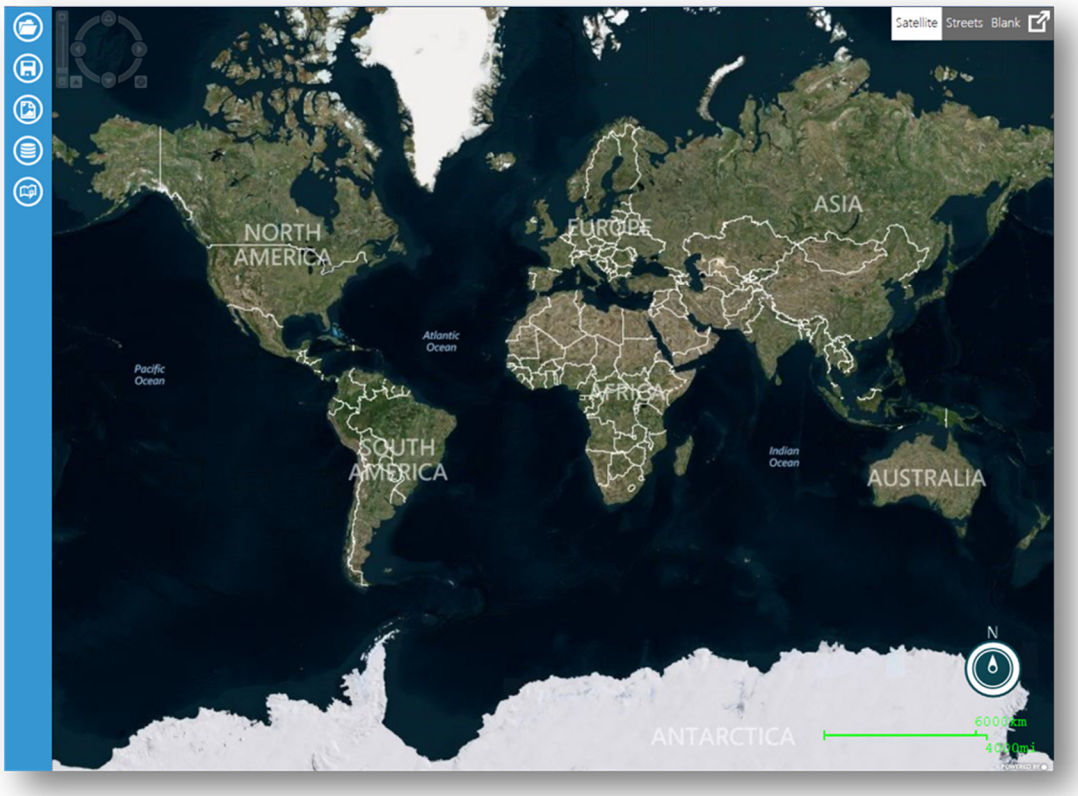

EpiMap Tutorial:

Representing Data with Maps

Document Version 3.1

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Acknowledgements

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Disclaimer

The following scenario and all data associated with the scenario and this training material are fictional. The scenario is not related to any real-life event and was designed for software training purposes only. The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Contents

Representing Data with Maps

This lesson introduces you to the Epi Info™ 7 Map module.

For this lesson, data adapted from a survey used at a local health department in the state of New York to support an asthma initiative will be utilized. A paper survey was created and data were collected around schools in the county to investigate asthma incidence at local schools. Student's demographics, symptoms information and school activities information were captured in the survey.

In Lesson 5, you will use Epi Map to create a combination of maps to look for relationships between income and asthma, incorporating additional layers to the map to identify the locations of regional hospitals and schools.

This lesson covers the basic information needed to create maps, understand the Epi Map workspace, and the different options available to edit and customize maps.

