

Jason & Glenwick, eds.

Methodological Approaches to Community-Based Research

Chapter 12/Web Appendix guide

Web Appendix Guide for Chapter 12/Geographic Information Systems (GIS)

The authors of this chapter used ArcMap to complete the GIS application described below. A 60-day free trial copy of ArcGIS can be obtained from

<http://www.esri.com/software/arcgis/arcview/eval/evaluate.html>. The following application instructions assume a basic familiarity with the functions of ArcGIS which can be obtained through tutorials provided by ESRI on a trial disc. However, there are several other GIS software and Web packages that can be used to complete the geocoding in this application. One is [Health Landscapes](#), where users can upload and geocode their own information in a web environment for free.

The files for the geocoding application can be found in the web appendix included with this book under GIS. These files should be copied onto your personal workspace before completing this exercise. One note is that ArcGIS is the name for a suite of products: here we will use ArcMap and ArcCatalog.

1. Open ArcMap and choose the option for a new, empty map.
2. From the ArcMap workspace, open ArcCatalog. This is the data management system for GIS operations; files used in ArcMap must be added from ArcCatalog and not the computer file management system.
3. In ArcCatalog, you must tell the program where to find the data for this exercise. Do this by clicking the picture of the globe with a right-facing yellow arrow, connect to folder. Navigate to where the data file (GIS) was saved and click OK. The folder/location containing the data will now appear in the data tree in the left panel of ArcCatalog.
4. Adding data to the map is accomplished by dragging and dropping the files individually into ArcMap.
5. Drag “PassaicCounty” from ArcCatalog to ArcMap (this is the boundary file for Passaic County, NJ).
6. Drag “pasrds00” from ArcCatalog to ArcMap (this is the roadway file).
7. Drag “PassaicPharmacyOutlets” from ArcCatalog to ArcMap (this is the address table of pharmacies). You should now see a county boundary with a road network in ArcMap. Note the table appears in the data tree in ArcMap’s left panel, but does not appear on the map yet. We now begin the process of geocoding the pharmacy addresses into the map.
8. Click Tools > Geocoding > Geocode Addresses

9. A window will come up prompting you to “Choose an address locator to use” This is an index created using the TIGER/Line road files to interpret them for the map.

10. Click Add > Navigate to the data files and choose “pasrds00” address locator, click Add

11. Highlight pasrds00 and click OK and another dialogue window will pop up.

12. This window allows you to set the options for geocoding. The top box asks for the address table, if it has been added to the map, PassaicPharmacyOutlets should appear in the drop down box.

13. The next box down asks for the Address Input Fields and this tells ArcMap where to look for the address and zip code data. In Street or Intersection, choose Address from the drop down box and in Zone, choose Zip from the drop down box.

14. In the output box, Output shapefile or feature class lets you choose where to save the data. Navigate to where the other data files are saved and click OK.

15. Click Geocoding Options. Here you can set how sensitive you prefer the address matching to be. Leave the defaults in place under Matching Options. Under Output Options, Side Offset enter 50 in the box and from the drop down choose “feet”. This ensures that the point on the map will fall on the correct side of the street. Click OK.

16. A window will pop up to show the progress of the geocoding. Here you will see the results of the geocoding as addresses will either be matched, tied, or unmatched. If you have a large number of unmatched addresses, you can click Rematch and manually edit the addresses to increase the match percentage.

17. Click Close. You will now see points added to the map representing the physical locations of the pharmacies in the data table.

This exercise will introduce basic mapping concepts as well as how to join tables with demographic information on spatial boundary information.

1. Continue with the map started above from the geocoding exercise.

2. From ArcCatalog, add the data file “CensusData” to the map by dragging it from ArcCatalog to ArcMap.

3. The goal is to join the Census data with the boundary data representing Census tracts in Passaic County, NJ. In the data tree, right click on Passaic County > Joins and Relates > Join. A new window will pop up.

4. In this window, the first option asks: What do you want to join to this layer? From the drop down box, choose “Join attributes from a table”.

5. Next, you must tell ArcMap what field in the data the join will use to match cases in the data set. There must be a unique identifier, or key, in the table to be joined that is spatially referenced. Here, the census data is broken down by census tract. The key is the numerical identifier for each census tract, and in the boundary layer's attribute data, this census tract identifier is also present, so there can be a match. In the window, (a) Choose the field in this layer the join will be based on: from the drop down box, choose "Key"; (b) choose the table to join to this layer: from the drop down box, choose "CensusData"; (c) choose the field in the table to base the join on, from the drop down box, choose "TractID". Click OK.

6. The demographic data is now joined with the boundary data. Right click on the Passaic County layer in the data tree in ArcMap. Choose Properties.

7. A new window will pop up and show all the properties associated with the data layer you have chosen. Choose the tab named "Symbology".

8. In the left pane of the symbology tab, chose Categories > Unique Values. The CensusData file has a field indicating the median income quartile for census tracts in Passaic County and a map will be made plotting the location of disease promoting pharmacies against the median income levels of census tracts in Passaic County.

9. Click on "Unique Values".

10. In the Value Field drop down box, choose "Median_I_A".

11. Uncheck the box <all other values>.

12. Click "Add All Values". This will add the values for median income in the main pane. The values go from 1-4 from lower to higher median incomes.

13. To change the color of the income quartiles, double click the colored rectangles and choose a color ramp of your choice indicating the progression from low to high median incomes.

14. To name the quartiles, click on the numbers in the middle of each row and type in the quartile range: <31,672; <44,375; <62,600; >62,601. The values will show up in the legend of the map. To change the title click on Median_I_A and type in Median Income Quartile.

15. Uncheck the box for <all other values>.

16. Click OK. The income quartiles will now be represented on the map.

17. To indicate which outlets retail disease promoting products, right click on the layer "Geocoding Result:".

18. Choose Properties > Symbology > Unique values, many fields.

19. In Value Fields, choose “Tobacco”, “Alcohol”, “Lottery”. One for each of the three drop down boxes. Click “Add All Values”. A list will appear showing the different combinations of products a pharmacy may retail (i.e., 0,1,1 or 1,0,0). Here the objective is to combine all the outlets that sell one of the products into one line.

20. Click on the line with values 0,0,0. This is the group of pharmacies that sell no disease promoting products. On the right hand side of the pane, click on the up arrow to move the 0,0,0 group to the top of the list.

21. To combine the other groups, click on the first line under the 0,0,0 group. Hold the shift key down on your keyboard and use the down key to highlight the remaining categories.

22. Right click on the highlighted categories and choose “Group Values”. The categories will be combined.

23. Using the instructions above change the labels and colors for the different pharmacies.

24. Click OK.

Next, the objective is to create a map that is able to be exported in .jpg or PDF format for printing or placing in a document.

1. Click on View > Layout View. This will take you to a screen where the layout of the map can be created. There are a few elements that must be included on any map: Title, Legend, Scale Bar, and North Arrow.

2. Click Insert > Title. Type in a title for the map.

3. Click Insert > North Arrow. Choose a North Arrow from the list and position on the map.

4. Click Insert > Scale Bar. Choose the Scale Bar style from the list. Click Properties, in Division Units, choose Miles from the drop down box. Position the scale bar on the map.

5. Click Insert > Legend. Choose the items to be included in the legend. Highlight the item “Geocoding Result:” and click on the right arrow to bring it into the right pane. Do the same for “Passaic County”. Click Next.

6. Type a title for the legend. Click next through until the legend is generated. Position the legend on the map.

7. Click on File > Export Map. Choose the format to export the map in. PDF works well for ArcMap and creates a clear image. See Online Figure 12.7 for the resulting map.