Kimley»Horn

Memorandum

To: Natalie Porter, P.E., T.E.

From: Chris Gregerson, P.E., T.E., PTP
Michael Schmitt, AICP CTP, PTP

Re: Technical Memorandum #7 & #8: Socioeconomic Data Review

Date: March 11, 2019

The purpose of this memorandum is to summarize the review performed of the socioeconomic data within the previous version of the El Dorado County travel demand model (EDC TDM), the review of the 2015 American Community Service (ACS) data for El Dorado County, the review of the 2012 California Household Travel Survey (CHTS), a comparison between the three sources, and any recommended changes to the socioeconomic data within the current TDM based on the comparison.

I. Model Socioeconomic File Overview

Socioeconomic household data is the primary dataset on which residential land uses are defined in the EDC TDM. The EDC TDM trip generation process uses a three-way cross-classification arrangement that relates household size with levels of income and auto-ownership. Households are classified by the number of persons (1, 2, 3, and 4+), number of workers (0, 1, 2, and 3+) and income level (5 income classes representing different levels of household income).

The socioeconomic data is provided within the model for both existing and future year scenarios. Each of the 673 Traffic Analysis Zones (TAZs) within the EDC TDM, both within the County and outside of it, are stratified by different combinations of the three socioeconomic variables (i.e. a household with 4+ people, 2 workers, and income class 4) and the total number of households that represent each combination.

II. 2012 California Household Travel Survey (CHTS) Overview

Household and trip-making characteristics for houses sampled within the County were pulled from the 2012 CHTS prepared by Caltrans. Data for the 2012 CHTS was collected between 2012 and 2013 statewide. It was undertaken as collaborative with numerous jurisdictions effort to collect travel information to inform regional and statewide travel and environmental models. The advantage of this approach being that the same methods were consistently used so the results were more useful from a comparative standpoint.

The 2012 CHTS includes travel information from households in all of California's 58 counties plus portions of three adjacent counties in Nevada. Data was collected using a combination of computer assisted telephone interviewing (CATI), online, and three types of global positioning systems (GPS) devices which included wearable, in-vehicle and in-vehicle plus an on-board diagnostic (OBD) unit. Travel information was collected for every day for a full year. All participating households were first recruited to record their travel in a diary for a pre-assigned 24-hour period, plus report long distance travel in the prior eight weeks. Households that participated in the GPS assisted survey used the wearable GPS devices for a total of three days, and the in-vehicle or in-vehicle plus OBD devices for a total of seven days. The travel data

was retrieved either by CATI, online, or by returning the travel diaries, long distance log and GPS devices (if applicable) by mail.

No data was reviewed for the area outside of the County due to too few samples to allow for a substantive comparison. In addition, while the data contains 412 households in El Dorado County, 186 of those households sampled are located outside of the model area in the Lake Tahoe area. Therefore, only 226 households within the model area were evaluated as part of this review. The CHTS data contains the number of people per household, workers per household, and income category for each household, among other variables. The households were recorded at the zip code level to allow for comparison to model TAZs. Although several aspects of the dataset were comparable, income from the CHTS was stratified differently as compared to the EDC TDM, making direct comparisons more difficult for the income category variable. The CHTS variables were stratified as follows:

- Persons: 1, 2, 3, 4+
- Workers: 0, 1, 2, 3+
- Income Category: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, No Answer

The following tables provide a summary of the 226 households found within the model area for the County and their socioeconomic attributes with respect to the three model variables. Table 1 summarizes the number of people per household, Table 2 summarizes the number of workers per household, while Table 3 summarizes the number of households in each income category.

As shown below, 46% of all households have two people living in them, 42% have one worker, and 35% fall into either Income Category 5 or 6. Income Category 5 represents a household income between $50,000 to $75,000, while Income Category 6 represents a household income between $75,000 and $100,000.