Time to complete: 1 hour (Beginner)

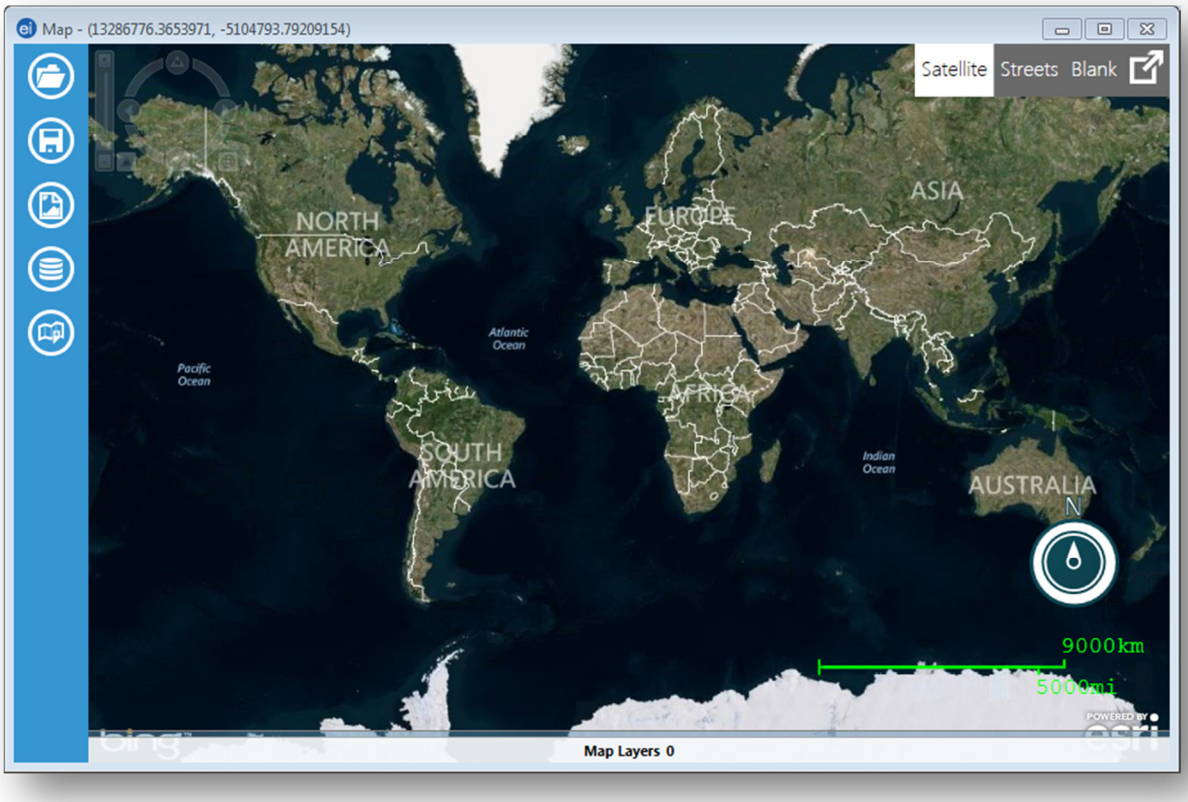
FIVE GOALS

1. Create a choropleth map of median income for the surveyed region.
2. Create a case cluster map that shows the correlation between income and asthma cases.
3. Incorporate additional layer to show the location of hospitals in the surveyed region.
4. Incorporate additional layer to show the location of schools in the surveyed region.
5. Create an image of the map to illustrate on a presentation.

The Epi Map Workspace

1. - From the Epi Info 7™ main menu, click Create Maps or select Tools>Create Maps to open the Epi Map module.

Here is the Epi Map workspace.



Navigating Epi Map

Most of the work in Epi Map requires map layers to be constructed with shapefiles and related data variables or latitude and longitudes coordinates captured in a database. You will use the Add Data Layer functionality to add, remove, or re-order layers. Once a map is displayed, you will be able to filter certain criteria, add additional data, and add points, zones and labels to a map.

Maps can be saved as .MAP files (interactive maps) that are editable and can be opened in Epi Map. Maps can also be saved as a portable network graphic (.png) file and used in presentations and in other programs.

