

TUTORIAL 7.2 | HISTORICAL CENSUS DATA

Goals

- Download and use historical census data.
- Learn how to use the IPUMS platform.

Introduction

Using IPUMS, a database of census and other types of social data maintained by the University of Minnesota. IPUMS has census records dating back to 1790, in the US and in other countries. The records have been “harmonized” to correspond with contemporary shapefiles – typically the 2000 or 2010 shapefile for older records. The farther back you search, the less likely that you’ll find fine-grained data for an area, but IPUMS has census tract level data for some variables dating back decades, and even more extensive county level data

For this tutorial, we’ll be looking at historical commuter data – specially, method of transportation to work. This data is available at the census tract level dating back to 1960. The data is available for each decade, but we’ll look at the change in 20 year increments: 1960, 80, 2000, and 2020. You’ll need a separate shapefile for each of these years, and since IPUMS data are only available for the entire country you’ll need to downsize the spreadsheets and shapefiles for each year as well. In the end you’ll have an extensive dataset of commuter change across the country, which you’ll reduce to only your city.

As with other census data, you’ll need to make sure that the GEOIDs for the spreadsheet and shapefile match and can be joined.

Step 1: Create a Free IPUMS NHGIS account.

The account and data are free for educational and research purposes.

<https://www.nhgis.org/>

Once you've created the account, login to the NHGIS website.

Step 2: Filter NHGIS tables by variable and geography.

You might not know at first which data table specifically you're looking for, or even what kinds of data are available for which years and geographical levels. I like to start by filtering by geographic level, and then by topic, and lastly by year. You'll see that each filter helpfully reduces the options for the next – for instance, once you select a geography and topic, only the years with that information available show up in the filter list.

2a Click **"Get Data"**, the green button on the NHGIS home page. Clicking **"Select Data"** at the top will also work.

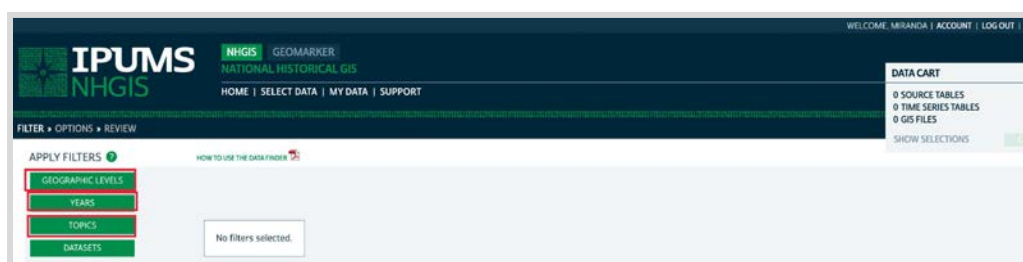


2b You will see the NHGIS search page. To show the tables we'll use, apply the following filters by clicking green plus symbol beside each filter:

Geography Level: census tract

Topic: Under "Population", scroll down and select "Journey to Work"


Year: select 1960, 1980, 2000, and 2020















GEOGRAPHIC LEVELS

Selected geographic levels will be used as defaults when adding tables to the Data Cart. ?
Dimmed choices are not available given your other filter selections.

SELECTED GEOGRAPHIC LEVEL FILTERS









































☒  Census Tract (by State--County)

SHOW COMPOUND GEOGRAPHIC LEVELS ?

MOST POPULAR	
ALL	NATION  Nation
STANDARD LARGE AREA UNITS	STATE  State
SMALL AREA STATISTICAL UNITS	COUNTY  County (by State)
PLACES / CITIES	CENSUS TRACT  <input checked="" type="checkbox"/> Census Tract (by State--County)
COUNTY SUBDIVISIONS	BLOCK GROUP  Block Group (by State--County--Census Tract)
METROPOLITAN AND URBAN / RURAL	BLOCK  Block (by State--County--Census Tract)
ZIP CODE AREAS	COUNTY SUBDIVISION  County Subdivision (by State--County)
SCHOOL AREAS	PLACE  Place (by State)
LEGISLATIVE / ELECTION AREAS	CONSOLIDATED CITY  Consolidated City (by State)
	CORE BASED (METROPOLITAN/MICROPOLITAN) STATISTICAL AREA [2003-PRESENT]  Metropolitan Statistical Area/Micropolitan Statistical Area
	METROPOLITAN STATISTICAL AREA/CONSOLIDATED METROPOLITAN STATISTICAL AREA [1990-2000]  Metropolitan Statistical Area/Consolidated Metropolitan Statistical Area
	URBAN AREA [1970-PRESENT] 

CANCEL **SUBMIT**

TOPICS

	 Relationship to Householder
	 Children in Households
	Same-Sex Couples
	 Household and Family Size
	 Unrelated Individuals
	 Group Quarters
	EDUCATION
	 Educational Attainment
	School Enrollment
	Type of School
	Literacy
	EMPLOYMENT AND COMMUTING
	 Labor Force and Employment Status
	 Military Service
	Occupation and Industry
	Class of Worker
	Usual Hours and Weeks Worked
	Place of Work
	 <input checked="" type="checkbox"/> Journey to Work
	INCOME
	Personal Income
	 Household and Family Income
	 Per Capita Income
	 Poverty (Income Relative to Poverty Level)
	Public Assistance
	Income Inequality
	DISABILITY
	Disability

YEARS

Dimmed choices are not available given your other filter selections.

