

High School Dropouts

The effect of neighborhood characteristics

– by Deden Rukmana

Introduction

Problem

Dropping out of high school is a serious national, state, and local problem. Students who drop out of high school have fewer options for employment and are at greater risk of low self-esteem. High school dropouts usually end up working low-skilled and low-paying positions with fewer possibilities for advancement. High school dropouts are also more likely to experience health problems and engage in crime than students who graduate from high school.

Much attention has been paid to dropout rates in relation to the characteristics of schools, students, and students' families. There have been few studies to examine dropout rates in relation to the characteristics of neighborhoods in which students reside.

Do characteristics of neighborhoods in which students reside contribute to dropout rates among high school students?

Location

Chatham County, Georgia

Time to complete the lab

Three to four hours

Prerequisites

- Familiarity with ArcGIS 10
- Familiarity with Microsoft Excel

Keywords: High school dropouts, neighborhoods, school attendance zones, socioeconomic factors, demographic factors

Data used in this lab

- High school dropout rates from the Savannah-Chatham County Public School System
- 2006–2010 American Community Survey data

Student activity

High school dropouts impose a heavy cost on the entire economy, not only on the young generation who fail to graduate from high school. Only seven of 10 ninth-graders will obtain high school diplomas. A high rate of high school dropouts is strongly associated with a high crime rate and a high unemployment rate. High school dropouts are also more likely to experience health problems (Levin and Rouse 2012).

A lot of studies have been conducted (Patterson, Hale, and Stessman 2008; Rumberger and Thomas 2000; and Williams et al. 2004) to examine dropout rates in relation to the characteristics of schools, students, and students' families. There have been few studies to examine dropout rates in relation to the characteristics of neighborhoods in which student live.

In this lab, you will attempt to address the following analytic questions:

1. Are neighborhood characteristics associated with the rate of high school dropouts?
2. What neighborhood characteristics contribute to the vulnerability of high school students to dropping out of school?

RETRIEVE SPATIAL DATA FROM THE US CENSUS

Start by retrieving census tracts from the US Census Bureau's TIGER website. You will retrieve the census tract files of Chatham County, Georgia. You will also retrieve demographic and socioeconomic spatial data of Chatham County from the Census Bureau's American FactFinder website. You will also use a number of demographic and socioeconomic factors from the 2010 American Community Survey (ACS) five-year data as follows:

- Proportion of persons below poverty level (*POVERTY*)
- Proportion of unemployment (*UNEMPL*)
- Proportion of persons without high school diploma (*NOHSDIPL*)
- Proportion of households with public assistance income (*PUBASINC*)
- Median household income (*MEDHI*)
- Proportion of female-headed households with children under 18 years old (*FEMHHC*)

- 1 Use your web browser to go to the 2010 TIGER/Line Shapefiles at <http://www.census.gov/cgi-bin/geo/shapefiles2010/main>.
- 2 Click the *Select a layer type* drop-down list, click *Census Tracts*, and then click *submit*.
- 3 Click the *Census Tract (2010)* list, click *Georgia*, and then click *submit*.
- 4 Click the *county* list, click *Chatham County*, and then click *Download*.
- 5 Save all five downloaded files to your working folder.

You have completed the first part of this exercise: retrieving the spatial data of census tracts of Chatham County, Georgia.

- 6 Now use your web browser to go to factfinder2.census.gov. <http://factfinder2.census.gov>.
- 7 Click *Geographies* in the left panel.
- 8 Click the *geographic type* list and click *Census Tract*.
- 9 Click the *state* list and click *Georgia*.
- 10 Click the *county* list and click *Chatham*.

- 11 Click *All Census Tracts within Chatham County, Georgia*. Your view should look similar to the image below.

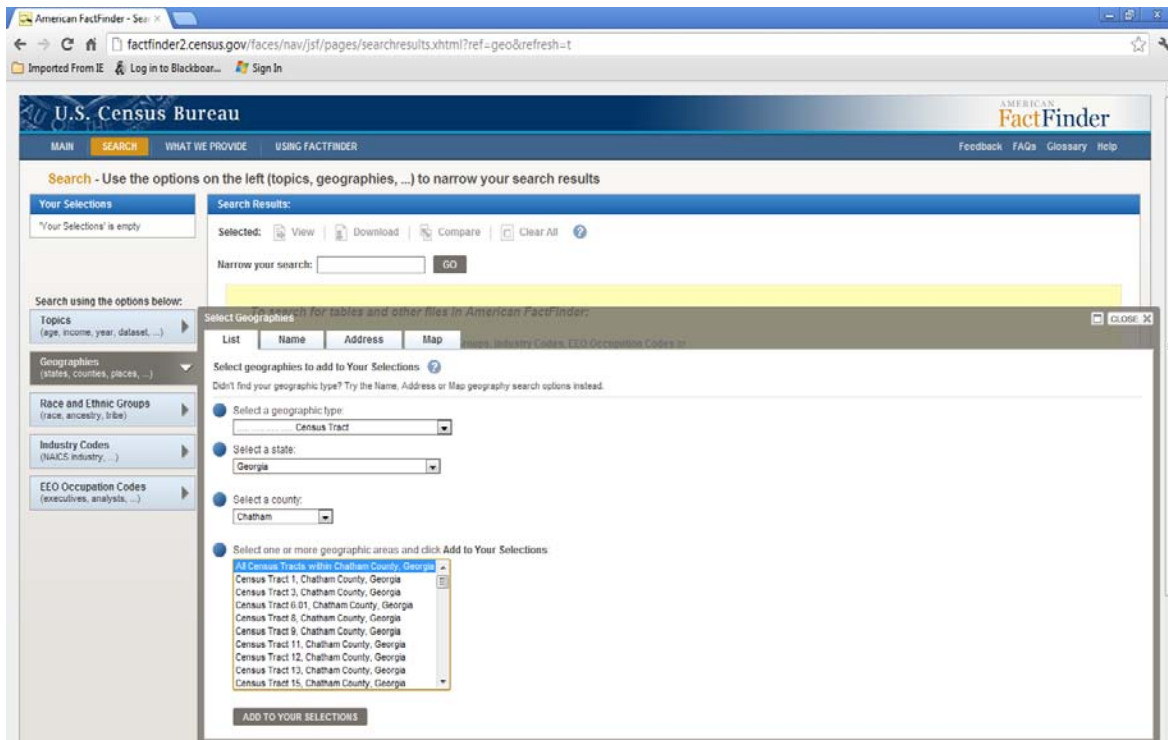


Figure 1. American FactFinder geographic selection.

- 12 Click **ADD TO YOUR SELECTIONS**.

Ensure that you do not have any selections before you click **ADD TO YOUR SELECTIONS**. Here you will start a new search.

- 13 Click *Topics* in the left panel.
- 14 Click *Year* and click *2010*, and then close the dialog box.
- 15 In the *Narrow your search* box, type **Poverty**.
- 16 Click **GO**.