Table 1 - Number of People per Household in El Dorado County (2012 CHTS)

Persons	Households	Percent
1	40	18%
2	103	46%
3	26	12%
4+	57	25%
Total	**226**	**100%**

Table 2 - Number of Workers per Household in El Dorado County (2012 CHTS)

Workers	Households	Percent
0	48	21%
1	95	42%
2	69	31%
3+	14	6%
Total	**226**	**100%**

Table 3 - Income Category by Household in El Dorado County (2012 CHTS)

Income Category	Households	Percent
1	6	3%
2	17	8%
3	17	8%
4	26	12%
5	38	17%
6	41	18%
7	31	14%
8	22	10%
9	5	2%
10	3	1%
No Answer	20	9%
Total	**226**	**100%**

The trip-making characteristics that were collected by the 2012 CHTS include trip purpose, mode choice, and trip distance. Consistent with the socioeconomic data regarding households, only a limited number of samples were obtained for inside the County. Only 439 entries for trip purpose were included for El Dorado County, 430 for trip mode, and 1,034 for trip distance. Due to the limited number of entries, the trip purpose and mode choice results were not usable for comparison in this memorandum. However, the average trip length was able to be used and the average trip length of all entries within El Dorado County was 7.8 miles.

III. 2015 American Community Survey (ACS) Overview

The household characteristics for houses sampled within the County were pulled from the 2015 ACS prepared by the United States Census. The American Community Survey (ACS) is part of the U.S. Census Bureau's Decennial Census Program and is designed, through sampling, to provide more current demographic, social, economic, and housing estimates than would be possible if the data were only collected each decade. The ACS provides information on more than 40 topics, including educational attainment, household size, household income, marital status, employment status, and many more. Each year the survey randomly samples around 3.5 million addresses and produces statistics that cover 1-year and 5-year periods for geographic areas in the United States and Puerto Rico, summarized at the census block level.

The ACS data below summarizes the number of people per household, workers per household, and income category for each household. The 2015 ACS income data was stratified in the same way as the CHTS income data, meaning it was stratified differently compared to the model, similarly making direct comparisons to EDC TCM income data more difficult. However, it does allow for a direct comparison with the CHTS income data. The ACS variables were stratified as follows:

- Persons: 1, 2, 3, 4+
- Workers: 0, 1, 2, 3+
- Income Category: 1, 2, 3, 4, 5, 6, 7, 8, 9 & 10

The following tables provide a summary of the 55,465 households found within the County, a much larger dataset than the CHTS data, and their socioeconomic attributes with respect to the three model variables. Table 4 summarizes the number of people per household, Table 5 summarizes the number of workers per household, while Table 6 summarizes the number of households in each income category.

As shown below, 40% of all households have two people living in them, 36% have one worker, and 30% fall into either Income Category 5 or 6. Income Category 5 represents a household income between $50,000 to $75,000, while Income Category 6 represents a household income between $75,000 and $100,000.

Table 4 - Number of People per Household in El Dorado County (2015 ACS)

Persons	Households	% HHs
1	12,177	22%
2	22,142	40%
3	8,913	16%
4+	12,233	22%
Total	**55,465**	**100%**

Table 5 - Number of Workers per Household in El Dorado County (2015 ACS)

Workers	Households	Percent
0	17,901	32%
1	19,822	36%
2	15,432	28%
3+	2,310	4%
Total	**55,465**	**100%**

Table 6 - Income Category by Household in El Dorado County (2015 ACS)

Income Category	Households	Percent
1	2,256	4%
2	6,355	11%
3	4,198	8%
4	5,876	11%
5	9,172	17%
6	7,057	13%
7	9,809	18%
8	4,858	9%
9 & 10	5,884	11%
Total	**55,465**	**100%**

IV. El Dorado County Travel Demand Model Overview

The household characteristics within the EDC TDM were summarized from the Household Multivariable (HHMV) input file for the base year. A total of 56,913 households are contained within the model area for the County. The following tables provide a summary of the 56,913 households within the County in the HHMV file and their socioeconomic attributes with respect to the three model variables.

Table 7 summarizes the number of people per household, Table 8 summarizes the number of workers per household, while Table 9 summarizes the number of households in each income category. As shown below, 39% of all households have two people living in them, 37% have one worker, and 40% fall into either Income Category 3 or 4.