DECENNIAL YEARS	NON-DECENNIAL YEARS	5-YEAR RANGES
<input checked="" type="checkbox"/> 2020	<input type="checkbox"/> 2021	<input type="checkbox"/> 2017-2021
<input type="checkbox"/> 2010	<input type="checkbox"/> 2019	<input type="checkbox"/> 2016-2020
<input checked="" type="checkbox"/> 2000	<input type="checkbox"/> 2018	<input type="checkbox"/> 2015-2019
<input type="checkbox"/> 1990	<input type="checkbox"/> 2017	<input type="checkbox"/> 2014-2018
<input checked="" type="checkbox"/> 1980	<input type="checkbox"/> 2016	<input type="checkbox"/> 2013-2017
<input type="checkbox"/> 1970	<input type="checkbox"/> 2015	<input type="checkbox"/> 2012-2016
<input checked="" type="checkbox"/> 1960	<input type="checkbox"/> 2014	<input type="checkbox"/> 2011-2015
<input type="checkbox"/> 1950	<input type="checkbox"/> 2013	<input type="checkbox"/> 2010-2014
<input type="checkbox"/> 1940	<input type="checkbox"/> 2012	<input type="checkbox"/> 2009-2013
<input type="checkbox"/> 1930	<input type="checkbox"/> 2011	<input type="checkbox"/> 2008-2012
<input type="checkbox"/> 1920	<input type="checkbox"/> 2009	<input type="checkbox"/> 2007-2011
<input type="checkbox"/> 1910	<input type="checkbox"/> 2007	<input type="checkbox"/> 2006-2010
<input type="checkbox"/> 1900	<input type="checkbox"/> 2006	<input type="checkbox"/> 2005-2009
<input type="checkbox"/> 1890	<input type="checkbox"/> 2005	
<input type="checkbox"/> 1880	<input type="checkbox"/> 2004	
<input type="checkbox"/> 1870	<input type="checkbox"/> 2003	
	<input type="checkbox"/> 1987	
	<input type="checkbox"/> 1986	
	<input type="checkbox"/> 1985	
	<input type="checkbox"/> 1984	
	<input type="checkbox"/> 1983	
	<input type="checkbox"/> 1982	
	<input type="checkbox"/> 1981	
	<input type="checkbox"/> 1979	
	<input type="checkbox"/> 1978	
	<input type="checkbox"/> 1977	
	<input type="checkbox"/> 1976	
	<input type="checkbox"/> 1975	
	<input type="checkbox"/> 1974	
	<input type="checkbox"/> 1973	
	<input type="checkbox"/> 1972	
	<input type="checkbox"/> 1971	
	<input type="checkbox"/> 1955	
	<input type="checkbox"/> 1954	
	<input type="checkbox"/> 1953	
	<input type="checkbox"/> 1952	
	<input type="checkbox"/> 1951	
	<input type="checkbox"/> 1949	
	<input type="checkbox"/> 1948	
	<input type="checkbox"/> 1947	
	<input type="checkbox"/> 1946	
	<input type="checkbox"/> 1945	
	<input type="checkbox"/> 1944	
	<input type="checkbox"/> 1943	
	<input type="checkbox"/> 1942	
	<input type="checkbox"/> 1941	
	<input type="checkbox"/> 1939	
	<input type="checkbox"/> 1938	
	<input type="checkbox"/> 1923	
	<input type="checkbox"/> 1922	
	<input type="checkbox"/> 1921	
	<input type="checkbox"/> 1919	
	<input type="checkbox"/> 1918	
	<input type="checkbox"/> 1917	
	<input type="checkbox"/> 1916	
	<input type="checkbox"/> 1915	
	<input type="checkbox"/> 1906	
	<input type="checkbox"/> 1886	
	<input type="checkbox"/> 1885	
	<input type="checkbox"/> 1884	
	<input type="checkbox"/> 1883	
	<input type="checkbox"/> 1882	
	<input type="checkbox"/> 1881	
	<input type="checkbox"/> 1879	

3-YEAR RANGES

☐ 2011-2013

APPLY FILTERS HOW TO USE THE DATA FINDER

GEOGRAPHIC LEVELS ☒ **TRACT**

YEARS ☒ **OR** ☐ 1960 ☐ 1980 ☐ 2000 ☐ 2020

TOPICS ☒ **INCLUDES** ☐ Journey to Work

DATASETS

RESET FILTERS

SELECT DATA

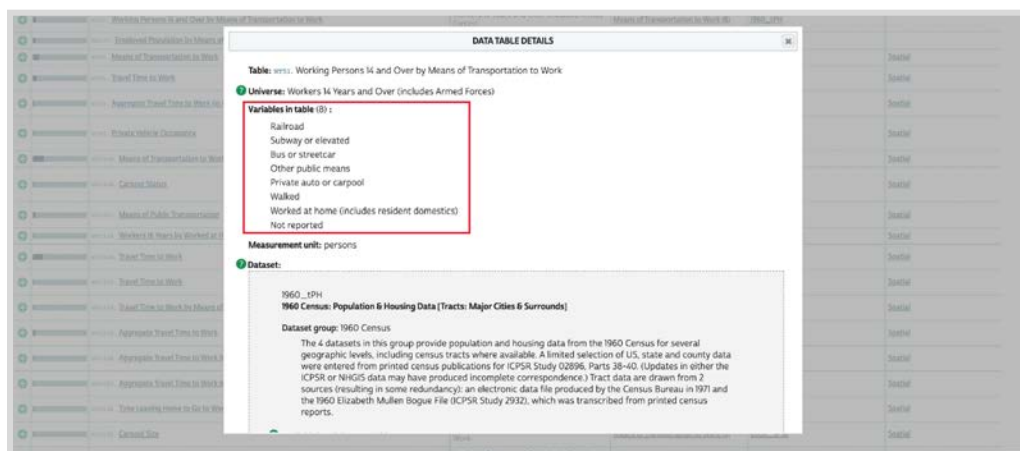
86 SOURCE TABLES **5 TIME SERIES TABLES** **11 GIS FILES**