- From the 2010 ACS 5-year estimated dataset, click **POVERTY STATUS IN THE PAST 12 MONTHS**. Your view should look similar to the image below.

The screenshot shows the American FactFinder interface for the table S1701, "POVERTY STATUS IN THE PAST 12 MONTHS". The data is presented in a table with the following structure:

Subject	Census Tract 4, Chatham County, Georgia				Census Tract 3, Chatham County, Georgia				Census Tract 6.01, Chatham County, Georgia									
	Total		Below poverty level		Total		Below poverty level		Total		Below poverty level							
	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error						
Population for whom poverty status is determined	1,084	+/-188	884	+/-186	84.0%	+/-8.8	992	+/-172	240	+/-122	24.2%	+/-10.8	2,382	+/-437	845	+/-468	35.9%	+/-15.5
RACE																		
Under 18 years	659	+/-138	588	+/-151	89.2%	+/-9.3	84	+/-60	0	+/-132	0.0%	+/-35.6	340	+/-251	217	+/-220	63.8%	+/-32.2
Related children under 18 years	655	+/-138	584	+/-151	89.2%	+/-9.3	84	+/-60	0	+/-132	0.0%	+/-35.6	340	+/-251	217	+/-220	63.8%	+/-32.2
18 to 64 years	375	+/-87	292	+/-87	77.9%	+/-10.8	815	+/-153	232	+/-122	28.5%	+/-12.6	1,474	+/-262	534	+/-206	36.2%	+/-15.9
65 years and over	30	+/-27	14	+/-26	46.7%	+/-53.3	93	+/-41	8	+/-13	8.6%	+/-13.5	538	+/-162	94	+/-59	17.5%	+/-14.6
SEX																		
Male	478	+/-86	371	+/-81	78.1%	+/-11.9	477	+/-135	39	+/-31	8.2%	+/-6.1	1,083	+/-241	344	+/-207	31.8%	+/-18.4
Female	589	+/-118	523	+/-125	88.8%	+/-7.2	515	+/-142	201	+/-122	39.0%	+/-16.4	1,289	+/-338	501	+/-370	39.0%	+/-26.3
RACE AND HISPANIC OR LATINO ORIGIN																		

Figure 2. American FactFinder data download.

18 Click **Download**. Your view should look similar to the image below.

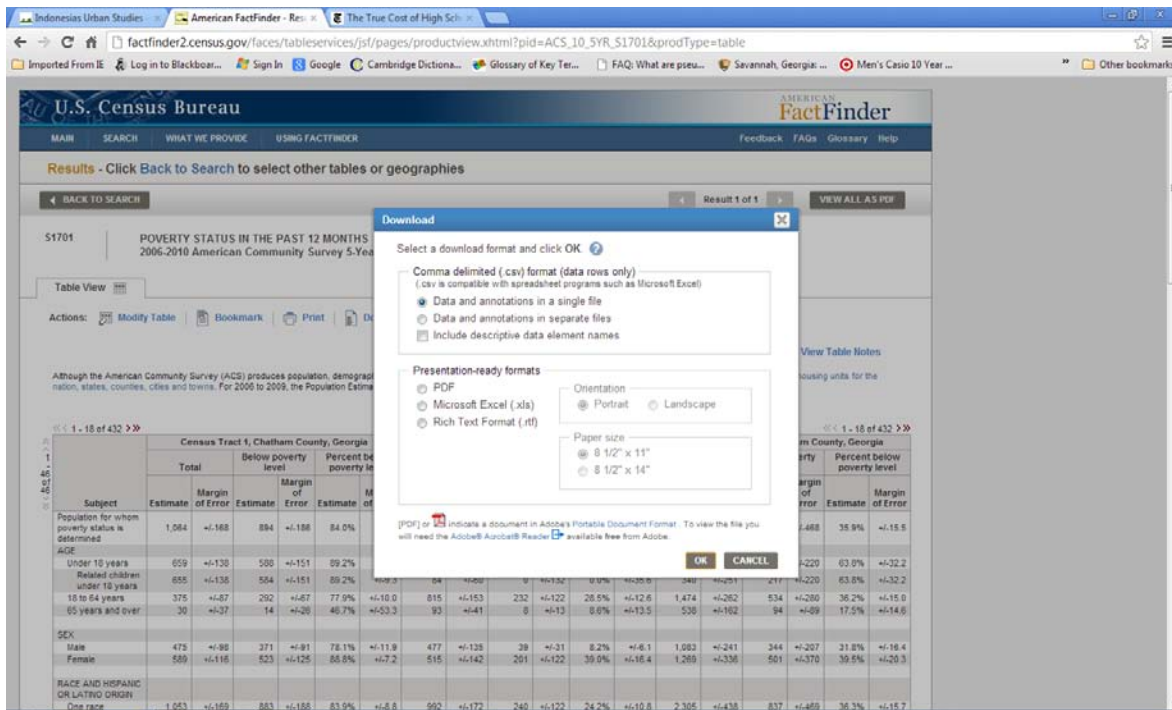


Figure 3. American FactFinder data download.

19 Ensure that *Data and annotations in a single file* is checked and click **OK**. You cannot select a download format in Microsoft Excel because the data contains 432 columns, which exceeds the 230-column limit of Excel.

20 Save all four downloaded files to your working folder.

21 Continue to download the other five demographic and socioeconomic factors from the Census Bureau's American FactFinder website and follow the steps as you do for the proportion of persons below the poverty level.

Question 1: Which census tract has the most people living below poverty level?

Question 2: Which census tract has the highest proportion of unemployment by total number of civilian labor force age 16 years and over?

Question 3: In which census tracts are more than 40% of households defined as female head of household with children under 18 years old?

PREPARE A BASEMAP WITH ATTRIBUTE TABLES

1 Start ArcMap using a new map.

- 2 Click the *Windows menu* and click *Catalog* if the Catalog tab is missing on the right side of the ArcMap application.
- 3 In the Catalog window, click the *Connect to Folder* icon.
- 4 Browse to the location of your data (working folder) and click OK.
- 5 Open your working folder.

In the Catalog window of your working folder, you will see three files, including ACS 2010.xlsx, School Attendance Zones.shp, and tl_2010_13051_tract10.shp.

- 6 Rename *tl_2010_13051_tract10.shp* to **2010 Census Tracts.shp**.
- 7 Add the *2010 Census Tracts* shapefile to your map. Your view should look similar to the image below.

