Appendix G: Mapping 101 - Joining Census data for beginning GIS users
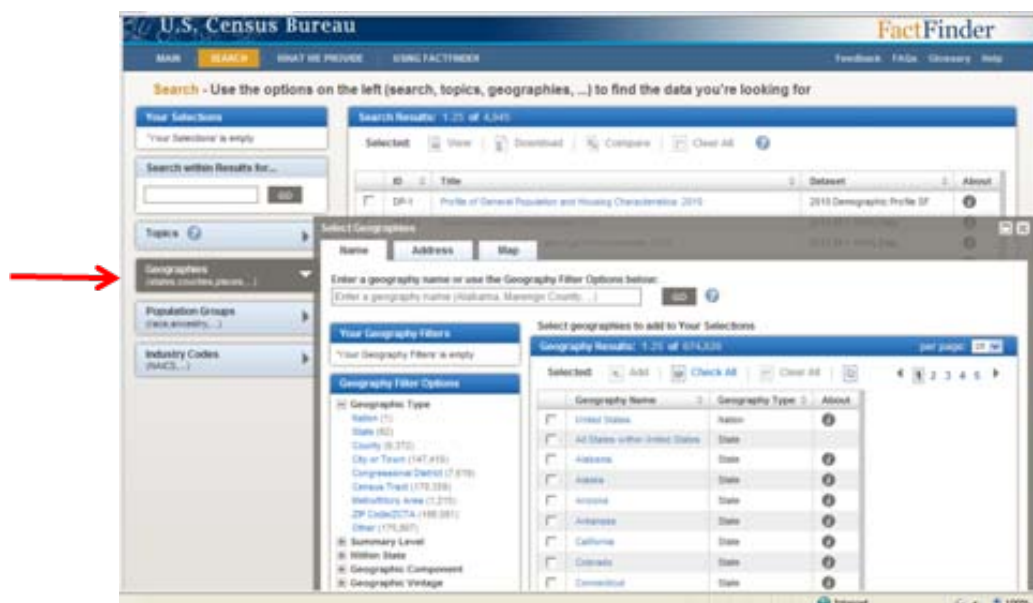
Mapping 101: Joining Census Data for Beginning GIS Users

In order to create an effective extreme heat plan for a community, it is critical to understand the local demographic and social make-up, and identify the more vulnerable or at-risk populations. In 2012, the Minnesota Department of Health (MDH) developed statewide maps of five demographic characteristics provided by the U.S. Census Bureau, including: percentage of population less than five years old, percentage of population 65 years old or older, percentage of elderly (65 year old and older) living alone, percentage of population with a high school degree or less, and percentage of population living below the poverty level. The data was mapped for all of the county subdivisions in the state (i.e., cities, townships, and unorganized territories).
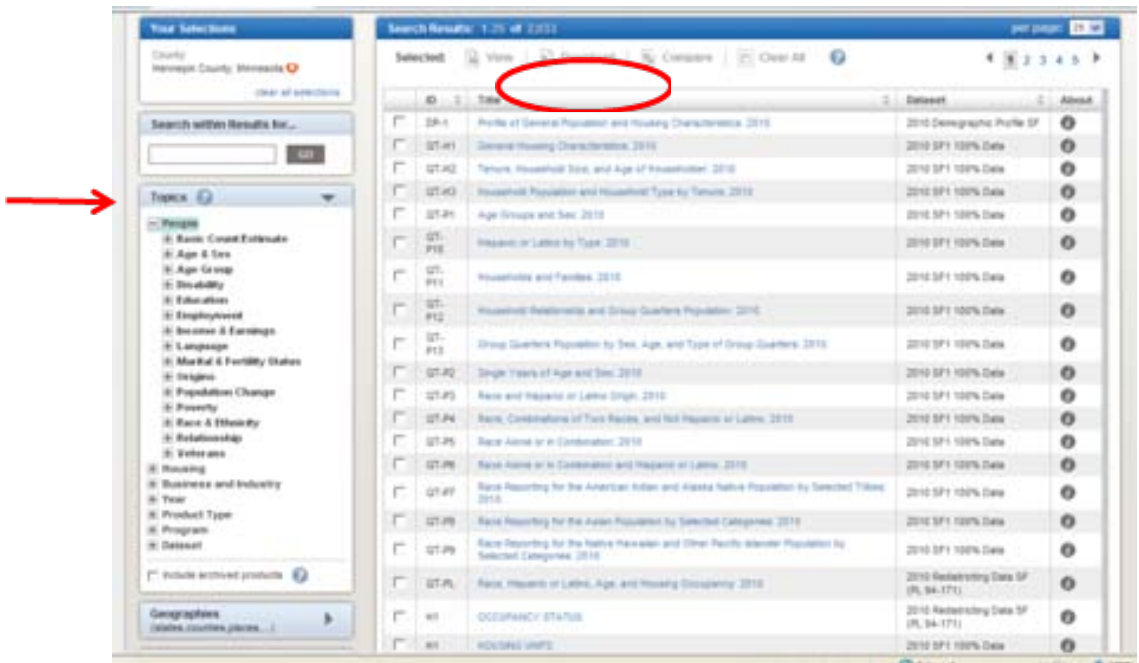
For some communities with larger populations, it may be beneficial to create their own maps at smaller geographic detail, such as census tracts. Additionally, some communities may want to create their own maps using other variables besides the five characteristics mapped by MDH. The following tutorial will walk GIS users through the process of downloading Census data and joining the data to corresponding shapefiles. The tutorial walks through the process using census tracks, but the same method would be applied for any other geographic unit. This tutorial is recommended for persons with some existing familiarity with how ArcGIS software works; it is not intended to teach a person how to use ArcGIS.