POPULARITY	TABLE NAME	UNIVERSE	CLASSIFICATIONS	YEAR - DATASET
8153	Working Persons 14 and Over by Means of Transportation to Work	Workers 14 Years and Over (includes Armed Forces)	Means of Transportation to Work (B)	1960_VPH
10977	Employed Population by Means of Transportation to Work (from printed report)	Employed Persons	Means of Transportation to Work (B)	1960_VPH
10947	Means of Transportation to Work	Workers 16 Years and Over	Means of Transportation to Work (B)	1980_STF3
10741	Travel Time to Work	Workers 16 Years and Over Who Did Not Work at Home	Travel Time to Work (B)	1980_STF3
10743	Aggregate Travel Time to Work (in Minutes)	Workers 16 Years and Over Who Did Not Work at Home		1980_STF3
		Workers 16 Years and Over Using Car, Truck		

You should now see a list of around 86 source tables, 5 time series tables, and 11 GIS files returned.

Step 3: Select the tables and GIS files. Download the data.

You'll see that many source tables have similar names. We want only the data about worker commute – not travel time to work, not travel time by type of transportation. To check what kind of data a table has you can click on the Table Name to pull up a window with variables, units, available geographic levels, and some other useful information. Note: when in doubt about which tables to use, check the “popularity” column. The more popular table is usually the safer bet.



3a Click the check mark beside the tables for each decade which relate to work transportation method. You'll see that the variable name changes:

Working Persons 14 and Over by Means of Transportation to Work (1960)

Means of Transportation to Work (1980 and 2000 and 2020)

Note: the tables are automatically sorted in date order, so the 2020 tables will follow several pages of 2000 results.

POPULARITY	TABLE NAME	UNIVERSE	CLASSIFICATIONS	YEAR - DATASET	BREAKDOWNS
<input checked="" type="checkbox"/>	Working Persons 14 and Over by Means of Transportation to Work	Workers 14 Years and Over (includes Armed Forces)	Means of Transportation to Work (8)	1960_1974	
<input checked="" type="checkbox"/>	Employed Population by Means of Transportation to Work from printed report	Employed Persons	Means of Transportation to Work (8)	1960_1974	
<input checked="" type="checkbox"/>	Means of Transportation to Work	Workers 16 Years and Over	Means of Transportation to Work (8)	1980_1973	Spatial
<input checked="" type="checkbox"/>	Travel Time to Work	Workers 16 Years and Over Who Did Not Work at Home	Travel Time to Work (8)	1980_1973	Spatial
<input checked="" type="checkbox"/>	Aggregate Travel Time to Work (in Minutes)	Workers 16 Years and Over Who Did Not Work at Home		1980_1973	Spatial
<input checked="" type="checkbox"/>	Private Vehicle Occupancy	Workers 16 Years and Over Using Car, Truck or Van as a Means of Transportation to Work	Means of Transportation to Work (5)	1980_1973	Spatial
<input checked="" type="checkbox"/>	Means of Transportation to Work	Workers 16 Years and Over	Means of Transportation to Work (7)	2000_SF3a	Spatial
<input checked="" type="checkbox"/>	Carpool Status	Workers 16 Years and Over Using Car, Truck or Van as a Means of Transportation to Work	Means of Transportation to Work (2)	2000_SF3a	Spatial

POPULARITY	TABLE NAME	UNIVERSE	CLASSIFICATIONS	YEAR - DATASET	BREAKDOWNS
<input checked="" type="checkbox"/>	Aggregate Travel Time to Work by Travel Time to Work by Means of Transportation to Work	Workers 16 Years and Over Who Did Not Work at Home	Means of Transportation to Work (2), Travel Time to Work (8)	2000_SF3a	Race/Ethnicity Spatial
<input checked="" type="checkbox"/>	Workers 16 Years and Over Who Did Not Work at Home by Time Leaving Home to Go to Work	Workers 16 Years and Over Who Did Not Work at Home	Time of Departure to Go to Work (4)	2000_SF3a	Race/Ethnicity Spatial
<input checked="" type="checkbox"/>	Workers 16 Years and Over Who Carpool to Work by Carpool Size	Workers 16 Years and Over Who Carpool to Work	Means of Transportation to Work (5)	2000_SF3a	Race/Ethnicity Spatial
<input checked="" type="checkbox"/>	Total Workers 16 Years and Over Who Did Not Commute to Work with a Car, Van, or Truck	Workers 16 Years and Over Commuting to Work by Other Means than Car, Truck, or Van (including Those Who Worked at Home)		2000_SF3a	Race/Ethnicity Spatial
<input checked="" type="checkbox"/>	Workers 16 Years and Over Using Car, Truck or Van as a Means of Transportation to Work by Imputation of Private Vehicle Occupancy	Workers 16 Years and Over Using Car, Truck or Van as a Means of Transportation to Work	Imputation/Allocation (2)	2000_SF3a	Race/Ethnicity Spatial
<input checked="" type="checkbox"/>	Workers 16 Years and Over Who Did Not Work at Home by Imputation of Time Leaving Home to Go to Work	Workers 16 Years and Over Who Did Not Work at Home	Imputation/Allocation (2)	2000_SF3a	Race/Ethnicity Spatial
<input checked="" type="checkbox"/>	Workers 16 Years and Over Who Did Not Work at Home by Imputation of Travel Time to Work	Workers 16 Years and Over Who Did Not Work at Home	Imputation/Allocation (2)	2000_SF3a	Race/Ethnicity Spatial
<input checked="" type="checkbox"/>	Means of Transportation to Work by Travel Time to Work	Workers 16 years and over who did not work from home	Means of Transportation to Work (10), Travel Time to Work (8)	2018_2020_ACS5a	Spatial
<input checked="" type="checkbox"/>	Aggregate Travel Time to Work (in Minutes) of Workers by Travel Time to Work	Workers 16 years and over who did not work from home	Travel Time to Work (8)	2018_2020_ACS5a	Spatial
<input checked="" type="checkbox"/>	Aggregate Travel Time to Work (in Minutes) of Workers by Means of Transportation to Work	Workers 16 years and over who did not work from home	Means of Transportation to Work (10)	2018_2020_ACS5a	Spatial
<input checked="" type="checkbox"/>	Means of Transportation to Work	Workers 16 years and over	Means of Transportation to Work (10)	2018_2020_ACS5a	Spatial
<input checked="" type="checkbox"/>	Time of Departure to Go to Work	Workers 16 years and over who did not work from home	Time of Departure to Go to Work (4)	2018_2020_ACS5a	Spatial

