household size



Source: Federal Highway Administration, 2009 National Household Travel Survey (NHTS)

Table 6 presents a side-by-side comparison of the data presented in Figure 2 and Figure 3.

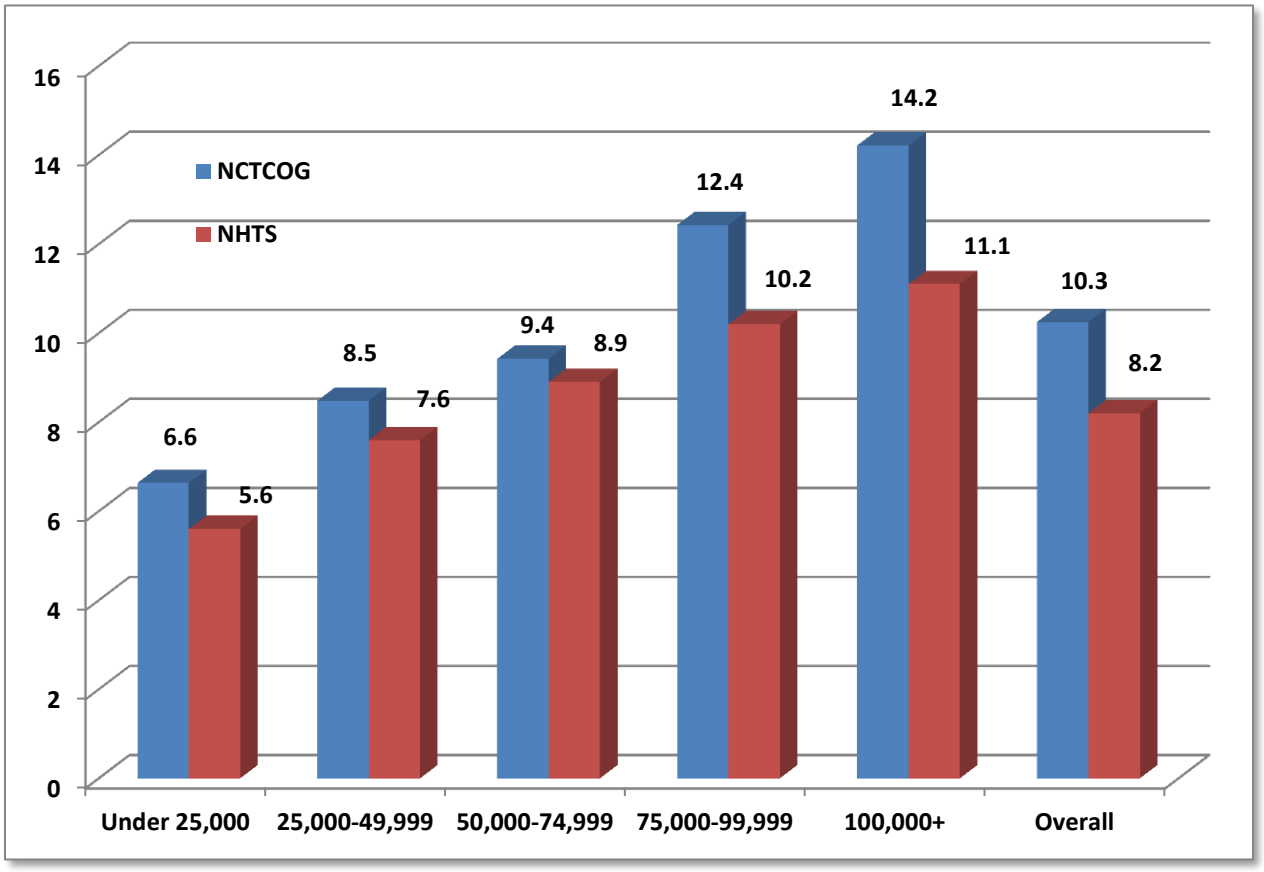
Table 6: Comparison of trip purpose by household size

Trip Purpose	1 HHM		2 HHM		3 HHM		4 HHM		5+ HHM	
	NHTS	NCTCOG	NHTS	NCTCOG	NHTS	NCTCOG	NHTS	NCTCOG	NHTS	NCTCOG
HBSHOP	26.4%	21.8%	24.3%	22.9%	21.4%	18.0%	17.6%	15.5%	19.3%	14.2%
HBSOCREC	13.0%	9.8%	13.0%	9.2%	13.8%	10.2%	14.7%	11.5%	13.5%	10.5%
HBW	11.6%	18.1%	12.9%	18.5%	12.8%	14.6%	10.8%	11.5%	8.1%	9.0%
HBO	14.3%	14.2%	16.3%	16.3%	21.2%	24.2%	26.5%	33.8%	34.8%	39.7%
NHB	34.3%	36.0%	33.3%	32.7%	30.6%	32.7%	30.3%	37.5%	24.0%	26.4%
OTHER	0.3%	0.1%	0.2%	0.3%	0.2%	0.3%	0.2%	0.2%	0.3%	0.3%

Source for NHTS data: Federal Highway Administration, 2009 National Household Travel Survey (NHTS)

Figure 4 shows the average number of trips per household by household income for the NHTS and NCTCOG datasets. While the NCTCOG data reflects a higher average number of trips than the NHTS data, similar to the findings with trip purpose by household size (Figure 2 and Figure 3), the pattern is the similar across datasets. The average number of trips per household is correlated with household income, with households reporting higher income levels making more trips. Overall the comparison between the NHTS and the NCTCOG data appear closely related until the reported income is $75,000 or more when the difference between the number of trips widens to more than two trips per household.

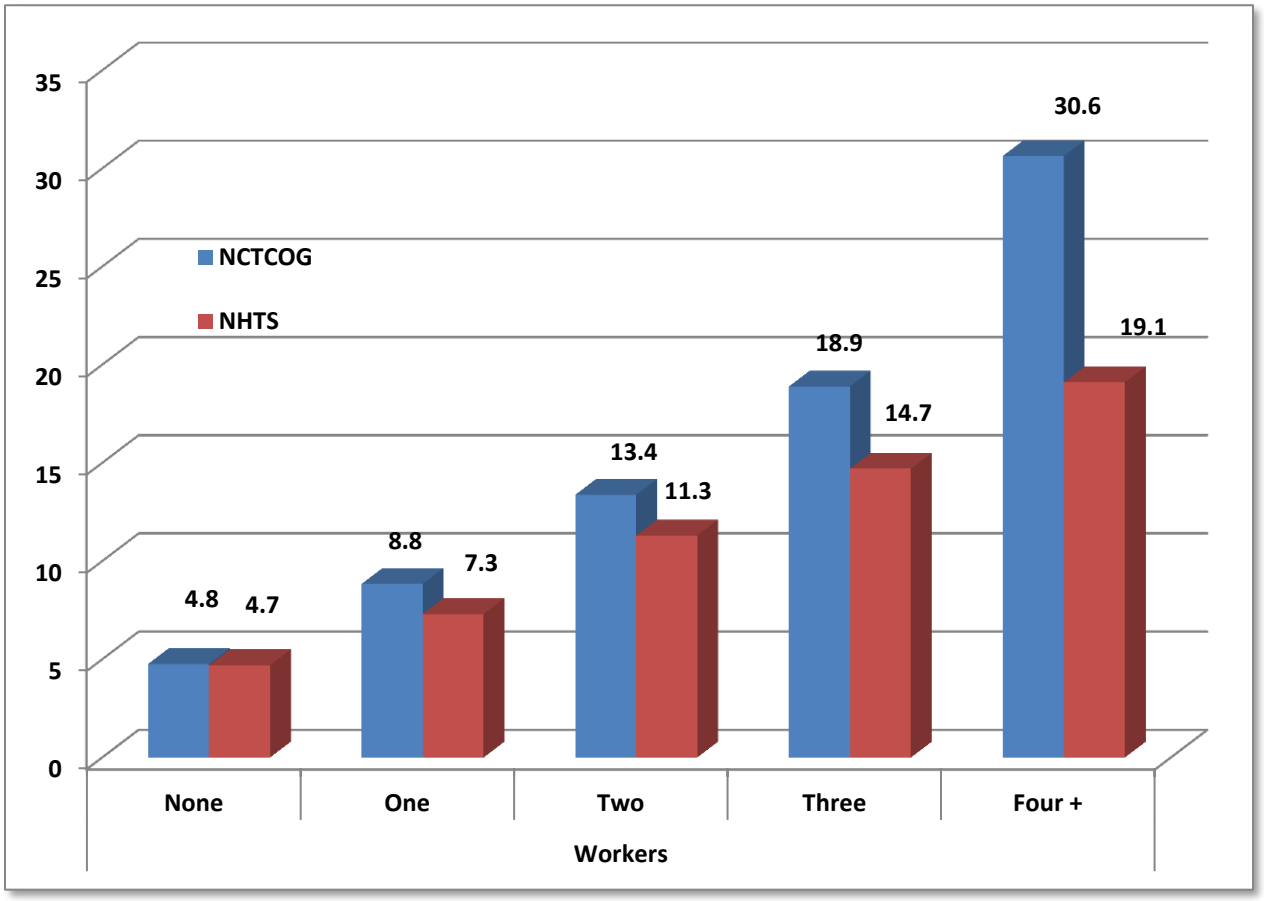
Figure 4: Comparison of NHTS and NCTCOG average number of trips per household by income



Source for NHTS data: Federal Highway Administration, 2009 National Household Travel Survey (NHTS)

These data presented in Figure 5 reflect that the overall number of trips per household is correlated with the number of household workers with households with more workers making more trips. In the NCTCOG dataset, households with four workers made 6.4 times the number of average daily trips as did households with no workers, and 1.6 times as three worker households. Households with workers in the NCTCOG data made more trips on average than those in the NHTS data, the difference becoming greater as the number of workers in the in household increases. Households with four or more workers made 11.5 more trips in the NCTCOG sample than did the same size households in the NHTS sample.

Figure 5: NCTCOG Region average number of trips per household by number of workers



Source for NHTS data: Federal Highway Administration, 2009 National Household Travel Survey (NHTS)

Figure 5 shows that households with four or more workers make the majority of trips (30.6 percent in the NCTCOG dataset); however, these trips are not necessarily HBW trips (Figure 6). Three worker households made more HBW trips than did any other households with workers. The percentage of trips is generally balanced across purpose, except that 30 percent of trips made by zero-worker households are HBSHOP trips and of course, the lack of HBW trips in zero-worker households.

Figure 6: NCTCOG Region average number of trips per household by trip purpose and number of workers

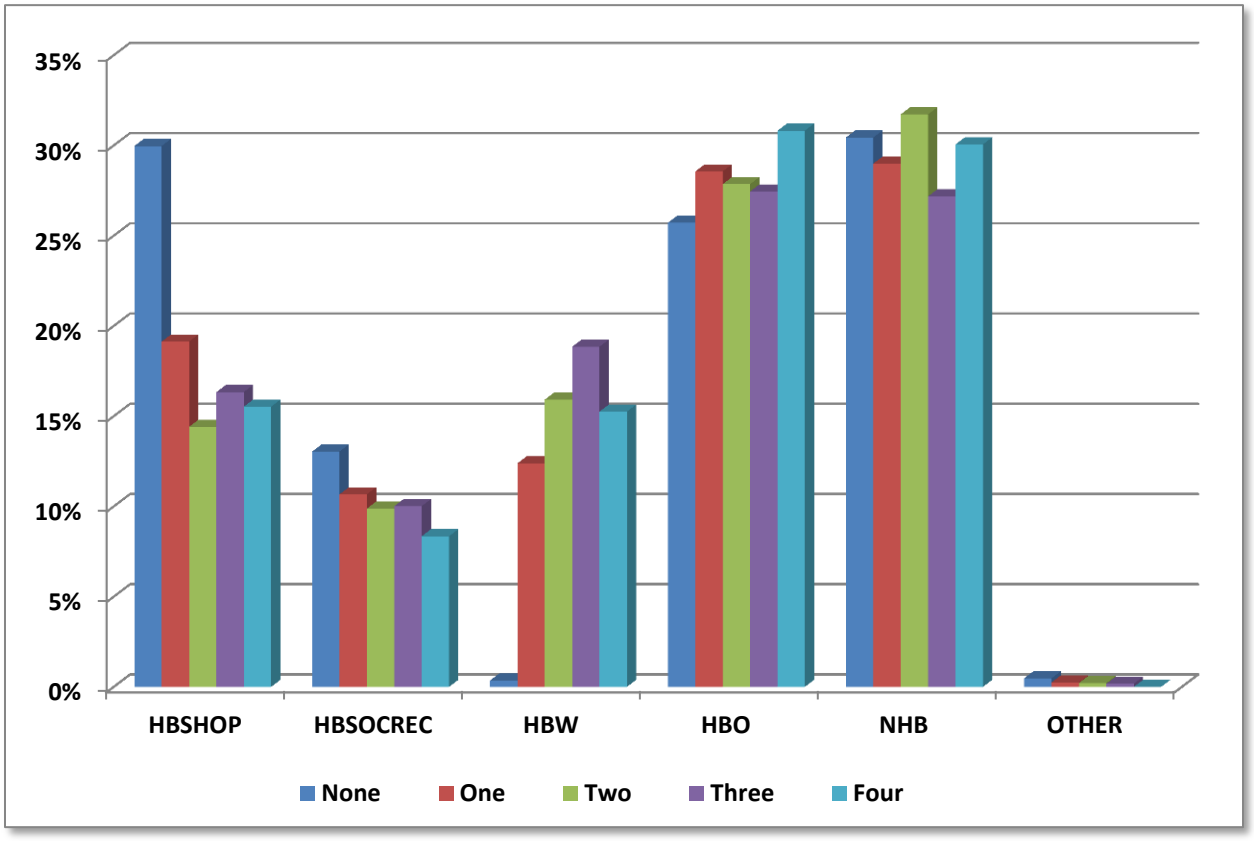


Figure 7 presents the NCTCOG region person trips by mode and Table 7 presents a list of all modes, comparing the percentage of mode share for each in the NCTCOG and NHTS datasets. The NHTS collects mode differently than many region surveys by separating out various types of personal occupancy vehicles (POVs) and collecting driver information at the trip detail reporting level. As such, the survey mode data readily shows the mode share by vehicle type. The NCTCOG data shows a mode share for POVs at 89.9 percent compared with 82.7 percent in the NHTS data. Additionally, sport utility vehicles (SUVs) were more than twice as common (22.1 percent) in the NCTCOG data as in the national dataset (10.4 percent). Walk as a mode of transportation was lower in the NCTCOG data (6.3 percent) compared with the NHTS data (10.4 percent), as was local public bus (0.3 versus 1.2 percent), but other modes were reported similarly across datasets.

Figure 7: NCTCOG region person trips by mode

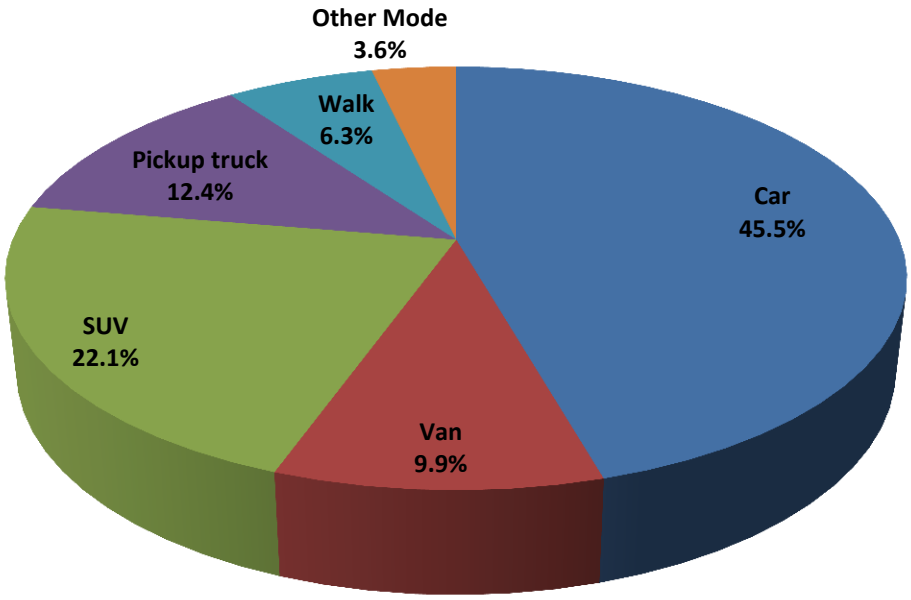


Table 7: Person trips by mode comparison

Mode	NCTCOG	NHTS	Mode	NCTCOG	NHTS
Car	45.5%	44.3%	Charter/tour bus		0.1%
SUV	22.1%	10.4%	City to city bus		0.0%
Van	9.9%	17.7%	Shuttle bus	0.1%	0.2%
Pickup Truck	12.4%	10.3%	Amtrak/intercity train		0.0%
Walk	6.3%	10.4%	Commuter train	0.1%	0.1%
Other truck	0.2%	0.5%	Subway/elevated train		0.4%
RV		0.0%	Street car/trolley		0.0%
Motorcycle	0.2%	0.3%	Taxicab	0.1%	0.2%
Light electric vehicle (golf cart)		0.0%	Ferry		0.0%
Local public bus	0.3%	1.2%	Airplane	0.2%	0.1%
Commuter bus		0.2%	Bicycle	0.7%	1.0%
School bus	1.2%	1.7%	Special transit-people w/disabilities		0.1%
			Other	0.6%	0.7%

Source for NHTS data: Federal Highway Administration, 2009 National Household Travel Survey (NHTS)

While vans make up the smallest mode share in the NCTCOG region (Figure 7 and Table 7), they contribute the largest number of daily trips by vehicle type as shown in Figure 8. Vans have 2.4 percent more trips than cars and 0.9 percent more than SUVs.

Figure 8: NCTCOG Region average number of daily trips per vehicle type

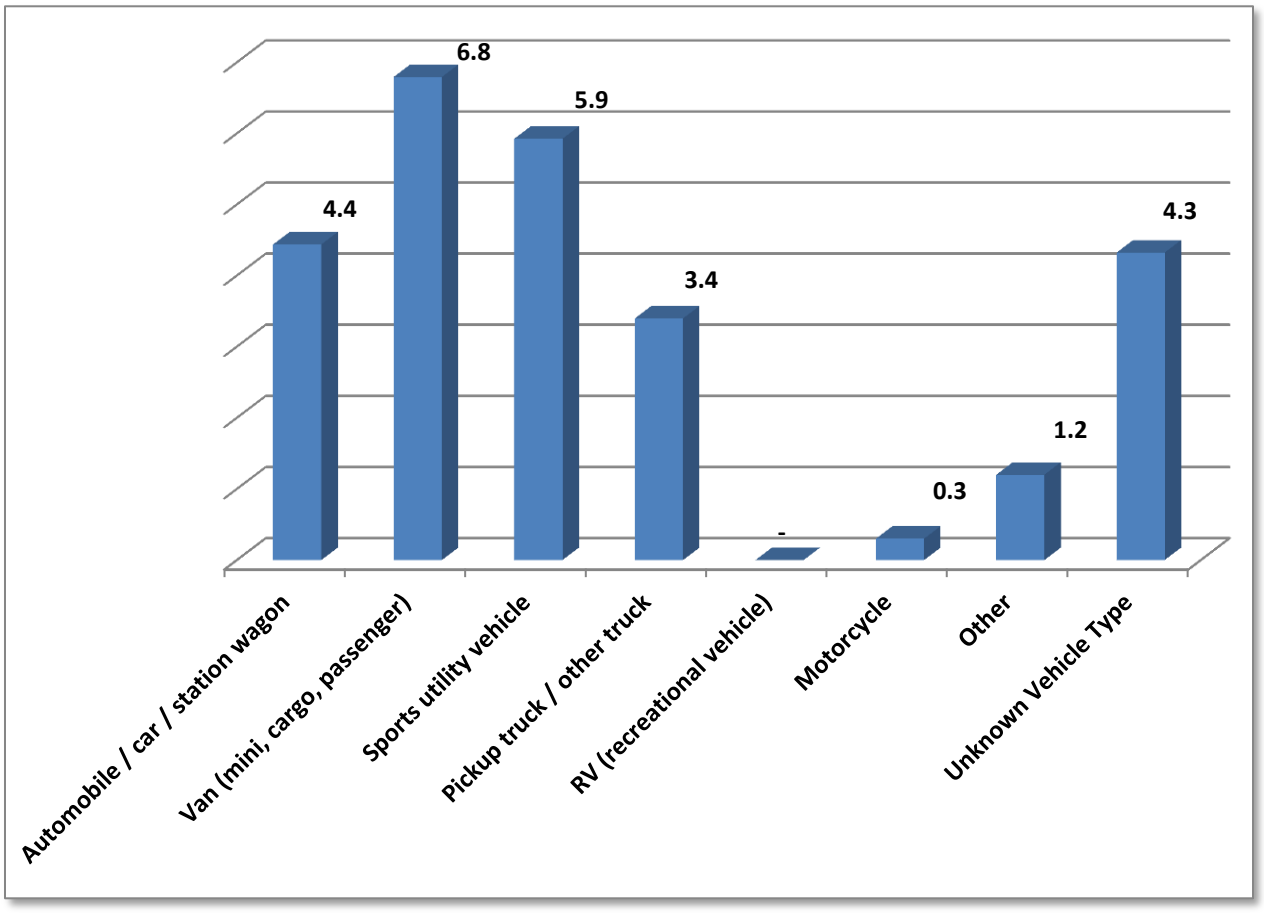


Figure 9 shows the average number of trips by age. The NHTS did not collect trip details for the population under five years old. The average number of daily trips is fairly consistent in the 5 to 24 year old population, varying no more than 0.5 trips at most, and ranges from a low of 2.8 trips per day for the 75 and older residents of the region to a high of 4.7 trips for the 35 to 54 year olds.