1   **Go to** http://factfinder2.census.gov/

2   **Select the Geographies sidebar button in the left column. A new selection box will open over the main webpage on your screen.**

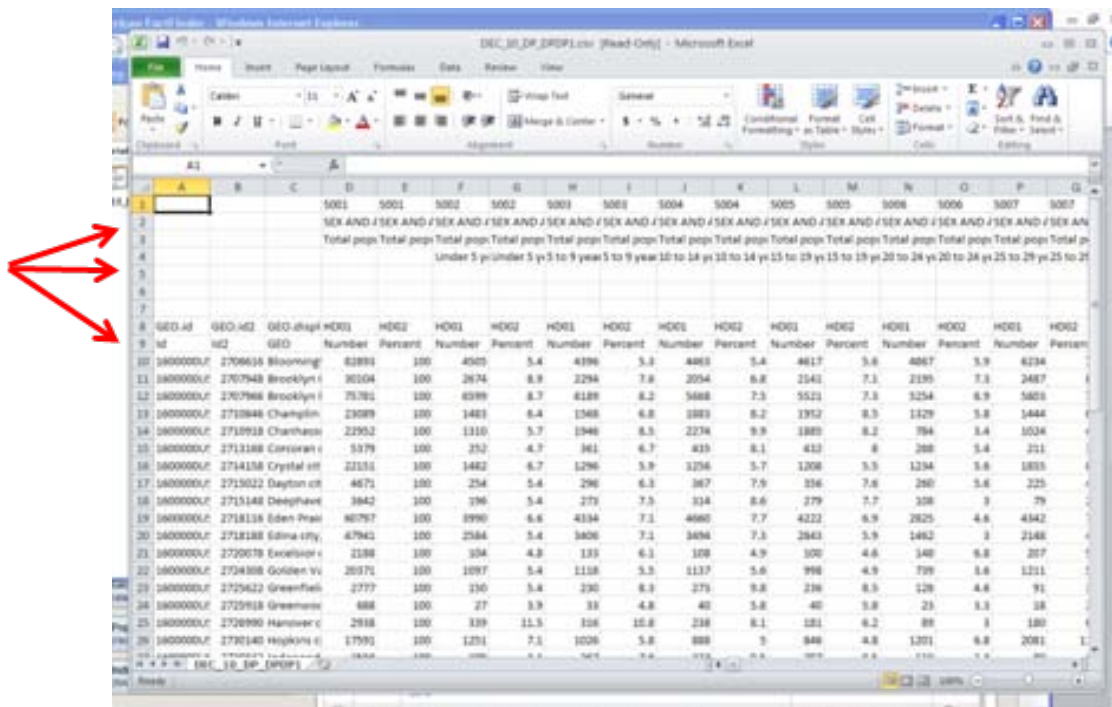**3**   **Use the Filter Options or Search function to search for the desired geographies.**

      a. First filter for the smallest desired geography (i.e. Census Tracts)

      b. Use Filter options again to filter further and narrow selected geographies (i.e. Census Tracts within Place).