Other features are also accessible through the Epi Map menu bar. The following options are available in the Epi Map menu.

Open a map file

Interactive maps created and saved in Epi Map can be opened using this menu option.

Save file as a map

This option allows users to save current map as an interactive map. Users will be able to open this file as many times as needed without having to select data sources and regenerate data layers. If the data source is updated, changes will be reflected in the map.

Save file as a graphic

This option allows users to save the map displayed in the current Epi Map session as a portable network graphic (.png) file.

Add data layer

Allows you to incorporate different types of data into one single map.

Add reference layer

Allows you to add a reference layer without any associated data needed.

Create time lapse

Based on a date field from your dataset, this feature allows you to plot points into your map using a motion effect to represent the order of occurrence based on the value of a date field.

Maps Types

The following maps can be generated using Epi Map.

Choropleth

Use to categorize features into equal ranges or counts (quantiles) that are color-coded to indicate changes in the data. In this lesson, you will create a choropleth map that illustrates income data for the region.

Case Cluster

Allows users to show exact locations of people with a specific attribute. In this lesson, you will create a case cluster map that shows the physical household locations of the children interviewed based on addresses captured for each household. You will also draw the locations of hospitals and schools based on latitude and longitude data.

Dot Density

A map type that uses dots or points to show a comparative density of features over a map based on values stored in polygon layer attribute fields. Dot density is an effective method to visualize concentrations of quantitative data.

In a dot density map, the dots are all the same size and do not represent actual point locations of data.

Spot Map

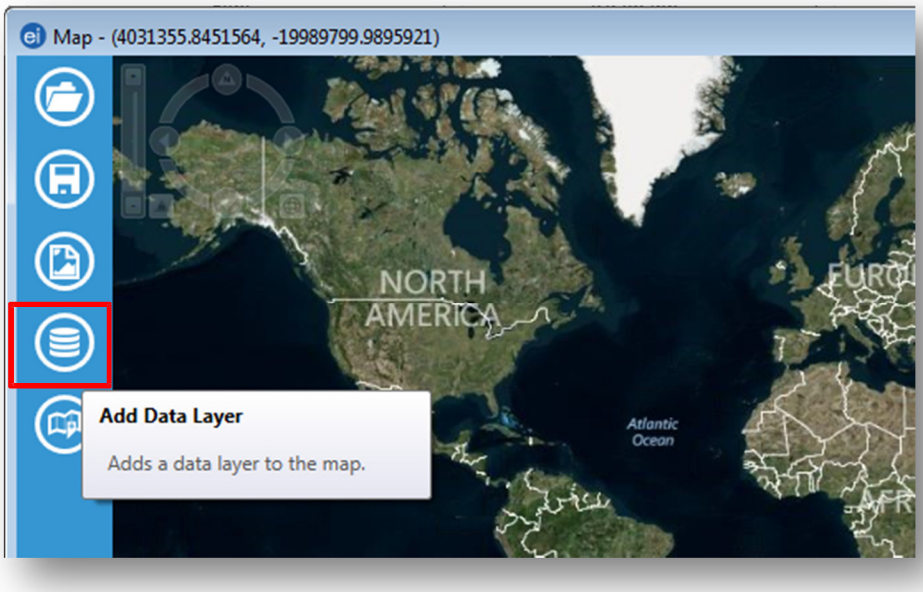
A map type that uses a symbol (diamond, square, cross) to represent the location of a phenomena or point of interest (for example location of water pumps near Broad Street. Spot maps require latitude and longitude values corresponding to the location(s) to be drawn into the map. In this lesson, you will incorporate spot maps to draw the locations of hospitals and schools based on latitude and longitude data.

