

A Comparison of the NCTCOG Weighting Method to the NHTS Weighting Method

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Weighting Methods of NHTS and NCTCOG

NHTS 2009 Original Weighting

METHOD

- HH Raking Starting Values – HH non-response adjustment weights
- Dimension Frames and Control Totals from ACS 2009
 - The household dimensions (~36):
 - State * Black (2)
 - State * Hispanic (2)
 - State * Owner / Renter (2)
 - State * Number of Vehicles (~3)
 - Month (12)
 - Day of Week (7)
 - State * Household size * Worker (~8)
 - The person dimensions (~29):
 - State * Race (2)
 - State * Ethnicity (2)
 - State * Sex by Age Group (~12)
 - Month Pair (6)
 - Day of the week (7)
- Raking HH and Person Records
 - HH – begin with HH non-response adjustment weights, match control totals
 - Person – begin with HH weights, match control totals
 - Trip – Inherits Person weights

CONCERNS

1. Consideration of Records for Expansion
 - Weekday and Weekend
 - Holidays
2. Completeness of the Records (Included Households with 50% completed trip diaries)
3. Geography – State of Texas used for control totals
4. Socio-Economic Characteristics Considered are not primary characteristics for travel modeling
5. Consistency between Household and Person Weights

NHTS 2017 Original Weighting

METHOD

- HH Raking Starting Values – HH non-response adjustment weights
- HH Records Considerations
 - Created Weekday weight - Removed households with weekend travel day
 - Removed households from travel day on 7 holidays
 - Removed households which did not have 100% completed travel diaries
- Dimension Frames and Control Totals from ACS 2015
 - The household dimensions (~36):
 - Region * MSA/heavy rail sampling stratum (~2)
 - Region * Race (2)
 - Region * Hispanic origin (2)
 - Region * Owner/Renter (2)
 - Region * Number of Vehicles (3)
 - Region * Month (12)
 - Region * Day of Week (5)
 - Region * HH size * # of workers in the HH (8)
 - The person dimensions (~29):
 - Region * MSA/heavy rail sampling stratum (~2)
 - Region * Race (2)
 - Region * Ethnicity (2)
 - Region * Sex * Age group (12)
 - Pairs of months (6)
 - Day of week (5)
- Raking HH and Person Records
 - HH – begin with HH non-response adjustment weights, match control totals
 - Person – begin with HH weights, match control totals
 - Trip – Inherits Person weights

CONCERNS

1. Consideration of Records for Expansion
 - Additional Holidays
2. Geography – NCTCOG Region used for control totals
3. Socio-Economic Characteristics Considered are not primary characteristics for travel modeling
4. Consistency between Household and Person Weights

NCTCOG NHTS 2009 Re-Weighting

METHOD

- HH Raking Starting Values – HH non-response adjustment weights
- HH Records Considerations
 - Removed households with travel day on weekend or one of 21 holidays
 - Removed households which did not have 100% completed travel diaries
 - Removed households with no value for new expansion dimensions
- Dimension Frames and Control Totals from ACS 2011
 - The household dimensions (133):
 - Household Income by County Group (35)
 - Worker Count by Household Vehicles by County Group (51)
 - Household Size by Worker Count by County Group (47)
 - The person dimensions (70):
 - Sex by Age by County Group (70)
- Raking HH and Person Records
 - HH – begin with HH non-response adjustment weights, match control totals
 - Person – begin with HH weights, match control totals
 - Trip – Inherit Person weights

