National Household Travel Survey Data Explorer User Guide — Public Use Version

Prepared by the Federal Highway Administration
Revised December 2023

TABLE OF CONTENTS

CHAPTER 1. BACKGROUND

The National Household Travel Survey (NHTS) Data Explorer (NHTS-DE) was created to support online data analysis of the 2022, 2017, 2009, and 2001 NHTS. It provides users with the ability to build customized tabulations without any special software and delivers output tables in Hypertext Markup Language (HTML), Excel spreadsheet, and comma-separated value (CSV) formats. The main goal of this online tool is to make NHTS data more user friendly. The public use version of this tool (i.e., NHTS-DE) is located on the NHTS homepage and can be used to analyze NHTS data at the national level.

CHAPTER 2. FREQUENTLY ASKED QUESTIONS

What is the NHTS-DE?

The NHTS-DE provides a convenient and user friendly way to analyze 2022, 2017, 2009, and 2001 NHTS data at the national level. Some of its features include the following:

- Users can run an analysis online without any special software.
- The tool automatically applies the correct statistical weight based on the selected unit of analysis and generates the margin of error (95% confidence interval) table for each query.
- The tool provides convenient summaries using the most common NHTS metrics (e.g., Average Annual Miles per Driver, Vehicle Occupancy, Annual Person Miles of Travel, Average Trip Length, Annual Vehicle Miles of Travel, etc.) built-in as a part of the available analysis variables.

How Do I Interpret and Use Margin of Error?

The margin of error (MoE) refers to the maximum difference expected between the true value of a measure and the estimated statistic, typically expressed in a confidence interval (CI). For example, a 95% CI means: there is a 95% confidence that the true value of an estimated measure will be in the given CI range. The MoE generated by the NHTS-DE is based on the 95% CI.

For more information on how to interpret MoE and calculate the confidence intervals within the NHTS-DE, refer to chapters 4 and 5 of this guide.

What Do I Do if I Encounter Problems While Running the NHTS-DE?

For technical assistance when using or interpreting the output from the NHTS-DE, contact Data User Support.

CHAPTER 3. ACCESSING THE NHTS DATA EXPLORER

The NHTS-DE can be accessed from the NHTS homepage using the following steps:

Step 1: Go to the NHTS homepage at https://nhts.ornl.gov/.

Step 2: Scroll down to the bottom of the homepage to access the tool (see Figure 1).