Figure 9: NCTCOG Region average number of daily trips by age

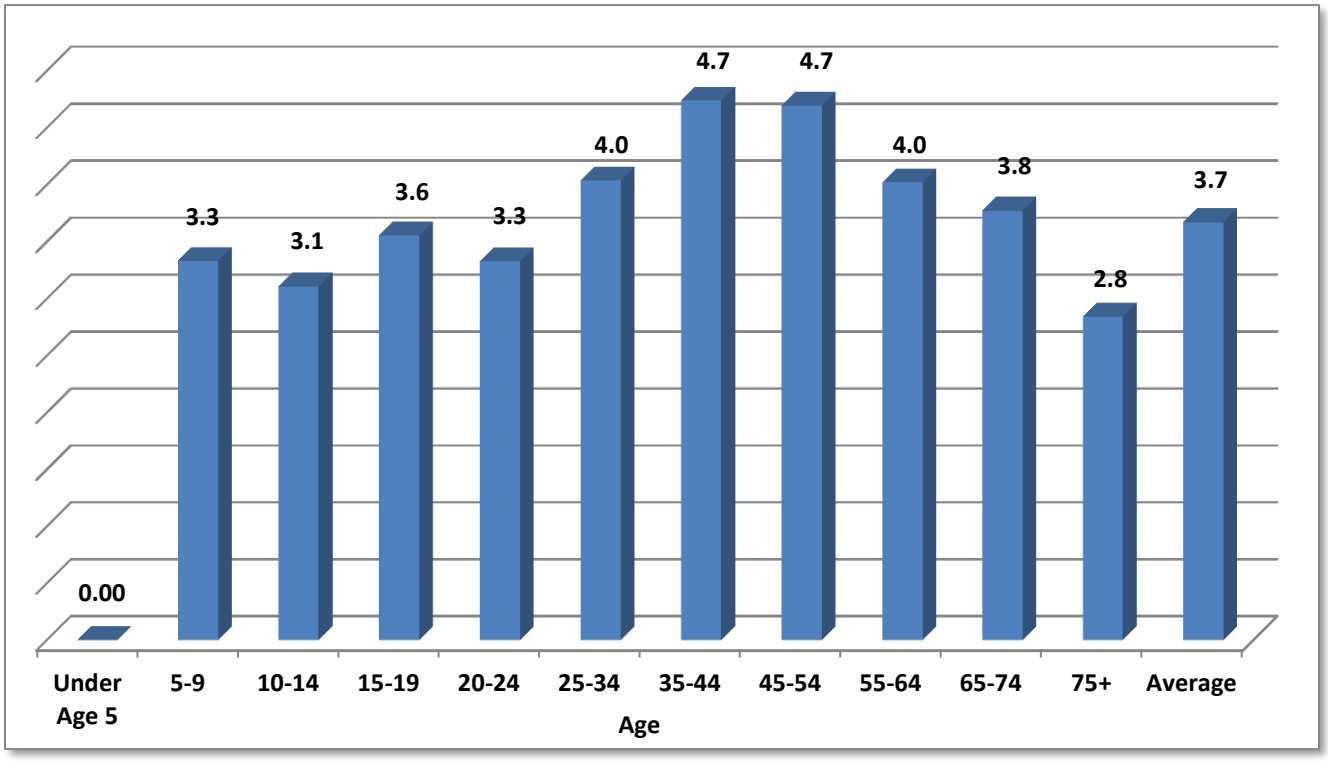


Table 8 shows that gender in the NCTCOG data has less of an effect on the average number of daily trips compared with the NHTS data. In the NHTS women made on average 0.6 more trips than men compared to 0.3 in the NCTCOG dataset. The average number of trips is also somewhat higher in the NHTS dataset.

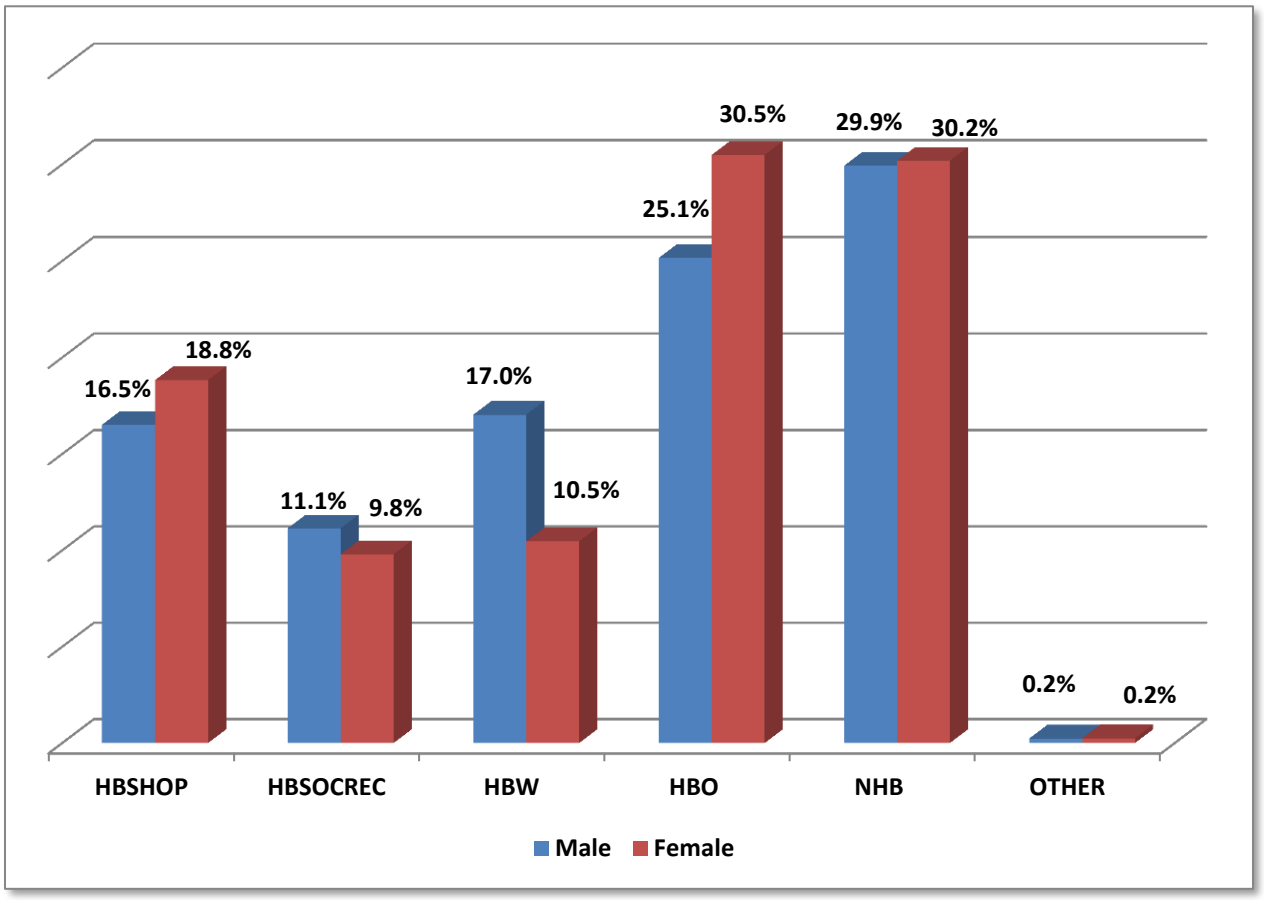
Table 8: Comparison of NCTCOG and NHTS trips by gender

		Male	Female	Total
NCTCOG	Total Number of Day Trips	10,989,411	12,235,687	23,225,099
	Total Number of Persons	3,123,423	3,202,523	6,325,946
	Average Number of Day Trips Per Person	**3.52**	**3.82**	**3.67**
NHTS	Total Number of Day Trips	540,698	626,623	1,167,321
	Total Number of Persons	139,257	143,797	283,054
	Average Number of Day Trips Per Person	**3.80**	**4.36**	**4.12**

Source of NHTS data: Federal Highway Administration, 2009 National Household Travel Survey (NHTS)

When trip purpose by gender is examined in Figure 10, there is little difference between the genders except for HBW and HBO purposes. Men make 6.5 more HBW trips than do women, while women make 5.4 more HBO trips than do men.

Figure 10: NCTCOG Region daily person trips by trip purpose and gender



In Table 9 the distribution of trip purpose by education is presented for all known levels of education. In the NCTCOG data the average number of daily trips is correlated with level of education. The more educated the respondent, the more trips are made.

Table 9: NCTCOG Region average number of trip by education level

	Less then high school graduate	High school graduate, include GED	Some college or Associate's degree	Bachelor's degree	Graduate or Professional Degree
Total Number of Daily Trips	1,287,196	3,483,890	5,592,049	5,502,300	3,159,121
Total Number of Persons	395,803	968,607	1,333,510	1,161,208	660,805
Average Number of Daily Trips Per Person	**3.25**	**3.60**	**4.19**	**4.74**	**4.78**

Figure 11 presents the overview of trip purpose by education. The data show an inverse relationship between education and trips whose purpose is HBSHOP. The HBO trips are more common among those with less than a high school degree. The difference between *less than high school graduate* and *graduate or professional degree* (18.8 percent) is most likely due to trips to school. Table 10 shows that HBO represents nearly half of all trips for the 5 to 19 year old population.

Figure 11: NCTCOG Region trip purpose by education

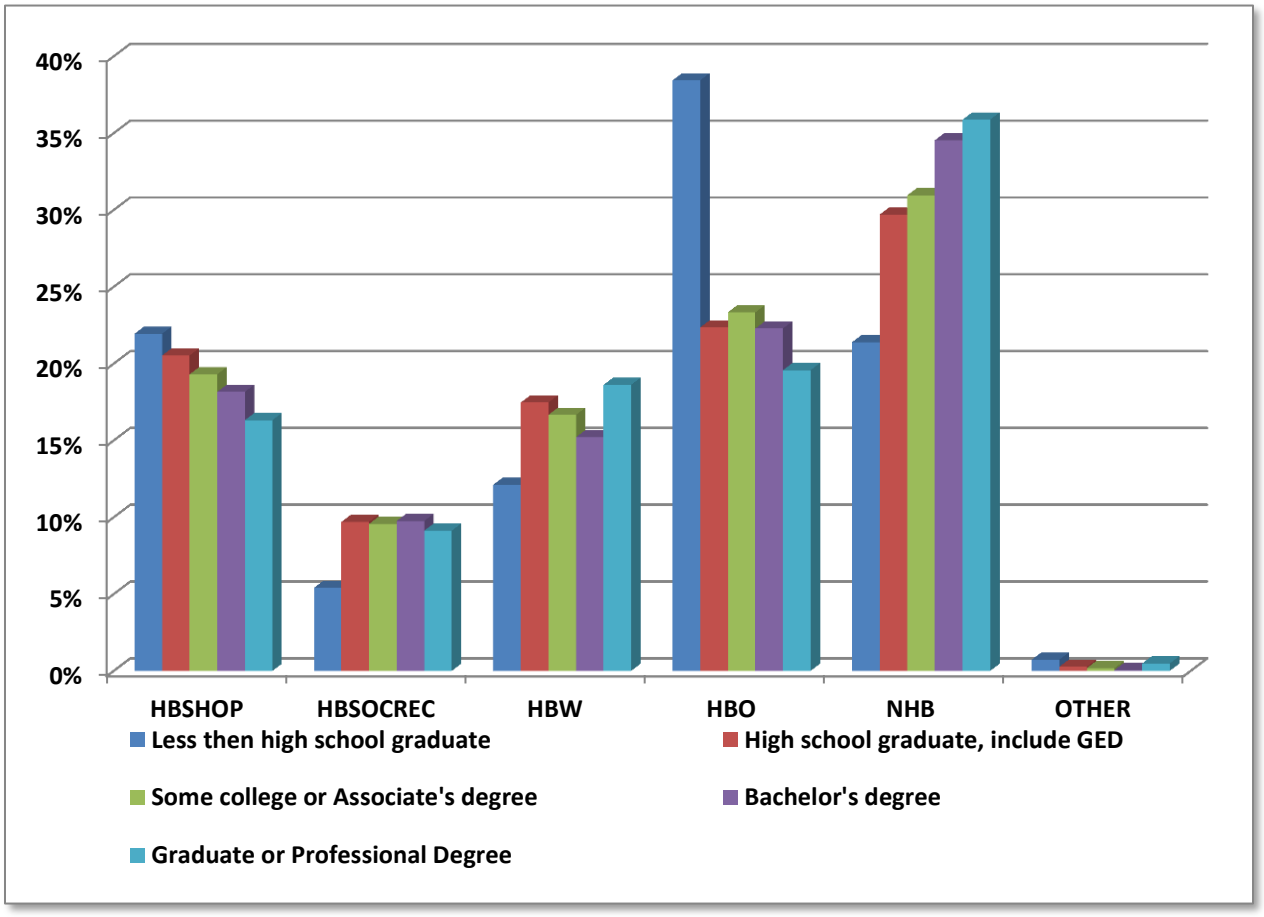


Table 10: NCTCOG Region age by trip purpose

	Trip Purpose						
Age	HBSHOP	HBSOCREC	HBW	HBO	NHB	OTHER	TOTAL
5-9	11.5%	15.1%	0.0%	52.1%	21.1%	0.2%	100.0%
10-14	12.0%	16.9%	0.0%	48.8%	22.0%	0.2%	100.0%
15-19	16.2%	11.6%	5.8%	41.7%	24.7%	0.1%	100.0%
20-24	20.5%	15.8%	19.1%	17.5%	26.8%	0.3%	100.0%
25-34	17.0%	10.7%	18.3%	23.3%	30.3%	0.5%	100.0%
35-44	15.5%	7.7%	17.0%	27.5%	32.1%	0.3%	100.0%
45-54	17.8%	8.4%	17.6%	22.6%	33.5%	0.2%	100.0%
55-64	20.1%	8.1%	18.9%	17.2%	35.6%	0.0%	100.0%
65-74	30.3%	11.5%	9.3%	18.2%	30.5%	0.2%	100.0%
75+	32.7%	12.3%	3.7%	21.5%	29.1%	0.7%	100.0%
Total	17.7%	10.4%	13.6%	28.0%	30.1%	0.2%	100.0%

Figure 12 presents the NCTCOG regional trip distribution for the NCTCOG MPA alone. Only 13.6 percent of all trip purposes were HBW, and HBO and NHB represented more than half of the trips in the region (58.1 percent).

Figure 12: NCTCOG Region household trips by purpose

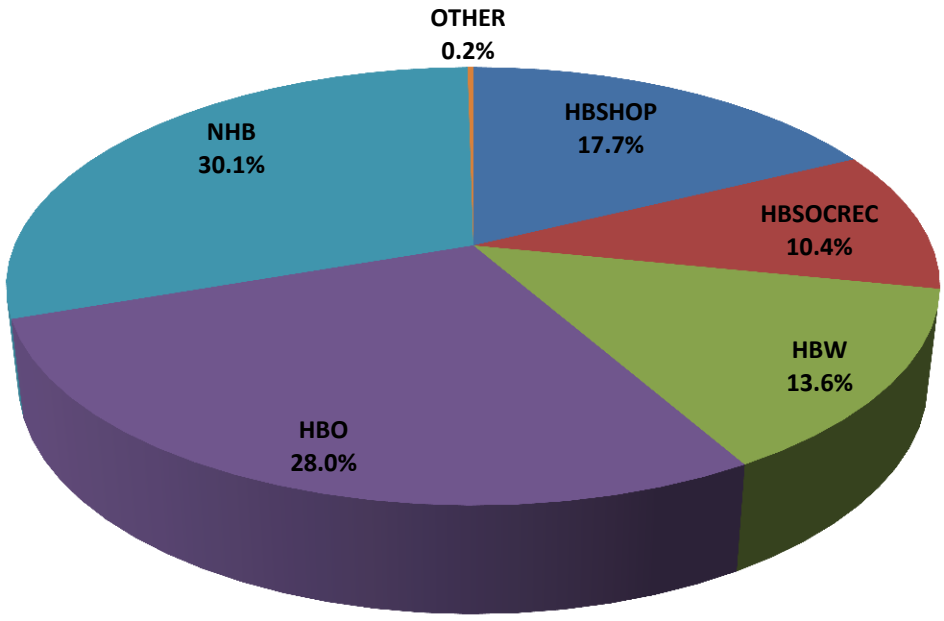
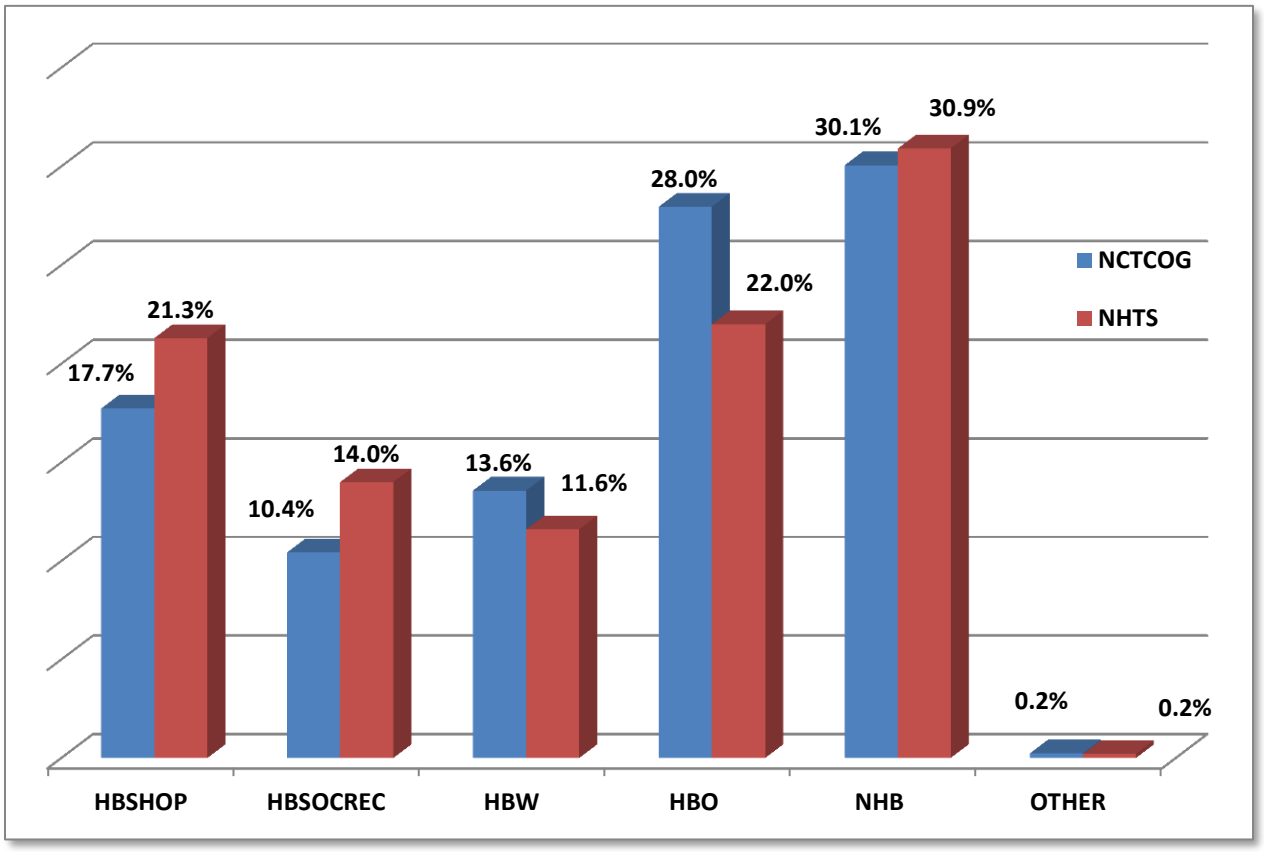


Figure 13 presents a comparison of trip purpose between the NCTCOG and NHTS datasets. HBSHOP and HBSOCREC trips comprise a smaller percentage of trips for the NCTCOG dataset. The results are different for HBW and HBO trips. Because the NCTCOG data excluded weekend and holiday travel dates, it is reasonable that HBW trips would represent a higher proportion of the total trips as well as the HBO trips, a category that includes transporting children to school and other after school activities.

Figure 13: Comparison of NCTCOG and NHTS trip purpose



Source of the NHTS data: Federal Highway Administration, 2009 National Household Travel Survey (NHTS)

Examination of trip purpose by worker status in Figure 14 shows that 22.3 percent of all trips made by workers are HBW and represent only a slightly higher percent of daily trips than HBO trips. Compared with workers, non-workers make 36.5 to 39.2 percent more HBSHOP, HBSOCREC and HBO trips.