      c. Once geographies have been found, select and click Add at the top of Geographic Results and close the Selecting Geographies window by clicking the "X" in the top right corner.
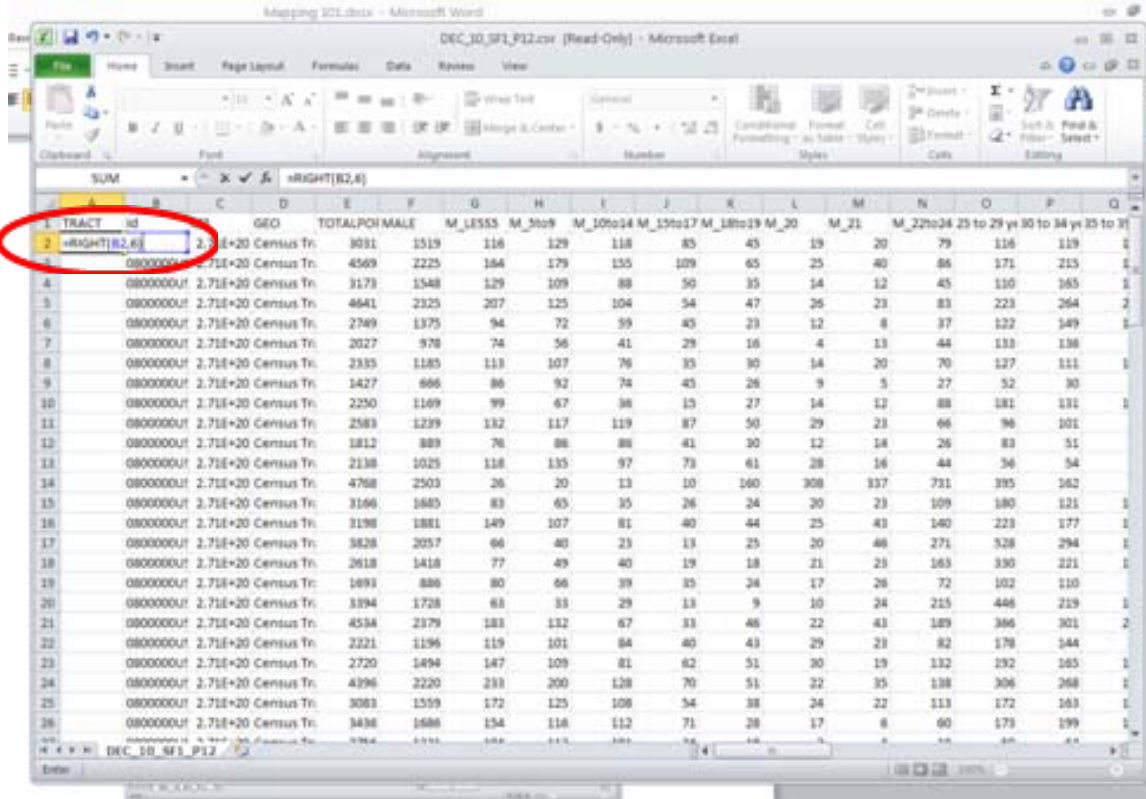
4   Next narrow down variables by searching through Topics sidebar button on the left column. Select the desired variables by checking the box next to the variables you want to download in the main selection screen. Once all variables have been selected click Download from the Search Results menu. If the file is small enough it will give you the option of opening it as a Microsoft Excel file. If the file is large it will automatically download as a zip file. Select Open from the File Download prompt window.