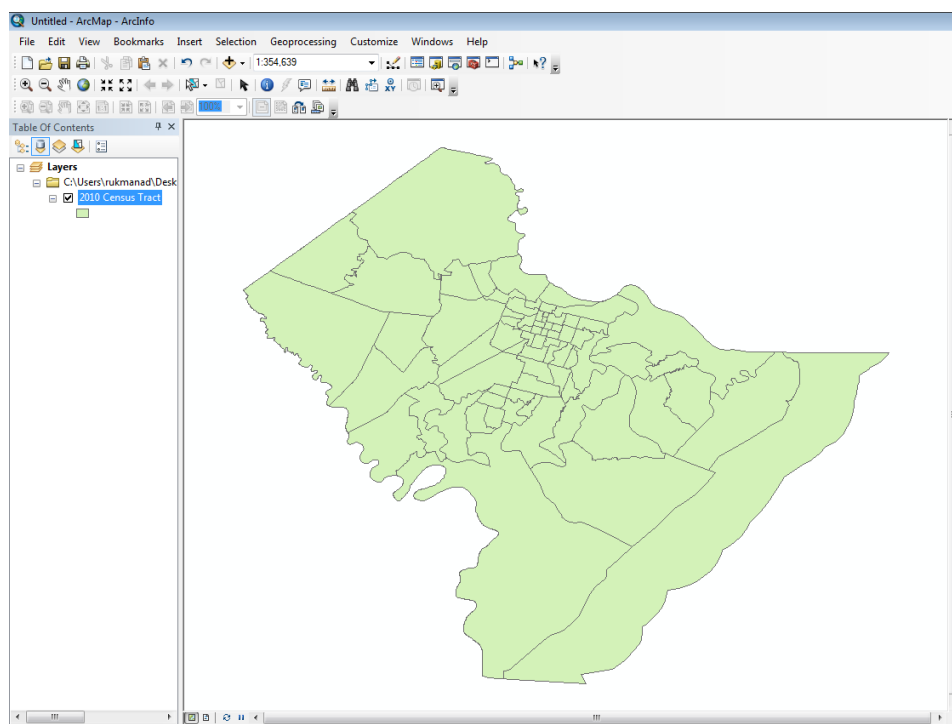


Figure 4. Census tracts in Chatham County, Georgia.

- 8 Add the ACS 2010\$ sheet of the ACS 2010 spreadsheet.
- 9 Make the *2010 Census Tract* layer editable.

- 10 Open the attribute table of the *2010 Census Tract* spatial layer and the stand-alone nonspatial *ACS 2010\$* table. You would want to discover if these two tables can be joined together to access data in the nonspatial table.
- 11 In the *Table of Contents*, right-click the *2010 Census Tract* layer, point to *Joins and Relates*, and click *Join*.
- 12 In box no. 1, select *NAMELSAD10*.
- 13 In box no. 2, select *ACS 2010\$*.
- 14 In box no. 3, select *Census tract*. Your view should look similar to the image below.

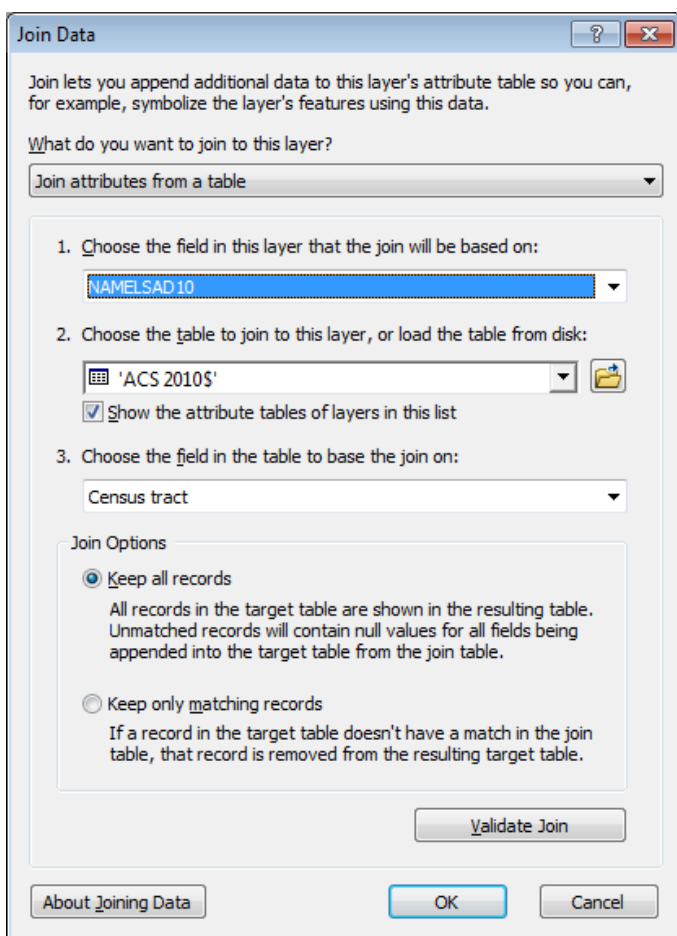


Figure 4. *Join Data* dialog box.

- 15 Click *OK*.
- 16 Save and stop all edits in the shapefile *2010 Census Tracts*.
- 17 Save your map as *Chatham2010.mxd*.

Question 4: In reference to *Chatham2010.mxd*, how many total census tracts are in Chatham County, and how many total demographic and socioeconomic variables are in the attribute tables?

CREATE THEMATIC MAPS OF NEIGHBORHOOD CHARACTERISTICS AND HIGH SCHOOL DROPOUTS

Now you will create several maps that show neighborhood characteristics and high school dropouts. The maps will visually display “the association” between neighborhood characteristics and the rate of high school dropouts. You will create maps that show the dropout rates of six public high schools in Chatham County, Georgia (Beach High School, Groves High School, Jenkins High School, Johnson High School, Savannah High School, and Windsor Forest High School) and six neighborhood characteristics:

- Proportion of persons below poverty level
- Proportion of unemployment
- Proportion of persons without high school diploma
- Proportion of households with public assistance income
- Median household income
- Proportion of female-headed households with children under 18 years old

- 1 Open *Chatham2010.mxd*.
- 2 Add the *School Attendance Zones* shapefile.

You will get a message: “Unknown spatial reference”. You can ignore this message and proceed with the next steps. This message appears because the *School Attendance Zones* shapefile does not have the coordinate system or projection defined. You can define the coordinate system for this shapefile, using (1) *ArcToolbox » Data Management Tools » Projections and Transformation* or (2) the Shapefile Properties page in ArcCatalog.

- 3 Right-click the *School Attendance Zones* layer in the *Table of Contents* and click *Properties*. On the *Layer Properties* dialog box, click the *Symbology* tab. Your view should look similar to the image below.