Figure 14: NCTCOG Region trip purpose by worker status

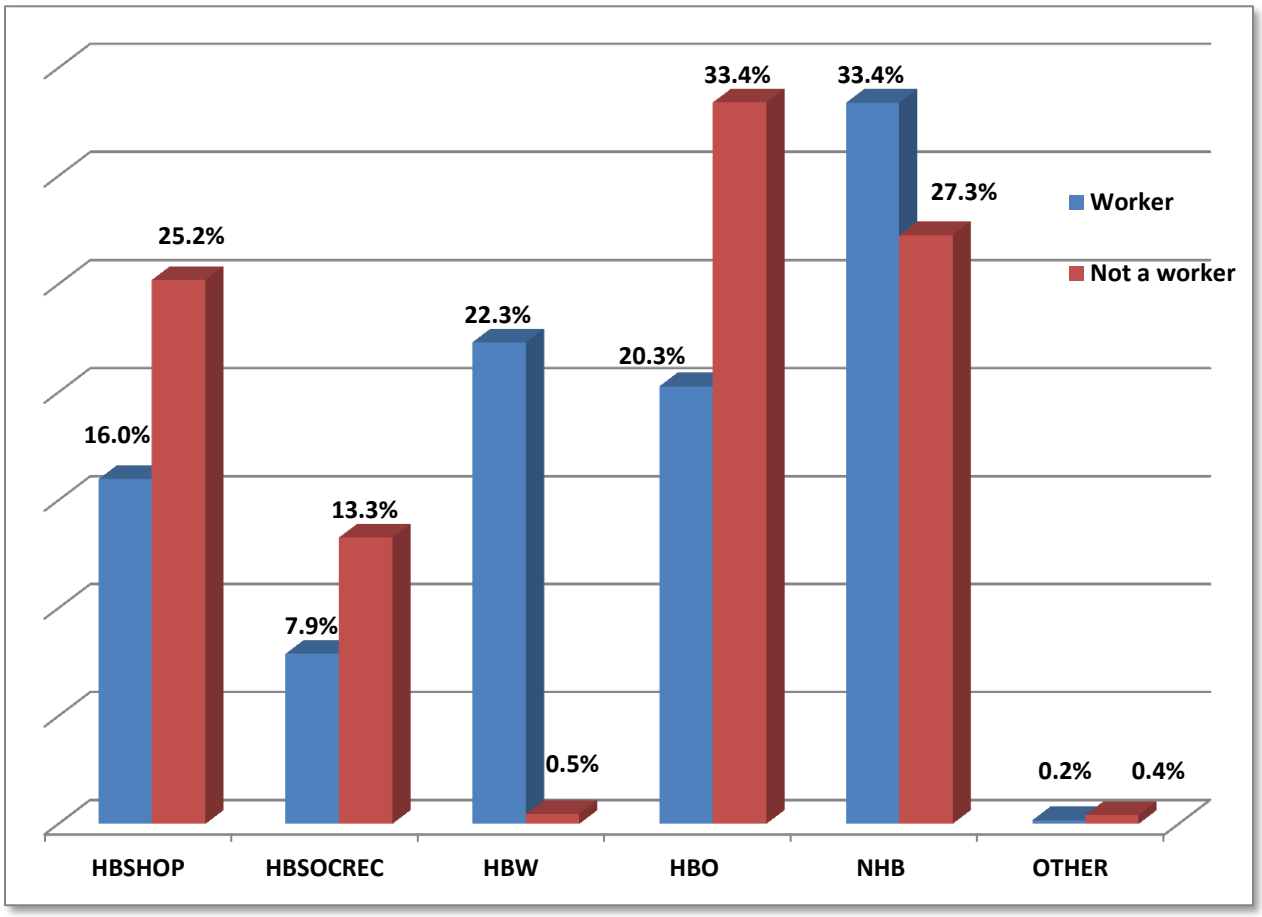
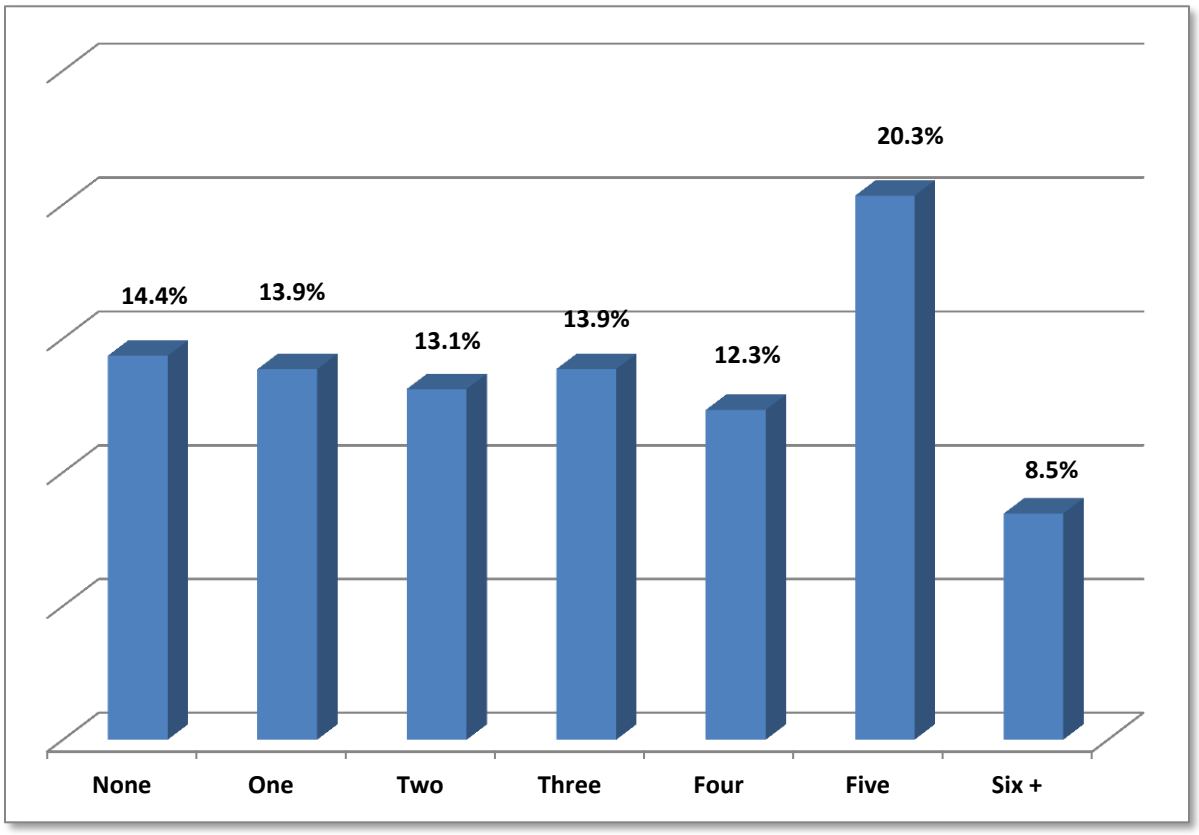


Figure 15 shows that the percentage of HBW trips is consistent in households with zero to four vehicles ranging only 2 percent (12.3 to 14.4 percent). The percentage of trips is highest in five vehicle households (20.3 percent) and lowest in six or more vehicle households (8.5 percent).

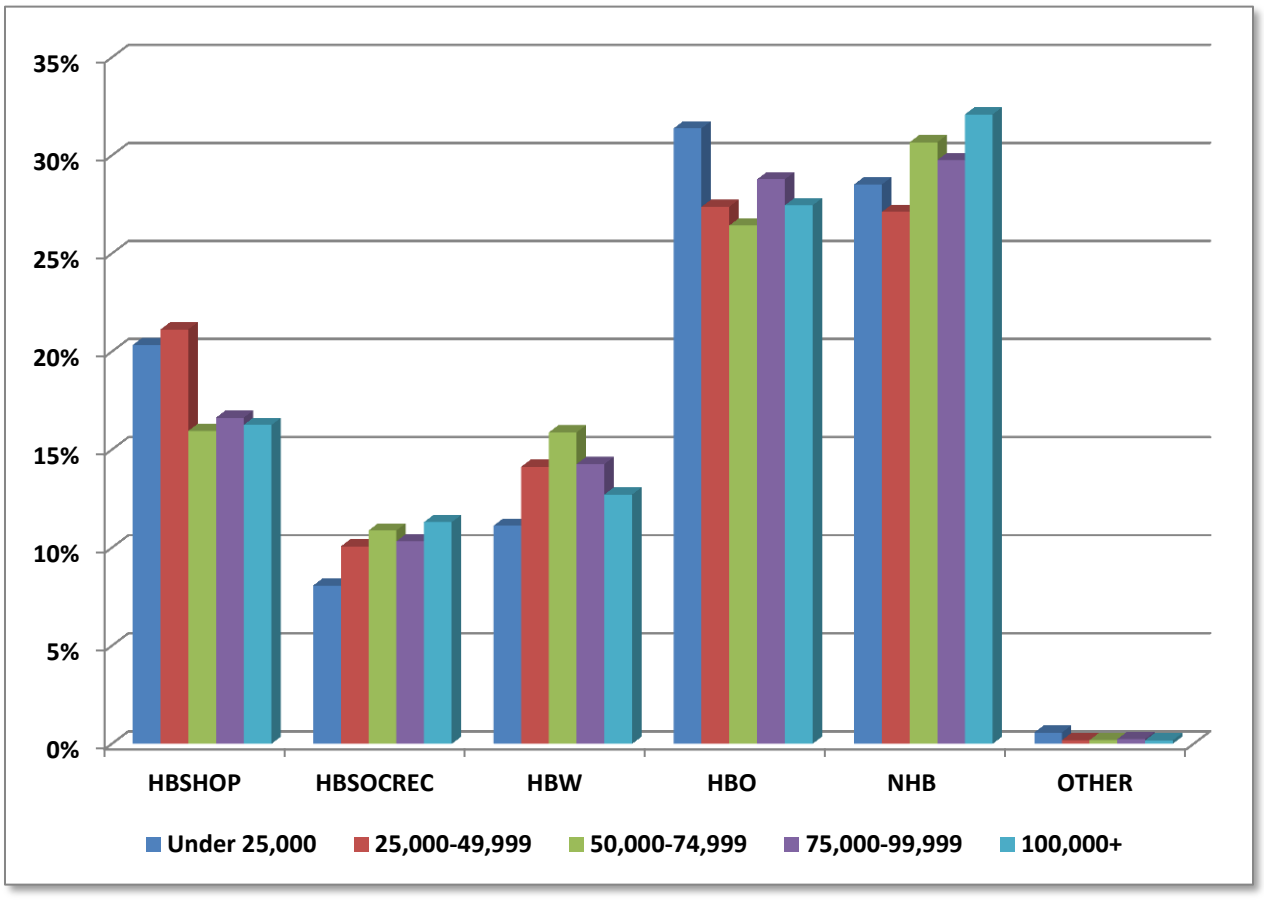
Figure 15: NCTCOG Region percentage of HBW trips by number of household vehicles



Income level impacts the number and types of trips that people make. Trip purpose by household income in the NCTCOG region is presented in Figure 16. Lower income households make fewer HBSOCREC and HBW trips than those households with higher incomes. All households make more HBO and NHB trips than any other type of trip and about five percent more HBSHOP trips are made by households reporting income less than $50,000.

Households reporting income between $50,000 and $74,999 make the most HBW trips (15.9 percent) and those reporting less than $25,000 annual income make the least number of HBW trips (11.1 percent). The percentage of HBW trips decreases in households with reported income in excess of $75,000 from the high of $50,000 - $74,999 households. This may be the result of the type of work done (e.g., professional versus retail jobs) and the ability to telecommute in some of the higher paying careers.

Figure 16: NCTCOG Region trip purpose by household income



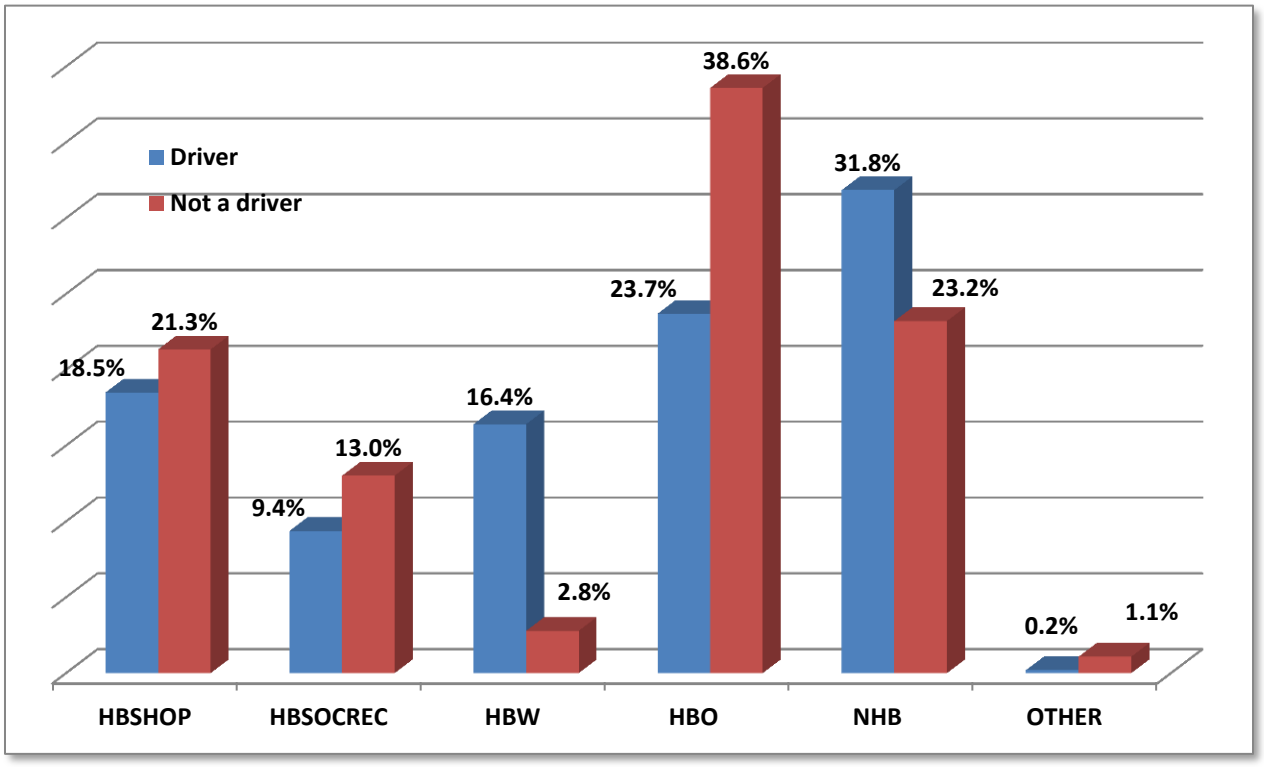
As expected, Table 11 shows that drivers make more trips than non-drivers. In fact they make nearly twice as many trips each day as do their non-driving counterparts.

Table 11: NCTCOG Region trips by driver status

	Appropriate Skip	Not Ascertained	Driver	Not a driver	Total
Total Number of Daily Trips	3,084,225	2,971	19,026,355	1,111,548	23,225,099
Total Number of Persons	1,458,811	1,000	4,377,632	488,504	6,325,946
Average Number of Daily Trips Per Person	**2.1**	**3.0**	**4.3**	**2.3**	**3.7**

When trip purpose is examined by driver status in Figure 17, it is found that drivers make 5.9 times the number of HBW trips than do non-drivers and non-drivers make almost half as many more HBO trips than do drivers. Drivers lead trip purpose share for HBW and NHB trips and these two purposes account for 48.2 percent of their trips.

Figure 17: Trip purpose by driver status



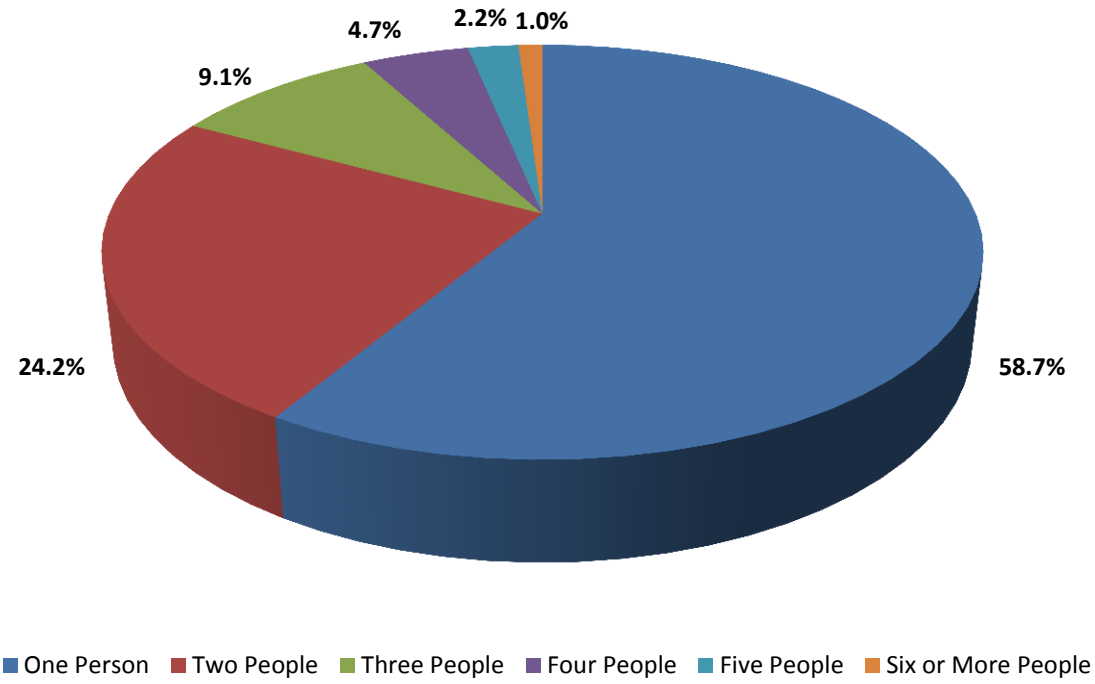
When examining the daily trips by mode of travel and annual household income in Table 12, it is no surprise that the majority of trips in the region were made in a personal vehicle (89.8 percent). Households reporting annual income of $100,000 or more were responsible for 37.8 percent of the trips made in the NCTCOG region. The least number of trips were made by households making less than $25,000. The percentage of trips made by households in the remaining three categories, $25,000 to $99,999, were similar to each other (16 to 18 percent).

Table 12: NCTCOG Region daily trips by mode of travel by annual household income

Annual Household Income	Under $25,000	$25,000-$49,999	$50,000-$74,999	$75,000-$99,999	$100,000+	Total
Appropriate skip	460	47,782	-	377	34,016	82,635
Car	1,273,461	1,972,660	1,854,795	1,541,910	3,293,400	9,936,226
Van	238,784	474,891	380,038	434,598	928,318	2,456,630
SUV	562,422	933,673	831,833	671,207	2,389,643	5,388,779
Pickup truck	344,976	571,250	512,506	441,586	789,114	2,659,431
Other truck	6,151	6,360	15,021	8,117	6,820	42,468
Motorcycle	5,900	3,054	795	6,611	14,561	30,920
Local public bus	77,029	20,586	5,941	14,309	8,703	126,568
School bus	94,183	94,183	41,339	53,054	105,355	388,114
Shuttle bus	3,180	5,230	-	4,519	13,389	26,318
Commuter train	14,393	3,891	7,782	10,879	669	37,615
Taxicab	-	14,435	2,134	-	9,372	25,941
Airplane	1,883	-	209	3,975	36,025	42,092
Bicycle	14,644	51,422	25,230	33,180	61,673	186,149
Walk	241,169	357,612	281,127	306,692	475,644	1,662,244
Other	32,803	42,803	17,280	17,113	22,970	132,969
Total	**2,911,437**	**4,599,832**	**3,976,030**	**3,548,126**	**8,189,673**	**23,225,099**

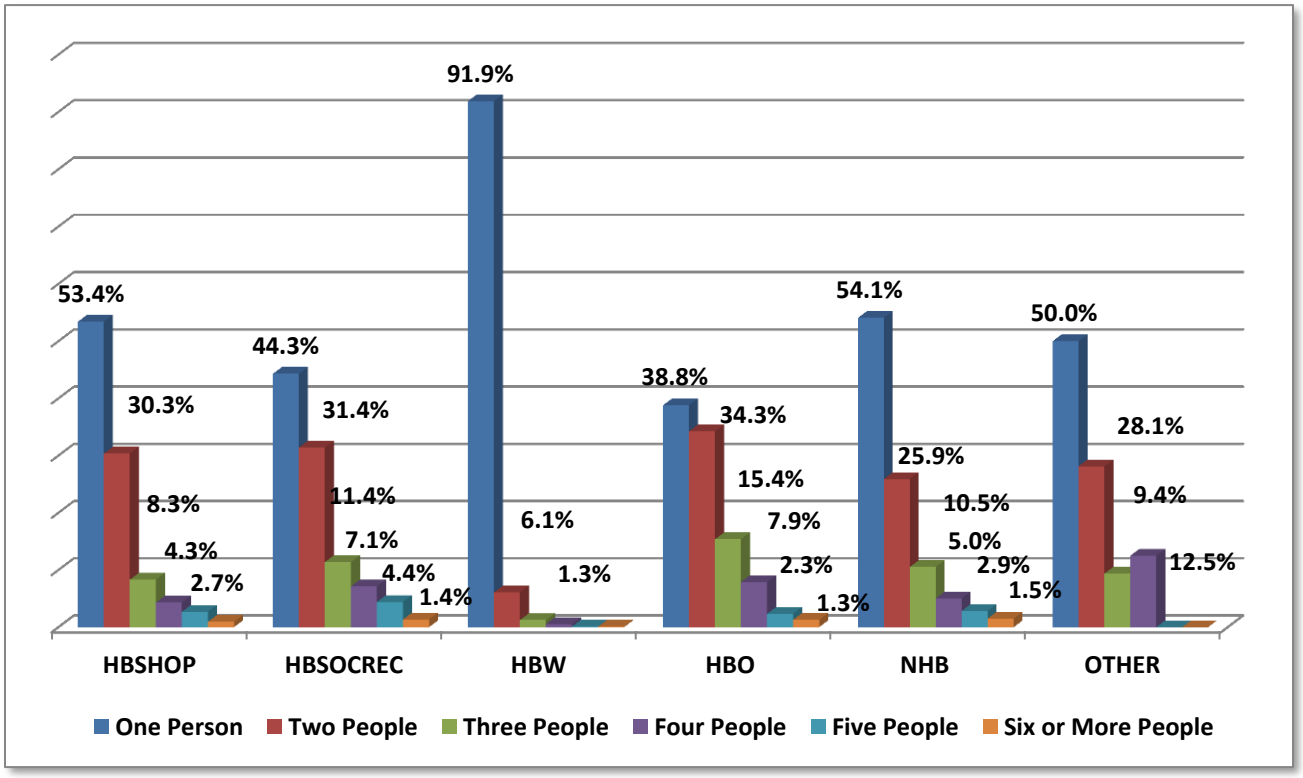
Figure 18 shows that most vehicle trips are made with a single occupant (58.7 percent) and that less than eight percent of all trips have four or more persons in the vehicle.