3b Next, go to the “GIS Files” tab. Select the files with the “2000 TIGER File” Basis. Select one for each of the 4 decades: 1960, 80, 2000, and 2020.

SELECT DATA

86 SOURCE TABLES

5 TIME SERIES TABLES

REG FILES

1 OF 1

PAGE 1 OF 1

20


POPULARITY	YEAR	GEOGRAPHIC LEVEL	EXTENT	BASIS
	1960	Census Tract	United States	2000 TIGER/Line
	1960	Census Tract	United States	2008 TIGER/Line
	1980	Census Tract	United States	2000 TIGER/Line
	1980	Census Tract	United States	2008 TIGER/Line
	2000	Census Tract	United States	2000 TIGER/Line
	2000	Census Tract	United States	2008 TIGER/Line
	2000	Census Tract	United States	2009 TIGER/Line
	2000	Census Tract	United States	2010 TIGER/Line
	2000	Census Tract (Centers of Population)	United States	2000 Census Centers of Population
	2020	Census Tract	United States	2020 TIGER/Line
	2020	Census Tract (Centers of Population)	United States	2020 Census Centers of Population

1 OF 1

PAGE 1 OF 1

20

3c Your “Data Cart” in the upper righthand corner should show 4 Source Tables and 4 GIS Files. Click “Continue”, review the files, and click “Continue” again. On the next page, click “Submit”.



IPUMS US CENSUS WORKBOOK

NHGIS NATIONAL HISTORICAL GIS

[HOME](#) | [SELECT DATA](#) | [MY DATA](#) | [SUPPORT](#)

[DATA CART](#)

4 SOURCE TABLES
0 TIME SERIES TABLES
4 GIS FILES

[CLEAR X](#)

[TA OPTIONS](#) | [REVIEW](#)

TA OPTIONS

SOURCE TABLES


SELECT GEOGRAPHIC LEVELS

DATASET	TABLES		GEOGRAPHIC LEVELS		BREAKDOWNS	YEARS
1960 Census: Population & Housing Data (Tracts: Major Cities & Surrounds)	1table	1of1				1of1
1980 Census: STF 3 - Sample-Based Data	1table	1of22			Spatial: 1of3	1of1
2000 Census: SF 3a - Sample-Based Data (Houses Larger Than Block Groups)	1table	1of107			Spatial: 1of99	1of1
2020 American Community Survey: 5-Year Data (2018-2020: Block Groups & Larger Areas)	1table	1of87			Spatial: 1of19	1of1

DATA FILES

YEAR	GEOGRAPHIC LEVEL	EXTENT	BASIS
<input checked="" type="checkbox"/> 1960	Census Tract	United States	2000.TIGER/Line+
<input checked="" type="checkbox"/> 1980	Census Tract	United States	2000.TIGER/Line+
<input checked="" type="checkbox"/> 2000	Census Tract	United States	2000.TIGER/Line+
<input checked="" type="checkbox"/> 2020	Census Tract	United States	2020.TIGER/Line+

3d You'll be taken to the "Extracts History" page. Once the "Status" column shows "Completed", download the tables and GIS files. Processing your request should take a few minutes.



NHGIS

GEOMARKER

NATIONAL HISTORICAL GIS

[HOME](#) | [SELECT DATA](#) | [MY DATA](#) | [SUPPORT](#)

[CREATE ANOTHER EXTRACT](#)

EXTRACTS HISTORY

NHGIS will send you an email when your data extract is ready to download. It may take a few minutes. Large requests may take longer.

