Commuting to Work Module in the American Housing Survey: User Guide

LAST UPDATED: MAY 2019

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
U.S. CENSUS BUREAU
U.S. DEPARTMENT OF COMMERCE

Contents

List of Exhibits

Useful Links

About the AHS:	https://www.census.gov/programs-surveys/ahs.html
AHS Data:	https://www.census.gov/programs-surveys/ahs/data.html
Using the AHS Data:	https://www.census.gov/programs-surveys/ahs/tech-documentation/help-guides/puf_start.html
AHS Codebook:	https://www.census.gov/data-tools/demo/codebook/ahs/ahsdict.html
AHS Questionnaire:	https://www2.census.gov/programs-surveys/ahs/2017/2017%20AHS%20Items%20Booklet.pdf
Technical Documentation:	https://www.census.gov/programs-surveys/ahs/tech-documentation.html
Table Creator:	https://www.census.gov/programs-surveys/ahs/data/interactive/ahstablecreator.html

Note: The links above may become outdated with time, because the Census Bureau may move the locations of the pages.

1. Overview

The American Housing Survey (AHS) is a longitudinal survey of housing units sponsored by the U.S. Department of Housing and Urban Development (HUD) and conducted by the U.S. Census Bureau. Using computer-assisted interviewing, the Census Bureau collects data every two years from residents of a nationally representative sample of approximately 50,000 housing units as well as oversamples of approximately 30,000 housing units in the 15 largest metropolitan areas; also included in the sample are about 5,200 HUD-assisted rental housing units. This allows for estimation not only at the national level, but for those 15 metropolitan areas and HUD-assisted units as well. The survey asks detailed questions about the housing unit—such as building type and age, number of bedrooms, equipment and appliances, housing costs, and problems with the unit—as well as about the households living in the units, including the number of people and their age, sex, race, and ethnicity.

Each AHS survey also includes two modules dealing with topical issues; in 2017, the AHS included a rotating topical module, **Commuting to Work**. This guide provides potential users information on how the commuting module was conducted, the questions asked, and how to access and analyze the data.

From 1997 until 2011, the core AHS questionnaire contained a Journey to Work module that collected information on commuting. That module gathered commuting information on more household members than the new Commuting to Work module does, while the new module collects more information on modes and costs of commuting.

2. How the Commuting to Work Module Was Collected

HUD and the Census Bureau split the AHS sample into two equal-sized subsamples, each of which is designed to represent the housing stock, and the usual practice is to assign a topical module of only one of the subsamples. The character variable *SPLITSAMP* indicates to which subsample a case belongs; in the case of the commuting module, *SPLITSAMP* = 1.[1] The variable INTSTATUS indicates which of three types of interviews was conducted: occupied interviews ("1"), usual residence elsewhere interviews ("2"), and vacant interviews ("3"). The *Commuting to Work* module was only asked during "occupied interviews"—that is, where *INTSTATUS* = 1. The Census Bureau provides special weights for each split sample; users analyzing data from the commuting module should use *SP1WEIGHT*.

Commuting data were collected only for the person who answered the AHS survey; that is, *RESPONDENT* = 1. For some AHS variables, such as *RACE*, the survey asks the respondent for information on everyone living in the household, but in the case of commuting, only data on the respondent were collected. There were two other limitations on the population for whom commuting data were collected: respondents unrelated to the reference person in the household were not asked questions from this module (in AHS terms, REL not in {12…17}), and the respondent had to have worked sometime in the 12 months before the interview (in AHS terms, *INCWORK* = 1). The *INCWORK* variable is only asked of respondents aged 16 years or older, which automatically screens respondents based on age. (*INCWORK* is not in the AHS file available to the public.)

---

[1] In this user's guide, variable and file names are in capital letters.

Exhibit 2.1. Conditions for Being Asked the Commuting to Work Module

SPLITSAMP="1" AND INTSTATUS="1" AND RESPONDENT="1" AND REL ≠ (12 through 17) AND INCWORK="1"

The variable SP1WEIGHT should be used to weight these data.

It should be noted that the householder is not always the same person as the respondent, and the characteristics of the householder may be different from those of the respondent.[2] For example, the employment status, gender, age, highest level of education, race and ethnicity, marital status, and citizenship status of the respondent may all be different from the householder, and thus his or her commuting patterns may be different. For the Commuting to Work module, the respondent was different from the householder in 16 percent of households.