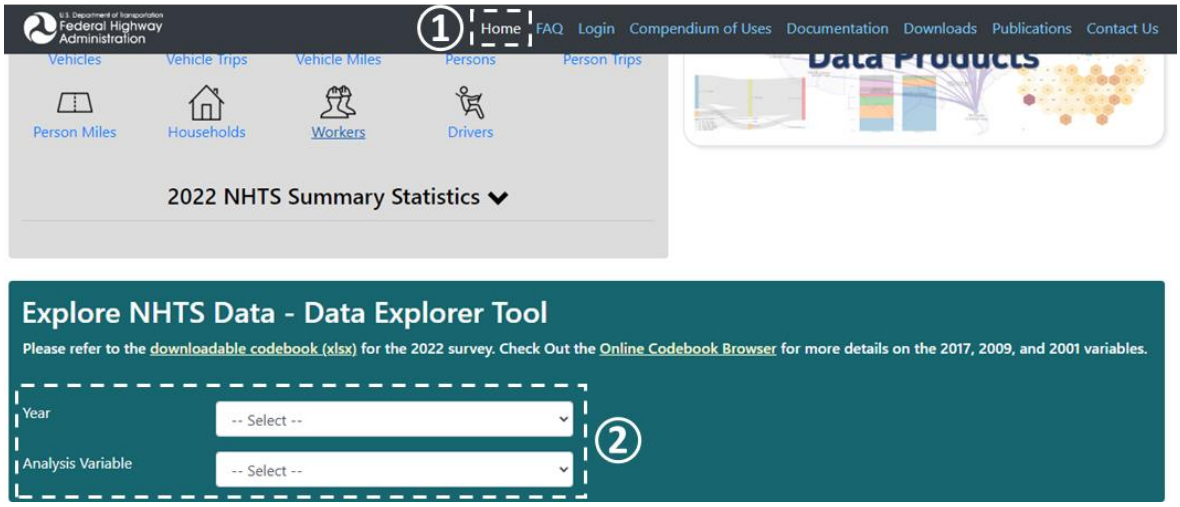


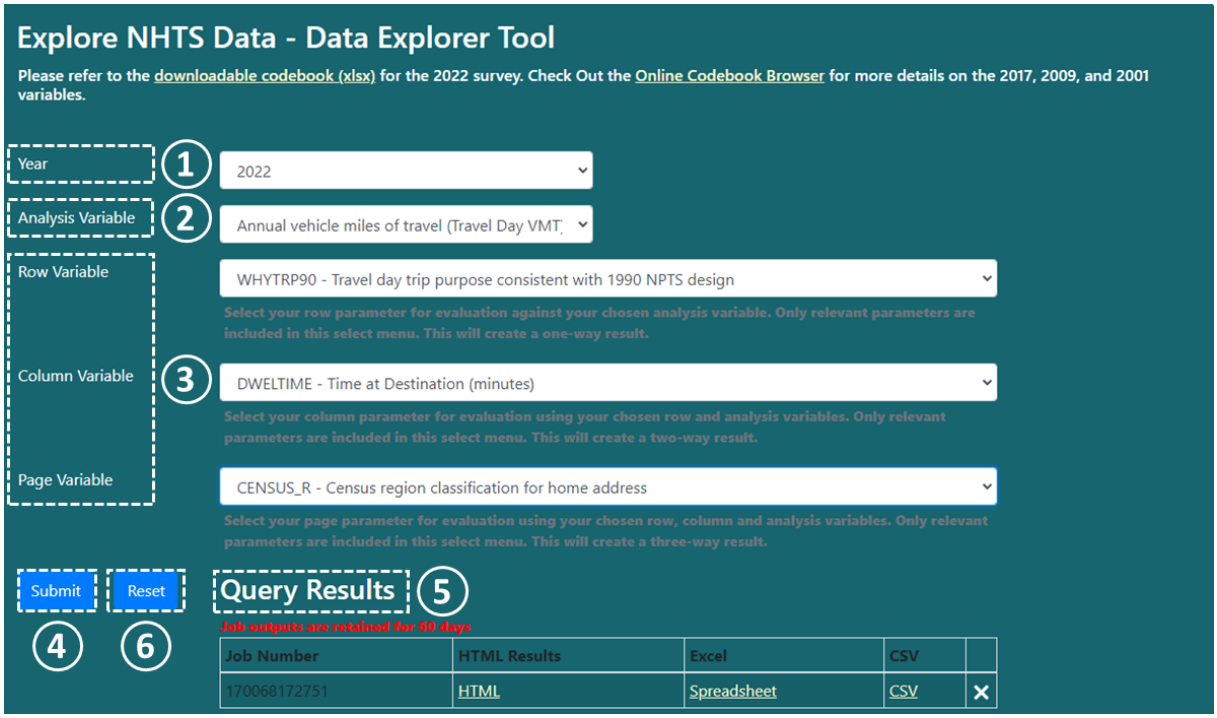
Figure 1.NHTS homepage.

CHAPTER 4. TOOL OVERVIEW

The NHTS-DE allows users to choose a year of the NHTS survey data and tabulate estimates at the national level. A basic NHTS tabulation consists of the Year of the survey data (element 1 in Figure 2), an Analysis Variable (element 2 in Figure 2) and one to three Tabulation Variables (element 3 in Figure 2).

NHTS-DE Key Elements

Before providing detail on how to use the NHTS-DE, it is important to understand the tool's key elements which are marked in Figure 2 followed by a brief description of each.



Note: Key elements for query selection: (1) Year of Survey Data, (2) Analysis Variable, (3) Tabulation Variables, (4) Submit, (5) Output, and (6) Reset.

Figure 2.NHTS-DE tool.

1. Year: 2022, 2017, 2009, and 2001 NHTS survey data are available for selection.

2. Analysis Variable: This variable denotes what the user is trying to calculate. For example, selecting "Households" from the Analysis Variable drop-down menu will calculate "Total Number of Households" summarized by the selected Tabulation Variables. (Please note that the tool requires at least the Row Variable to be selected to create a basic one-dimensional table. For information on Tabulation Variables, refer to key element 3 in this chapter).

Since Analysis Variables represent the basis of calculation, the NHTS-DE tool includes the most common NHTS metrics (e.g., Average Annual Miles per Driver, Average Vehicle Occupancy, Annual Person Miles of Travel, Average Person Trip Length, Annual Vehicle Miles of Travel, etc.) built-in as Analysis Variables. Also, the list of applicable Analysis Variables will be automatically updated based on the Year of the survey data selected in the

key element 1. For the entire list, please choose a Year of interest and see the Analysis Variable drop-down menu in the NHTS-DE.

3. Tabulation Variables: Tabulation Variables are the variables by which the Analysis Variable would be summarized in the output table(s). These are basically data items (i.e., NHTS variables) that were collected in the selected year of NHTS data. Up to three Tabulation Variables can be selected: Row, Column, and Page:

- **Row Variable:** This is the first of the three Tabulation Variables and is required by the tool in order to generate output. When clicking on the field for Row Variable, a drop-down menu of Row Variables appears, which provides a list of applicable NHTS variables by which the selected Analysis Variable can be generated. The resultant output table summarizes the Analysis Variable by the selected Row Variable.
- **Column Variable:** This second Tabulation Variable can only be selected once the Row Variable is selected. The Column Variable drop-down menu provides a list of applicable NHTS variables similar to the Row Variable. The resultant output table summarizes the Analysis Variable based on combinations of the Row and the Column Variables.
- **Page Variable:** This third Tabulation Variable can only be selected after both the Row and Column Variables are selected. The Page Variable drop-down menu provides a list of applicable NHTS variables that can be used to further breakdown the results into multiple tables. The resultant output generates separate tables, summarizing the Analysis Variable by Row and Column Variables based on the selected Page Variable.

As shown in Figure 1, Year and Analysis Variable are the only two fields present on the interface of the tool at the start. Once they are selected, the Tabulation Variables will automatically appear one after the other once the previous variable is selected. For example, the Row Variable will appear automatically after the Analysis Variable is selected. Similarly, the Column Variable will appear once Row Variable is selected.

4. Submit: Click on the Submit button to generate desired data summaries.

5. Output: The Query Results table, showing the links to the generated tabular output, will appear when the results are generated.

After the Submit button is clicked, the NHTS-DE returns the Query Results table. The Query Results table consists of the job number (a unique identification number associated with the specific query job that was carried out by the user) and links to the generated output table (in HTML, Excel spreadsheet, and CSV formats).

For queries with Row and/or Column Variable(s), the NHTS-DE automatically generates a default set of three tables: (1) annualized weighted sum or average (depending on the selected Analysis Variable), (2) sample size, and (3) margin of error (MoE).

For queries with all three Tabulation Variables selected, the tool generates the default set of three tables based on combinations of the Row and Column Variables for each category of the selected Page Variable.

The MoE needs special mention, as there is often confusion on how to interpret it.