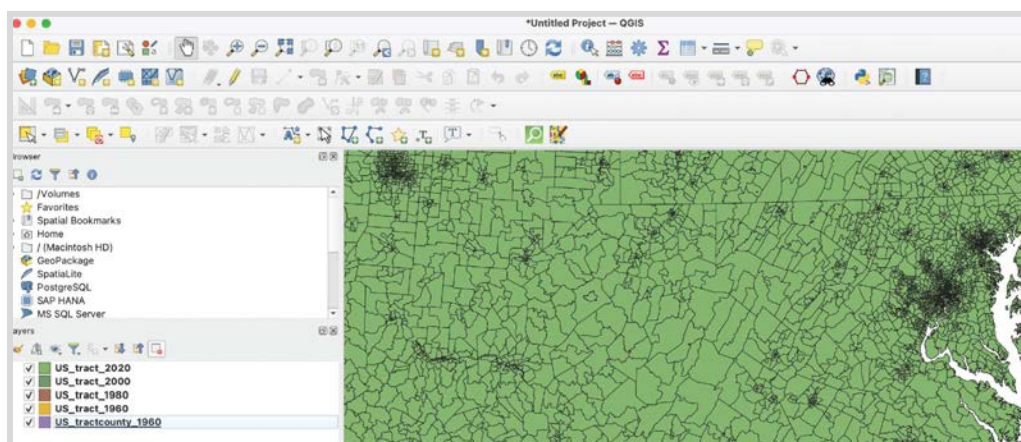
EXTRACT #	DATE CREATED	STATUS	DOWNLOAD DATA	REVISE EXTRACT	DESCRIPTION (CLICK TO EDIT)
10	2023-Jun-12	COMPLETED	TABLES 9.66 MB GIS FILES 941 MB	REVISE	...
9	2023-Jun-12	COMPLETED	TABLES 17.2 MB GIS FILES 869 MB	REVISE	...
8	2022-Jul-05	EXPIRED	RESUBMIT	REVISE	...

Step 4: Import and join in QGIS.

4a First, open a new QGIS file. Set the CRS to “UTM 17N”.

4b Unzip and Import your TIGER shapefiles.

NOTE: the census tracts are divided into different geographical categories depending on the decade. You can import and check each file. You’ll see that in 1960, Roanoke and Lynchburg were not divided into census tracts, but by 1980 they were. For each decade, import the GIS file which contains your city (tract or county).



4c Open the Attribute Table for the 1960 shapefile and scroll to the “GIS Join” columns. Open the 1960 csv file you downloaded and check that the GIS Join column and the data table’s GIS Join columns match. Sort both columns ascending to check.

US_tract_1960 -- Features Total: 23096, Filtered: 23096, Selected: 0

	NHGISST	NHGISCTY	GISJOIN	GISJOIN2	SHAPE_AREA	SHAPE_LEN
1	010	0550	G01005500001	01005500001	1328844.02...	5594.88525...
2	010	0550	G01005500002	01005500002	10143051.58...	18021.17581...
3	010	0550	G01005500003	01005500003	2529992.98...	10765.60674...
4	010	0550	G01005500004	01005500004	12378956.12...	21315.98760...
5	010	0550	G01005500005	01005500005	6461961.164...	13470.81060...
6	010	0550	G01005500006	01005500006	9683290.712...	25130.01289...
7	010	0550	G01005500007	01005500007	1372800.45...	5104.83648...
8	010	0550	G01005500008	01005500008	1863291.750...	6093.76388...
9	010	0550	G01005500009	01005500009	7212531.676...	14761.35280...

shgmd010_de92_1960_tract -- 10000

	GISJOIN	YEAR	STATE	STATEA	COUNTY	COUNTYA	MSA	PLACE	PRETRA
1	G01005500001	1960	Alabama	1	Etowah	55	2880	28696	
2	G01005500002	1960	Alabama	1	Etowah	55	2880	28696	
3	G01005500003	1960	Alabama	1	Etowah	55	2880	28696	
4	G01005500004	1960	Alabama	1	Etowah	55	2880	28696	
5	G01005500005	1960	Alabama	1	Etowah	55	2880	28696	
6	G01005500006	1960	Alabama	1	Etowah	55	2880	28696	
7	G01005500007	1960	Alabama	1	Etowah	55	2880	28696	
8	G01005500008	1960	Alabama	1	Etowah	55	2880	28696	

NOTE: if your city is included in the “tractcounty” instead of the “tract” file, you’ll need to download the “county” csv for that year instead. For instance, Roanoke does not appear in the 1960 tract shapefile but does appear in the tractcounty file, so for that year I need to go back to the NHGIS website and download the “county” level geography for the 1960 “Working Persons 14 and Over by Means of Transportation to Work” table.

4d Reduce each csv table before importing it to QGIS.

First, sort the table by “State” and copy / paste the Virginia rows into a new spreadsheet. Copy / paste the header column from the first spreadsheet as well. Note: from 1980 onward you can further reduce the spreadsheet to only your county, using the following codes in the relevant county column, “CountyA”, or “CountyFP”, or “NHGISCity”:

Roanoke: 770
Richmond: 760
Lynchburg: 680

		Sheet 1														
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	
48922		GS1076000705	1980	S	3	5	Virginia	51	6760	Richmond City	760	5	1035	705		
48923		GS1076000706	1980	S	3	5	Virginia	51	6760	Richmond City	760	5	1035	706		
48924		GS1076000707	1980	S	3	5	Virginia	51	6760	Richmond City	760	5	1035	707		
48925		GS1076000708	1980	S	3	5	Virginia	51	6760	Richmond City	760	5	1035	708		
48926		GS1076000709	1980	S	3	5	Virginia	51	6760	Richmond City	760	5	1035	709		
48927		GS1077000001	1980	S	3	5	Virginia	51	6800	Roanoke City	770	5	1045	1		
48928		GS1077000002	1980	S	3	5	Virginia	51	6800	Roanoke City	770	5	1045	2		
48929		GS1077000003	1980	S	3	5	Virginia	51	6800	Roanoke City	770	5	1045	3		
48930		GS1077000004	1980	S	3	5	Virginia	51	6800	Roanoke City	770	5	1045	4		
48931		GS1077000005	1980	S	3	5	Virginia	51	6800	Roanoke City	770	5	1045	5		
48932		GS1077000006	1980	S	3	5	Virginia	51	6800	Roanoke City	770	5	1045	6		
48933		GS1077000007	1980	S	3	5	Virginia	51	6800	Roanoke City	770	5	1045	7		
48934		GS1077000008	1980	S	3	5	Virginia	51	6800	Roanoke City	770	5	1045	8		
48935		GS1077000009	1980	S	3	5	Virginia	51	6800	Roanoke City	770	5	1045	9		
48936		GS1077000010	1980	S	3	5	Virginia	51	6800	Roanoke City	770	5	1045	10		
48937		GS1077000011	1980	S	3	5	Virginia	51	6800	Roanoke City	770	5	1045	11		
48938		GS1077000012	1980	S	3	5	Virginia	51	6800	Roanoke City	770	5	1045	12		
48939		GS1077000013	1980	S	3	5	Virginia	51	6800	Roanoke City	770	5	1045	13		
48940		GS1077000014	1980	S	3	5	Virginia	51	6800	Roanoke City	770	5	1045	14		
48941		GS1077000015	1980	S	3	5	Virginia	51	6800	Roanoke City	770	5	1045	15		
48942		GS1077000016	1980	S	3	5	Virginia	51	6800	Roanoke City	770	5	1045	16		
48943		GS1077000017	1980	S	3	5	Virginia	51	6800	Roanoke City	770	5	1045	17		
48944		GS1077000018	1980	S	3	5	Virginia	51	6800	Roanoke City	770	5	1045	18		
48945		GS1077000019	1980	S	3	5	Virginia	51	6800	Roanoke City	770	5	1045	19		
48946		GS1077000020	1980	S	3	5	Virginia	51	6800	Roanoke City	770	5	1045	20		
48947		GS1077000021	1980	S	3	5	Virginia	51	6800	Roanoke City	770	5	1045	21		
48948		GS1077000022	1980	S	3	5	Virginia	51	6800	Roanoke City	770	5	1045	22		
48949		GS1077000023	1980	S	3	5	Virginia	51	6800	Roanoke City	770	5	1045	23		
48950		GS1077500101	1980	S	3	5	Virginia	51	6800	Salem City	775	5	1080	101		
48951		GS1077500102	1980	S	3	5	Virginia	51	6800	Salem City	775	5	1080	102		
48952		GS1077500103	1980	S	3	5	Virginia	51	6800	Salem City	775	5	1080	103		
48953		GS1077500104	1980	S	3	5	Virginia	51	6800	Salem City	775	5	1080	104		

Second, in the new reduced spreadsheet, delete every column except the GISJoin column and the columns with census codes (B9G001, B9G002, DHD001, etc.). For each table, refer to the accompanying “codebook” text file which contains the full name of each data column in the table.

Third, rename the census columns according to the codebook file. Note that, though the exact name of transportation methods changes between the decades, you should use the same name across all years: for instance, “Walk”, “Drive”, etc. If these names match between all 4 tables you’ll be able to more easily share styles between them in QGIS. In some cases, you may want to combine multiple columns using the “SUM” function (make sure not to remove columns, since you will need the full count for a “total” column).. I recommend simplifying the columns to “Walk”, “Drive”, “Public” (public transit), “Other” (including bike), “Home” (work from home), and “None” (eg no response). Note that in the codebook text file, the column descriptions indicate categories, and after colon a

subcolumn. So, for the 2020 file, “Car, truck or van: Drove alone” is a subset of “Car, truck, or van”. When totalling these columns, don’t include the subcolumns or you’ll double count.

1	GISJOIN	DHD001	DHD002	DHD003	DHD004	DHD005	DHD006
2	G51077000001	1359	423	126	29	7	8
3	G51077000002	1207	370	193	15	9	6
4	G51077000003	1649	365	100	74	5	23
						46	28
						33	27
						17	7
						17	5
						7	10
						0	14
						19	26
						5	0
						19	48
						19	19
						23	15
						32	28
						47	39
						13	22
						16	19
						34	65
						11	24
22	G51077000021	1060	145	7	13	8	9
23	G51077000022	1190	335	10	28	8	9

nhgis0010_ds107_1980_tract_codebook.txt

SUPFLG25: Renter-Occupied Housing Unit with Asian and Pacific Islander Householder
Suppression Flag

SUPFLG26: Renter-Occupied Housing Unit with Spanish Householder Suppression Flag

SUPFLG27: Owner/Renter Occupied Housing Unit Suppression Flag

Breakdown:

Geographic Subarea: Total area (0000)

Table 1: Means of Transportation to Work

Universe: Workers 16 Years and Over

Source code: NT48

NHGIS code: DHD

DHD001: Car, truck or van: Drive alone

DHD002: Car, truck or van: Carpool

DHD003: Public transportation

DHD004: Walked only

DHD005: Other means

DHD006: Worked at home

Citation and Use of NHGIS Data

All persons are granted a limited license to use this documentation and the accompanying data, subject to the following conditions:

* REDISTRIBUTION: You will not redistribute the data without permission.