CONCERNS

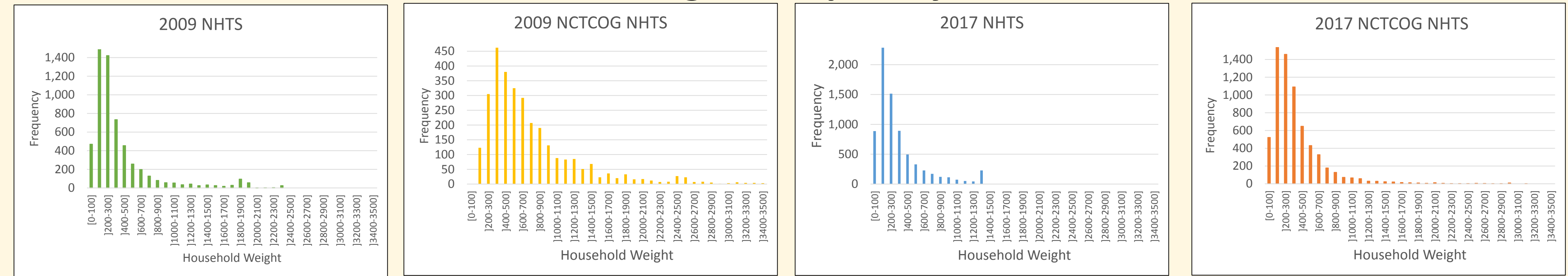
1. Consistency between Household and Person Weights

NCTCOG NHTS 2017 Re-Weighting

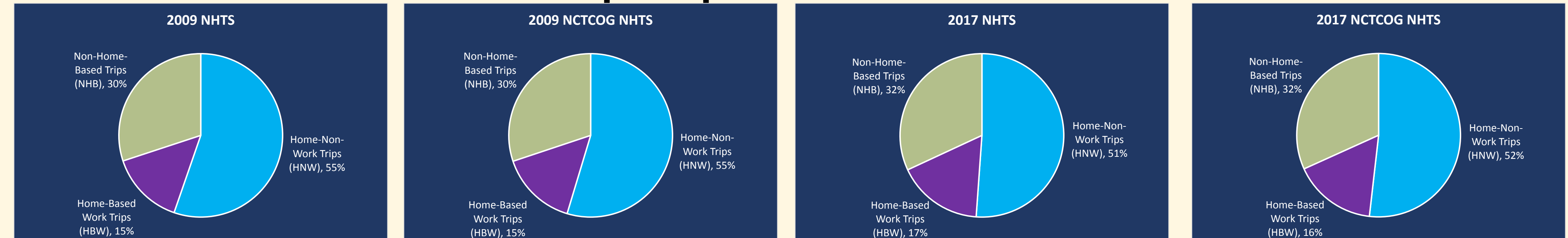
METHOD

- HH Raking Starting Values – HH non-response adjustment weights
- HH Records Considerations
 - Removed households with travel day on one of 21 holidays
 - Removed households with no value for new expansion dimensions
- Dimension Frames and Control Totals from ACS 2016 and PUMS 2016
 - The household dimensions (161):
 - Household Income by County Group (34)
 - Worker Count by Household Vehicles by County Group (42)
 - Household Size by County Group (23)
 - Number of Children in the Household by County Group (20)
 - Number of Seniors in the Household by County Group (21)
 - Number of Males in the Household by County Group (21)
- Raking HH and Person Records
 - HH – begin with non-response adjustment weights, match control totals
 - Person, Trip – Inherit Person weights