3. The Commuting to Work Module Questionnaire and Variables

The Commuting to Work module focused on how far the respondent commuted, how he or she commuted, and the costs of commuting. The AHS questionnaire, including the questions in this module, is available at https://www2.census.gov/programs-surveys/ahs/2017/2017%20AHS%20 Items%20Booklet.pdf. Appendix A maps the commuting questions asked to the 20 variables in the public use file (PUF). Details on all 20 variables are available in the AHS Codebook at https://www.census.gov/data-tools/demo/codebook/ahs/ahsdict.html. In the Codebook, use the "Filter By" menu to select the 2017 survey year, the Commuting topic, and the General, Vehicle, and Public Transportation subtopics. The Codebook lists a 21st variable, *DIST_IUF*, that is found in the internal use file (IUF) that is available only at the Census Bureau; it is the same as the *DIST* variable (round-trip commute distance) but provides the answer in actual miles rather than in one of 18 mileage categories.

4. The Commuting to Work Module Data

The AHS data can be downloaded at https://www.census.gov/programs-surveys/ahs/data.html.[3]

4.1. SAS© Format

Because the AHS collects data at a variety of levels (i.e., household, person, mortgage, home improvement projects), the data are released in SAS© format in a relational file structure; that is, the data are arranged in different datasets depending on their relation to the main data file. The main data file is the *HOUSEHOLD* file, which consists of all household- and housing unit-level data. This file includes the variables from the Commuting to Work module.

---

[2] The Census Bureau characterizes some households using data on all household members, providing information on household size, the presence or absence of children, or family status, for example. For other characteristics, such as age or race, the Census Bureau takes characteristics from one individual. Known as the householder, this person is any responsible member of the household competent enough to answer questions about the household. In a traditional household with two adults and one or more children, the householder could be either of the adults.

[3] See *Getting Started with the AHS: 2015 and Beyond,* available at https://www.census.gov/programs-surveys/ahs/tech-documentation/help-guides/2015-later/puf_start.html.

The other data files available in the SAS© format are the *PERSON* file, which consists of data on all persons living in the household; the *PROJECT* file, which provides information on each home improvement project undertaken by the household in the last two years; and the MORTGAGE file (not yet released), which includes information on each mortgage or similar debt owed by the household. For each case in the *HOUSEHOLD* file, there may be multiple records in the *PERSON* and *PROJECT* files all connected by the *CONTROL* variable.

4.2. CSV Format

The Census Bureau and HUD also release the AHS PUF in three CSV files (*HOUSEHOLD*, *PERSON*, and *PROJECT*), with the fourth file, *MORTGAGE*, not yet released; the Commuting to Work module data are available in the *HOUSEHOLD* file.

The coding of the CSV file is slightly different for the "Not Applicable" and "Not Reported" categories. The "Not Applicable" category means that the respondent was not in the universe for a specific question (e.g., *DRIVEOTH* was asked of only those who responded with "Yes" to *DRIVEOWN*, so those saying "No" to *DRIVEOWN* would be coded as "Not Applicable" in *DRIVEOTH*). In the SAS© file, "Not Applicable" is coded as ".N" and in the CSV file as "-9." Similarly, the "Not Reported" category indicates that the respondent was eligible to be asked that item but did not provide a response for it. In the SAS© file, "Not Reported" is coded as ".M" and in the CSV file as "-6."

4.3. Flat File Structure

The AHS data are also available in both SAS© and CSV format as flat file structures, which means that all the data from *HOUSEHOLD*, *PERSON*, *PROJECT*, and *MORTGAGE* (when available) are combined in one file. For example, if, in the flat file structure, a household has three persons, then the *RACE* variable from the *PERSON* table in the relational file structure will be flattened and appear as *RACE1*, *RACE2*, and *RACE3* in the flat file; the number appended to *RACE* reflects the number of the person. The same convention is used for the *MORTGAGE* and *PROJECT* tables.

4.4. Internal Use File (IUF)

An IUF is also available in SAS© format, but it can be used only at Census Data Centers. Users must apply for permission to use the file and comply with various Census Bureau requirements regarding data use. For more details, see https://www.census.gov/programs-surveys/ahs/tech-documentation/help-guides/ahs_IUF.html.

5. Analyzing the Commuting to Work Module Data

The Census Bureau releases a set of tables with counts for each AHS module. These tables, including crosstabulations with householder demographic and home characteristic variables, can be accessed using the Table Creator on the Census Bureau's website at https://www.census.gov/ programs-surveys/ahs/data/interactive/ahstablecreator.html. Instructions for using the Table Creator appear on the opening screen.

While the Table Creator allows the data user to access a set of pre-programmed tables with these data, users may also be interested in creating crosstabulations that are not already available. For example, a data user might be interested in looking at how the mode of commuting or the commute distance—which are available from the commuting module—relate, among recent movers, to their assessment of their new

neighborhood in comparison to their previous neighborhood (which is asked as part of the core AHS survey). To do this, the data user will need to use the PUF to create custom tables.