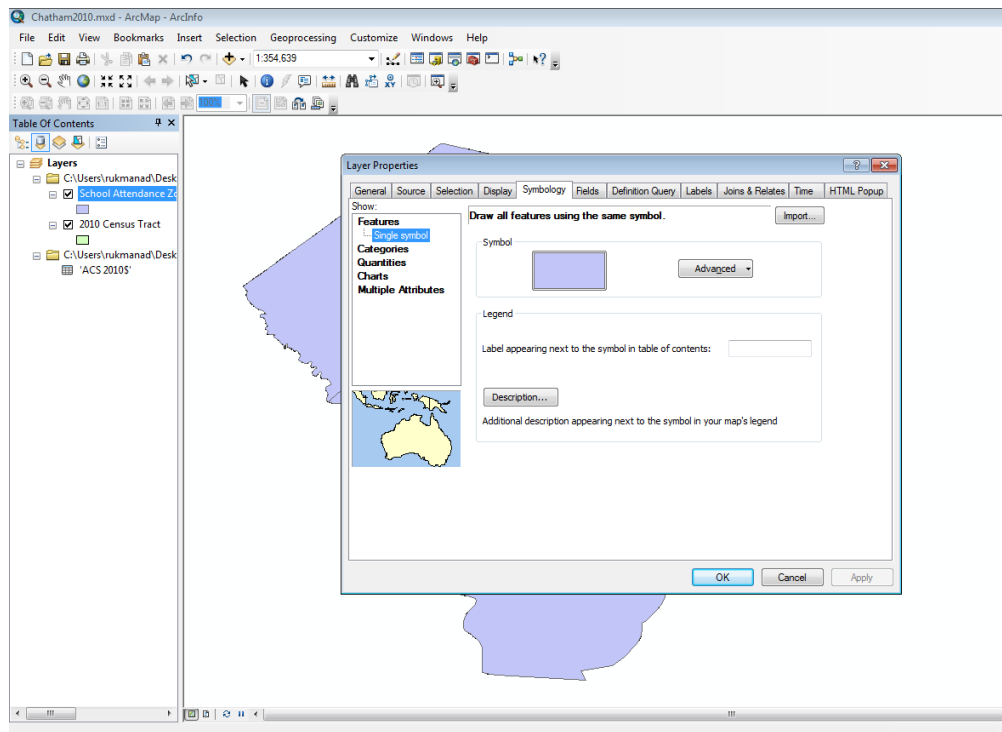


Figure 5. *Symbology* tab on *Layer Properties* dialog box.

- 4 In the *Show* panel of the *Layer Properties* dialog box, click *Charts*, and then click *Bar/Column*.
- 5 In the *Field Selection*, click *2009DO*. This field is the variable that indicates the dropout rates of public high schools in Chatham County, Georgia, in 2009.

- 6 Click (>) to move this field to the right panel for use in this map. The *Layer Properties* dialog box should look similar to the image below.

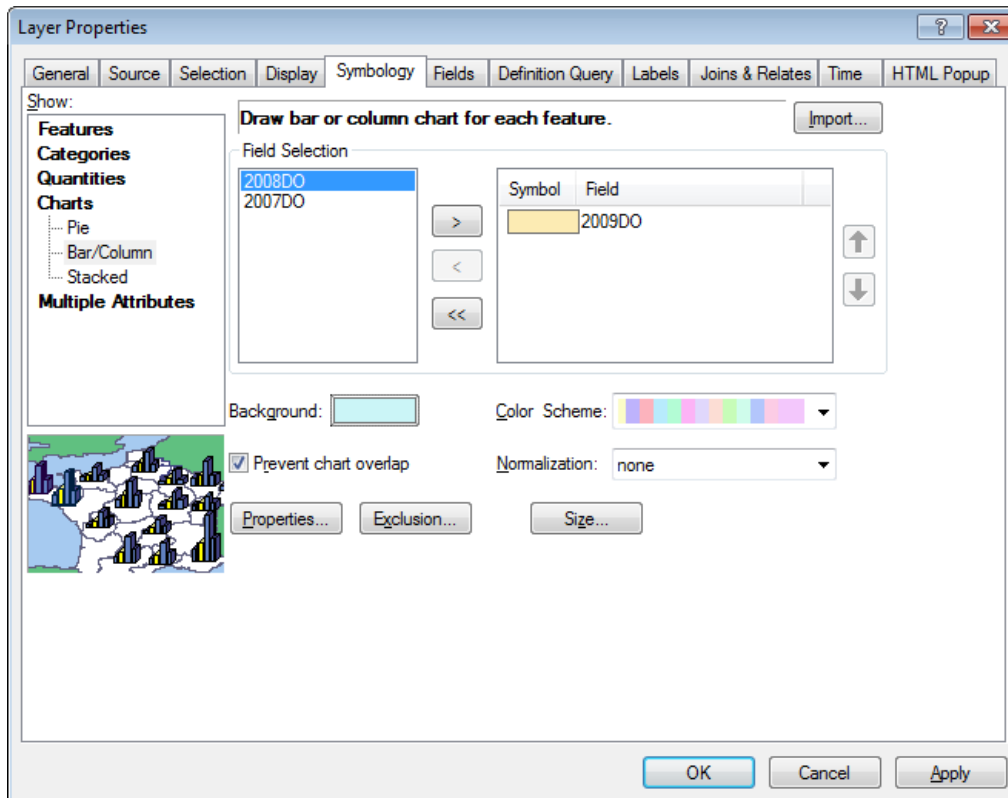


Figure 6. *Field Selection* settings on the *Layer Properties* dialog box.

- 7 Click the box next to *Background* to change the background color of the *School Attendance Zones* polygons.
- 8 The *Symbol Selector* will appear. Click the box next to *Fill Color* and select **No Color**.

- 9 Change the *Outline Width* to **2** and change the *Outline Color* to **Blue**. The *Symbol Selector* should look similar to the image below.

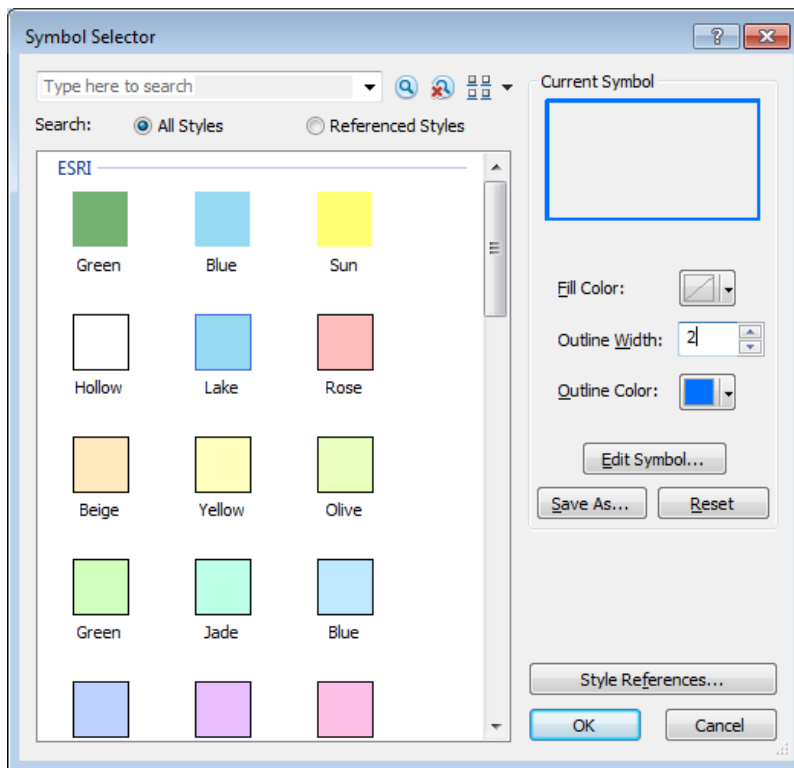


Figure 7. *Symbol Selector* settings.