The MoE refers to the maximum difference expected between the true value of a measure and the estimated statistic, typically expressed in a confidence interval (CI). A 95% CI means that there is a 95% confidence that the true value of an estimated measure will fall in the given CI range. The MoE generated by the NHTS-DE is based on the 95% CI. For example, according to the 2022 NextGen NHTS, the weighted survey estimates of total trips (nationally) reported by workers was 136,981.07 (in millions) while its corresponding MoE was estimated as 6,951.16 (in millions). This MoE estimate allows one to conclude with 95% confidence that the interval 130,029.91 (in millions) to 143,932.23 (in millions) contains the true estimate of total number of trips undertaken by workers. These lower and upper bounds of the 95% CI in this case were calculated as follows:

- **Lower Bound (in millions):** 136,981.07 – 6,951.16 = 130,029.91
- **Upper Bound (in millions):** 136,981.07 + 6,951.16 = 143,932.23

For another example of how to calculate the confidence intervals with the output MoE, refer to chapter 5 in the next section of this guide.

When contacting user support with questions about your output, it is helpful to provide the specific job log number(s).

6. Reset: Click on the Reset button to clear out all selections and restart the query process.

CHAPTER 5. USING THE TOOL

This chapter describes how to use the NHTS-DE by using an example of tabulating the 2022 annual person trips (PT) by trip purpose and household size and then calculating the confidence interval for a specific combination of the categories using the MoE table.

Tabulating the Query

Step 1. Select the Year of the Survey Data: In this example, 2022 NHTS data will be used. Figure 3 shows how to select *2022* from the Year drop-down menu.

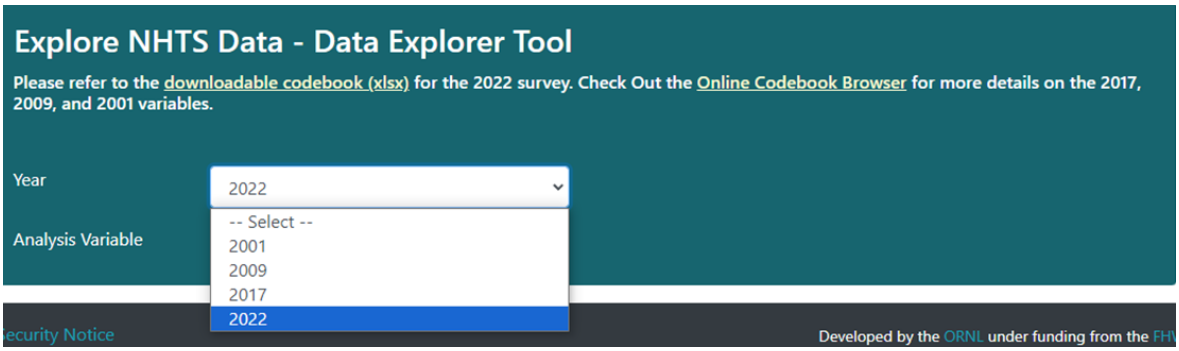


Figure 3. Make a selection from the Year drop-down menu.

Step 2. Select Analysis Variable: Once the Year is selected, the list of applicable metrics will be automatically populated in the drop-down menu of Analysis Variable. For this example, *Annual person trips (Travel Day PT)* should be selected as the Analysis Variable as shown in Figure 4.

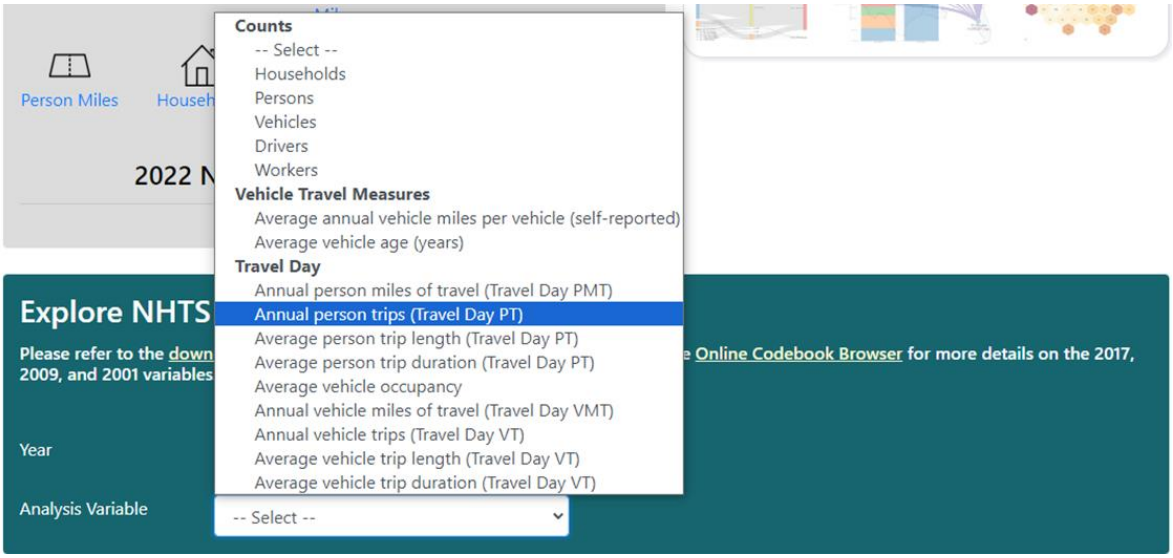


Figure 4. Make a selection for the Analysis Variable.

Step 3. Select Tabulation Variables: After the Analysis Variable is selected, Row Variable will appear automatically with a list of applicable NHTS variables. Similarly, the Column Variable will appear after a selection is made to the Row Variable. For this example, two Tabulation Variables need to be specified as follows:

- **Row Variable:** For trip purpose, variable *WHYTRP90 – Travel day trip purpose consistent with 1990 NPTS design* is selected in this example. Note: there are five trip purpose variables available in the public dataset of 2022 NextGen NTHS. For more information, refer to section *5.5 Trip Purpose Variables* of the 2022 Data User Guide.
- **Column Variable:** For household size, select *HHSIZE – count of household members*.
- **Page Variable:** Not used.