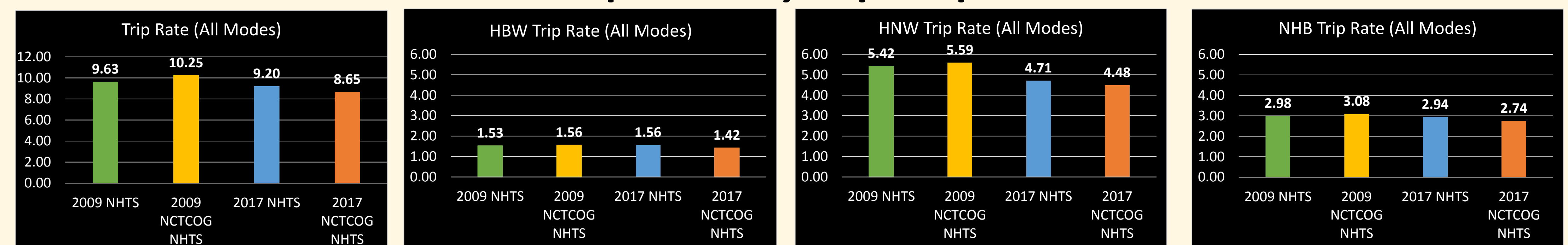
Household Weight Frequency Distribution



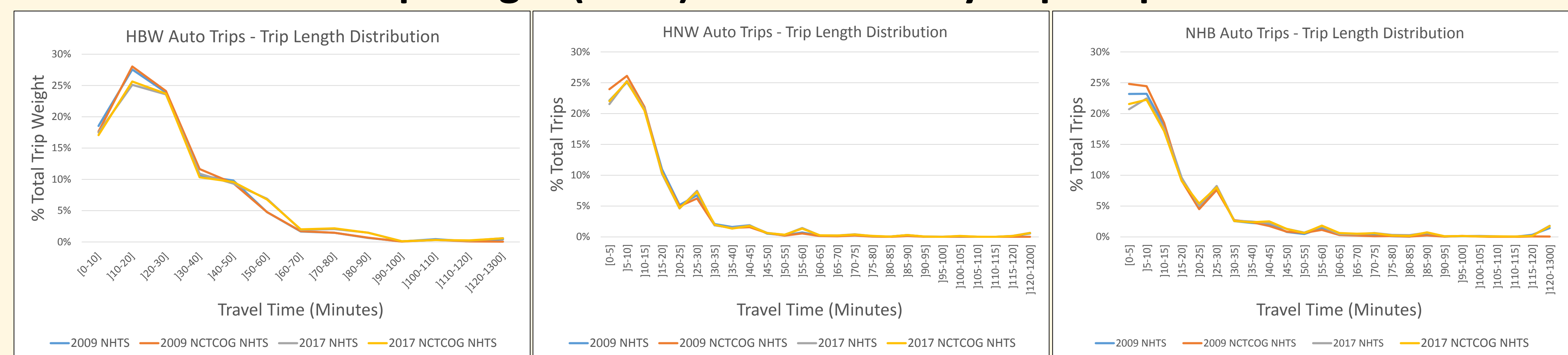
Trip Purpose Breakdown



Trip Rates by Trip Purpose



Trip Length (Time) Distribution by Trip Purpose



Observations

1. Trip Rate from 2017 NHTS

NHTS 2017 trip rates are generally 10% less than historical rates. Most of the reduction appears in Home-Based Non-Work trips. This difference is not due to different methods for weighting.

2. Waterfall Method and Person Total Inconsistency

The Waterfall method used in the 2009 and 2017 NHTS national dataset and the 2009 NCTCOG NHTS re-weighting creates an internal inconsistency between two tables of the survey. Since person weights inherited from the household table are adjusted to match person controls totals, two different values are extracted from the survey database for person queries. For example, using the NHTS 2017 dataset in the NCTCOG area, the total persons from the Household table is 6.5M versus 7.1M from the Person table. This internal inconsistency can be removed by using the NCTCOG weighting method.

3. Persons Control Total

The person control totals (Annual Estimates of the Resident Population minus Group Quarters Table B26001) obtained from ACS do not match the household person total obtained from household ACS tables (Table B11016). In the NCTCOG region, there is a 300,000 person difference between the two estimates. This difference added to the persons will increase the weight of the persons and, therefore, the trips. The effect will be seen as increased trip rates in the order of 5%.

4. Starting Values for Raking

The raking method for estimation of the weights is sensitive to the starting values for the households. Use of non-response weights can potentially provide a proper starting point. It seems that the overall trip rates values calculated from weights from different starting points do not differ significantly from each other.