Table 7 - Number of People per Household in El Dorado County (2016 EDC TDM)

Persons	Households	Percent
1	11,462	20%
2	21,987	39%
3	8,839	16%
4+	14,625	26%
Total	**56,913**	**100%**

Table 8 - Number of Workers per Household in El Dorado County (2016 EDC TDM)

Workers	Households	Percent
0	14,851	26%
1	21,219	37%
2	17,402	31%
3+	3,441	6%
Total	**56,913**	**100%**

Table 9 - Income Category by Household in El Dorado County (2016 EDC TDM)

Income Category	Households	Percent
1	4,410	8%
2	7,741	14%
3	10,825	19%
4	11,695	21%
5	22,241	39%
Total	**56,913**	**100%**

After reviewing the trips made within the County in the model, the average trip length is 8.3 miles compared to 7.8 miles as noted in the 2012 CHTS.

V. Socioeconomic Variable Comparison

The two socioeconomic variables that were compared to better understand how the model distribution differs from the ACS and CHTS data were the people per household variable and the workers per household variable. The income category variable was not compared due to difference in stratifying household income. There is no detailed documentation on what the income categories represent for the model and therefore a direct comparison is impossible.

As shown in Table 10, when comparing the EDC TDM to the CHTS data, the EDC TDM has:

- 6% more one-person households
- 11% fewer two-people households
- 6% more three-people households
- 1% fewer households with four or more people

When compared to the ACS data, the EDC TDM has:

- 2% more one-person households
- 6% fewer two-people households
- 1% more three-people households, and
- 3% more households with four or more people

As shown in Table 11, when comparing the EDC TDM to the CHTS data, the EDC TDM has:

- 1% fewer zero-worker households and households with three or more workers
- 1% more households with one and two workers.

When compared to the ACS data, the EDC TDM has:

- 12% fewer zero-worker households
- 7% more households with one worker
- 4% more households with two workers
- 1% more households with three or more workers

Table 10 - Number of People per Household in El Dorado County (Comparison)

Persons	2012 CHTS	2015 ACS	EDC TDM	EDC TDM vs 2012 CHTS	EDC TDM vs 2015 ACS
1	18%	22%	24%	6%	2%
2	46%	40%	34%	-12%	-6%
3	11%	16%	17%	6%	1%
4+	25%	22%	25%	0%	3%
Total	**100%**	**100%**	**100%**	-	-

Table 11 - Number of Workers per Household in El Dorado County (Comparison)

Workers	2012 CHTS	2015 ACS	EDC TDM	EDC TDM vs 2012 CHTS	EDC TDM vs 2015 ACS
0	21%	32%	20%	-1%	-12%
1	42%	36%	43%	1%	7%
2	31%	28%	32%	1%	4%
3+	6%	4%	5%	-1%	1%
Total	**100%**	**100%**	**100%**	-	-

VI. Recommendations

As shown in the comparisons above, the model does a good job of matching the 2015 ACS data for household size and the 2012 CHTS data for number of workers per household. However, it is off by twelve-percent for two-person households when compared to the 2012 CHTS data and for zero worker households when compared to the 2015 ACS data. Given the much larger number of samples, by orders of magnitude, in the 2015 ACS data compared to the CHTS data, the goal of the model should be to more closely match the ACS data rather than the CHTS data. In addition, as noted in the trip-making summary of the 2012 CHTS data, too few entries were submitted to provide meaningful guidance in any model changes to the trip-making characteristics. Given the goal of matching the model with the ACS data, it is recommended in the next model update that a more detailed analysis of the number of workers per household be conducted at the Census block level in order to further determine whether a redistribution of the number of workers per household needs to be obtained to allow the model base year to better match the 2015 ACS data for the base year.

It should be noted that as a part of the model development process, the base year model was updated to 2016 and validated against 2016 traffic counts located throughout the County on a variety of facilities. As noted in Technical Memorandum #3[1], the model was deemed to be validated using industry standard methodologies, without any changes to the socioeconomic distributions. However, it is still recommended that as a part of the next major model update, the County further analyze the three socioeconomic variables described in this memorandum to determine whether the model is accurately representing households in the County and whether any modifications are needed to allow the next base year model to validate successfully.

[1] *Technical Memorandum #3: Validation and Calibration Results*. Kimley-Horn. August 22, 2018.