Figure 18: NCTCOG Region vehicle occupancy by number of people



When trip purpose is examined with vehicle occupancy in Figure 19, 91.9 percent of all HBW trips are single occupancy trips. HBO trips are more likely to have more than one person in the vehicle than any other trip purpose (61.2 percent), followed closely by HBSOCREC trips (55.7 percent). Still, these data show that most trips in the region are made with one or two occupants in the vehicle.

Figure 19: NCTCOG Region trip purpose by number of people in private vehicles



Another important element in understanding travel is knowing when people travel. Figure 20[7] shows that the single, peak travel hour in the NCTCOG region is 7:00 to 8:00 am when 10.3 percent of all daily trips occur. However, the evening rush extends for several hours, from 3:00 until 7:00 pm. During these four hours, 34.5 percent of all trips occur; 11.1 percent more than the morning peak times between 6:00 and 10:00 am. When you consider the number of HBO and NHB trips that take place across the region, combined with the evening peak beginning at 3:00 pm it is likely that the workers and non-workers are traveling together during this period of the day.

Figure 20: NCTCOG Region daily trips by time of day

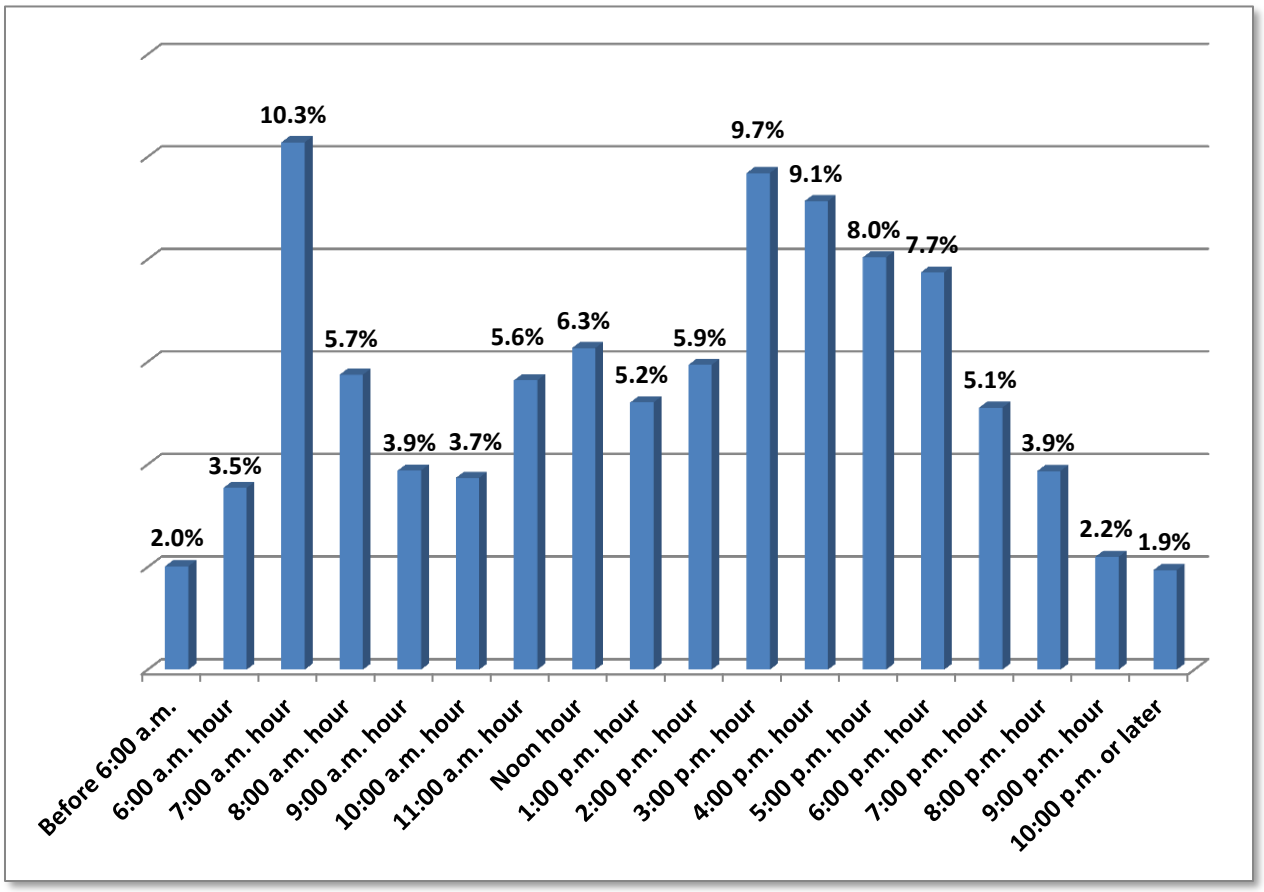


Figure 21 shows that 19.7 percent of all HBO trips are made during the peak travel hour of 7 a.m. and another 13.8 percent of HBO trips occur at the beginning of the afternoon peak travel period (3 p.m.). Most HBW trips are reported in the 7 a.m. hour (15.2 percent) and in the 5 p.m. hour (12.5 percent). NHB trips spike at 11.5 percent in the noon hour. These HBO and HBW percentages may likely present a much different picture of daily travel when examined as tours, as HBO trips may actually be part of HBW tours.

[7] Not ascertained responses for trip time were removed.

Figure 21 : NCTCOG Region trip purpose by time of day

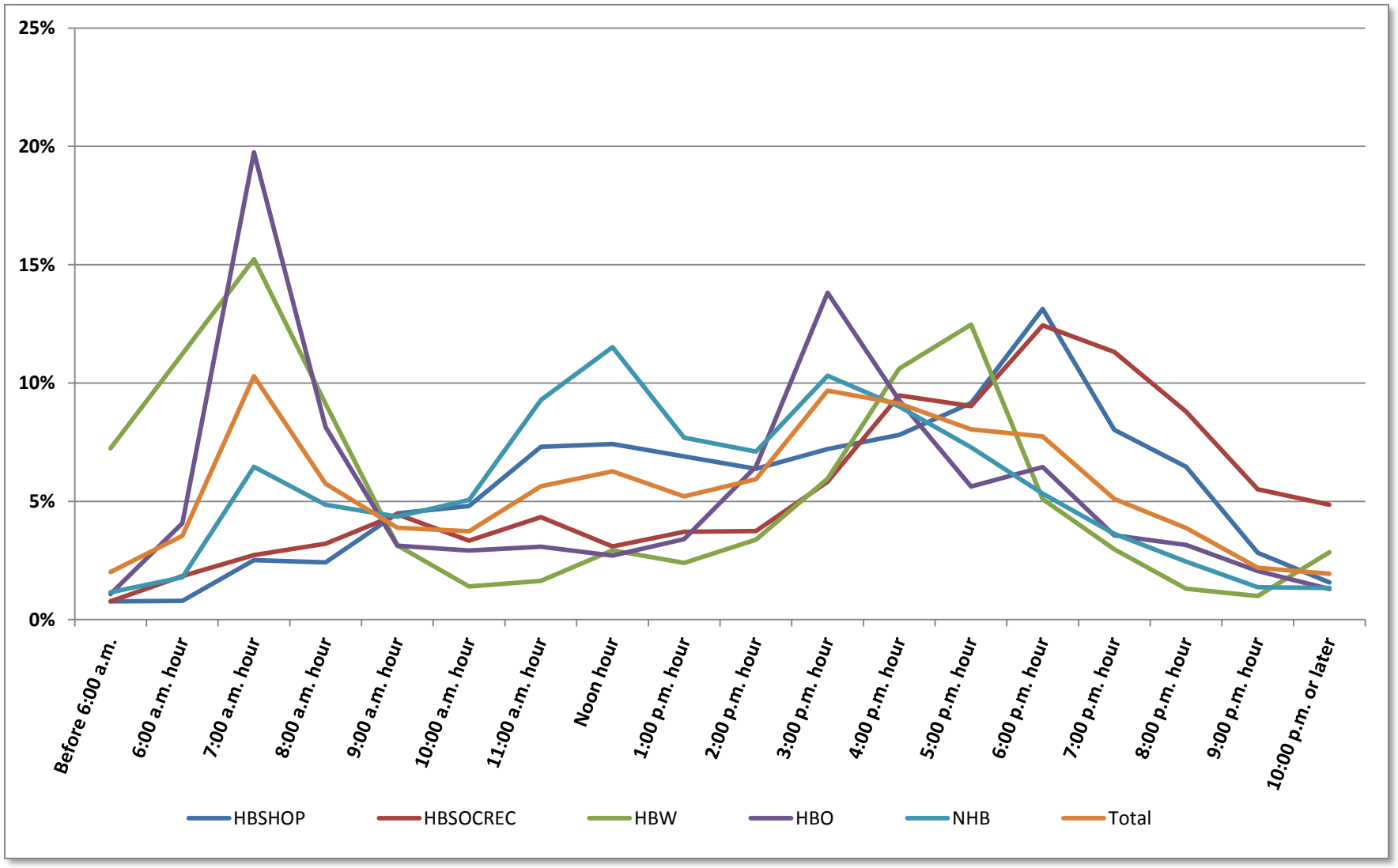


Table 13 presents the percentage of trips by hour and purpose and Table 14 the count of the same data. Notice that while most morning HBW trips originate in the 6 and 7 a.m. hours, 4.9 percent begin in the 5 a.m. hour.

Table 13: NCTCOG Region percentage of trips by hour and purpose

	HBSHOP	HBSOCREC	HBW	HBO	NHB
12:00 a.m. hour	0.2%	0.4%	0.6%	0.4%	0.1%
1:00 a.m. hour	0.0%	0.3%	0.4%	0.0%	0.0%
2:00 a.m. hour	0.1%	0.1%	0.3%	0.0%	0.2%
3:00 a.m. hour	0.0%	0.2%	0.1%	0.0%	0.0%
4:00 a.m. hour	0.0%	0.3%	0.9%	0.1%	0.3%
5:00 a.m. hour	0.5%	1.1%	4.9%	0.6%	0.5%
6:00 a.m. hour	0.8%	1.1%	11.2%	4.1%	1.8%
7:00 a.m. hour	2.5%	2.7%	15.2%	19.7%	6.5%
8:00 a.m. hour	2.4%	3.2%	9.1%	8.1%	4.9%
9:00 a.m. hour	4.5%	4.5%	3.1%	3.1%	4.4%
10:00 a.m. hour	4.8%	3.3%	1.4%	2.9%	5.1%
11:00 a.m. hour	7.3%	4.3%	1.6%	3.1%	9.3%
Noon hour	7.4%	3.1%	2.9%	2.7%	11.5%
1:00 p.m. hour	6.9%	3.7%	2.4%	3.4%	7.7%
2:00 p.m. hour	6.4%	3.8%	3.4%	6.5%	7.1%
3:00 p.m. hour	7.2%	5.8%	6.0%	13.8%	10.3%
4:00 p.m. hour	7.8%	9.5%	10.6%	9.3%	9.0%
5:00 p.m. hour	9.2%	9.0%	12.5%	5.6%	7.3%
6:00 p.m. hour	13.1%	12.4%	5.1%	6.5%	5.3%
7:00 p.m. hour	8.0%	11.3%	3.0%	3.6%	3.6%
8:00 p.m. hour	6.5%	8.8%	1.3%	3.2%	2.5%
9:00 p.m. hour	2.8%	5.5%	1.0%	2.1%	1.4%
10:00 p.m. hour	1.4%	3.2%	1.4%	0.8%	1.1%
11:00 p.m. hour	0.2%	1.7%	1.5%	0.5%	0.3%

Table 14: NCTCOG Region number of trips by hour and purpose

	HBSHOP	HBSOCREC	HBW	HBO	NHB
12:00 a.m. hour	7,962	8,757	19,708	22,685	8,436
1:00 a.m. hour	0	8,174	11,191	1,540	1,741
2:00 a.m. hour	3,198	1,294	10,457	447	16,735
3:00 a.m. hour	1,148	4,174	4,175	0	1,703
4:00 a.m. hour	1,178	7,292	29,420	5,592	18,125
5:00 a.m. hour	18,485	26,011	153,268	39,954	33,892
6:00 a.m. hour	32,692	44,667	353,882	264,539	125,250
7:00 a.m. hour	103,483	66,118	480,057	1,282,171	451,291
8:00 a.m. hour	99,889	77,773	287,430	528,640	338,931
9:00 a.m. hour	185,122	107,725	99,001	203,156	303,916
10:00 a.m. hour	198,060	80,872	44,223	190,128	353,468
11:00 a.m. hour	301,110	105,100	51,653	199,990	648,285
Noon hour	305,811	74,968	92,320	176,075	804,279
1:00 p.m. hour	284,402	89,991	75,474	220,919	536,854
2:00 p.m. hour	262,594	90,842	106,664	420,566	496,031
3:00 p.m. hour	296,911	141,233	187,869	897,485	719,372
4:00 p.m. hour	321,488	229,610	334,306	602,386	628,813
5:00 p.m. hour	376,986	218,798	392,837	365,324	508,359
6:00 p.m. hour	541,018	301,235	160,480	418,775	371,641
7:00 p.m. hour	330,513	274,039	93,920	231,163	253,576
8:00 p.m. hour	266,242	213,033	41,328	205,116	171,070
9:00 p.m. hour	116,484	133,472	31,348	133,721	95,705
10:00 p.m. hour	55,977	76,313	43,955	50,712	76,275
11:00 p.m. hour	8,966	41,315	45,902	33,711	17,195

In Figure 22 trip times by gender is presented. Little differences in pattern of trip making by hour are observed by gender; however, females do make more trips in the morning and afternoon peak hours of 7 a.m. and 3 p.m. Table 15 provides the number of trips and percentages for gender by hour.

Figure 22: NCTCOG Region trip times by gender

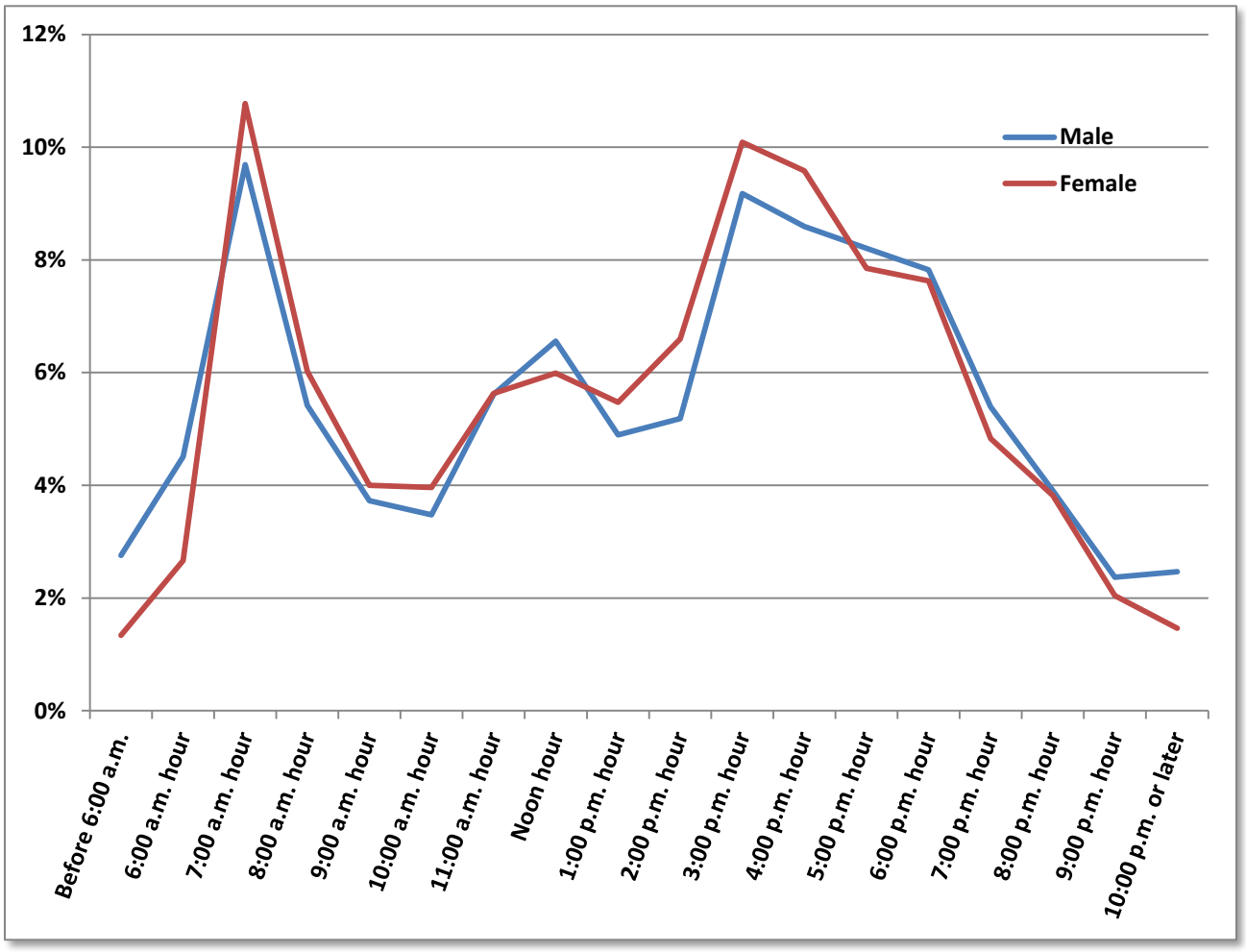


Table 15: NCTCOG Region number and percentage of trips by hour and gender

	Male		Female	
	Trips	Percentage	Trips	Percentage
Before 6:00 a.m.	303,082	2.8%	163,659	1.3%
6:00 a.m. hour	495,382	4.5%	325,648	2.7%
7:00 a.m. hour	1,064,804	9.7%	1,318,316	10.8%
8:00 a.m. hour	595,281	5.4%	737,382	6.0%
9:00 a.m. hour	409,593	3.7%	489,327	4.0%
10:00 a.m. hour	382,045	3.5%	484,707	4.0%
11:00 a.m. hour	617,195	5.6%	688,944	5.6%
Noon hour	720,693	6.6%	732,760	6.0%
1:00 p.m. hour	537,917	4.9%	669,723	5.5%
2:00 p.m. hour	569,733	5.2%	806,964	6.6%
3:00 p.m. hour	1,008,897	9.2%	1,233,972	10.1%
4:00 p.m. hour	944,671	8.6%	1,171,932	9.6%
5:00 p.m. hour	901,764	8.2%	960,538	7.9%
6:00 p.m. hour	859,670	7.8%	933,480	7.6%
7:00 p.m. hour	592,498	5.4%	590,712	4.8%
8:00 p.m. hour	429,455	3.9%	467,333	3.8%
9:00 p.m. hour	260,575	2.4%	250,155	2.0%
10:00 p.m. or later	271,290	2.5%	179,030	1.5%

As shown in Table 16, 63.9 percent of all trips in the region took 15 minutes or less. Personal vehicle trips account for 88.3 percent of all trip modes. Aside from personal vehicles, only school bus (1.7 percent) and walk trips (7.2 percent) had a mode share above one percent. Of the walk trips, 74.2 percent were 15 minutes or less.