Creating a Choropleth Map

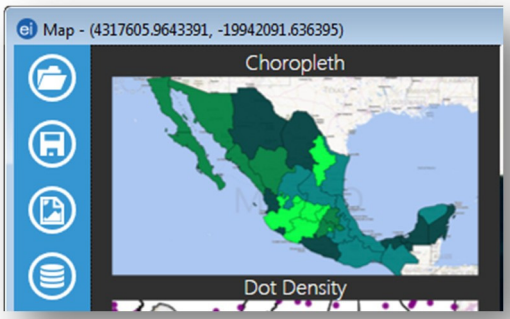
In this lesson, you will create and customize a choropleth map and save it as a .map7 interactive map file.

The schools in the survey cover a ZIP code region containing a variety of demographics. To determine whether you have more cases of asthma in certain income brackets, you will create a choropleth map of the regions using income data and then map cases of asthma from the school survey onto the map. This will help you determine if a link exists between income and asthma in the students from the survey. First, create the choropleth map and then plot the case-based data on to the map.

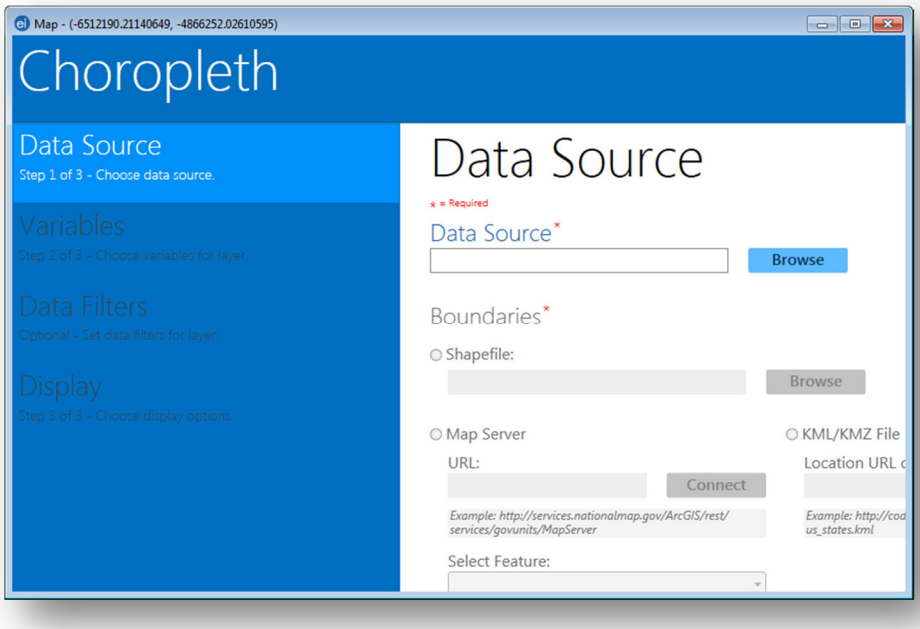
1. Open Epi Map. 2.
   Click the Add Data Layer menu option