- 10 Click *OK*.

- 11 Click *OK* on the *Layer Properties* dialog box, and your view should look similar to the image below.

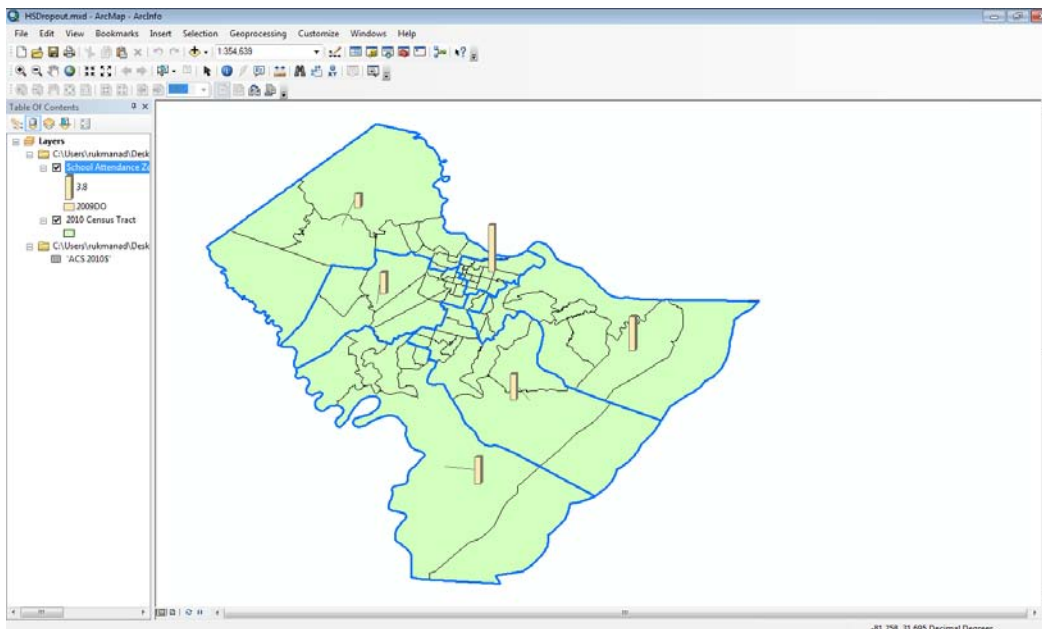


Figure 8. High school dropout rates in 2009.

You can change the format of the columns including color, shape, and size to create a good contrast between the columns and the background. Figure 8 is only an example, and you can modify it for a better contrast between the columns and the background.

Question 5: (a) Which public high school in Chatham County had the highest dropout rate in 2009? (b) What was the dropout rate of Groves High School in 2009? (c) In which part of Chatham County is this high school located?

The next step is to create maps that visually show the neighborhood characteristics and the high school dropout rates together. You have six neighborhood characteristics and will show each of them with the high school dropout rates in Chatham County.

- 12 Right-click the *2010 Census Tract* layer in the *Table of Contents* and click *Properties*.

- 13 Click the *Symbology* tab.

- 14 In the *Show* panel, click *Quantities* » *Graduated colors*. Your view should look similar to the image below.

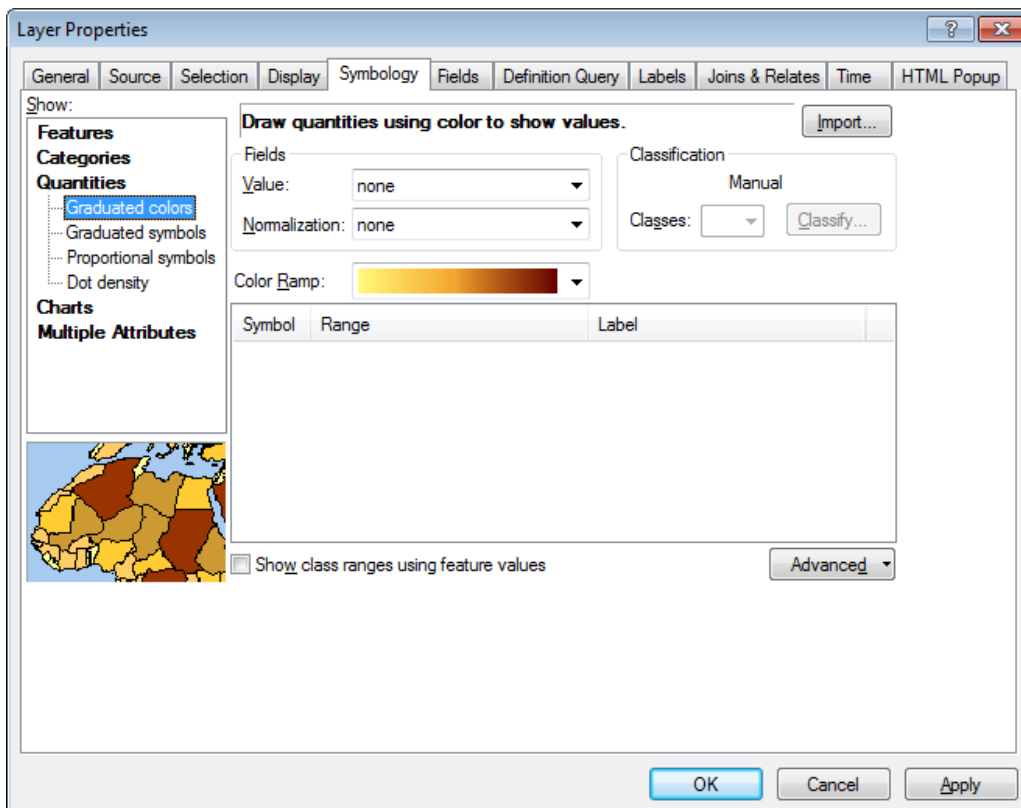


Figure 9. Layer Properties of 2010 Chatham County.

- 15 In the *Fields* panel, click the *Value* drop-down list and click *POVERTY*.
- 16 Click *OK*.

The variable *POVERTY* is derived from the ratio of the number of persons living below poverty level to the total population in each census tract. For example, the value of 0.103427 of *POVERTY* means 10.3427% of the census tract population is living below poverty level. If you want to change the number of decimal places of *POVERTY*, please follow these steps:

- (1) In the *Table of Contents*, right-click *2010 Census Tracts* and click *Properties*.
- (2) Click the *Fields* tab and click *POVERTY*.
- (3) On the *Number Format* tab, select the *Numeric* check box.
- (4) A *Number Format* window appears. Select *Numeric*.
- (5) Change *Number of decimal places* from 6 to **2** and click *OK*.

You have completed a map that shows the proportion of persons below poverty level and the high school dropout rates in Chatham County, Georgia.