Exhibit 5.1 contains an example of code in SAS© that will allow the user to create a crosstabulation of the number of respondents using each mode or type of commute (*COMTYPE*) by their satisfaction with their current neighborhood in comparison to the previous one (*NRATE*).

5.1   Crosstabulation in the Number of Respondents

Exhibit 5.1 Example of SAS© Program (With Output) Using 2017 National PUF

options pagesize=6000 linesize=110 compress=binary nocenter MPRINT MLOGIC NODATE NONUMBER;

libname OUT 'C:\AHS_DATA';

ods HTML file="C:\AHS_DATA\Topical Study.XLS";

*Commute Type by Satisfaction with Current Neighborhood in Comparison to Previous Neighborhood;

*(# of respondents);

/*NOTE: This Code assumes that AHS data ahs2017n exist in the folder C:\AHS_DATA and the OUTPUT excel sheet will go to the same folder*/

Title "Cross tab of comtype and nrate from the AHS2017n data where SPLITSAMP=1"; RUN;

proc Freq data=ahs2017n (where= (SPLITSAMP='1'));

table comtype*nrate/missing nocol norow nopercent;Weight SP1WEIGHT;run;

ODS HTML CLOSE;

ODS LISTING;

Following is the output from the above code.

COMTYPE (Flag indicating mode(s) of transportation used to commute to work)	NRATE (Rating of current neighborhood)						
	1	2	3	4	M	N	Total
0	579814	197348	477383	60229.4	16215.6	3995209	5326199
1	5760419	1561205	5286183	542517	183536	3.56E+07	4.89E+07
2	232193	44662.5	283053	52611.7	3443.58	1696473	2312437
3	712054	238836	732877	78889.1	42943.9	3793708	5599308
4	444678	135061	364437	34796.5	13064.6	1597033	2589070
5	472721	58778.9	376504	26111.7	10857.1	3166805	4111778
6	110866	54838.1	201418	16278.2	0	557508	940907
M	100919	17772	75444.6	0	137420	813298	1144854
N	3964217	1078261	3634848	484607	655154	5.67E+07	6.65E+07
Total	1.24E+07	3386763	1.14E+07	1296040	1062635	1.08E+08	1.37E+08

Note: The Census Bureau provides a SAS format syntax file that labels the values for each variable in the dataset. It is available in the AHS 2017 Value Labels Package at https://www.census.gov/programs-surveys/ahs/data/2017/ahs-2017-public-use-file--puf-/ahs-2017-national-public-use-file--puf-.html.

6. Uniqueness of the AHS in Commuting Research

The Commuting to Work module data is unique because it allows researchers to combine information on housing units and housing choices with information on commuting. For example, how does the cost of commuting factor into choosing a home and the cost of the home? Or, do those who choose a neighborhood because of shorter commutes end up actually having shorter commutes compared to the average?

A scan of the literature on commuting reveals that researchers have not made extensive use of the commuting data in the AHS before 2011 but, to the extent that they have used it, they have utilized the unique power of the AHS data. Examples of research that has used AHS commuting data include:

- A study of factors related to residential infiltration of pollutants to the indoor environment for 94 core-based statistical areas. The analyses created clusters using data on characteristics of homes (e.g., presence of air conditioning, home size, year home built) available in the AHS and used the commuting data collected in the AHS (e.g., in-vehicle commuting time, distance).[4]

- A 2009 National Association of Home Builders special study analyzing the commuting data in the AHS within the context of how different types of households choose neighborhoods and homes.[5]

- A HUD-sponsored paper analyzing the relationship between the housing stock and commuting patterns.[6]

- A study comparing the characteristics of SUV and light-truck commuters to their car-driving counterparts to explore the impact of explanatory variables, such as income and housing value, on using one type of vehicle versus the other.[7]

The AHS data, in short, allow researchers to examine in more depth the relationships between commuting (e.g., modes, time, cost) and a variety of household, home, and neighborhood characteristics. Other datasets may offer more information on different household members or details on specific jobs or trips, but the AHS is unique in that it allows for an in-depth analysis of commuting behaviors in conjunction with how people live.

7. Other Datasets on Commuting

The Census Bureau's American Community Survey (ACS) and Survey of Income and Program Participation (SIPP) also collect data on commuting. Other Federal agencies that collect commuting data

---

[4] Baxter, L. K., & Sacks, J. D. (2014). Clustering cities with similar fine particulate matter exposure characteristics based on residential infiltration and in-vehicle commuting factors. *The Science of the Total Environment,* 470–471, 631–638.