5   Open the Excel file (unzip the zipped file first if necessary). The goal now is to condense all column headers down to <u>one</u> row. Rename the columns of data you want to keep with a maximum of 8 characters (e.g. "Total Population" would become "TOTALPOP"). Then delete any remaining column header rows.
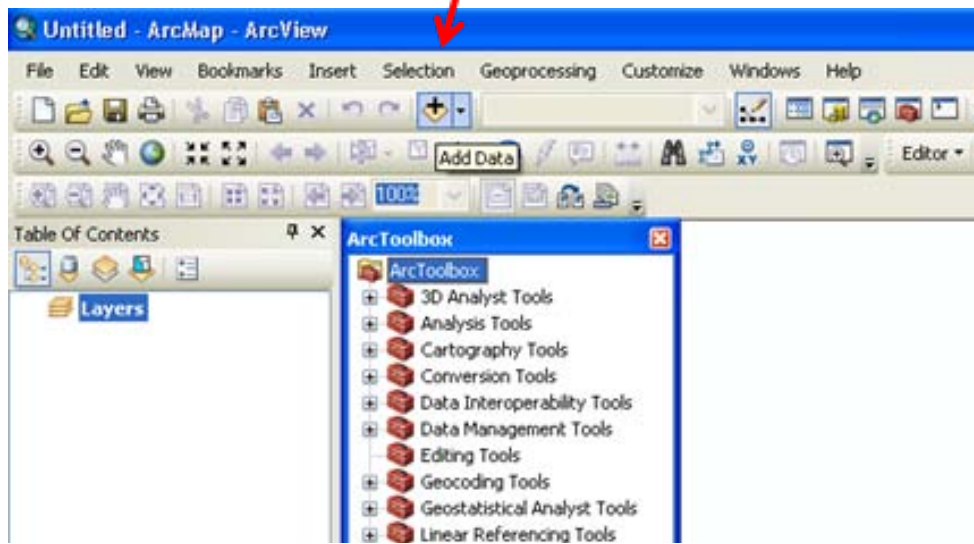
6 Next insert a column before Column A and name it TRACT or BLKGRP or BLOCK (if you downloaded Census Tracts, Block Groups, or Blocks, respectively). In the first cell below the title, insert the function "=RIGHT(B2,6)" and hit the Enter key. [If you downloaded block groups, use "=RIGHT(B2,7); if you downloaded blocks, use "=RIGHT(B2,10]
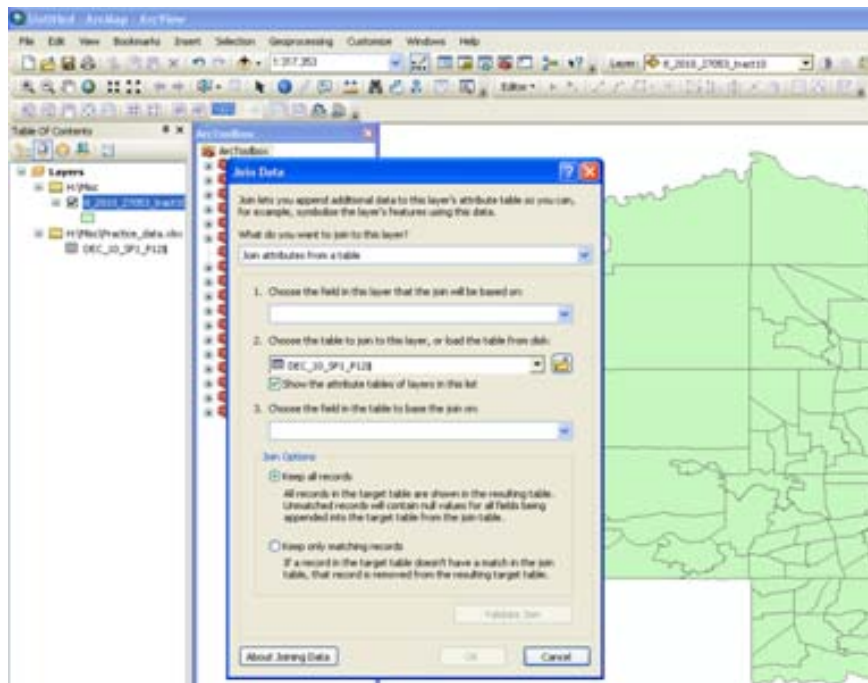

7 Drag the formula all the way down the column (or double click in the lower right corner of the cell for the same effect). Next select the entire column by clicking on column header "A". Right click on "A" and select Copy. Right click on "A" again and select Paste as Special. Select Values as your Paste as Special option. Then save and close the Excel spreadsheet or CSV file as an Excel spreadsheet.

8 Download the Census TigerLine shapefiles. Use 2000 shapefiles for Census 2000 and American Community Survey estimates through 2009. American Community Survey estimates from 2010 and later and for Decennial 2010 Census, use 2010 TigerLine shapefiles.

a. Download files here: http://www.census.gov/geo/www/tiger/index.html

b. Click 2010 Tigerline shapefiles main page

c. Under Download select FTP site like under Download by State.

d. Select Minnesota

e. Select Directory 27

f. Select tl_2010_27_tract10.zip

g. In File Download select Save and save the zip file in the same folder as Excel data.

h. Unzip the folder.

A Tip: After unzipping the data, open the file in Microsoft Excel. Ensure that field names have no spaces (use an "_" or "-" instead). Also, remove any extraneous rows of field names; ArcMap can only read ONE row of field names.