Question 6: Which parts of Chatham County have high rates of persons below poverty level?

Question 7: Are these neighborhoods with high rates of persons below poverty level located within the attendance zone of the high school with the highest dropout rate in 2009?

17 To create maps that show the high school dropout rate and the other five neighborhood characteristics, right-click *2010 Census Tract* in the *Table of Contents* and click *Properties*.

18 Click the *Symbology* tab.

19 In the *Fields* panel, click the *Value* drop-down list and click

- *UNEMPL* for proportion of unemployment,
- *NOHSDIPL* for proportion of persons without high school diploma,
- *PUBASINC* for proportion of households with public assistance income,
- *MEDHI* for median household income, and
- *FEMHHC* for proportion of female-headed households with children under 18 years old.

20 Click *OK*.

You are asked to create six different map documents. Each map document shows a neighborhood characteristic.

21 Save all six thematic maps of neighborhood characteristics and high school dropout rates.

Question 8: How do you interpret the six maps on the association between the rates of high school dropouts and neighborhood characteristics?

References

Levin, H. M., and Rouse, C. E., "The True Cost of High School Dropouts," *The New York Times*, January 25, 2012.

Patterson, Jean A., Dalia Hale, and Martin Stessman. 2008. "Cultural Contradictions and School Leaving: A Case Study of an Urban High School." *High School Journal* 91 (2): 1-15.

Rumberger, Russell W., and Scott L. Thomas. 2000. "The Distribution of Dropout and Turnover Rates among Urban and Suburban High Schools." *Sociology of Education* 73 (1): 39-67.

Williams, J. H., C. D. Ayers, R. Van Dorn, and M. W. Arthur. 2004. Risk and Protective Factors in the Development of Delinquency and Conduct Disorder. In *Risk and Resilience in Childhood: An Ecological Perspective*, ed. M. W. Fraser, 209–50. Washington, DC: National Association of Social Workers Press.

Submit your work

Submit the following to your instructor:

- All six thematic maps of neighborhood characteristics and high school dropouts
- Answers to questions 1 through 8
- Brief essays explaining each of the following:
 - Are neighborhood characteristics associated with the rate of high school dropouts?
 - What neighborhood characteristics contribute to the vulnerability of high school students to dropping out of school?

Credits

Sources of supplied data

ACS 2010.xlsx, courtesy of US Census Bureau.

School Attendance Zones.shp, courtesy of the Savannah-Chatham County Public School System, created by the author.

Instructor resources

This lab exercise uses six demographic and socioeconomic factors that represent neighborhood characteristics. These factors are retrieved from the US 2010 American Community Survey (ACS) five-year data available at the US Census Bureau's American FactFinder website. The 2010 ACS five-year data is based on ACS data collected from 2006 through 2010 for the following:

- Proportion of persons below poverty level
- Proportion of unemployment
- Proportion of persons without high school diploma
- Proportion of households with public assistance income
- Median household income
- Proportion of female-headed households with children under 18 years old

The variable of proportion of persons below poverty level is used to represent the extent of poverty in the neighborhoods. This variable is derived from the ratio of the number of persons living below poverty level to the total population. This variable is obtained from table S1701, Poverty Status in the Past 12 Months. The proportion of persons below poverty level is derived from the total people below poverty level divided by the total number of population.

The proportion of unemployment is derived from the total number of unemployed people divided by the total number of civilian labor force 16 years and over. This unemployment figure includes unemployed people classified as members of the labor force but excludes people who are not classified as members of the labor force. This variable was obtained from table S1701, Poverty Status in the Past 12 Months.

The variable of proportion of persons without a high school diploma is derived from the ratio of the number of people age 25 years and over whose highest educational attainment is ninth to 12th grade without a diploma or less than ninth grade to the total population age 25 years and over. This variable is obtained from DP02, Selected Social Characteristics in the United States. This variable is composed of the educational attainment of less than ninth grade and of ninth to 12th grade without a diploma.

The variable of proportion of households with public assistance income is to represent the extent of deprivation in the neighborhoods. Households that are eligible for public assistance income are those who earn income much less than median household income. This variable is derived from the ratio of the number of households with public assistance income to the total number of households. Public assistance income includes general assistance and Temporary Assistance to Needy Families (TANF). This excludes Supplemental Security Income (SSI). This variable is obtained from table B19057, Public Assistance Income in the Past 12 Months.

The variable of median household income is used to represent the income distribution among neighborhoods. Median household income divides the income distribution in a neighborhood or census tract into two equal groups. The first group has income above median income, and the second group has income below median income. Median household income is based on people 15

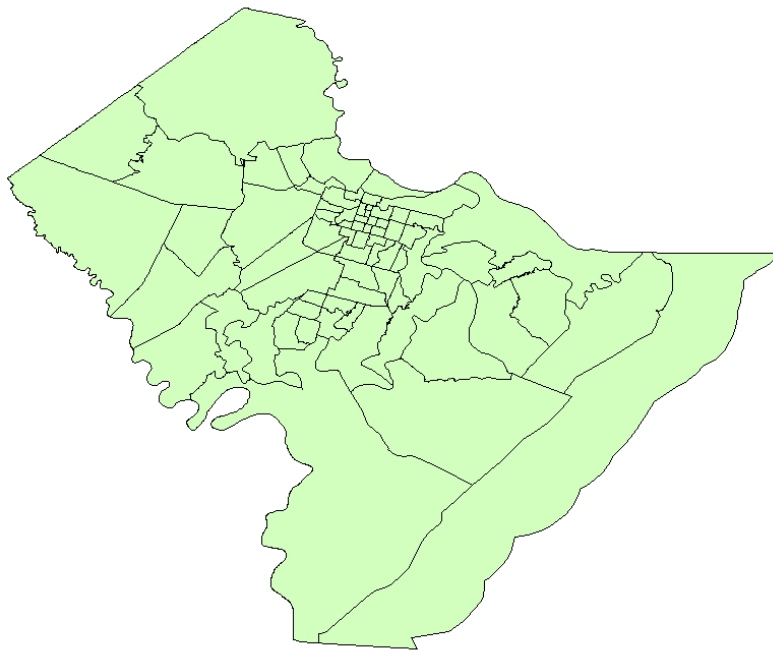
years old and over with income. This variable is obtained from table B19013, Median Household Income in the Past 12 Months.

The variable of female-headed households with children under 18 years old is derived from the ratio of the number of households headed by female with the presence of their own children age 18 years old to the total number of households. This variable is obtained from tableDP01, Profile of General Population and Housing Characteristics.