[5] Emrath, P., & Siniavskaia, N. (2009). Household type, housing choice, and commuting behavior. *Housing Economics,* Special Studies. Retrieved from https://www.nahbclassic.org/generic.aspx?genericContentID=129785.

[6] Blake, K. S., & Cowart, W. (2005, November 20). Commuting Patterns and the Housing Stock. Report for the U.S. Department of Housing and Urban Development.

[7] Plaut, P. O. (2004). The uses and users of SUVs and light trucks in commuting. *Transportation Research Part D: Transport and Environment, 9* (3), 175–183.

include the Federal Highway Administration's National Household Travel Survey (NHTS) and the U.S. Bureau of Labor Statistics' American Time Use Survey (ATUS).

The ACS and SIPP provide data annually; the ACS provides commuting data for all eligible persons living in the household, and the SIPP provides further details by collecting commuting information for each eligible person in the household for each job to which they commute (for up to seven jobs). The ATUS is also collected annually and provides commuting information on the survey respondents. The NHTS is, however, implemented once every eight years (as of 2001) and provides information on commuting trips for all eligible persons living in the household.

The AHS and SIPP collect commuting information for a "typical week," while the ACS and NHTS collect this information for the "last week"; the ATUS collects time-use information for a 24-hour time period beginning at four a.m. the day before the survey interview.

Appendix A

The Commuting to Work Questionnaire

The 2017 AHS asked the following questions as a part of the Commuting to Work module. Note that the variable names provided with the question wording are the names of the variables in the AHS questionnaire. Where the names in the questionnaire are different from the names in the dataset, the variable name in the dataset is provided in a grey box next to that item.

CMTINTRO The next questions are about commuting and how people get to work, how long it takes, and any associated costs.
1. Enter 1 to continue

COMDAYS How many days do you leave your home to go to work in a typical week?

DRIVESELF In a typical work week, how many days do you drive from home ALL the way to work?

DRIVESELF is called DRIVEALL in PUF

DRIVEOWN In a typical work week, do you drive a company vehicle that you take home for personal use?

DRIVEOWN is called COMPANYCAR in PUF

1. Yes
2. No

DRIVEOTH Do you drive your own vehicle for a portion of your commute?

1. Yes
2. No

DRIVEOTH is called *DRIVEPART* in PUF

Combined to create CARPOOL in PUF.

CARPOOL In a typical work week, do you carpool to work?
1. Yes
2. No

POOLNUM How many people are typically in your carpool?
(Read as necessary: The driver and riders do not need to have the same final destination to be considered a carpool.)
Enter 1–998
Respondents should include themselves in the carpool number.

POOLAMT What is your typical weekly carpool fee?
Enter 0–998

DIST On a typical day, approximately how many ROUND-TRIP miles do you drive VEHICLE for your commute?

Combined to create PARKING in PUF.

PARKCOST During your commute, do you pay for parking?
    1. Yes
    2. No

PARKAMT How much do you spend on parking in a typical week?
Enter 998 if $998 or more.

Combined to create *TOLL* in PUF.

TOLLCOST During your commute, do you pay a toll to use a road?
Yes
No

TOLLAMT How much per week?
Enter 1–998

PUBTRANS Do you use any of the following as part of your commute?
Enter all that apply.
                                            Disaggregated as BUS, SUBWAY, and VAN in PUF
    1. Public bus
    2. Subway, commuter rail, light rail, or trolley car
    3. Commuter van or commuter bus
    4. None

Combined to create *TOLL* in PUF.

TRANSUB Does your employer provide you a subsidy for your public transportation costs?
    1. Yes
    2. No

SUBSIDY2 Does that subsidy typically cover all your public transportation costs for commuting?
    1. Yes
    2. No

TRANAMT Thinking only about your weekly commuting costs, how much do you spend out of pocket each week on your public transportation cost?
Enter 0–998

TAXI In a typical week, do you use a taxi, cab, or car service, such as Uber or Lyft, as part of your commute?
    1. Yes
    2. No

    TAXIAMT What is your weekly taxi or car service expense?

FERRY In a typical week, do you use a ferry as part of your commute?
    1. Yes
    2. No

    FERRYAMT What is your weekly ferry expense?

WALK In a typical week, do you walk from home all the way to work?
    1. Yes
    2. No

BIKE In a typical week, do you bike from home all the way to work?
    1. Yes
    2. No

Source: https://www2.c ensus.gov/programs-surveys/ahs/2017/2017%20AHS%20Items%20Booklet.pdf

U.S. Department of Housing and Urban Development

Office of Policy Development and Research

Washington, DC 20410-6000