You may publish a subset of the data to meet journal requirements for accessing data related to a particular publication. Contact us for permission for any other

Table 1						
GISJOIN	Drive	Car	Carpool	Public	Walk	
G51077000001	SUM C2:D2	1359	423	126	29	
G51077000002	1577	1207	370	193	15	
G51077000003	2014	1649	365	100	74	
G51077000004	2509	2097	412	110	24	
G51077000005	2100	1645	455	158	70	

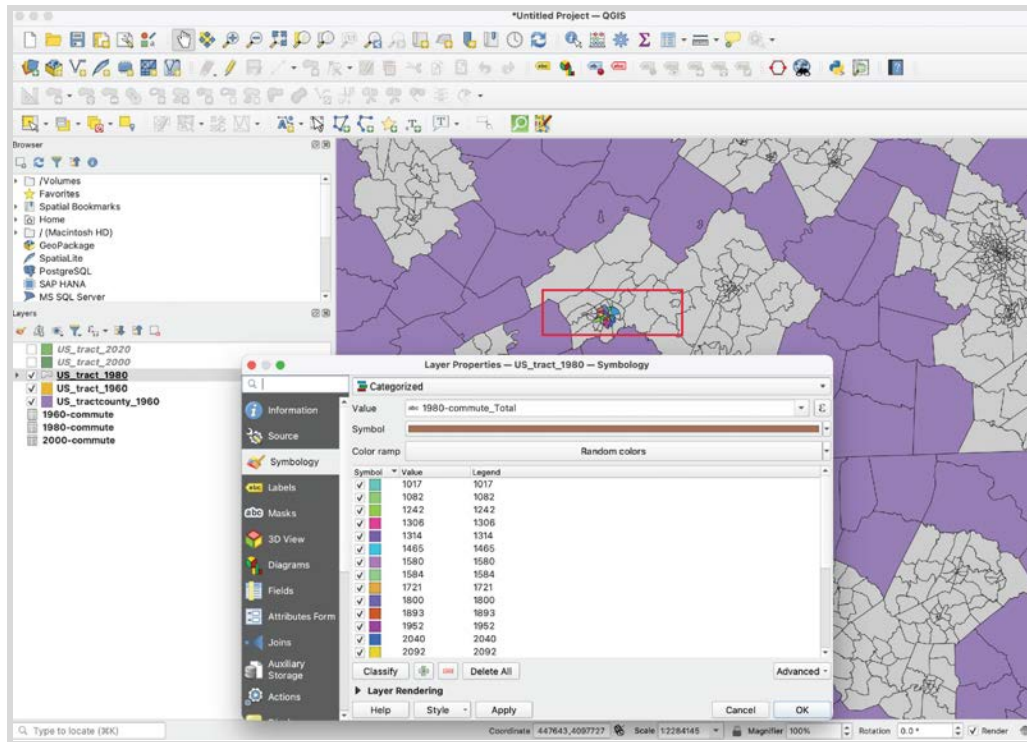
Lastly, add a column which totals the other census columns. Fill out this column with the function “=SUM(*cell range*)”, without the quotation marks. For instance, =SUM(C2:F2). Pull the function down the entire column by clicking and dragging from the bottom.

GISJOIN	Total	Drive	Public	Walk	Other	Home
G5107700000100	1632	1459	108	43	0	22
G5107700000200	1708	1526	69	36	60	17
G5107700000300	2612	2410	56	53	49	44
G5107700000400	2076	1959	31	22	46	18
G5107700000500	2178	2002	35	64	42	35

Save the new file as a csv. Repeat for the remaining 3 tables.

4d Once all the data table and shapefile GEOID columns match for their respective years (1960 to 1960, 1980 to 1980, and so on), import the 4 data tables to QGIS.

4e Join each data table to its respective shapefile. Check the Attribute Tables of the shapefiles to make sure the new columns joined correctly and are not Null – but note that **only the tracts around your city will have data**, since you deleted everything else. You can also check by styling the data.



Step 5: Reduce the shapefiles to your city of interest.

5a Open the Attribute table of the 1960 shapefile. Click “Select by Expression” from the upper toolbar. Select “NHGISCTY” and set it equal to your city’s code with an additional 0 at the end:

Roanoke: 7700
 Richmond: 7600
 Lynchburg: 6800

US_tract_1980 — Features Total: 42917, Filtered: 42917, Selected: 0

	NHGISST	NHGISCTY	Select features using an expression	SHAPE_AREA	SHAPE_LEN	1980-commute_Tot	1980-commute_Driv	80-commu...
1	470	0010	G470001002... 47000100210	132774973.1...	60265.0224...	NULL	NULL	NULL
2	470	0010	G470001002... 47000100202	36194661.17...	26550.6686...	NULL	NULL	NULL
3	470	0010	G470001002... 47000100208	36876193.0	36369.8706	NULL	NULL	NULL

US_tract_1980 — Select by Expression

Expression: "NHGISCTY" = '7700'

Fields and Values:

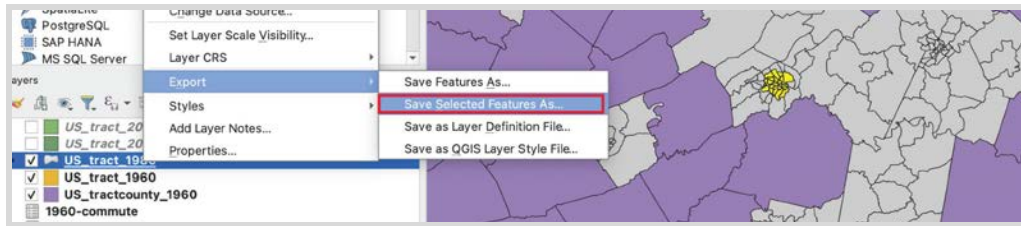
- feature geometry id
- NULL
- NHGISST
- NHGISCTY
- GISJOIN
- GISJOIN2
- SHAPE_AREA
- SHAPE_LEN
- 1980-commute_Total
- 1980-commute_Drive
- 1980-commute_Public
- 1980-commute_Walk
- 1980-commute_Other
- 1980-commute_Home