Figure 5 shows how to select *WHYTRP90* from the Row Variable drop-down menu. The same process should be followed to select *HHSIZE* as the Column Variable.

For guidance on the proper variable to use for any Tabulation Variable, use the codebook of the selected survey year and search for the variable by keyword(s). Online and downloadable codebooks can be found on the Documentation page of the NHTS website.

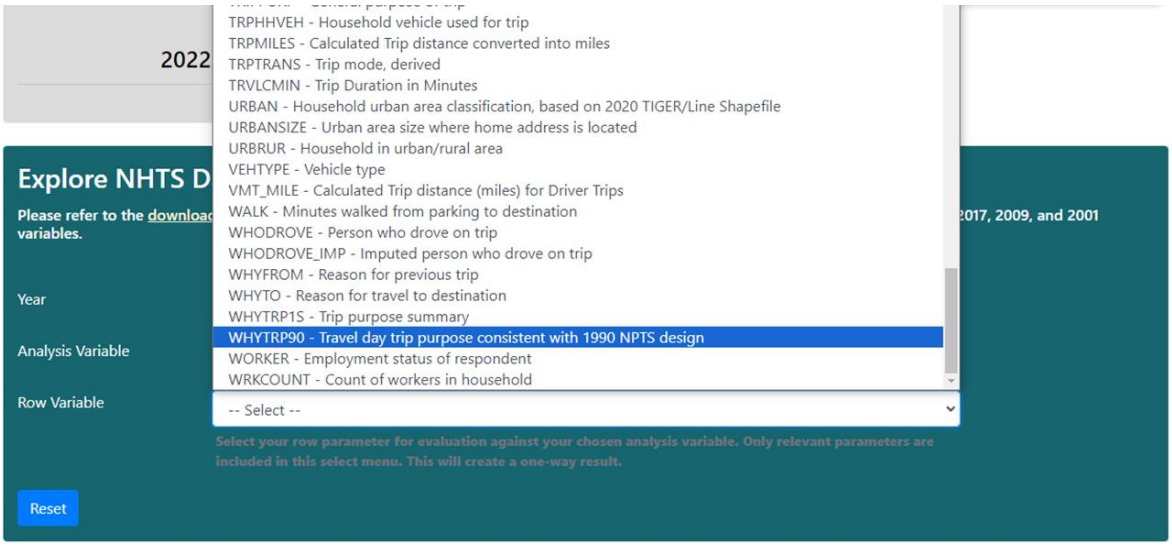


Figure 5. Select *WHYTRP90* for the Row Variable.

Step 4. Click Submit Button: At this point in the process, all key elements are selected based on the query (i.e., 2022 annual PT by trip purpose and by household size) and it is time to generate the output tables. To do so, click the Submit button to request the output table (see Figure 6).

Step 5. Click on the HTML Link: After clicking the Submit button, Query Results table will appear. Within the table, click on any one of the links (HTML Results, Excel, or CSV) to get the output tables in the desired format. In this example, the HTML Results link was selected for viewing the online outputs (see Figure 6).

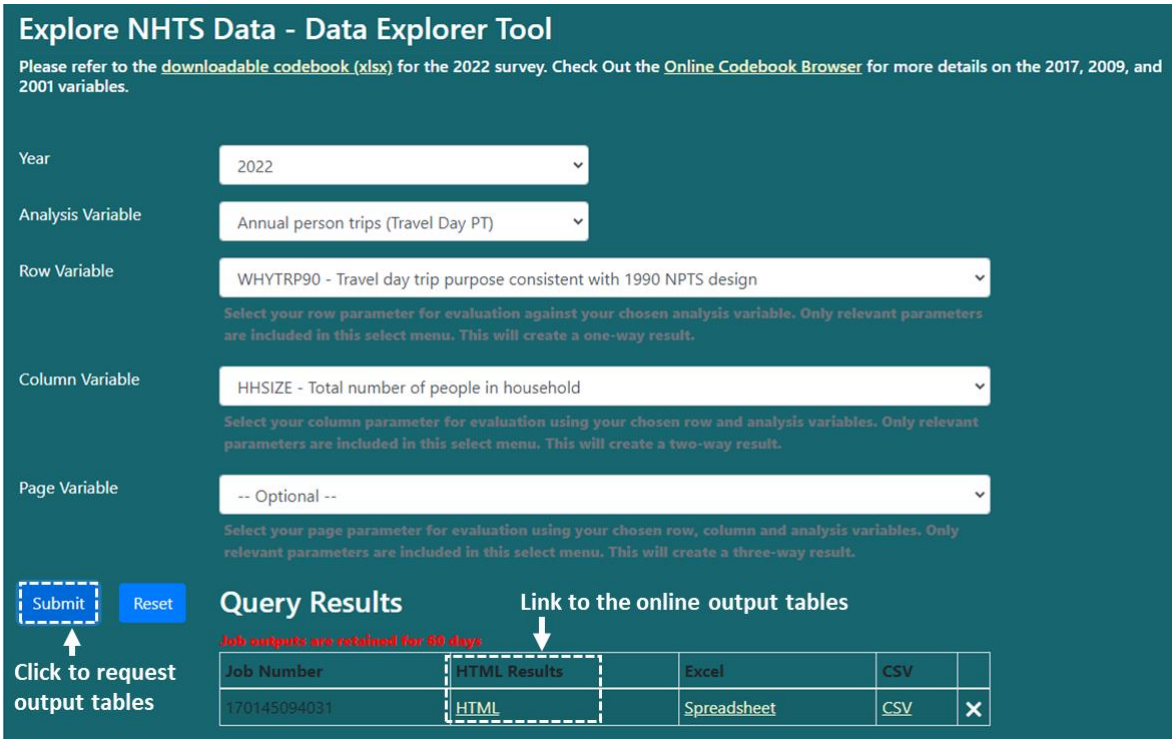


Figure 6. Request and access output tables.