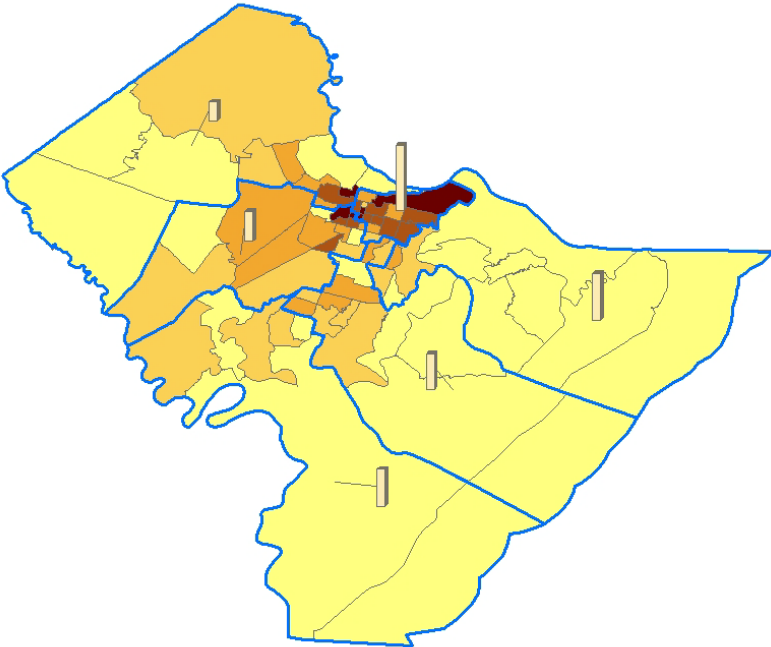
In 2009, there were seven public high schools in Chatham County, Georgia, including Beach High School, Groves High School, Jenkins High School, Johnson High School, Savannah High School, Windsor Forest High School, and Savannah Art Academy. Savannah Art Academy is a dedicated performing and visual arts high school. All students who live in Chatham County are eligible to attend this high school if they meet the performing and visual arts requirements. This high school does not have a school attendance zone and is excluded from the dataset of this lab exercise.

The rates of high school dropouts are derived from the total number of high school dropouts to the total number of high school students. In this lab exercise, the rates of high school dropouts are available in three years (2007, 2008, and 2009) for Beach High School, Groves High School, Jenkins High School, Johnson High School, Savannah High School, and Windsor Forest High School. The data of high school dropout rates is retrieved from the Savannah-Chatham County Public School System.

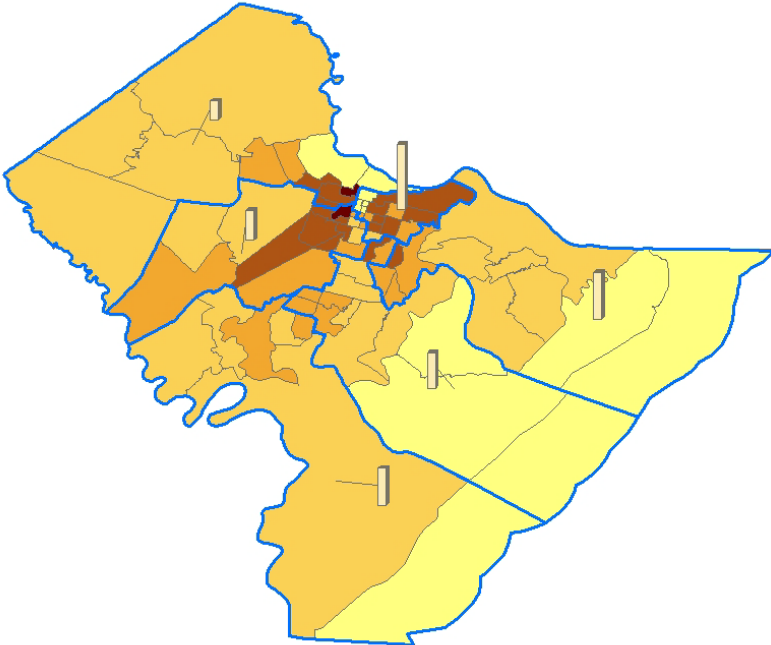
Map results



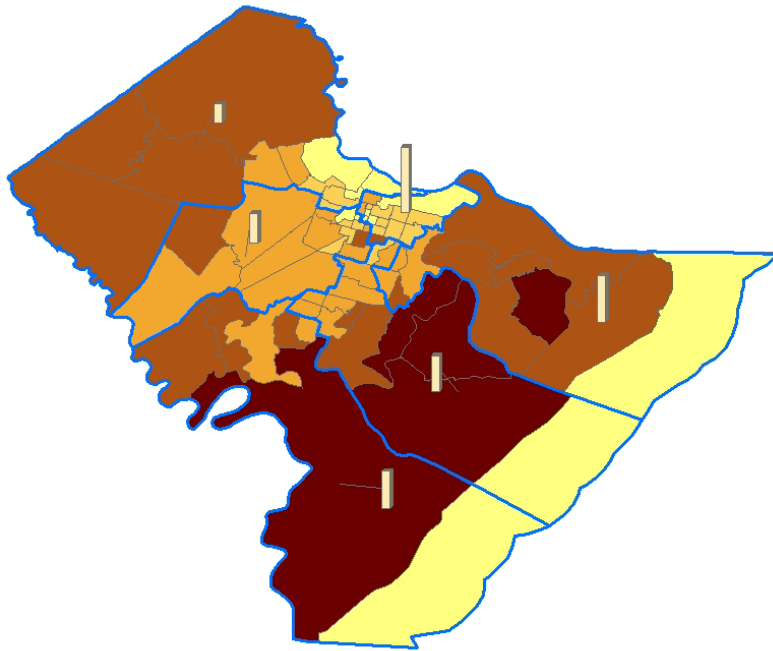
Chatham2010.



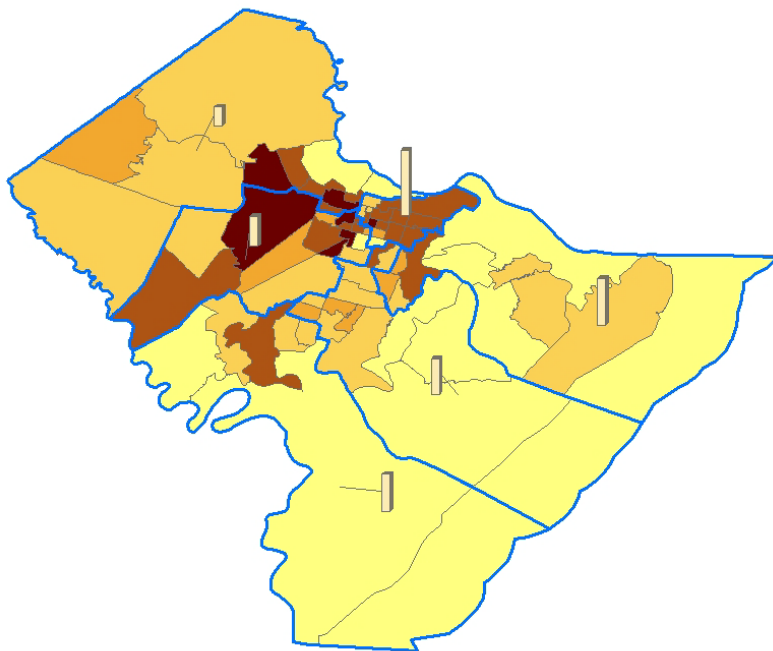
HSDropout_POVERTY.