Select Features

US_tract_1980 — Features Total: 42917, Filtered: 42917, Selected: 23

	NHGISST	NHGISCTY	GISJOIN	GISJOIN2	SHAPE_AREA	SHAPE_LEN	1980-commute_Tot	1980-commute_Driv	80-commu...
40911	510	7700	G510770000...	G51077000008	1686648.22...	6228.01633...	1017	773	206
40912	510	7700	G510770000...	G51077000021	6784131.551...	12523.83314...	1242	1205	7
40913	510	7700	G510770000...	G51077000013	2474457.93...	8691.30102...	1584	1366	96
40914	510	7700	G510770000...	G51077000003	8752462.255...	13849.91272...	2216	2014	100
40915	510	7700	G510770000...	G51077000004	3578044.89...	9100.04360...	2717	2509	110
40916	510	7700	G510770000...	G51077000023	7307433.02...	12838.23751...	3014	2857	29

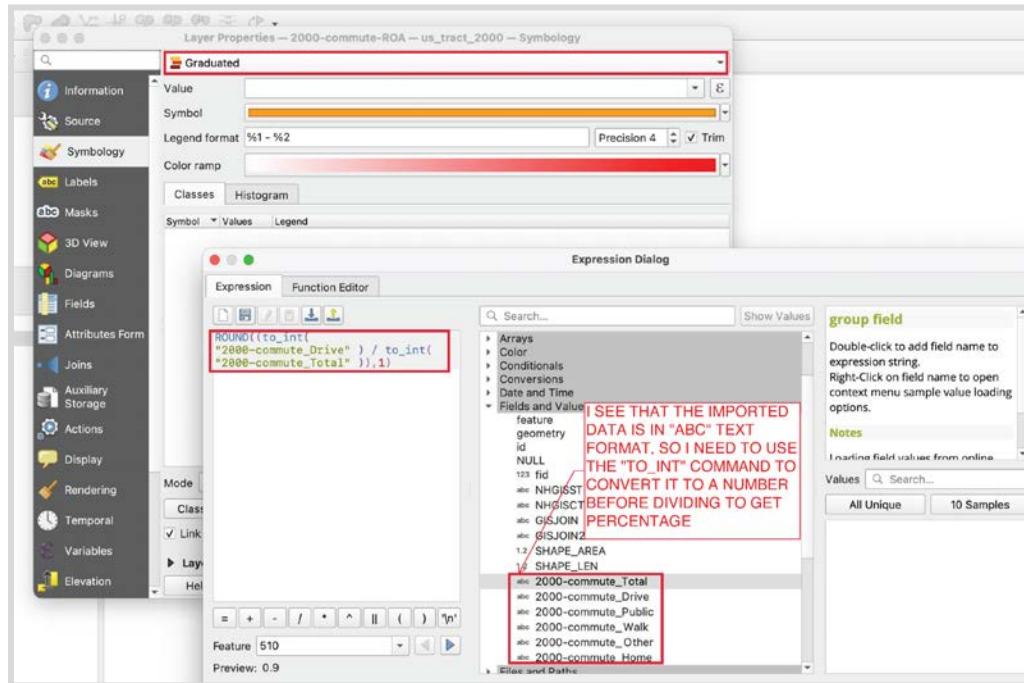
5b If you see the correct selection in your map, right click on the Shapefile layer, go to “Export”, and then “Save Selected Features As”. The new reduced shapefile will be added to your map.



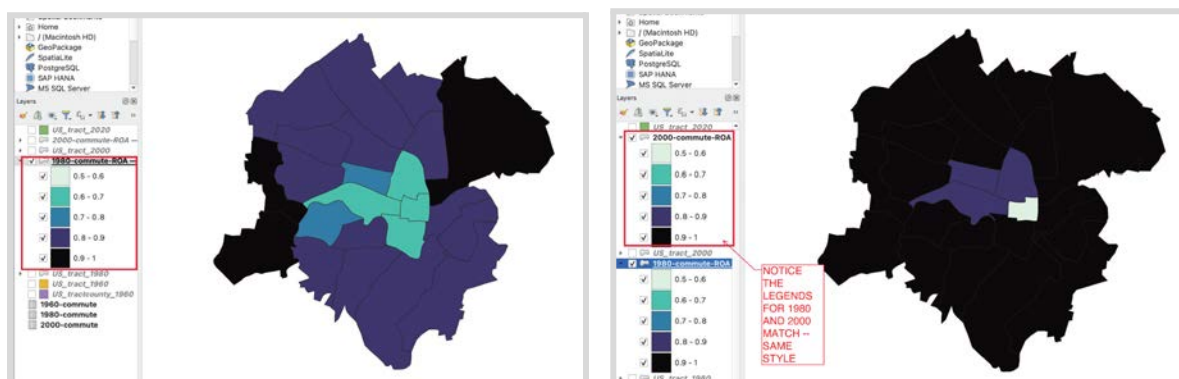
5c Repeat these steps for the other three shapefiles.

Step 6: Create a Print Layout to compare the four decades.

6a Using the “Total” and “Drive” columns, show the percentage of Car commuters for each decade. You may need to use the “to_int” function if your data is text instead of numbers.



6b Be sure to use the same color scheme for each decade. Use the “Save Style As” and “Load Style” functions.





6c In the print layout, include one map for each decade. Include some observations about trends. As always, include a title, legend, scale, north arrow, map labels, your name, and sources.