For this example, the NHTS-DE automatically generates following three tables:

- Table 1 (in Figure 7) shows weighted totals for the person trips (annualized) by trip purpose (i.e., *WHYTRP90*) and by household size (i.e., *HHSIZE*).
- Table 2 (in Figure 8) shows the sample size of the query.
- Table 3 (in Figure 9) shows the margin of error.

Under each table, the citation for the data source is provided.

2022 NHTS
PT
2022 National Household Travel Survey
WTTRDFIN_sum

	HHSIZE				
	1.0	2.0	3.0	4+	TOTAL
WHYTRP90					
Medical/Dental	1,193,126,572.21	2,841,018,075.76	1,501,698,295.65	2,239,720,045.98	7,775,562,989.61
Other	478,823,683.02	1,206,434,271.17	751,901,419.59	1,949,084,883.84	4,386,244,257.62
Other Family/Personal Business	3,437,804,168.36	9,474,157,974.03	6,202,561,693.29	14,671,730,460.92	33,786,254,296.59
Other Social/Recreational	7,767,717,981.14	16,992,967,827.94	9,719,442,936.45	20,568,618,439.12	55,048,747,184.64
Refused / Don't Know	20,458,738.33	22,350,508.56	144,504,778.57	89,164,108.17	276,478,133.62
School/Church	886,583,445.89	3,043,034,334.62	4,086,816,455.35	19,898,057,690.54	27,914,491,926.39
Shopping	5,931,492,169.91	14,299,041,427.46	7,192,568,278.17	11,509,742,025.65	38,932,843,901.18
To/From Work	4,657,893,899.49	13,270,398,464.81	9,202,736,284.40	16,054,137,163.54	43,185,165,812.24
Visit Friends/Relatives	1,829,576,626.64	4,496,580,125.53	2,530,818,539.81	3,986,354,371.34	12,843,329,663.31
Work-Related Business	1,137,092,784.19	1,861,951,351.55	2,090,646,479.16	2,476,980,849.30	7,566,671,464.20
TOTAL	27,340,570,069.17	67,507,934,361.42	43,423,695,160.43	93,443,590,038.39	231,715,789,629.41

Source: Federal Highway Administration, 2022 National Household Travel Survey (NHTS)
Tabulation created on the NHTS website at https://nhts.ornl.gov

Figure 7. Output Table 1: Annualized person trips (weighted)

2022 NHTS
PT
2022 National Household Travel Survey
Sample Size

	HHSIZE				
	1.0	2.0	3.0	4+	TOTAL
WHYTRP90					
Medical/Dental	183	595	160	213	1,151
Other	85	213	89	128	515
Other Family/Personal Business	527	1,676	787	1,669	4,659
Other Social/Recreational	1,192	3,339	1,098	2,004	7,633
Refused / Don't Know	1	3	13	6	23
School/Church	173	714	509	1,922	3,318
Shopping	996	2,743	842	1,186	5,767
To/From Work	752	1,917	955	1,489	5,113
Visit Friends/Relatives	356	900	250	443	1,949
Work-Related Business	154	383	184	225	946
TOTAL	4,419	12,483	4,887	9,285	31,074

Source: Federal Highway Administration, 2022 National Household Travel Survey (NHTS)
Tabulation created on the NHTS website at https://nhts.ornl.gov

Figure 8. Output Table 2: Sample size

2022 NHTS
PT
2022 National Household Travel Survey
MoE

	HHSIZE				
	1.0	2.0	3.0	4+	TOTAL
WHYTRP90					
Medical/Dental	516,110,885.15	610,843,284.78	600,198,316.58	764,037,551.19	1,246,943,368.40
Other	182,164,022.57	316,116,795.25	381,136,433.12	931,288,754.61	1,066,586,027.42
Other Family/Personal Business	846,252,257.97	1,810,488,847.77	1,353,610,792.30	2,266,026,736.68	3,237,168,515.13
Other Social/Recreational	994,765,966.83	1,549,028,890.95	1,730,478,845.96	2,994,303,435.32	3,733,049,593.49
Refused / Don't Know	40,099,127.12	34,967,032.70	165,605,810.79	82,842,554.87	192,597,617.58
School/Church	320,771,737.30	638,568,548.57	1,157,171,901.10	3,197,726,219.43	3,442,512,585.54
Shopping	1,325,516,575.64	1,767,104,209.84	1,567,952,868.40	2,050,959,136.83	3,293,750,856.57
To/From Work	694,303,890.91	1,654,217,436.86	1,551,849,713.94	2,050,651,906.05	3,002,932,345.27
Visit Friends/Relatives	394,674,094.64	766,078,407.99	911,035,516.67	1,567,470,744.37	1,987,927,525.65
Work-Related Business	388,288,317.74	429,364,634.96	835,867,085.72	836,133,634.35	1,304,383,091.68
TOTAL	2,064,396,908.33	3,289,954,223.38	3,476,021,793.85	5,713,071,385.37	6,004,295,559.35

Source: Federal Highway Administration, 2022 National Household Travel Survey (NHTS)
Tabulation created on the NHTS website at https://nhts.ornl.gov

Figure 9. Output Table 3: Margin of error (MoE)

When analyzing any survey results, it is important to review the unweighted sample distribution to detect any instances where the count of observations in any one cell is fewer than 30 (i.e., below the minimum for statistical testing) prior to using the weighted results. When a small sample size (i.e., with less than 30 observations) is present, users should consider collapsing the categories in the tabulation variables. Implications of analyzing cells with fewer than 30 observations can be assessed using the confidence intervals. The next section includes an example of how to use the MoE table to calculate the confidence interval for a specific cell.