Table 16: NCTCOG Region trips by length in minutes by transportation mode

Transportation Mode	5 minutes or less	6-10 minutes	11-15 minutes	16-20 minutes	21-25 minutes	26-30 minutes	31-45 minutes	45-59 minutes	60-90 minutes	91-120 minutes	121+ minutes	Appropriate skip/Not ascertained	Total
Car	2,076,968	2,267,678	1,971,865	1,018,735	526,899	749,491	801,206	167,739	245,437	25,188	57,489	27,531	9,936,226
Van	547,861	676,019	410,959	252,215	119,120	190,626	148,869	18,954	40,293	19,289	32,426	-	2,456,630
SUV	1,412,790	1,298,691	1,005,304	509,200	279,621	371,587	283,261	71,882	112,175	3,849	33,305	7,113	5,388,779
Pickup truck	422,297	554,012	525,518	274,977	148,241	279,286	227,738	73,891	118,744	17,322	17,406	-	2,659,431
Other truck	5,397	10,753	5,648	1,674	-	3,682	2,092	377	6,067	-	6,778	-	42,468
Motorcycle	753	5,105	4,519	4,728	2,887	3,515	8,535	167	711	-	-	-	30,920
Local public bus	6,402	-	6,318	8,494	2,510	7,155	24,811	10,418	41,380	16,192	2,887	-	126,568
School bus	11,464	23,305	74,602	63,849	42,845	66,652	68,326	10,084	24,226	1,255	418	1,088	388,114
Shuttle bus	3,598	1,674	2,469	1,757	962	9,163	1,130	377	1,883	-	3,305	-	26,318
Commuter train	3,347	-	837	-	3,096	-	19,247	1,423	8,954	711	-	-	37,615
Taxicab	-	4,854	5,397	1,046	460	2,008	-	-	6,736	5,439	-	-	25,941
Airplane	-	-	-	209	-	-	-	2,510	11,255	6,611	21,381	126	42,092
Bicycle	75,773	36,652	25,104	17,196	2,469	13,975	3,975	-	5,858	2,552	2,594	-	186,149
Walk	552,463	348,532	331,712	140,584	74,267	113,514	32,385	4,644	38,995	920	7,573	16,653	1,662,244
Other	23,933	17,155	17,824	11,841	7,866	12,176	16,109	1,339	15,648	837	8,243	-	132,969
Appropriate skip	20,878	25,523	8,996	14,100	-	5,648	669	-	6,653	-	-	167	82,635
Total	**5,163,927**	**5,269,951**	**4,397,072**	**2,320,606**	**1,211,244**	**1,828,477**	**1,638,353**	**363,804**	**685,015**	**100,166**	**193,806**	**52,677**	**23,225,099**

As noted in Figure 23 and Table 17, trip length tends to have short durations of less than 16 minutes with the notable exception being HBW trips.

Figure 23: NCTCOG Region trip purpose by trip length

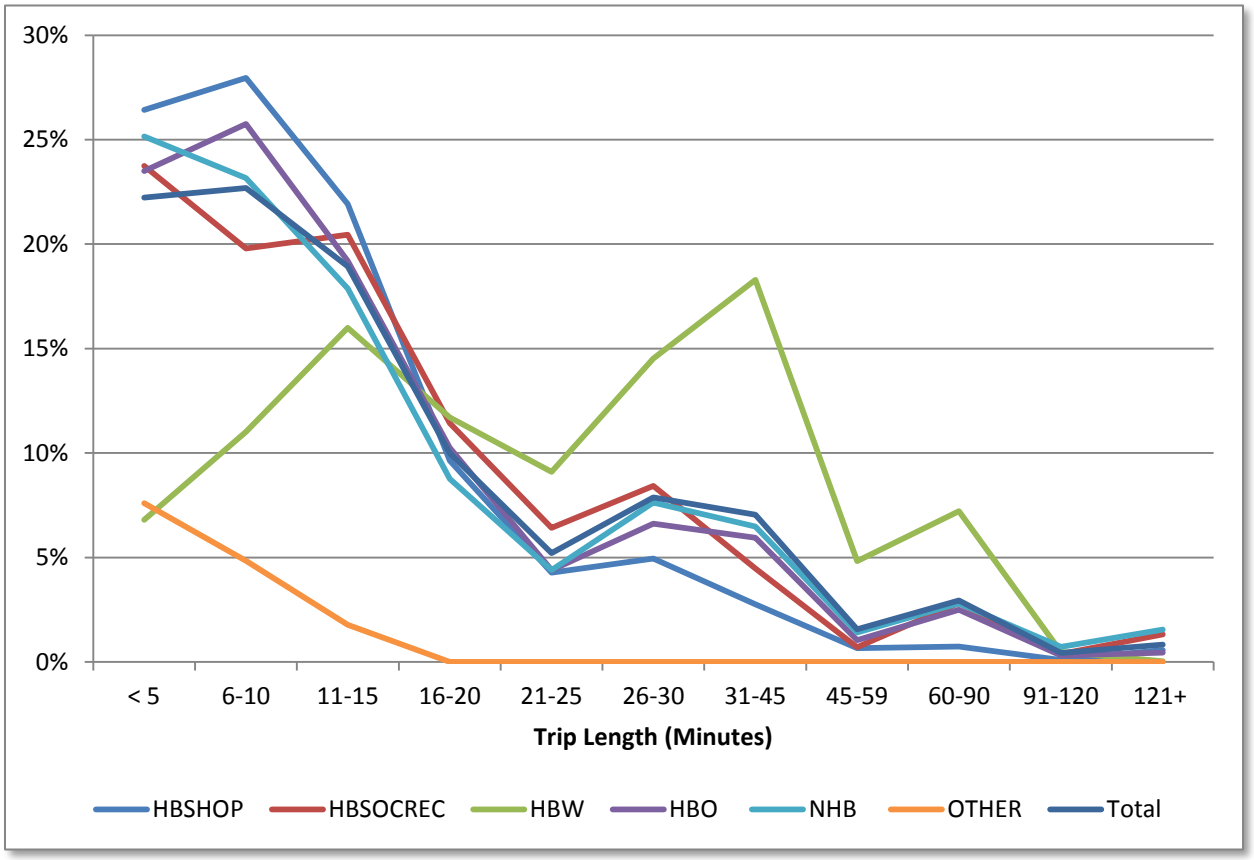
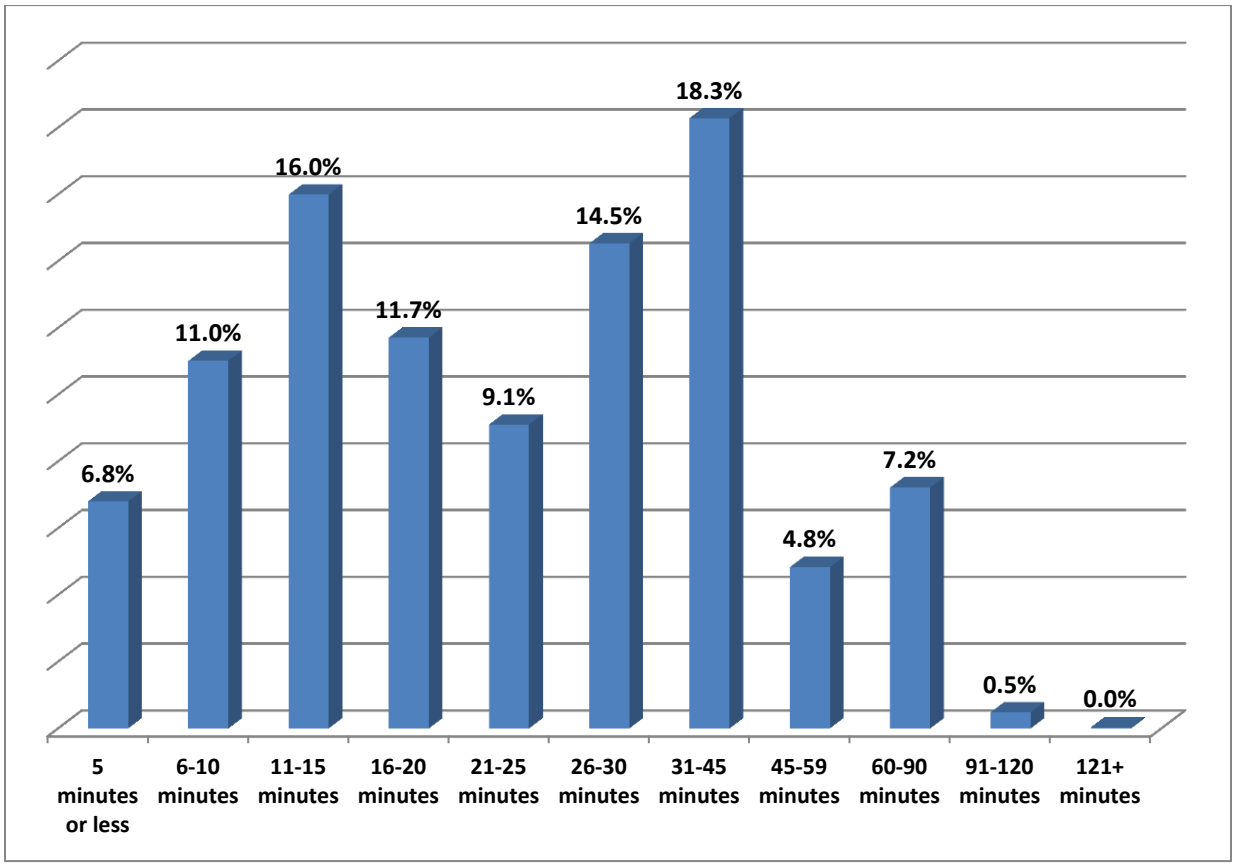


Table 17: NCTCOG Region trip purpose by trip length in minutes

	Trip Purpose						
Trip Length	HBSHOP	HBSOCREC	HBW	HBO	NHB	OTHER	Total
5 minutes or less	4.7%	2.5%	0.9%	6.6%	7.6%	0.0%	22.3%
6-10 minutes	5.0%	2.1%	1.5%	7.2%	7.0%	0.0%	22.7%
11-15 minutes	3.9%	2.1%	2.2%	5.4%	5.4%	0.0%	19.0%
16-20 minutes	1.7%	1.2%	1.6%	2.9%	2.6%	0.0%	10.0%
21-25 minutes	0.8%	0.7%	1.2%	1.2%	1.3%	0.0%	5.2%
26-30 minutes	0.9%	0.9%	2.0%	1.9%	2.3%	0.0%	7.9%
31-45 minutes	0.5%	0.5%	2.5%	1.7%	2.0%	0.0%	7.1%
45-59 minutes	0.1%	0.1%	0.7%	0.3%	0.4%	0.0%	1.6%
60-90 minutes	0.1%	0.3%	1.0%	0.7%	0.8%	0.0%	3.0%
91-120 minutes	0.0%	0.0%	0.1%	0.1%	0.2%	0.0%	0.4%
121+ minutes	0.1%	0.1%	0.0%	0.1%	0.5%	0.0%	0.8%
Average	17.8%	10.5%	13.6%	28.0%	30.1%	0.0%	100.0%

In Figure 24, further investigation of HBW are presenting by displaying HBW trips by trip length. While the majority of trips in the region took 15 minutes or less (6.3.9 percent), only 33.8 percent of all HBW trips took less than 15 minutes. About 35 percent took between 16 and 30 minutes, and almost 31 percent took 31 minutes or more.

Figure 24: HBW trips by trip length



Considerations for the future

While many similarities in the overall observed travel behavior patterns exist between the NCTCOG and NHTS datasets, transportation planners will need to carefully evaluate beyond the scope of this report how well the NHTS data suits the needs of the NCTCOG MPA. The differences between the NCTCOG and NHTS data observed in this brief analysis indicate that the exclusions to the dataset made in Tasks 3 and 4 did factor into the observed results. For example, the revised NCTCOG dataset resulted in an average of 2.24 more daily trips per household than were found in the national dataset, suggesting that weekend travel disguises the results needed to make decisions about peak travel behavior. More detailed analysis is required to determine if the results achieved in this effort should be employed moving forward.

Special notes:

Warning: In the course of evaluating the NHTS data Westat discovered some variables in the NHTS datasets that should be used with caution.

- TDWKND was created by FHWA and is clearly described in the derived variables documentation; however, the label used in the NHTS Public Use Codebook could be misleading. FHWA created this flag to capture travel that started at 6 pm or later on Friday and up to 12 am on Sunday.
- HHMEMDRV used in conjunction with DRVR_FLG is not reliable.

Appendix A: Deliverables

Each deliverable listed in this appendix is provided on the final deliverable DVD.

Task 1 Deliverables

The following deliverables have been submitted to NCTCOG and are referenced in this final documentation report.

Working documents:

Task 1 - Findings Webinar 022013 FINAL.pdf

Final documents:

TASK 1- Final Report_060713.doc
Final Report Memo.pdf

Supporting documentation from FHWA:

These files were part of the original NHTS data deliverable to Federal Highway Administration (FHWA) and were provided to NCTCOG by permission of FHWA NHTS program manager.

Sample Design_May_20.pdf
Supplemental Weighting Plan - Approved 090310.pdf
Task N-Weighting Report.pdf
UsersGuideV2.pdf

Supporting documentation from Westat:

As part of Task 1, Westat provided NCTCOG with additional details related to the weighting procedures used with enhance weights provided to FHWA in 2010. Specifically, output from the rake-trim procedure was provided.

TX_HH_Rake_Trim_flag3_Xtract.lst
TX_PP_Rake_Trim_flag3_Xtract.lst

Task 2 Deliverables

The following deliverables have been submitted to NCTCOG and are referenced in this final documentation report.

Working documents:

Task 2 Memo 031212.pdf
Task 2 Memo Data Edits Review.pdf

Final dataset:

NHTS-2009-NCTCOG-2013-06-19.zip

Final documents:

NCTCOG-NHTS-Task 2-Check-Results-Memo-2013-06-19.pdf

NCTCOG-NHTS-CheckResults-2013-06-17.zip – contents of this zip file included:

- NCTCOG-NHTS-CheckResults-2013-06-17.accdb
- NCTCOG-NHTS-EditChecks-with-names-2013-06-17.xlsx
  - Table 2 Non-Response Checks
  - Table 3 Range Checks
  - Table 4 Accuracy and Logic Checks
  - Table 5 Consistency Checks
- RegeocodedLocations.accdb

Task 4 Deliverables

Working documents:

NCTCOG_ NHTS Preliminary Analysis.pptx

Final documents:

Task 4 Technical Memo FINAL.pdf

Final datasets:

Core_Data_Files.zip

- Data_Dictionary.xls
- HHTYPE.DBF
- LINKEDTRIPS.DBF
- PERTYPE.DBF
- SUBTOUR.DBF
- TOUR.DBF
- UNLINKEDTRIPS.DBF

Task 3 Deliverables

No formal deliverables were included for this task.

Task 5 Deliverables

Final documents:

Literature Review on Weighting Procedures 08012013.pdf

Weighting Report_Final.docx

Task 6 Deliverables

Working documents:

ListofTables_Final.docx

Final documents:

HHtables_trips.xlsx
Modetables.xlsx
Persontables_opinioninfo.xlsx
Persontables_otherinfo.xlsx
Persontables_trips.xlsx
Triplengthtables.xlsx
Vehicleoccupancytables.xlsx
Vehicletables_HHvehiclecount.xlsx
Vehicletables_trips.xlsx

Task 7 Deliverables

Final documents:

2009 FARS Makes and Models.pdf
Codebooks:
- NCTCOG Household Codebook (weekday)_FINAL.pdf
- NCTCOG Locations Codebook (weekday)_FINAL.pdf
- NCTCOG Person Codebook (weekday)_FINAL.pdf
- NCTCOG Trip Codebook (weekday)_FINAL.pdf
- NCTCOG Vehicle Codebook (weekday)_FINAL.pdf

Final Report

Appendix B: Household-Level Raking Cells

Number of workers by number of vehicles by county of residence

Number of Workers	Number of Vehicles										Total
	0		1		2		3		4+		
0	All Counties	77	Collin	34	Collin	24	Core	50	All Counties	24	
			Dallas	157	Dallas	94					
			Denton	33	Denton	23					
			Tarrant	142	Tarrant	90					
			South	35	South	18	Not-Core	21			
			West	21	West	20					
			East	27	East	20					
			TOTAL	**449**	**TOTAL**	**289**	**TOTAL**	**71**			
1	All Counties	17	Collin	31	Collin	80	Core	123	All Counties	52	
			Dallas	143	Denton	75					
			Denton	29	South	28	Not-Core	28			
			Tarrant	113	East	24					
			Non-Core	33							
			TOTAL	**349**	**TOTAL**	**563**	**TOTAL**	**151**			
2			All Counties	26	Collin	105	Collin	35	All Counties	98	
					Dallas	137					
					Denton	73	Dallas	50			
					Tarrant	167					
					South	26	Denton	22			
					West	21					
					East	26	Tarrant	72			
							Non-Core	38			
					TOTAL	**555**	**TOTAL**	**217**			
3+			**All Counties**		**20**		**All Counties**	**58**	**All Counties**	**37**	
Total											**3,053**

Note: South consists of Ellis and Johnson Counties, West consists of Hood, Parker, and Wise Counties, East consists of Hunt, Kaufman, and Rockwall Counties, Core consists of Collin, Dallas, Denton, and Tarrant Counties, Non-Core consists of Ellis, Hood, Hunt, Johnson, Kaufman, Parker, Rockwall, and Wise Counties

Number of workers by number of vehicles by county of residence (control totals)

	Texas County												All
	Collin	Dallas	Denton	Tarrant	Ellis	Johnson	Hood	Parker	Wise	Hunt	Kaufman	Rockwall	
Estimate; Total:	276234	840663	231355	643917	49233	51220	20916	41579	19995	30624	34014	25717	2265467
Margin of Error; Total:	1204	3157	1348	2268	545	670	517	458	457	553	480	336	11993
Estimate; Total: 0 vehicle	7242	62072	6175	30778	1540	1335	643	1787	501	1488	1305	345	115211
Margin of Error; Total: 0 vehicle	516	1746	548	1320	256	249	178	273	145	254	250	140	5875
Estimate; Total: 1 vehicle	82996	328856	69314	219859	11880	14074	6221	10584	5159	10190	8889	5517	773539
Margin of Error; Total: 1 vehicle	1849	3352	2001	2924	766	732	546	570	467	532	583	532	14854
Estimate; Total: 2 vehicles	133593	317501	108847	273175	21849	22751	9465	18576	8594	12029	13817	12746	952943
Margin of Error; Total: 2 vehicles	2259	3596	1892	3203	882	766	659	718	478	585	658	535	16231
Estimate; Total: 3 vehicles	39281	98446	35503	88239	9711	9403	3265	7787	4213	4946	7090	5289	313173
Margin of Error; Total: 3 vehicles	1237	2147	1199	1928	609	557	419	468	384	380	488	414	10230
Estimate; Total: 4+ vehicles	13122	33788	11516	31866	4253	3657	1322	2845	1528	1971	2913	1820	110601
Margin of Error; Total: 4+ vehicles	763	1040	669	1214	442	393	268	340	203	307	355	298	6292
Estimate; Total: 0 workers	34469	161564	31607	119405	9222	11220	6617	9591	4590	8612	6950	4289	408136
Margin of Error; Total: 0 workers	1178	2230	1307	2133	469	585	399	512	290	449	412	378	10342
Estimate; Total: 0 workers, 0 vehicles	3458	34223	3008	18676	1065	836	472	1190	323	1061	912	248	65472
Margin of Error; Total: 0 workers, 0 vehicles	408	1217	423	918	211	177	161	229	117	182	175	112	4330

	Texas County												
	Collin	Dallas	Denton	Tarrant	Ellis	Johnson	Hood	Parker	Wise	Hunt	Kaufman	Rockwall	All
Estimate; Total: 0 workers, 1 vehicle	17309	81744	16655	62183	4191	5444	2910	3991	1954	4089	3150	1683	205303
Margin of Error; Total: 0 workers, 1 vehicle	785	1608	1130	1681	359	419	328	339	247	347	330	246	7819
Estimate; Total: 0 workers, 2 vehicles	11398	37396	9980	31936	2981	3517	2605	3553	1639	2758	2121	1681	111565
Margin of Error; Total: 0 workers, 2 vehicles	662	1295	584	949	311	315	292	374	217	316	252	261	5828
Estimate; Total: 0 workers, 3 vehicles	2047	6574	1630	5247	816	1091	534	646	509	446	613	525	20678
Margin of Error; Total: 0 workers, 3 vehicles	337	503	264	445	168	193	155	160	139	115	152	137	2768
Estimate; Total: 0 workers, 4+ vehicles	257	1627	334	1363	169	332	96	211	165	258	154	152	5118
Margin of Error; Total: 0 workers, 4+ vehicles	96	250	98	204	73	118	54	83	89	106	67	114	1352
Estimate; Total: 1 worker	125345	391001	98936	281370	17599	20036	7825	16356	7257	12478	12996	9303	1000502
Margin of Error; Total: 1 worker	2008	3661	1932	3238	726	874	548	735	447	556	696	495	15916
Estimate; Total: 1 worker, 0 vehicles	2803	22802	2225	9628	342	367	90	388	152	370	361	69	39597
Margin of Error; Total: 1 worker, 0 vehicles	388	1210	349	812	120	129	52	142	80	127	148	75	3632
Estimate; Total: 1 worker, 1 vehicle	58323	212072	46704	138923	6488	7464	2789	5545	2459	5346	4683	3334	494130
Margin of Error; Total: 1 worker, 1 vehicle	1694	2932	1594	2919	620	644	403	494	337	420	487	503	13047
Estimate; Total: 1 worker, 2 vehicles	50679	122986	39868	102868	7444	8867	3850	7230	3198	4613	5271	4360	361234
Margin of Error; Total: 1 worker, 2 vehicles	1654	2250	1440	2357	486	644	454	531	341	425	479	431	11492