Extreme Heat Toolkit

9   Open ArcMap and click "Add Data". Add both the TigerLine shapefile and the spreadsheet you modified with Census Data.
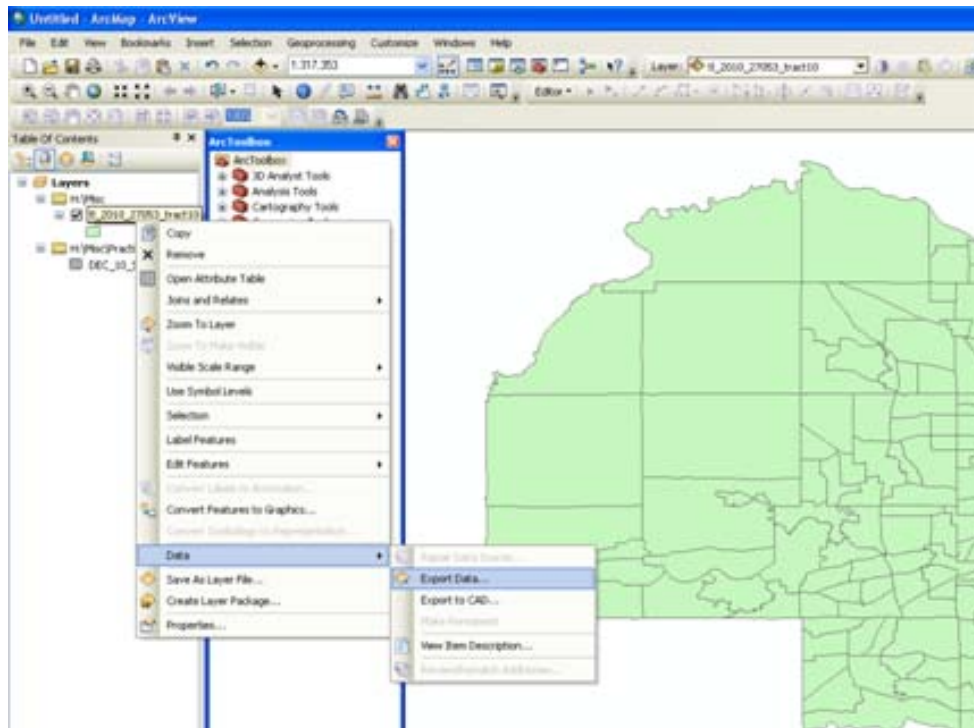

10   Right-click the shapefile and select "Joins & Relates" and then "Join . . ." You should get a window that looks like this:
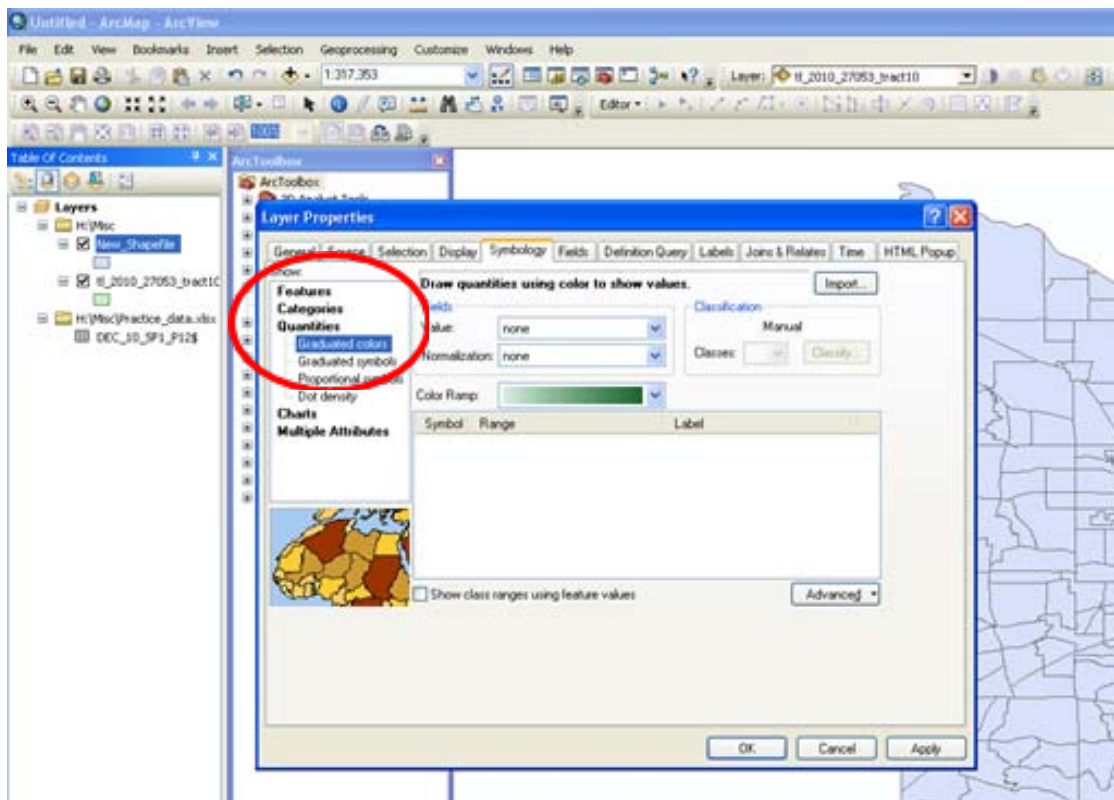