Calculating Confidence Interval using MoE

The weighted survey estimate of total number of annual PT for medical/dental purpose (i.e., WHYTRP90 = Medical/Dental) taken by people that live alone (i.e., HHSIZE=1) is 1,193,126,572.21 (see Figure 7), its corresponding MoE is estimated as 516,110,885.15 (see Figure 9). As a result, the lower and upper bounds of the confidence interval for this particular case can be calculated as follows:

- **Lower bound:** 1,193,126,572.21 − 516,110,885.15 = 677,015,687.06
- **Upper bound:** 1,193,126,572.21 + 516,110,885.15 = 1,709,237,457.36

As the MoE generated by the tool is based on the 95% CI, this MoE estimate allows one to conclude with 95% confidence that the interval 677,015,687.06 to 1,709,237,457.36 contains the estimated number of medical/dental PT by people who live alone.

CHAPTER 6. EXAMPLE APPLICATIONS

This chapter provides two examples that demonstrate how to use the NHTS-DE.

Example 1. Trending the data with 2022, 2017 and 2009 NHTS

Example 1 outlines how to leverage the Year function of the NHTS-DE to create a trending table for Average Vehicle Occupancy (AVO) by Census Division with 2022, 2017, and 2009 NHTS data.

Step 1. Select Year of the Survey data: For a query with multiple years of data, select any year to start with. As an example, *2022* is selected to generate the 2022 data table first.

Step 2. Select Analysis Variables: In this example, *Average Vehicle Occupancy* is selected as the Analysis Variable.

Step 3. Select Tabulation Variables: As the interest is in generating AVO for each Census Division, variable *CENSUS_D* (i.e., Census division classification for the respondent's home address) is selected as the Row Variable, which is the only tabulation variable needed for the example.

Step 4. Click Submit Button: At this point in the process, it is time to generate the output tables. To do so, click the Submit button to request the output tables.

Step 5. Click on the HTML link: To quickly view the output tables online, click on the HTML link within the Query Results table.

For this example, the NHTS-DE automatically generates the default set of three tables: (1) annualized weighted AVO by census division, (2) sample size, and (3) margin of error. Under each table, the citation for the data source is provided.

Step 6. Download the Excel output: To facilitate compiling the results for the final trending table, download the output by clicking on the Spreadsheet link within the Query Results table. The default name for the Excel download is the job number of the query. It is recommended the user save the excel file using a more recognizable name showing the key query variables and the year of data used for the download (e.g., avo_censusD_2022).

Figure 10 shows what the NHTS-DE should look like after following steps 1–6.

Step 7. Reset the tool to generate data for 2017: After generating the tables for AVO by Census Division with the 2022 NextGen NHTS, reset the tool by clicking the Reset button. Select *2017* as the Year of the survey data and repeat steps 2–6 to generate the output for 2017.

Step 8. Reset the tool to generate data with 2009: Once the 2017 results are downloaded, reset the tool for the final year of the series. Select *2009* as the Year of the survey data and repeat steps 2–6 to generate the output for 2009.

Step 9. Compile outputs in Excel for the final trending table: Use the output spreadsheets to create the trending table in Excel.

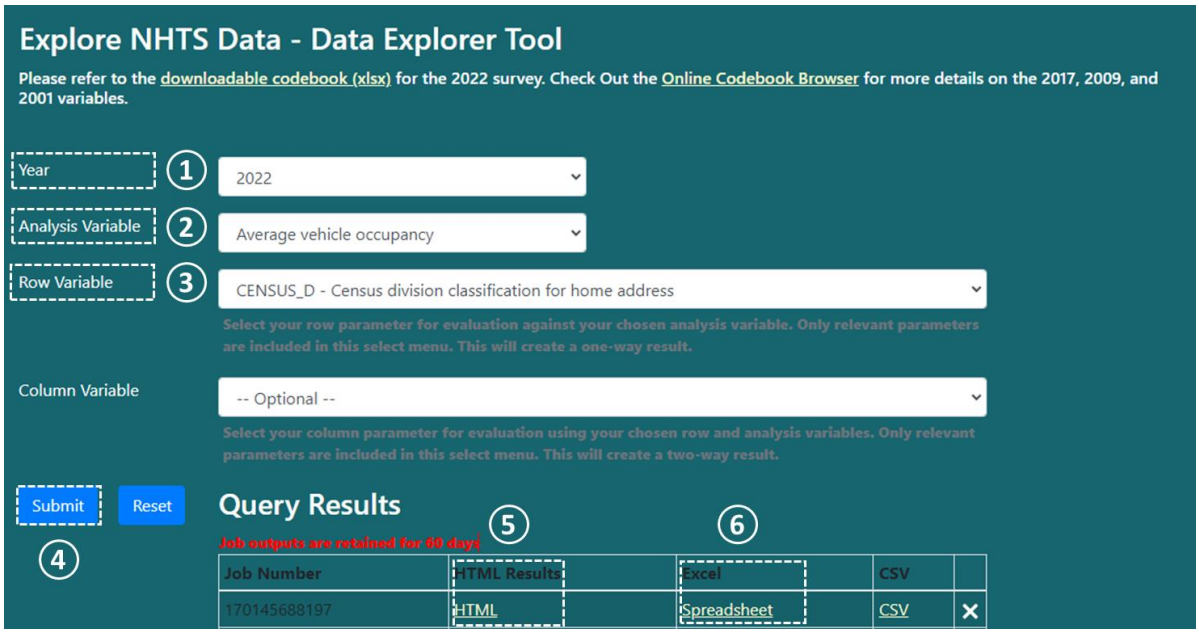


Figure 10. Query selections based on step 1–6 for example 1.