	Texas County												
	Collin	Dallas	Denton	Tarrant	Ellis	Johnson	Hood	Parker	Wise	Hunt	Kaufman	Rockwall	All
Estimate; Total: 1 worker, 3 vehicles	10880	27010	8652	24476	2538	2401	861	2464	1181	1727	2167	1269	85626
Margin of Error; Total: 1 worker, 3 vehicles	767	1227	672	920	296	306	270	308	236	295	311	250	5858
Estimate; Total: 1 worker, 4+ vehicles	2660	6131	1487	5475	787	937	235	729	267	422	514	271	19915
Margin of Error; Total: 1 worker, 4+ vehicles	396	511	249	522	186	238	92	157	85	132	142	111	2821
Estimate; Total: 2 workers	98174	235096	83709	202950	18450	16226	5464	13202	7019	8134	11730	10327	710481
Margin of Error; Total: 2 workers	1785	2919	1735	2976	728	837	488	710	468	490	630	571	14337
Estimate; Total: 2 workers, 0 vehicles	763	4084	772	2107	130	120	81	173	26	53	19	28	8356
Margin of Error; Total: 2 workers, 0 vehicles	184	483	171	342	73	64	56	72	31	35	19	30	1560
Estimate; Total: 2 workers, 1 vehicle	6343	31233	5535	17041	1068	1005	481	890	695	696	924	424	66335
Margin of Error; Total: 2 workers, 1 vehicle	694	1504	592	1066	251	239	188	238	211	168	230	170	5551
Estimate; Total: 2 workers, 2 vehicles	68623	144868	56317	130944	10909	9738	2811	7389	3636	4400	6230	6544	452409
Margin of Error; Total: 2 workers, 2 vehicles	1699	2588	1726	2652	690	563	357	595	353	432	471	479	12605
Estimate; Total: 2 workers, 3 vehicles	18003	43379	16833	41101	4762	4100	1560	3617	2126	2165	3143	2587	143376
Margin of Error; Total: 2 workers, 3 vehicles	969	1318	919	1407	469	475	287	324	249	258	399	329	7403
Estimate; Total: 2 workers, 4+ vehicles	4442	11532	4252	11757	1581	1263	531	1133	536	820	1414	744	40005
Margin of Error; Total: 2 workers, 4+ vehicles	428	726	444	697	292	245	168	214	118	188	285	192	3997

	Texas County												
	Collin	Dallas	Denton	Tarrant	Ellis	Johnson	Hood	Parker	Wise	Hunt	Kaufman	Rockwall	All
Estimate; Total: 3+ workers	18246	53002	17103	40192	3962	3738	1010	2430	1129	1400	2338	1798	146348
Margin of Error; Total: 3+ workers	892	1398	912	1218	420	390	225	253	191	226	315	300	6740
Estimate; Total: 3+ workers, 0 vehicles	218	963	170	367	3	12	0	36	0	4	13	0	1786
Margin of Error; Total: 3+ workers, 0 vehicles	131	260	120	143	5	17	95	44	95	10	21	95	1036
Estimate; Total: 3+ workers, 1 vehicle	1021	3807	420	1712	133	161	41	158	51	59	132	76	7771
Margin of Error; Total: 3+ workers, 1 vehicle	286	518	144	302	82	95	41	125	37	44	80	83	1837
Estimate; Total: 3+ workers, 2 vehicles	2893	12251	2682	7427	515	629	199	404	121	258	195	161	27735
Margin of Error; Total: 3+ workers, 2 vehicles	423	817	448	559	167	200	93	138	65	104	102	84	3200
Estimate; Total: 3+ workers, 3 vehicles	8351	21483	8388	17415	1595	1811	310	1060	397	608	1167	908	63493
Margin of Error; Total: 3+ workers, 3 vehicles	582	909	752	852	289	271	146	169	104	173	260	240	4747
Estimate; Total: 3+ workers, 4+ vehicles	5763	14498	5443	13271	1716	1125	460	772	560	471	831	653	45563
Margin of Error; Total: 3+ workers, 4+ vehicles	568	785	457	871	281	224	165	172	149	142	216	151	4181

Number of workers by number of vehicles by region of residence (control totals)

	South	West	East	Core	Non-Core
Estimate; Total:	100453	82490	90355	1992169	273298
Margin of Error; Total:	1215	1432	1369	7977	4016
Estimate; Total: 0 vehicle	2875	2931	3138	106267	8944
Margin of Error; Total: 0 vehicle	505	596	644	4130	1745
Estimate; Total: 1 vehicle	25954	21964	24596	701025	72514
Margin of Error; Total: 1 vehicle	1498	1583	1647	10126	4728
Estimate; Total: 2 vehicles	44600	36635	38592	833116	119827
Margin of Error; Total: 2 vehicles	1648	1855	1778	10950	5281
Estimate; Total: 3 vehicles	19114	15265	17325	261469	51704
Margin of Error; Total: 3 vehicles	1166	1271	1282	6511	3719
Estimate; Total: 4+ vehicles	7910	5695	6704	90292	20309
Margin of Error; Total: 4+ vehicles	835	811	960	3686	2606
Estimate; Total: 0 workers	20442	20798	19851	347045	61091
Margin of Error; Total: 0 workers	1054	1201	1239	6848	3494
Estimate; Total: 0 workers, 0 vehicles	1901	1985	2221	59365	6107
Margin of Error; Total: 0 workers, 0 vehicles	388	507	469	2966	1364
Estimate; Total: 0 workers, 1 vehicle	9635	8855	8922	177891	27412
Margin of Error; Total: 0 workers, 1 vehicle	778	914	923	5204	2615
Estimate; Total: 0 workers, 2 vehicles	6498	7797	6560	90710	20855
Margin of Error; Total: 0 workers, 2 vehicles	626	883	829	3490	2338
Estimate; Total: 0 workers, 3 vehicles	1907	1689	1584	15498	5180
Margin of Error; Total: 0 workers, 3 vehicles	361	454	404	1549	1219

	South	West	East	Core	Non-Core
Estimate; Total: 0 workers, 4+ vehicles	501	472	564	3581	1537
Margin of Error; Total: 0 workers, 4+ vehicles	191	226	287	648	704
Estimate; Total: 1 worker	37635	31438	34777	896652	103850
Margin of Error; Total: 1 worker	1600	1730	1747	10839	5077
Estimate; Total: 1 worker, 0 vehicles	709	630	800	37458	2139
Margin of Error; Total: 1 worker, 0 vehicles	249	274	350	2759	873
Estimate; Total: 1 worker, 1 vehicle	13952	10793	13363	456022	38108
Margin of Error; Total: 1 worker, 1 vehicle	1264	1234	1410	9139	3908
Estimate; Total: 1 worker, 2 vehicles	16311	14278	14244	316401	44833
Margin of Error; Total: 1 worker, 2 vehicles	1130	1326	1335	7701	3791
Estimate; Total: 1 worker, 3 vehicles	4939	4506	5163	71018	14608
Margin of Error; Total: 1 worker, 3 vehicles	602	814	856	3586	2272
Estimate; Total: 1 worker, 4+ vehicles	1724	1231	1207	15753	4162
Margin of Error; Total: 1 worker, 4+ vehicles	424	334	385	1678	1143
Estimate; Total: 2 workers	34676	25685	30191	619929	90552
Margin of Error; Total: 2 workers	1565	1666	1691	9415	4922
Estimate; Total: 2 workers, 0 vehicles	250	280	100	7726	630
Margin of Error; Total: 2 workers, 0 vehicles	137	159	84	1180	380
Estimate; Total: 2 workers, 1 vehicle	2073	2066	2044	60152	6183
Margin of Error; Total: 2 workers, 1 vehicle	490	637	568	3856	1695
Estimate; Total: 2 workers, 2 vehicles	20647	13836	17174	400752	51657
Margin of Error; Total: 2 workers, 2 vehicles	1253	1305	1382	8665	3940

	South	West	East	Core	Non-Core
Estimate; Total: 2 workers, 3 vehicles	8862	7303	7895	119316	24060
Margin of Error; Total: 2 workers, 3 vehicles	944	860	986	4613	2790
Estimate; Total: 2 workers, 4+ vehicles	2844	2200	2978	31983	8022
Margin of Error; Total: 2 workers, 4+ vehicles	537	500	665	2295	1702
Estimate; Total: 3+ workers	7700	4569	5536	128543	17805
Margin of Error; Total: 3+ workers	810	669	841	4420	2320
Estimate; Total: 3+ workers, 0 vehicles	15	36	17	1718	68
Margin of Error; Total: 3+ workers, 0 vehicles	22	234	126	654	382
Estimate; Total: 3+ workers, 1 vehicle	294	250	267	6960	811
Margin of Error; Total: 3+ workers, 1 vehicle	177	203	207	1250	587
Estimate; Total: 3+ workers, 2 vehicles	1144	724	614	25253	2482
Margin of Error; Total: 3+ workers, 2 vehicles	367	296	290	2247	953
Estimate; Total: 3+ workers, 3 vehicles	3406	1767	2683	55637	7856
Margin of Error; Total: 3+ workers, 3 vehicles	560	419	673	3095	1652
Estimate; Total: 3+ workers, 4+ vehicles	2841	1792	1955	38975	6588
Margin of Error; Total: 3+ workers, 4+ vehicles	505	486	509	2681	1500

Number of workers by number of vehicles by county group of residence (control totals)

	Total 7 County	Total 5 County	Total 2 County
Estimate; Total:	2265467	2265467	2265467
Margin of Error; Total:	11993	11993	11993
Estimate; Total: 0 vehicle	115211	115211	115211
Margin of Error; Total: 0 vehicle	5875	5875	5875
Estimate; Total: 1 vehicle	773539	773539	773539
Margin of Error; Total: 1 vehicle	14854	14854	14854
Estimate; Total: 2 vehicles	952943	952943	952943
Margin of Error; Total: 2 vehicles	16231	16231	16231
Estimate; Total: 3 vehicles	313173	313173	313173
Margin of Error; Total: 3 vehicles	10230	10230	10230
Estimate; Total: 4+ vehicles	110601	110601	110601
Margin of Error; Total: 4+ vehicles	6292	6292	6292
Estimate; Total: 0 workers	408136	408136	408136
Margin of Error; Total: 0 workers	10342	10342	10342
Estimate; Total: 0 workers, 0 vehicles	65472	65472	65472
Margin of Error; Total: 0 workers, 0 vehicles	4330	4330	4330
Estimate; Total: 0 workers, 1 vehicle	205303	205303	205303
Margin of Error; Total: 0 workers, 1 vehicle	7819	7819	7819
Estimate; Total: 0 workers, 2 vehicles	111565	111565	111565
Margin of Error; Total: 0 workers, 2 vehicles	5828	5828	5828
Estimate; Total: 0 workers, 3 vehicles	20678	20678	20678
Margin of Error; Total: 0 workers, 3 vehicles	2768	2768	2768
Estimate; Total: 0 workers, 4+ vehicles	5118	5118	5118
Margin of Error; Total: 0 workers, 4+ vehicles	1352	1352	1352

	Total 7 County	Total 5 County	Total 2 County
Estimate; Total: 1 worker	1000502	1000502	1000502
Margin of Error; Total: 1 worker	15916	15916	15916
Estimate; Total: 1 worker, 0 vehicles	39597	39597	39597
Margin of Error; Total: 1 worker, 0 vehicles	3632	3632	3632
Estimate; Total: 1 worker, 1 vehicle	494130	494130	494130
Margin of Error; Total: 1 worker, 1 vehicle	13047	13047	13047
Estimate; Total: 1 worker, 2 vehicles	361234	361234	361234
Margin of Error; Total: 1 worker, 2 vehicles	11492	11492	11492
Estimate; Total: 1 worker, 3 vehicles	85626	85626	85626
Margin of Error; Total: 1 worker, 3 vehicles	5858	5858	5858
Estimate; Total: 1 worker, 4+ vehicles	19915	19915	19915
Margin of Error; Total: 1 worker, 4+ vehicles	2821	2821	2821
Estimate; Total: 2 workers	710481	710481	710481
Margin of Error; Total: 2 workers	14337	14337	14337
Estimate; Total: 2 workers, 0 vehicles	8356	8356	8356
Margin of Error; Total: 2 workers, 0 vehicles	1560	1560	1560
Estimate; Total: 2 workers, 1 vehicle	66335	66335	66335
Margin of Error; Total: 2 workers, 1 vehicle	5551	5551	5551
Estimate; Total: 2 workers, 2 vehicles	452409	452409	452409
Margin of Error; Total: 2 workers, 2 vehicles	12605	12605	12605
Estimate; Total: 2 workers, 3 vehicles	143376	143376	143376
Margin of Error; Total: 2 workers, 3 vehicles	7403	7403	7403
Estimate; Total: 2 workers, 4+ vehicles	40005	40005	40005
Margin of Error; Total: 2 workers, 4+ vehicles	3997	3997	3997

	Total 7 County	Total 5 County	Total 2 County
Estimate; Total: 3+ workers	146348	146348	146348
Margin of Error; Total: 3+ workers	6740	6740	6740
Estimate; Total: 3+ workers, 0 vehicles	1786	1786	1786
Margin of Error; Total: 3+ workers, 0 vehicles	1036	1036	1036
Estimate; Total: 3+ workers, 1 vehicle	7771	7771	7771
Margin of Error; Total: 3+ workers, 1 vehicle	1837	1837	1837
Estimate; Total: 3+ workers, 2 vehicles	27735	27735	27735
Margin of Error; Total: 3+ workers, 2 vehicles	3200	3200	3200
Estimate; Total: 3+ workers, 3 vehicles	63493	63493	63493
Margin of Error; Total: 3+ workers, 3 vehicles	4747	4747	4747
Estimate; Total: 3+ workers, 4+ vehicles	45563	45563	45563
Margin of Error; Total: 3+ workers, 4+ vehicles	4181	4181	4181

Household size by number of workers by county of residence

Household Size	Number of Workers								Total
	0		1		2		3		
1	Collin	26	Collin	23					
	Dallas	166	Dallas	124					
	Denton	32	Denton	32					
	Tarrant	119	Tarrant	98					
	Non-Core	81	Non-Core	28					
	TOTAL	**424**	**TOTAL**	**305**					
2	Collin	40	Collin	62	Collin	70			
	Dallas	131	Dallas	138	Dallas	123			
	Denton	35	Denton	40	Denton	44			
	Tarrant	140	Tarrant	145	Tarrant	127			
	South	28	South	22	South	24			
	West	31	West	19	West	22			
	East	31	East	25	East	31			
	TOTAL	**436**	**TOTAL**	**451**	**TOTAL**	**441**			
3	**All Counties**	**50**	**All Counties**	**154**	Collin	41	**All Counties**	**51**	
					Dallas	47			
					Denton	25			
					Tarrant	79			
					Non-Core	21			
					TOTAL	**213**			
4+			Core	182	Collin	46	**All Counties**	**65**	
					Dallas	50			
			Not-Core	36	Denton	41			
					Tarrant	75			
					Non-Core	33			
			TOTAL	**218**	**TOTAL**	**245**			
Total									**3,053**

Note: South consists of Ellis and Johnson Counties, West consists of Hood, Parker, and Wise Counties, East consists of Hunt, Kaufman, and Rockwall Counties, Core consists of Collin, Dallas, Denton, and Tarrant Counties, Non-Core consists of Ellis, Hood, Hunt, Johnson, Kaufman, Parker, Rockwall, and Wise Counties

Household size by number of workers by county of residence (control totals)

	Texas County												
	Collin	Dallas	Denton	Tarrant	Ellis	Johnson	Hood	Parker	Wise	Hunt	Kaufman	Rockwall	All
Estimate; Total:	276234	840663	231355	643917	49233	51220	20916	41579	19995	30624	34014	25717	2265467
Margin of Error; Total:	1204	3157	1348	2268	545	670	517	458	457	553	480	336	11993
Estimate; Total: 0 workers	34469	161564	31607	119405	9222	11220	6617	9591	4590	8612	6950	4289	408136
Margin of Error; Total: 0 workers	1178	2230	1307	2133	469	585	399	512	290	449	412	378	10342
Estimate; Total: 1 worker	125345	391001	98936	281370	17599	20036	7825	16356	7257	12478	12996	9303	1000502
Margin of Error; Total: 1 worker	2008	3661	1932	3238	726	874	548	735	447	556	696	495	15916
Estimate; Total: 2 workers	98174	235096	83709	202950	18450	16226	5464	13202	7019	8134	11730	10327	710481
Margin of Error; Total: 2 workers	1785	2919	1735	2976	728	837	488	710	468	490	630	571	14337
Estimate; Total: 3+ workers	18246	53002	17103	40192	3962	3738	1010	2430	1129	1400	2338	1798	146348
Margin of Error; Total: 3+ workers	892	1398	912	1218	420	390	225	253	191	226	315	300	6740
Estimate; Total: 1 person HH	59975	242453	51867	164006	8021	9627	4809	8029	3631	7836	5962	4089	570305
Margin of Error; Total: 1 person HH:	1592	2600	1595	2697	588	613	481	600	334	456	454	453	12463
Estimate; Total: 1 person HH, 0 workers	15388	83586	14669	60221	3791	4546	2705	4473	1812	4045	2869	1558	199663
Margin of Error; Total: 1 person HH, 0 workers	837	1681	950	1873	380	401	332	406	247	317	324	251	7999
Estimate; Total: 1 person HH, 1 worker	44587	158867	37198	103785	4230	5081	2104	3556	1819	3791	3093	2531	370642
Margin of Error; Total: 1 person HH, 1 worker	1468	2559	1335	2538	431	532	382	447	231	390	397	424	11134

	Texas County												
	Collin	Dallas	Denton	Tarrant	Ellis	Johnson	Hood	Parker	Wise	Hunt	Kaufman	Rockwall	All
Estimate; Total: 2 person HH	84773	242926	73628	196772	15625	17235	9104	15057	7429	11407	11345	8142	693443
Margin of Error; Total: 2 person HH	1869	2660	1639	2565	593	583	486	638	457	455	542	515	13002
Estimate; Total: 2 person HH, 0 workers	14678	50552	12365	41064	3746	4557	3517	4193	2221	3549	2919	2154	145515
Margin of Error; Total: 2 person HH, 0 workers	782	1190	744	1179	263	361	311	358	234	291	299	238	6250
Estimate; Total: 2 person HH, 1 worker	30856	92067	25927	74339	5437	6400	3232	5338	2524	4369	4201	2793	257483
Margin of Error; Total: 2 person HH, 1 worker	1333	1762	1109	1642	457	532	451	454	289	365	453	359	9206
Estimate; Total: 2 person HH, 2 workers	39239	100307	35336	81369	6442	6278	2355	5526	2684	3489	4225	3195	290445
Margin of Error; Total: 2 person HH, 2 workers	1320	1783	1101	1812	402	494	379	481	315	332	438	355	9212
Estimate; Total: 3 person HH	50329	132367	40490	108923	9546	8293	2509	7622	3479	4237	6299	4786	378880
Margin of Error; Total: 3 person HH	1849	2486	1617	2095	635	673	376	596	363	421	480	428	12019
Estimate; Total: 3 person HH, 0 workers	2496	13535	2369	8483	753	1017	168	420	312	369	597	319	30838
Margin of Error; Total: 3 person HH, 0 workers	472	734	434	563	187	228	79	97	114	94	153	151	3306
Estimate; Total: 3 person HH, 1 worker	19151	54364	13237	40226	3085	2692	958	2876	988	1718	2312	1308	142915
Margin of Error; Total: 3 person HH, 1 worker	1149	1668	1002	1321	382	417	193	431	187	237	391	255	7633
Estimate; Total: 3 person HH, 2 workers	22861	50428	19287	48289	4685	3416	1063	3481	1806	1736	2714	2712	162478
Margin of Error; Total: 3 person HH, 2 workers	939	1924	1076	1576	471	399	287	376	290	265	347	330	8280