11   In dropdown "1." select "TRACTCE10"; in dropdown "2." make sure your worksheet is selected; in dropdown "3." select "TRACT". Keep all records should be selected. Then click 'OK'.

12   Now if you right-click on the shapefile and select "Open Attribute Table" you should see the Census data joined to the shapefile. The shapefile may contain more attributes than your Census worksheet, in which case you will have some fields that say "NULL".
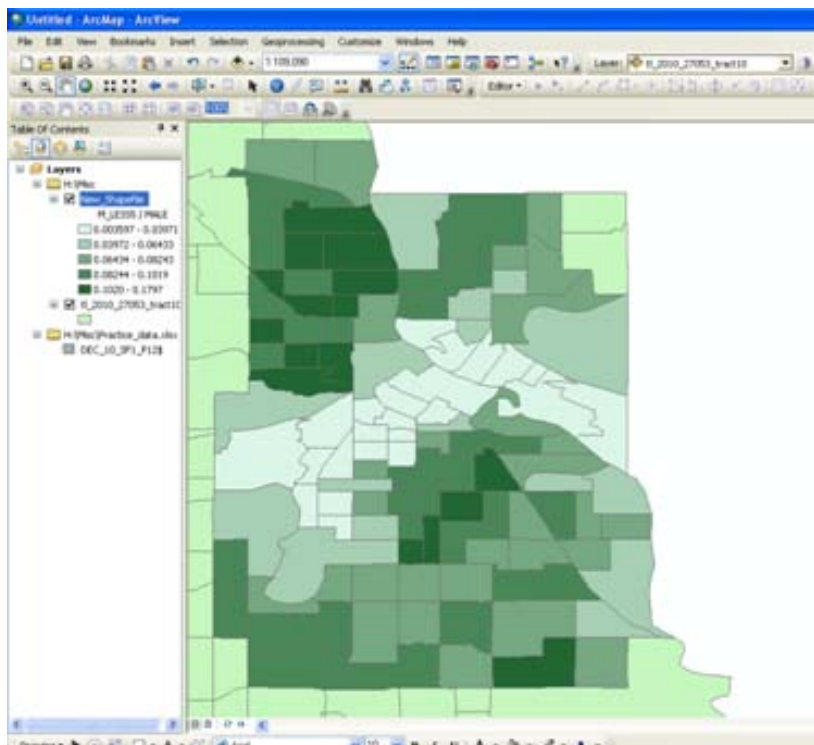
13 Make the Join permanent: right-click the shapefile again and select "Data" and then "Export Data". Save the new shapefile with the joined Census data.

14 Finally you are ready to make the map. To show your variables, double-click the newly created shapefile. This will open the Layer Properties window. Select the tab called Symbology. Within Symbology, select the option on the right for Quantities, and then select Graduated Colors.

15 Now choose the variable you want to display in the Value dropdown (e.g. [Male]). You can normalize the data (create a ratio or percentage) by adding another variable to the Normalization dropdown. For example, you could show number of males less than 5 years old as a true count or you could normalize it by adding the total number of males in the Normalization dropdown to get a ratio of the percent of males that are less than 5 years old. Then select the Color Ramp of your choice and click OK. Next select the Classify button. Choose Natural Breaks or Quantile, then click OK. Select the number of Classes (or groups) of data you want to display ("Classes"> 4). Your map might look something like this:

16 In the View dropdown, select Layout View. Uncheck any shapefiles you do not want to show in the final map. Finally, go to the Insert dropdown and add a legend, north arrow and scale bar.

Minnesota Department of Health