For this analysis, each year's Excel output consists of three tabs and each tab contains one of the three default tables, indicated by the tab name. Figure 11 shows the Excel output for the query using the 2009 NHTS.

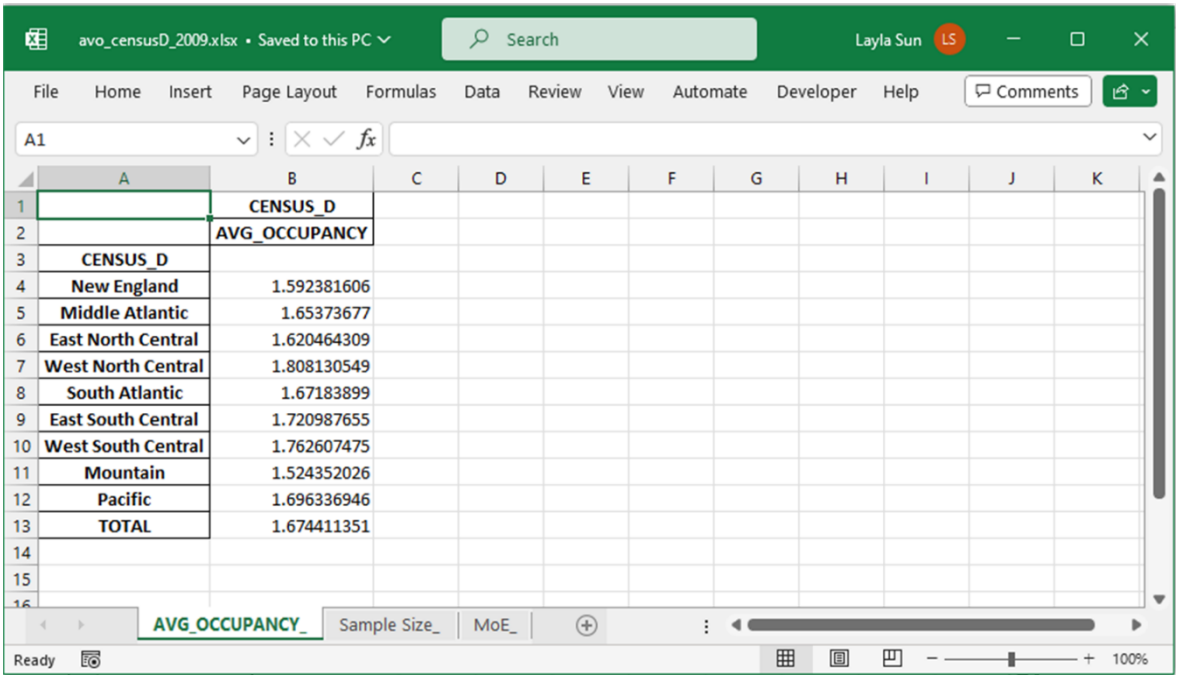


Figure 11. Excel output for AVO by Census Division for 2009.

To create the trending data table for AVO by Census Division over the three survey years, manually compile the weighted average occupancy table from the first tab of each Excel output and apply any desired formatting adjustments to the combined table. Table 1 shows a sample trending table, displaying AVO by Census Division for 2009, 2017, and 2022, based on the Excel outputs generated by the NHTS-DE.

Table 1. Sample trending table for AVO by Census Division in 2009, 2017, and 2022

Census Division	AVO by Year		
	2009	2017	2022
New England	1.59	1.62	1.28
Middle Atlantic	1.65	1.75	1.51
East North Central	1.62	1.59	1.49
West North Central	1.81	1.70	1.88
South Atlantic	1.67	1.65	1.54
East South Central	1.72	1.75	1.37
West South Central	1.76	1.62	1.56
Mountain	1.52	1.71	1.58
Pacific	1.70	1.70	1.45
TOTAL	1.67	1.67	1.52

Source: Federal Highway Administration, 2009, 2017, and 2022 National Household Travel Survey (NHTS). Tabulation created on the NHTS website at https://nhts.ornl.gov.

Example 2. Creating a table using all three tabulation variables

Example 2 demonstrates how to use the NHTS-DE to obtain a table showing the total number of workers by days per week worked from home and by respondent sex (i.e., female or male) with a geographical focus on those living in the urban area, with the 2022 NextGen NHTS data.

Step 1. Select Year of the Survey data: Select *2022* as the Year of the survey data.

Step 2. Select Analysis Variable: Based on the query, *Workers* should be selected as the Analysis Variable.

Step 3. Select Tabulation Variables: Three aspects of workers are being considered: number of days per week worked from home, respondent sex (imputed), and households in urban area. So, all three Tabulation Variables need to be specified as follows:

- **Row Variable:** *WKFMHM22* – Days per week worked from home.
- **Column Variable**: *R_SEX_IMP* – Respondent sex (imputed).
- **Page Variable**: *URBRUR* – Household in urban/rural area.

Step 4. Click Submit Button: To do generate the query output based on the selections above, click the Submit button.

Step 5. Click on the HTML Link: To quickly view the output tables online, click on the HTML link within the Query Results table.

Figure 12 shows what the NHTS-DE should look like after following steps 1–5.