	Texas County												
	Collin	Dallas	Denton	Tarrant	Ellis	Johnson	Hood	Parker	Wise	Hunt	Kaufman	Rockwall	All
Estimate; Total: 3 person HH, 3 workers	5821	14040	5597	11925	1023	1168	320	845	373	414	676	447	42649
Margin of Error; Total: 3 person HH, 3 workers	544	809	534	757	221	229	145	172	107	139	175	134	3966
Estimate; Total: 4+ person HH	81157	222917	65370	174216	16041	16065	4494	10871	5456	7144	10408	8700	622839
Margin of Error; Total: 4+ person HH	1428	2575	1139	2057	606	690	371	469	364	465	568	532	11264
Estimate; Total: 4+ person HH, 0 workers	1907	13891	2204	9637	932	1100	227	505	245	649	565	258	32120
Margin of Error; Total: 4+ person HH, 0 workers	267	827	328	738	201	248	134	157	116	167	163	146	3492
Estimate; Total: 4+ person HH, 1 worker	30751	85703	22574	63020	4847	5863	1531	4586	1926	2600	3390	2671	229462
Margin of Error; Total: 4+ person HH, 1 worker	1244	2022	1004	1564	477	520	221	412	288	361	378	385	8876
Estimate; Total: 4+ person HH, 2 workers	36074	84361	29086	73292	7323	6532	2046	4195	2529	2909	4791	4420	257558
Margin of Error; Total: 4+ person HH, 2 workers	1314	2040	1089	1824	505	543	302	343	293	295	395	495	9438
Estimate; Total: 4+ person HH, 3+ workers	12425	38962	11506	28267	2939	2570	690	1585	756	986	1662	1351	103699
Margin of Error; Total: 4+ person HH, 3+ workers	781	1235	786	1043	389	326	185	242	180	184	268	260	5879

Household size by number of workers by county group of residence (control totals)

	South	West	East	Core	Non-Core
Estimate; Total:	100453	82490	90355	1992169	273298
Margin of Error; Total:	1215	1432	1369	7977	4016
Estimate; Total: 0 workers	20442	20798	19851	347045	61091
Margin of Error; Total: 0 workers	1054	1201	1239	6848	3494
Estimate; Total: 1 worker	37635	31438	34777	896652	103850
Margin of Error; Total: 1 worker	1600	1730	1747	10839	5077
Estimate; Total: 2 workers	34676	25685	30191	619929	90552
Margin of Error; Total: 2 workers	1565	1666	1691	9415	4922
Estimate; Total: 3+ workers	7700	4569	5536	128543	17805
Margin of Error; Total: 3+ workers	810	669	841	4420	2320
Estimate; Total: 1 person HH	17648	16469	17887	518301	52004
Margin of Error; Total: 1 person HH:	1201	1415	1363	8484	3979
Estimate; Total: 1 person HH, 0 workers	8337	8990	8472	173864	25799
Margin of Error; Total: 1 person HH, 0 workers	781	985	892	5341	2658
Estimate; Total: 1 person HH, 1 worker	9311	7479	9415	344437	26205
Margin of Error; Total: 1 person HH, 1 worker	963	1060	1211	7900	3234
Estimate; Total: 2 person HH	32860	31590	30894	598099	95344
Margin of Error; Total: 2 person HH	1176	1581	1512	8733	4269
Estimate; Total: 2 person HH, 0 workers	8303	9931	8622	118659	26856
Margin of Error; Total: 2 person HH, 0 workers	624	903	828	3895	2355
Estimate; Total: 2 person HH, 1 worker	11837	11094	11363	223189	34294
Margin of Error; Total: 2 person HH, 1 worker	989	1194	1177	5846	3360

	South	West	East	Core	Non-Core
Estimate; Total: 2 person HH, 2 workers	12720	10565	10909	256251	34194
Margin of Error; Total: 2 person HH, 2 workers	896	1175	1125	6016	3196
Estimate; Total: 3 person HH	17839	13610	15322	332109	46771
Margin of Error; Total: 3 person HH	1308	1335	1329	8047	3972
Estimate; Total: 3 person HH, 0 workers	1770	900	1285	26883	3955
Margin of Error; Total: 3 person HH, 0 workers	415	290	398	2203	1103
Estimate; Total: 3 person HH, 1 worker	5777	4822	5338	126978	15937
Margin of Error; Total: 3 person HH, 1 worker	799	811	883	5140	2493
Estimate; Total: 3 person HH, 2 workers	8101	6350	7162	140865	21613
Margin of Error; Total: 3 person HH, 2 workers	870	953	942	5515	2765
Estimate; Total: 3 person HH, 3 workers	2191	1538	1537	37383	5266
Margin of Error; Total: 3 person HH, 3 workers	450	424	448	2644	1322
Estimate; Total: 4+ person HH	32106	20821	26252	543660	79179
Margin of Error; Total: 4+ person HH	1296	1204	1565	7199	4065
Estimate; Total: 4+ person HH, 0 workers	2032	977	1472	27639	4481
Margin of Error; Total: 4+ person HH, 0 workers	449	407	476	2160	1332
Estimate; Total: 4+ person HH, 1 worker	10710	8043	8661	202048	27414
Margin of Error; Total: 4+ person HH, 1 worker	997	921	1124	5834	3042
Estimate; Total: 4+ person HH, 2 workers	13855	8770	12120	222813	34745
Margin of Error; Total: 4+ person HH, 2 workers	1048	938	1185	6267	3171
Estimate; Total: 4+ person HH, 3+ workers	5509	3031	3999	91160	12539
Margin of Error; Total: 4+ person HH, 3+ workers	715	607	712	3845	2034

Household size by number of workers by county group of residence (control totals)

	Total 7 County	Total 5 County	Total 2 County
Estimate; Total:	2265467	2265467	2265467
Margin of Error; Total:	11993	11993	11993
Estimate; Total: 0 workers	408136	408136	408136
Margin of Error; Total: 0 workers	10342	10342	10342
Estimate; Total: 1 worker	1000502	1000502	1000502
Margin of Error; Total: 1 worker	15916	15916	15916
Estimate; Total: 2 workers	710481	710481	710481
Margin of Error; Total: 2 workers	14337	14337	14337
Estimate; Total: 3+ workers	146348	146348	146348
Margin of Error; Total: 3+ workers	6740	6740	6740
Estimate; Total: 1 person HH	570305	570305	570305
Margin of Error; Total: 1 person HH:	12463	12463	12463
Estimate; Total: 1 person HH, 0 workers	199663	199663	199663
Margin of Error; Total: 1 person HH, 0 workers	7999	7999	7999
Estimate; Total: 1 person HH, 1 worker	370642	370642	370642
Margin of Error; Total: 1 person HH, 1 worker	11134	11134	11134
Estimate; Total: 2 person HH	693443	693443	693443
Margin of Error; Total: 2 person HH	13002	13002	13002
Estimate; Total: 2 person HH, 0 workers	145515	145515	145515
Margin of Error; Total: 2 person HH, 0 workers	6250	6250	6250
Estimate; Total: 2 person HH, 1 worker	257483	257483	257483
Margin of Error; Total: 2 person HH, 1 worker	9206	9206	9206
Estimate; Total: 2 person HH, 2 workers	290445	290445	290445
Margin of Error; Total: 2 person HH, 2 workers	9212	9212	9212

	Total 7 County	Total 5 County	Total 2 County
Estimate; Total: 3 person HH	378880	378880	378880
Margin of Error; Total: 3 person HH	12019	12019	12019
Estimate; Total: 3 person HH, 0 workers	30838	30838	30838
Margin of Error; Total: 3 person HH, 0 workers	3306	3306	3306
Estimate; Total: 3 person HH, 1 worker	142915	142915	142915
Margin of Error; Total: 3 person HH, 1 worker	7633	7633	7633
Estimate; Total: 3 person HH, 2 workers	162478	162478	162478
Margin of Error; Total: 3 person HH, 2 workers	8280	8280	8280
Estimate; Total: 3 person HH, 3 workers	42649	42649	42649
Margin of Error; Total: 3 person HH, 3 workers	3966	3966	3966
Estimate; Total: 4+ person HH	622839	622839	622839
Margin of Error; Total: 4+ person HH	11264	11264	11264
Estimate; Total: 4+ person HH, 0 workers	32120	32120	32120
Margin of Error; Total: 4+ person HH, 0 workers	3492	3492	3492
Estimate; Total: 4+ person HH, 1 worker	229462	229462	229462
Margin of Error; Total: 4+ person HH, 1 worker	8876	8876	8876
Estimate; Total: 4+ person HH, 2 workers	257558	257558	257558
Margin of Error; Total: 4+ person HH, 2 workers	9438	9438	9438
Estimate; Total: 4+ person HH, 3+ workers	103699	103699	103699
Margin of Error; Total: 4+ person HH, 3+ workers	5879	5879	5879

Household income by county of residence

County of Residence	0-24,999	25,000 - 49,999	50,000 - 74,999	75,000 - 99,999	100K+	TOTAL
Collin	33	56	57	67	174	**387**
Dallas	189	237	149	133	219	**927**
Denton	29	62	61	52	114	**318**
Tarrant	131	233	159	144	274	**941**
South (Ellis, Johnson)	43	38	32	26	25	**164**
West (Hood, Parker, Wise)	29	46	24	18	35	**152**
East (Hunt, Kaufman, Rockwall)	31	41	29	26	37	**164**
Total	**485**	**713**	**511**	**466**	**878**	**3,053**

Household income by county of residence (control totals)

	Texas County											
	Collin	Dallas	Denton	Tarrant	Ellis	Johnson	Hood	Parker	Wise	Hunt	Kaufman	Rockwall
Estimate; Total:	276234	840663	231355	643917	49233	51220	20916	41579	19995	30624	34014	25717
Margin of Error; Total:	1204	3157	1348	2268	545	670	517	458	457	553	480	336
Estimate; Total: Less than $10,000	8721	60052	8796	36554	2092	2182	953	2190	960	2241	1824	706
Margin of Error; Total: Less than $10,000	710	1635	761	1489	279	287	232	323	208	322	270	187
Estimate; Total: $10,000 to $14,999	5985	42963	5655	29230	1834	1990	939	1959	886	2525	1689	566
Margin of Error; Total: $10,000 to $14,999	613	1309	515	1234	328	312	197	316	201	360	250	189
Estimate; Total: $15,000 to $19,999	6969	46740	7037	30500	2409	1986	960	1752	827	2038	1514	379
Margin of Error; Total: $15,000 to $19,999	645	1484	616	1297	357	310	224	336	166	279	284	142
Estimate; Total: $20,000 to $24,999	8509	50848	9147	31737	2243	2551	1007	1811	860	1784	1516	671
Margin of Error; Total: $20,000 to $24,999	685	1760	727	1181	343	327	209	291	172	233	317	199
Estimate; Total: $25,000 to $29,999	10147	52786	8860	33401	2277	2732	1191	1713	718	1780	1192	532
Margin of Error; Total: $25,000 to $29,999	713	1526	831	1270	378	334	265	250	163	242	175	145
Estimate; Total: $30,000 to $34,999	8876	48128	9662	33436	2106	2728	1254	1914	923	1825	1778	737
Margin of Error; Total: $30,000 to $34,999	709	1155	716	1297	328	438	292	302	190	262	335	216
Estimate; Total: $35,000 to $39,999	10417	45303	9909	31226	1762	2750	1088	1568	995	1504	1549	813
Margin of Error; Total: $35,000 to $39,999	815	1436	875	1327	270	364	267	228	200	245	261	205
Estimate; Total: $40,000 to $44,999	10801	43167	9296	31602	2230	3144	1225	1712	1029	1545	1659	859
Margin of Error; Total: $40,000 to $44,999	809	1426	835	1487	354	374	226	299	200	246	272	226
Estimate; Total: $45,000 to $49,999	8301	38403	8184	27841	2218	2454	983	1787	1243	1287	941	965
Margin of Error; Total: $45,000 to $49,999	647	1569	732	923	276	319	247	337	236	215	203	231
Estimate; Total: $50,000 to $59,999	18856	71638	18289	55510	4375	5080	2119	3065	1898	2700	3198	2172
Margin of Error; Total: $50,000 to $59,999	1017	1474	1077	1556	496	448	307	364	251	324	323	311
Estimate; Total: $60,000 to $74,999	27141	83588	25242	67453	5350	5960	2190	4679	1942	2969	3861	2943
Margin of Error; Total: $60,000 to $74,999	1244	1942	1382	1936	498	504	349	466	246	332	408	370
Estimate; Total: $75,000 to $99,999	40131	90620	31341	82670	7697	7620	2453	5570	3519	3517	5714	4579
Margin of Error; Total: $75,000 to $99,999	1603	2102	1470	1750	479	568	316	464	343	378	499	387
Estimate; Total: $100,000 to $124,999	34026	57098	27295	58061	5066	4213	1457	4570	1695	2405	3168	3301
Margin of Error; Total: $100,000 to $124,999	1219	1512	1273	1465	397	380	229	351	256	343	409	404
Estimate; Total: $125,000 to $149,999	23586	34189	18056	32752	3309	2320	1044	2117	1101	881	2065	2290
Margin of Error; Total: $125,000 to $149,999	898	1281	994	1157	373	254	253	295	224	172	304	327
Estimate; Total: $150,000 to $199,999	27286	33139	18076	32310	2362	2091	1187	3106	718	1014	1285	2442
Margin of Error; Total: $150,000 to $199,999	1039	1367	886	1181	310	293	259	396	164	225	202	355
Estimate; Total: $200,000 or more	26482	42001	16510	29634	1903	1419	866	2066	681	609	1061	1762
Margin of Error; Total: $200,000 or more	1061	1240	919	1012	301	240	245	278	140	144	208	292

Appendix C: Person-Level Raking Cells

Sex by age by county of residence

	Age												
Sex	**<5**		**5-17**		**18-29**		**30-49**		**50-64**		**65+**		**TOTAL**
Male	Collin	37	Collin	91	Core	160	Collin	150	Collin	123	Collin	76	
			Dallas	141			Dallas	189	Dallas	259	Dallas	220	
	Dallas	43	Denton	90			Denton	111	Denton	94	Denton	55	
			Tarrant	182			Tarrant	261	Tarrant	269	Tarrant	225	
	Denton	26	South	30	Non-Core	28	South	39	South	43	South	39	
			West	23			West	40	West	49	West	45	
	Tarrant	49	East	19			East	38	East	60	East	41	
	Non-Core	28											
	TOTAL	**183**	**TOTAL**	**576**	**TOTAL**	**188**	**TOTAL**	**828**	**TOTAL**	**897**	**TOTAL**	**701**	3,373
Female	Collin	31	Collin	96	Core	202	Collin	142	Collin	154	Collin	69	
			Dallas	147			Dallas	217	Dallas	344	Dallas	298	
	Dallas	36	Denton	60			Denton	128	Denton	107	Denton	61	
			Tarrant	174			Tarrant	284	Tarrant	310	Tarrant	275	
	Denton	41	South	36	Non-Core	28	South	46	South	50	South	64	
			West	30			West	40	West	54	West	49	
	Tarrant	54	East	22			East	41	East	62	East	52	
	Non-Core	25											
	TOTAL	**187**	**TOTAL**	**565**	**TOTAL**	**230**	**TOTAL**	**898**	**TOTAL**	**1,081**	**TOTAL**	**868**	3,829
Total	**370**		**1,141**		**418**		**1,726**		**1,978**		**1,569**		**7,202**

Note: South consists of Ellis and Johnson Counties, West consists of Hood, Parker, and Wise Counties, East consists of Hunt, Kaufman, and Rockwall Counties, Core consists of Collin, Dallas, Denton, and Tarrant Counties, Non-Core consists of Ellis, Hood, Hunt, Johnson, Kaufman, Parker, Rockwall, and Wise Counties

Sex by age by county of residence (control totals)

	Texas County												
	Collin	Dallas	Denton	Tarrant	Ellis	Johnson	Hood	Parker	Wise	Hunt	Kaufman	Rockwall	All
Estimate; Total:	764424	2348702	648470	1780700	146997	50569	85390	149681	101197	114764	76349	58703	6325946
Margin of Error; Total:	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	0
Estimate; Male:	376225	1162869	319114	874271	72561	24975	42401	74988	49791	58164	37362	29654	3122375
Margin of Error; Male:	82	57	79	138	120	140	129	162	93	104	166	121	1391
Estimate; Male: Under 5 years	29980	99350	25457	72479	5648	1436	3013	5481	3792	3672	2817	2009	255134
Margin of Error; Male: Under 5 years	4	26	36	50	44	126	50	75	49	68	97	46	671
Estimate; Male: 5 to 9 years	33480	91985	26240	73222	6388	1430	3163	6070	3945	4299	3259	2000	255481
Margin of Error; Male: 5 to 9 years	1077	1448	891	1401	426	227	275	477	349	346	276	218	7411
Estimate; Male: 10 to 14 years	30877	87555	25476	67977	5997	1599	2964	5804	4659	4414	3527	2423	243272
Margin of Error; Male: 10 to 14 years	1082	1449	891	1389	432	228	280	460	347	343	257	202	7360

	Texas County												
	Collin	Dallas	Denton	Tarrant	Ellis	Johnson	Hood	Parker	Wise	Hunt	Kaufman	Rockwall	All
Estimate; Male: 15 to 17 years	17681	53430	14329	41192	3910	1156	1924	3622	2541	2843	1982	1541	146151
Margin of Error; Male: 15 to 17 years	84	34	49	44	40	75	89	87	24	42	106	114	788
Estimate; Male: 18 and 19 years	9172	33366	9118	24768	2222	637	1396	2172	1319	1784	926	849	87729
Margin of Error; Male: 18 and 19 years	42	31	81	3	35	197	180	203	30	82	114	52	1050
Estimate; Male: 20 years	3997	17690	4963	11449	1132	240	367	1072	437	624	448	373	42792
Margin of Error; Male: 20 years	497	964	606	807	248	120	125	216	138	179	135	172	4207
Estimate; Male: 21 years	3640	17027	4992	12210	662	227	708	969	695	518	324	393	42365
Margin of Error; Male: 21 years	407	948	578	828	188	142	193	212	187	182	120	140	4125
Estimate; Male: 22 to 24 years	11758	52588	13729	36767	2761	757	1884	2621	1613	2410	899	994	128781
Margin of Error; Male: 22 to 24 years	542	1117	692	1075	260	174	253	255	205	230	159	160	5122

	Texas County												
	Collin	Dallas	Denton	Tarrant	Ellis	Johnson	Hood	Parker	Wise	Hunt	Kaufman	Rockwall	All
Estimate; Male: 25 to 29 years	24163	99373	24245	66885	4266	1188	2585	4621	2954	3332	2067	1749	237428
Margin of Error; Male: 25 to 29 years	34	41	124	83	23	107	156	97	53	92	80	52	942
Estimate; Male: 30 to 34 years	28344	92868	24457	62665	4410	1216	2427	4772	3285	3377	2562	1746	232129
Margin of Error; Male: 30 to 34 years	35	44	87	51	32	50	138	143	5	82	113	64	844
Estimate; Male: 35 to 39 years	32602	89566	26713	66090	5064	1459	2825	5352	3374	3636	3290	1938	241909
Margin of Error; Male: 35 to 39 years	942	1526	920	1263	358	212	267	430	287	362	314	197	7078
Estimate; Male: 40 to 44 years	33730	84075	26443	63623	5132	1385	2718	5260	3971	4191	2643	2015	235186
Margin of Error; Male: 40 to 44 years	939	1529	930	1257	357	232	256	426	282	373	292	177	7050
Estimate; Male: 45 to 49 years	31625	82279	25305	65924	5475	1778	3147	5853	3730	5030	3115	2425	235686
Margin of Error; Male: 45 to 49 years	22	38	86	73	33	79	33	100	12	140	103	53	772

	Texas County												
	Collin	Dallas	Denton	Tarrant	Ellis	Johnson	Hood	Parker	Wise	Hunt	Kaufman	Rockwall	All
Estimate; Male: 50 to 54 years	25300	73738	20552	59210	5327	1881	3055	5433	3606	4484	2485	2249	207320
Margin of Error; Male: 50 to 54 years	31	3	4	58	53	108	28	114	52	77	61	18	607
Estimate; Male: 55 to 59 years	19127	57163	15924	46218	4308	1949	2383	4713	2995	3965	1762	2030	162537
Margin of Error; Male: 55 to 59 years	669	1154	672	980	257	205	238	344	273	284	218	213	5507
Estimate; Male: 60 and 61 years	6722	20613	5322	16860	1737	790	1138	1437	978	1534	972	772	58875
Margin of Error; Male: 60 and 61 years	513	803	432	856	198	172	185	257	180	212	227	157	4192
Estimate; Male: 62 to 64 years	8910	25499	6775	20449	1785	942	1453	2051	1341	1622	1172	819	72818
Margin of Error; Male: 62 to 64 years	538	972	579	801	233	185	195	280	204	252	234	159	4632
Estimate; Male: 65 and 66 years	5248	13446	3705	10774	1134	802	786	1497	737	1269	644	567	40609
Margin of Error; Male: 65 and 66 years	384	632	370	512	175	164	153	215	171	206	148	154	3284