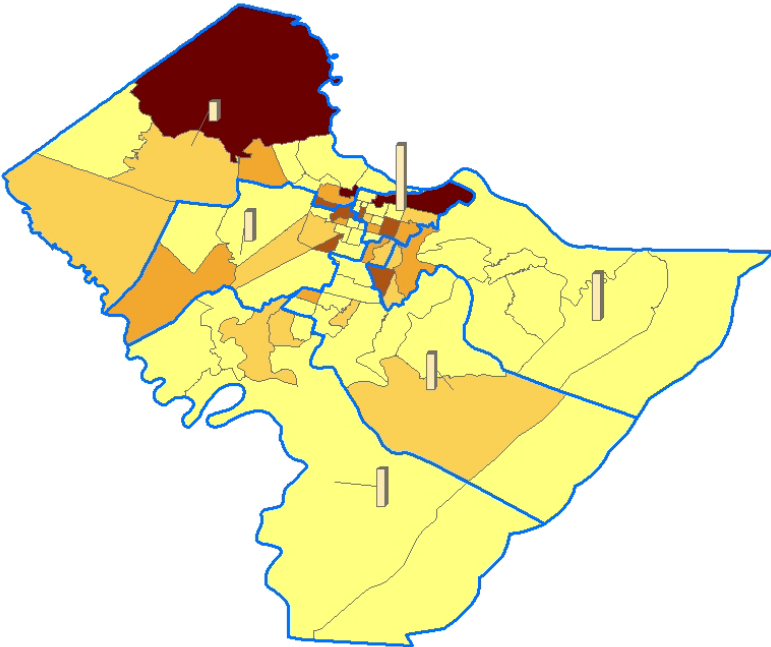
HSDropout_FEMHHC.



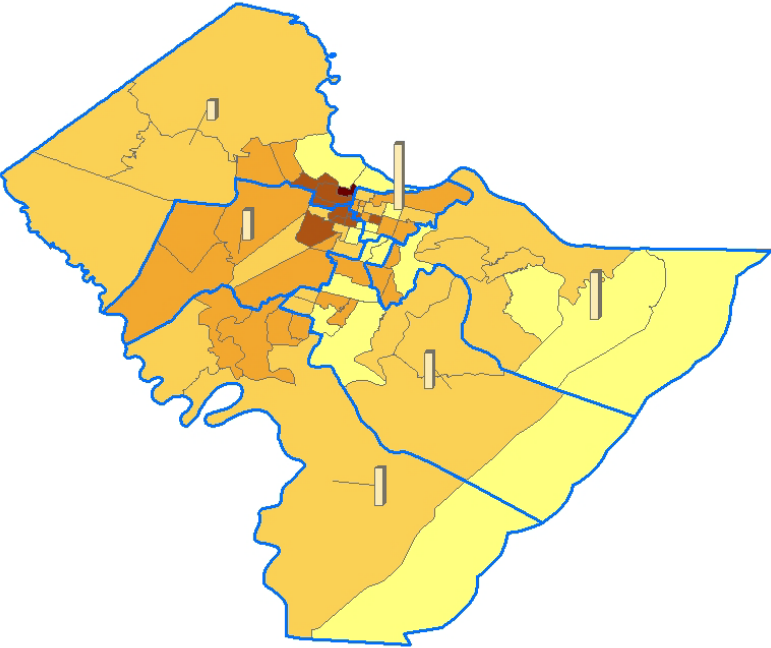
HSDropout_MEDHI.



HSDropout_NOHSDIPL.



HSDropout_PUBASINC.



HSDropout_UNEMPL.

Answers to questions

Question 1: *Which census tract has the most people living below poverty level?*

Answer: Census tract 1 with 84.0226% of the population living below poverty level.

Question 2: *Which census tract has the highest proportion of unemployment by total number of civilian labor force age 16 years and over?*

Answer: Census tract 1 with 32.70% of the total number of civilian labor force age 16 years and over being unemployed people.

Question 3: *In which census tracts are more than 40% of households defined as female head of household with children under 18 years old?*

Answer:

- Census tract 1 (83.39%)
- Census tract 12 (58.62%)
- Census tract 44 (47.26%)

Question 4: *In reference to Chatham2010.mxd, how many total census tracts are in Chatham County, and how many total demographic and socioeconomic variables are in the attribute tables?*

Answer: There are 72 census tracts in Chatham County and six demographic and socioeconomic variables. The six variables are as follows:

- Proportion of persons below poverty level (POVERTY)
- Proportion of unemployment (UNEMPL)
- Proportion of persons without high school diploma (NOHSDIPL)
- Proportion of households with public assistance income (PUBASINC)
- Median household income (MEDHI)
- Proportion of female-headed households with children under 18 years old (FEMHHC)

Question 5: *(a) Which public high school in Chatham County had the highest dropout rate in 2009? (b) What was the dropout rate of Groves High School in 2009? (c) In which part of Chatham County is this high school located?*

Answer:

- (a) Savannah High School.
- (b) The dropout rate of Groves High School in 2009 was 2.2.
- (c) Groves High School is located in the western part of Chatham County.

Question 6: *Which parts of Chatham County have high rates of persons below poverty level?*

Answer: The center parts of Chatham County have high rates of persons below poverty level. These areas are in the inner city of Savannah. The concentration of poverty in inner-city areas is very common in American cities.

Question 7: *Are these neighborhoods with high rates of persons below poverty level located within the attendance zone of the high school with the highest dropout rate in 2009?*

Answer: Yes, the neighborhoods with high rates of persons below poverty level are located within the attendance zone of Savannah High School with the highest dropout rate in 2009.

Question 8: *How do you interpret the six maps on the association between the rates of high school dropouts and neighborhood characteristics?*

Answer: Five demographic and socioeconomic variables including POVERTY, UNEMPL, NOHSDIPL, PUBASINC, and FEMHHC have high rates in the center parts of Chatham County and low rates in the suburbs of Chatham County. The rates of these five demographic and socioeconomic variables correspond positively with high school dropout rates in Chatham County. Areas with high rates of these five variables have high rates of high school dropouts, and areas with low rates of these five variables have low rates of high school dropouts.

In the meantime, the MEDHI variable has a negative association with high school dropout rates in Chatham County. Areas in the suburbs of Chatham County have high values of median household income, and areas in the center parts of Chatham County have low values of median household income.

In summary, characteristics of neighborhoods in which students reside can explain the dropout rates among high schools in Chatham County. Neighborhoods with high rates of persons below poverty level (POVERTY), unemployment (UNEMPL), persons without a high school diploma (NOHSDIPL), households with public assistance income (PUBASINC), and female-headed households with children under 18 years old (FEMHHC) are likely to have high dropout rates among high school students. Meanwhile, neighborhoods with high median household incomes are likely to have low dropout rates among high school students.