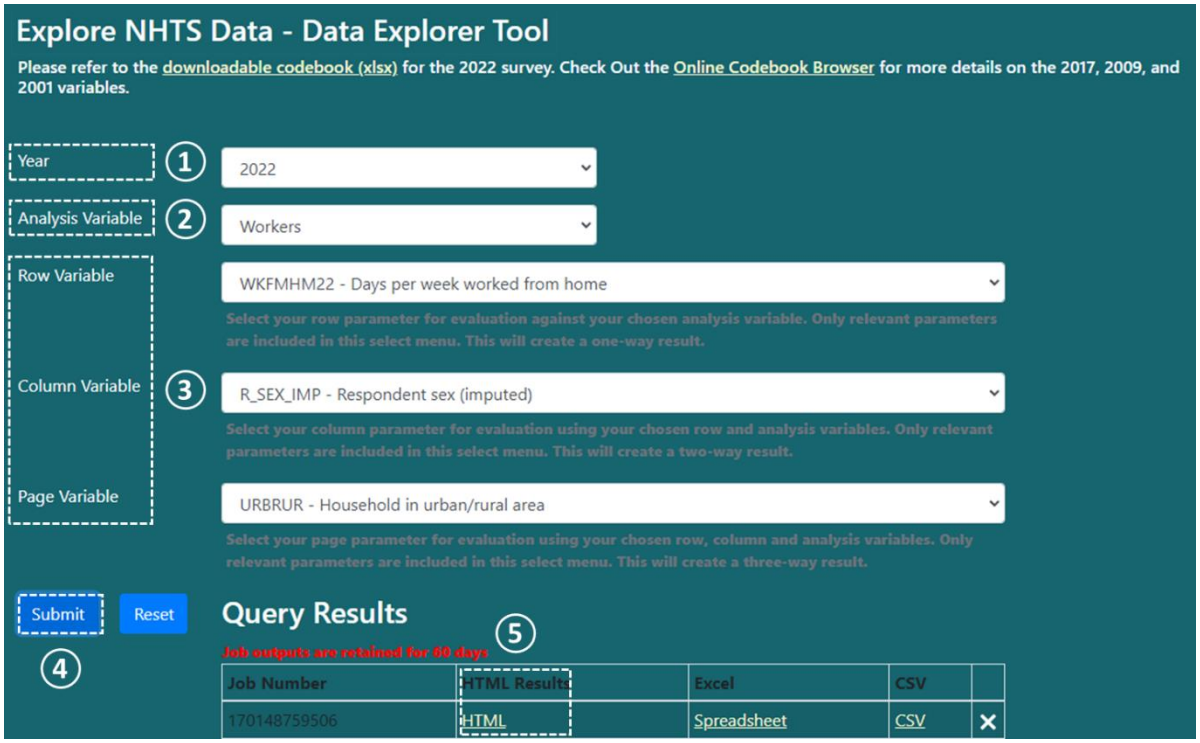


Figure 12. Query selections based on step 1–5 for example 2.

The HTML output for this query produces the following six tables – one default set of three tables, summarizing the Analysis Variable by Row and Column Variables for each category of the Page Variable, *URBRUR*:

- **For workers living in urban area (i.e., URBRUR: Urban):**
  - Weighted total number of workers by days per week worked from home and by imputed respondent sex (i.e., female or male).
  - Sample size table.
  - MoE table.

- **For workers living in rural area (i.e., URBRUR: Rural):**
  - Weighted total number of workers by days per week worked from home and by imputed respondent sex (i.e., female or male).
  - Sample size table.
  - MoE table.

As the analysis focuses on workers living in urban areas, the first three tables (as shown in Figure 13) will be used. Also, the analysis can be extended to compare the results between workers living in urban and rural areas.

2022 NHTS
Workers
2022 National Household Travel Survey
WTPERFIN_sum
URBRUR: Urban

	R_SEX_IMP		
	Female	Male	TOTAL
WKFMHM22			
Never	36,544,107.14	40,988,792.52	77,532,899.66
Five or more days a week/ Entire work week	13,629,386.34	12,830,761.79	26,460,148.14
One or two days a week	7,125,709.40	8,493,422.38	15,619,131.78
Three or four days a week	4,268,544.00	4,795,013.71	9,063,557.71
TOTAL	61,567,746.88	67,107,990.41	128,675,737.29

Source: Federal Highway Administration, 2022 National Household Travel Survey (NHTS)
Tabulation created on the NHTS website at https://nhts.ornl.gov

2022 NHTS
Workers
2022 National Household Travel Survey
Sample Size
URBRUR: Urban

	R_SEX_IMP		
	Female	Male	TOTAL
WKFMHM22			
Never	1,632	1,759	3,391
Five or more days a week/ Entire work week	719	722	1,441
One or two days a week	446	502	948
Three or four days a week	252	275	527
TOTAL	3,049	3,258	6,307

Source: Federal Highway Administration, 2022 National Household Travel Survey (NHTS)
Tabulation created on the NHTS website at https://nhts.ornl.gov

2022 NHTS
Workers
2022 National Household Travel Survey
MoE
URBRUR: Urban

	R_SEX_IMP		
	Female	Male	TOTAL
WKFMHM22			
Never	2,997,484.59	3,176,126.55	4,057,582.84
Five or more days a week/ Entire work week	1,679,269.17	1,621,318.20	2,265,647.47
One or two days a week	895,114.35	1,118,068.52	1,393,667.76
Three or four days a week	717,467.58	894,918.67	1,128,789.83
TOTAL	3,341,464.28	3,536,395.68	4,046,122.18

Source: Federal Highway Administration, 2022 National Household Travel Survey (NHTS)
Tabulation created on the NHTS website at https://nhts.ornl.gov

Figure 13. Sample output tables for analysis focused on workers living in urban area.

Note: When Page Variable is used for any query with any year of survey data, it is recommended to review all the sample size tables to detect any instances with small sample size (i.e., less than 30 observations) as they tend to occur when Page Variable is involved.