	Texas County												
	Collin	Dallas	Denton	Tarrant	Ellis	Johnson	Hood	Parker	Wise	Hunt	Kaufman	Rockwall	All
Estimate; Male: 67 to 69 years	5568	16536	4396	12802	1368	958	1047	1594	1166	1279	474	666	47854
Margin of Error; Male: 67 to 69 years	432	615	348	528	209	162	166	227	196	237	129	126	3375
Estimate; Male: 70 to 74 years	6206	20963	4740	16904	1634	1254	1499	1888	1087	1622	974	918	59689
Margin of Error; Male: 70 to 74 years	358	679	349	488	222	181	162	176	150	192	162	129	3248
Estimate; Male: 75 to 79 years	4255	15065	3038	12245	1102	1103	923	1360	840	1119	501	666	42217
Margin of Error; Male: 75 to 79 years	322	524	295	478	141	144	142	172	146	164	114	115	2757
Estimate; Male: 80 to 84 years	2278	10573	1948	7455	700	508	489	860	477	698	306	307	26599
Margin of Error; Male: 80 to 84 years	256	491	246	455	132	124	114	153	133	163	92	88	2447
Estimate; Male: 85+	1562	8121	1247	6103	399	280	507	486	249	442	213	205	19814
Margin of Error; Male: 85+	219	547	226	433	104	83	148	124	76	132	111	76	2279

	Texas County												
	Collin	Dallas	Denton	Tarrant	Ellis	Johnson	Hood	Parker	Wise	Hunt	Kaufman	Rockwall	All
Estimate; Female:	388199	1185833	329356	906429	74436	25594	42989	74693	51406	56600	38987	29049	3203571
Margin of Error; Female:	82	57	79	138	120	140	129	162	93	104	166	121	1391
Estimate; Female: Under 5 years	28603	94649	24236	69860	5256	1450	2770	5256	3828	3558	2837	1897	244200
Margin of Error; Female: Under 5 years	21	39	4	51	72	124	66	69	50	67	110	48	721
Estimate; Female: 5 to 9 years	32260	88817	26499	67389	5951	1452	3001	5336	4055	3842	3272	2144	244018
Margin of Error; Female: 5 to 9 years	989	1537	737	1334	381	154	265	373	347	304	268	251	6940
Estimate; Female: 10 to 14 years	29740	83458	22979	67673	5739	1335	2879	5932	3961	4285	3252	2128	233361
Margin of Error; Female: 10 to 14 years	987	1536	741	1333	377	154	261	352	349	314	267	233	6904
Estimate; Female: 15 to 17 years	16678	50865	13636	39498	3784	1000	1724	3391	2335	2649	1920	1275	138755
Margin of Error; Female: 15 to 17 years	79	21	49	81	50	52	101	74	21	54	99	32	713

	Texas County												
	Collin	Dallas	Denton	Tarrant	Ellis	Johnson	Hood	Parker	Wise	Hunt	Kaufman	Rockwall	All
Estimate; Female: 18 and 19 years	8137	30939	10069	23667	2017	469	1156	1999	1210	1539	826	755	82783
Margin of Error; Female: 18 and 19 years	67	69	609	82	103	58	133	82	13	62	93	103	1474
Estimate; Female: 20 years	3477	16652	5410	11748	779	125	802	669	565	598	301	221	41347
Margin of Error; Female: 20 years	471	972	543	753	189	73	151	203	165	172	126	122	3940
Estimate; Female: 21 years	3081	15337	4952	11475	1039	235	589	753	805	727	208	182	39383
Margin of Error; Female: 21 years	334	1010	520	780	266	109	148	187	197	187	87	86	3911
Estimate; Female: 22 to 24 years	12286	51719	14303	38007	2673	754	1547	2681	1468	1502	1026	1155	129121
Margin of Error; Female: 22 to 24 years	484	1153	754	949	278	145	199	236	200	226	106	181	4911
Estimate; Female: 25 to 29 years	26125	97939	25295	68827	4603	1305	2556	4675	3242	2910	2171	1766	241414
Margin of Error; Female: 25 to 29 years	72	35	7	76	55	121	39	88	62	49	107	76	787

	Texas County												
	Collin	Dallas	Denton	Tarrant	Ellis	Johnson	Hood	Parker	Wise	Hunt	Kaufman	Rockwall	All
Estimate; Female: 30 to 34 years	31172	92219	25697	65250	4671	1148	2524	4867	3523	3122	2938	1592	238723
Margin of Error; Female: 30 to 34 years	38	65	3	86	45	86	69	163	32	48	114	24	773
Estimate; Female: 35 to 39 years	35019	87639	29068	67849	5626	1574	2662	5420	3864	3959	3257	2003	247940
Margin of Error; Female: 35 to 39 years	868	1521	889	1413	350	221	260	400	290	335	272	233	7052
Estimate; Female: 40 to 44 years	33765	83487	25221	66528	5110	1338	2910	4937	3662	4212	2846	2067	236083
Margin of Error; Female: 40 to 44 years	874	1519	893	1417	333	206	266	392	286	327	265	236	7014
Estimate; Female: 45 to 49 years	31737	82186	25545	66875	5595	1896	3203	5714	3882	4725	3358	2327	237043
Margin of Error; Female: 45 to 49 years	42	43	55	63	43	62	43	115	60	64	131	28	749
Estimate; Female: 50 to 54 years	25796	76215	21437	60931	5304	1926	3123	5174	3569	4524	2781	2214	212994
Margin of Error; Female: 50 to 54 years	26	12	42	65	64	63	50	65	41	65	112	27	632

	Texas County												
	Collin	Dallas	Denton	Tarrant	Ellis	Johnson	Hood	Parker	Wise	Hunt	Kaufman	Rockwall	All
Estimate; Female: 55 to 59 years	21428	62859	17211	48582	4611	1887	2599	5004	3271	3813	2044	1910	175219
Margin of Error; Female: 55 to 59 years	739	1055	572	914	283	232	243	275	258	250	236	187	5244
Estimate; Female: 60 and 61 years	7363	23431	6058	18849	1380	944	1061	1491	991	1446	787	746	64547
Margin of Error; Female: 60 and 61 years	459	899	531	743	239	187	203	214	180	195	184	143	4177
Estimate; Female: 62 to 64 years	9493	28327	6977	22794	2131	1233	1542	2140	1358	1872	1052	879	79798
Margin of Error; Female: 62 to 64 years	664	996	500	843	276	207	204	244	221	219	173	169	4716
Estimate; Female: 65 and 66 years	5538	15156	3927	12409	1164	838	852	991	935	1055	581	529	43975
Margin of Error; Female: 65 and 66 years	411	616	350	635	187	147	128	177	164	164	113	120	3212
Estimate; Female: 67 to 69 years	6258	20615	5326	15424	1339	956	1102	1877	1159	1114	620	836	56626
Margin of Error; Female: 67 to 69 years	373	653	422	592	183	171	164	193	162	191	130	135	3369

	Texas County												
	Collin	Dallas	Denton	Tarrant	Ellis	Johnson	Hood	Parker	Wise	Hunt	Kaufman	Rockwall	All
Estimate; Female: 70 to 74 years	7366	26582	5253	20046	2027	1277	1513	2388	1199	1987	1131	746	71515
Margin of Error; Female: 70 to 74 years	419	745	364	653	205	184	165	186	170	220	163	128	3602
Estimate; Female: 75 to 79 years	4792	20889	4384	16358	1624	1117	1012	1735	985	1443	824	689	55852
Margin of Error; Female: 75 to 79 years	402	722	413	633	205	170	154	179	131	209	156	125	3499
Estimate; Female: 80 to 84 years	4433	18560	3130	13661	1153	707	842	1122	873	866	550	522	46419
Margin of Error; Female: 80 to 84 years	388	689	353	661	196	160	136	159	123	160	138	116	3279
Estimate; Female: 85+	3652	17293	2743	12729	860	628	1020	1141	666	852	405	466	42455
Margin of Error; Female: 85+	360	857	364	693	178	145	162	196	129	186	120	112	3502

Sex by age by region of residence (control totals)

	South	West	East	Core	Non-Core
Estimate; Total:	197566	336268	249816	5542296	783650
Margin of Error; Total:	0	0	0	0	0
Estimate; Male:	97536	167180	125180	2732479	389896
Margin of Error; Male:	260	384	391	356	1035
Estimate; Male: Under 5 years	7084	12286	8498	227266	27868
Margin of Error; Male: Under 5 years	170	174	211	116	555
Estimate; Male: 5 to 9 years	7818	13178	9558	224927	30554
Margin of Error; Male: 5 to 9 years	653	1101	840	4817	2594
Estimate; Male: 10 to 14 years	7596	13427	10364	211885	31387
Margin of Error; Male: 10 to 14 years	660	1087	802	4811	2549
Estimate; Male: 15 to 17 years	5066	8087	6366	126632	19519
Margin of Error; Male: 15 to 17 years	115	200	262	211	577
Estimate; Male: 18 and 19 years	2859	4887	3559	76424	11305
Margin of Error; Male: 18 and 19 years	232	413	248	157	893
Estimate; Male: 20 years	1372	1876	1445	38099	4693
Margin of Error; Male: 20 years	368	479	486	2874	1333
Estimate; Male: 21 years	889	2372	1235	37869	4496
Margin of Error; Male: 21 years	330	592	442	2761	1364
Estimate; Male: 22 to 24 years	3518	6118	4303	114842	13939
Margin of Error; Male: 22 to 24 years	434	713	549	3426	1696
Estimate; Male: 25 to 29 years	5454	10160	7148	214666	22762
Margin of Error; Male: 25 to 29 years	130	306	224	282	660
Estimate; Male: 30 to 34 years	5626	10484	7685	208334	23795
Margin of Error; Male: 30 to 34 years	82	286	259	217	627
Estimate; Male: 35 to 39 years	6523	11551	8864	214971	26938
Margin of Error; Male: 35 to 39 years	570	984	873	4651	2427
Estimate; Male: 40 to 44 years	6517	11949	8849	207871	27315
Margin of Error; Male: 40 to 44 years	589	964	842	4655	2395
Estimate; Male: 45 to 49 years	7253	12730	10570	205133	30553
Margin of Error; Male: 45 to 49 years	112	145	296	219	553
Estimate; Male: 50 to 54 years	7208	12094	9218	178800	28520
Margin of Error; Male: 50 to 54 years	161	194	156	96	511
Estimate; Male: 55 to 59 years	6257	10091	7757	138432	24105
Margin of Error; Male: 55 to 59 years	462	855	715	3475	2032
Estimate; Male: 60 and 61 years	2527	3553	3278	49517	9358
Margin of Error; Male: 60 and 61 years	370	622	596	2604	1588
Estimate; Male: 62 to 64 years	2727	4845	3613	61633	11185
Margin of Error; Male: 62 to 64 years	418	679	645	2890	1742

	South	West	East	Core	Non-Core
Estimate; Male: 65 and 66 years	1936	3020	2480	33173	7436
Margin of Error; Male: 65 and 66 years	339	539	508	1898	1386
Estimate; Male: 67 to 69 years	2326	3807	2419	39302	8552
Margin of Error; Male: 67 to 69 years	371	589	492	1923	1452
Estimate; Male: 70 to 74 years	2888	4474	3514	48813	10876
Margin of Error; Male: 70 to 74 years	403	488	483	1874	1374
Estimate; Male: 75 to 79 years	2205	3123	2286	34603	7614
Margin of Error; Male: 75 to 79 years	285	460	393	1619	1138
Estimate; Male: 80 to 84 years	1208	1826	1311	22254	4345
Margin of Error; Male: 80 to 84 years	256	400	343	1448	999
Estimate; Male: 85+	679	1242	860	17033	2781
Margin of Error; Male: 85+	187	348	319	1425	854
Estimate; Female:	100030	169088	124636	2809817	393754
Margin of Error; Female:	260	384	391	356	1035
Estimate; Female: Under 5 years	6706	11854	8292	217348	26852
Margin of Error; Female: Under 5 years	196	185	225	115	606
Estimate; Female: 5 to 9 years	7403	12392	9258	214965	29053
Margin of Error; Female: 5 to 9 years	535	985	823	4597	2343
Estimate; Female: 10 to 14 years	7074	12772	9665	203850	29511
Margin of Error; Female: 10 to 14 years	531	962	814	4597	2307
Estimate; Female: 15 to 17 years	4784	7450	5844	120677	18078
Margin of Error; Female: 15 to 17 years	102	196	185	230	483
Estimate; Female: 18 and 19 years	2486	4365	3120	72812	9971
Margin of Error; Female: 18 and 19 years	161	228	258	827	647
Estimate; Female: 20 years	904	2036	1120	37287	4060
Margin of Error; Female: 20 years	262	519	420	2739	1201
Estimate; Female: 21 years	1274	2147	1117	34845	4538
Margin of Error; Female: 21 years	375	532	360	2644	1267
Estimate; Female: 22 to 24 years	3427	5696	3683	116315	12806
Margin of Error; Female: 22 to 24 years	423	635	513	3340	1571
Estimate; Female: 25 to 29 years	5908	10473	6847	218186	23228
Margin of Error; Female: 25 to 29 years	176	189	232	190	597
Estimate; Female: 30 to 34 years	5819	10914	7652	214338	24385
Margin of Error; Female: 30 to 34 years	131	264	186	192	581
Estimate; Female: 35 to 39 years	7200	11946	9219	219575	28365
Margin of Error; Female: 35 to 39 years	571	950	840	4691	2361
Estimate; Female: 40 to 44 years	6448	11509	9125	209001	27082
Margin of Error; Female: 40 to 44 years	539	944	828	4703	2311
Estimate; Female: 45 to 49 years	7491	12799	10410	206343	30700
Margin of Error; Female: 45 to 49 years	105	218	223	203	546

	South	West	East	Core	Non-Core
Estimate; Female: 50 to 54 years	7230	11866	9519	184379	28615
Margin of Error; Female: 50 to 54 years	127	156	204	145	487
Estimate; Female: 55 to 59 years	6498	10874	7767	150080	25139
Margin of Error; Female: 55 to 59 years	515	776	673	3280	1964
Estimate; Female: 60 and 61 years	2324	3543	2979	55701	8846
Margin of Error; Female: 60 and 61 years	426	597	522	2632	1545
Estimate; Female: 62 to 64 years	3364	5040	3803	67591	12207
Margin of Error; Female: 62 to 64 years	483	669	561	3003	1713
Estimate; Female: 65 and 66 years	2002	2778	2165	37030	6945
Margin of Error; Female: 65 and 66 years	334	469	397	2012	1200
Estimate; Female: 67 to 69 years	2295	4138	2570	47623	9003
Margin of Error; Female: 67 to 69 years	354	519	456	2040	1329
Estimate; Female: 70 to 74 years	3304	5100	3864	59247	12268
Margin of Error; Female: 70 to 74 years	389	521	511	2181	1421
Estimate; Female: 75 to 79 years	2741	3732	2956	46423	9429
Margin of Error; Female: 75 to 79 years	375	464	490	2170	1329
Estimate; Female: 80 to 84 years	1860	2837	1938	39784	6635
Margin of Error; Female: 80 to 84 years	356	418	414	2091	1188
Estimate; Female: 85+	1488	2827	1723	36417	6038
Margin of Error; Female: 85+	323	487	418	2274	1228

Sex by age by county group of residence (control totals)

	Total 7 County	Total 5 County	Total 2 County
Estimate; Total:	6325946	6325946	6325946
Margin of Error; Total:	0	0	0
Estimate; Male:	3122375	3122375	3122375
Margin of Error; Male:	1391	1391	1391
Estimate; Male: Under 5 years	255134	255134	255134
Margin of Error; Male: Under 5 years	671	671	671
Estimate; Male: 5 to 9 years	255481	255481	255481
Margin of Error; Male: 5 to 9 years	7411	7411	7411
Estimate; Male: 10 to 14 years	243272	243272	243272
Margin of Error; Male: 10 to 14 years	7360	7360	7360
Estimate; Male: 15 to 17 years	146151	146151	146151
Margin of Error; Male: 15 to 17 years	788	788	788
Estimate; Male: 18 and 19 years	87729	87729	87729
Margin of Error; Male: 18 and 19 years	1050	1050	1050
Estimate; Male: 20 years	42792	42792	42792
Margin of Error; Male: 20 years	4207	4207	4207
Estimate; Male: 21 years	42365	42365	42365
Margin of Error; Male: 21 years	4125	4125	4125
Estimate; Male: 22 to 24 years	128781	128781	128781
Margin of Error; Male: 22 to 24 years	5122	5122	5122
Estimate; Male: 25 to 29 years	237428	237428	237428
Margin of Error; Male: 25 to 29 years	942	942	942
Estimate; Male: 30 to 34 years	232129	232129	232129
Margin of Error; Male: 30 to 34 years	844	844	844
Estimate; Male: 35 to 39 years	241909	241909	241909
Margin of Error; Male: 35 to 39 years	7078	7078	7078
Estimate; Male: 40 to 44 years	235186	235186	235186
Margin of Error; Male: 40 to 44 years	7050	7050	7050
Estimate; Male: 45 to 49 years	235686	235686	235686
Margin of Error; Male: 45 to 49 years	772	772	772
Estimate; Male: 50 to 54 years	207320	207320	207320
Margin of Error; Male: 50 to 54 years	607	607	607
Estimate; Male: 55 to 59 years	162537	162537	162537
Margin of Error; Male: 55 to 59 years	5507	5507	5507
Estimate; Male: 60 and 61 years	58875	58875	58875
Margin of Error; Male: 60 and 61 years	4192	4192	4192
Estimate; Male: 62 to 64 years	72818	72818	72818
Margin of Error; Male: 62 to 64 years	4632	4632	4632

	Total 7 County	Total 5 County	Total 2 County
Estimate; Male: 65 and 66 years	40609	40609	40609
Margin of Error; Male: 65 and 66 years	3284	3284	3284
Estimate; Male: 67 to 69 years	47854	47854	47854
Margin of Error; Male: 67 to 69 years	3375	3375	3375
Estimate; Male: 70 to 74 years	59689	59689	59689
Margin of Error; Male: 70 to 74 years	3248	3248	3248
Estimate; Male: 75 to 79 years	42217	42217	42217
Margin of Error; Male: 75 to 79 years	2757	2757	2757
Estimate; Male: 80 to 84 years	26599	26599	26599
Margin of Error; Male: 80 to 84 years	2447	2447	2447
Estimate; Male: 85+	19814	19814	19814
Margin of Error; Male: 85+	2279	2279	2279
Estimate; Female:	3203571	3203571	3203571
Margin of Error; Female:	1391	1391	1391
Estimate; Female: Under 5 years	244200	244200	244200
Margin of Error; Female: Under 5 years	721	721	721
Estimate; Female: 5 to 9 years	244018	244018	244018
Margin of Error; Female: 5 to 9 years	6940	6940	6940
Estimate; Female: 10 to 14 years	233361	233361	233361
Margin of Error; Female: 10 to 14 years	6904	6904	6904
Estimate; Female: 15 to 17 years	138755	138755	138755
Margin of Error; Female: 15 to 17 years	713	713	713
Estimate; Female: 18 and 19 years	82783	82783	82783
Margin of Error; Female: 18 and 19 years	1474	1474	1474
Estimate; Female: 20 years	41347	41347	41347
Margin of Error; Female: 20 years	3940	3940	3940
Estimate; Female: 21 years	39383	39383	39383
Margin of Error; Female: 21 years	3911	3911	3911
Estimate; Female: 22 to 24 years	129121	129121	129121
Margin of Error; Female: 22 to 24 years	4911	4911	4911
Estimate; Female: 25 to 29 years	241414	241414	241414
Margin of Error; Female: 25 to 29 years	787	787	787
Estimate; Female: 30 to 34 years	238723	238723	238723
Margin of Error; Female: 30 to 34 years	773	773	773
Estimate; Female: 35 to 39 years	247940	247940	247940
Margin of Error; Female: 35 to 39 years	7052	7052	7052
Estimate; Female: 40 to 44 years	236083	236083	236083
Margin of Error; Female: 40 to 44 years	7014	7014	7014
Estimate; Female: 45 to 49 years	237043	237043	237043
Margin of Error; Female: 45 to 49 years	749	749	749

	Total 7 County	Total 5 County	Total 2 County
Estimate; Female: 50 to 54 years	212994	212994	212994
Margin of Error; Female: 50 to 54 years	632	632	632
Estimate; Female: 55 to 59 years	175219	175219	175219
Margin of Error; Female: 55 to 59 years	5244	5244	5244
Estimate; Female: 60 and 61 years	64547	64547	64547
Margin of Error; Female: 60 and 61 years	4177	4177	4177
Estimate; Female: 62 to 64 years	79798	79798	79798
Margin of Error; Female: 62 to 64 years	4716	4716	4716
Estimate; Female: 65 and 66 years	43975	43975	43975
Margin of Error; Female: 65 and 66 years	3212	3212	3212
Estimate; Female: 67 to 69 years	56626	56626	56626
Margin of Error; Female: 67 to 69 years	3369	3369	3369
Estimate; Female: 70 to 74 years	71515	71515	71515
Margin of Error; Female: 70 to 74 years	3602	3602	3602
Estimate; Female: 75 to 79 years	55852	55852	55852
Margin of Error; Female: 75 to 79 years	3499	3499	3499
Estimate; Female: 80 to 84 years	46419	46419	46419
Margin of Error; Female: 80 to 84 years	3279	3279	3279
Estimate; Female: 85+	42455	42455	42455
Margin of Error; Female: 85+	3502	3502	3502