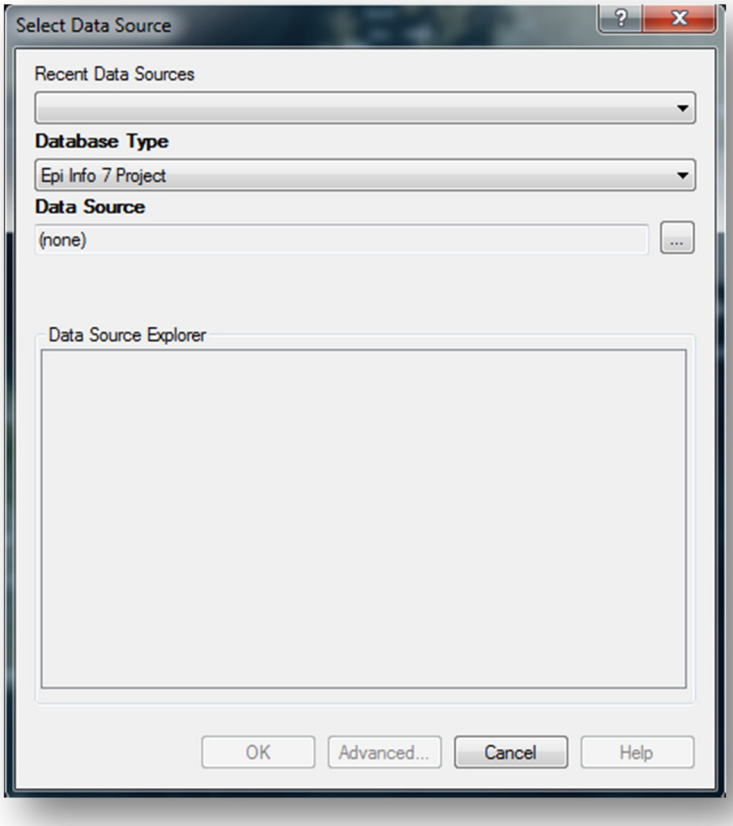
3. Click on Choropleth. -



4. The Choropleth Map Configuration window opens. -



5. Click on the Browse button. The Select Data Source window opens. -

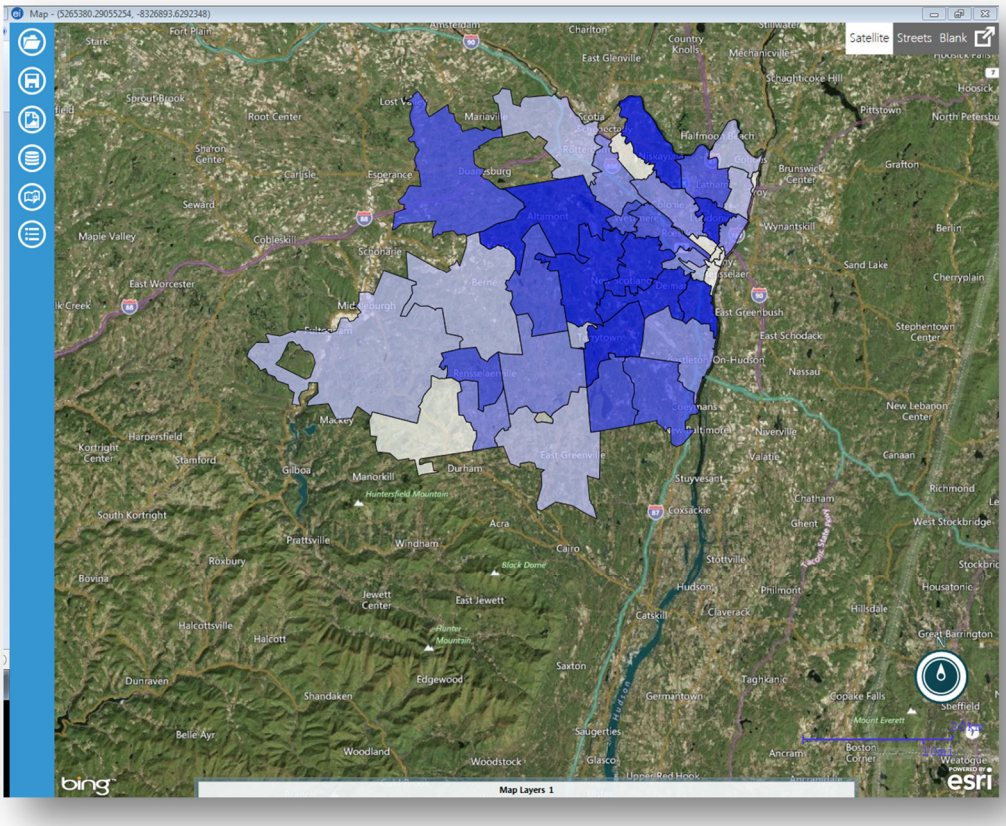


6. - Select MS Access 200-2003 as the Database Type.
7. - Locate the file albany_demogz.mdb file in the Epi Info 7/Resources/Training Projects/Community Health Assessment folder.
8. - Click Open. The Select Data Table From dialog box opens.

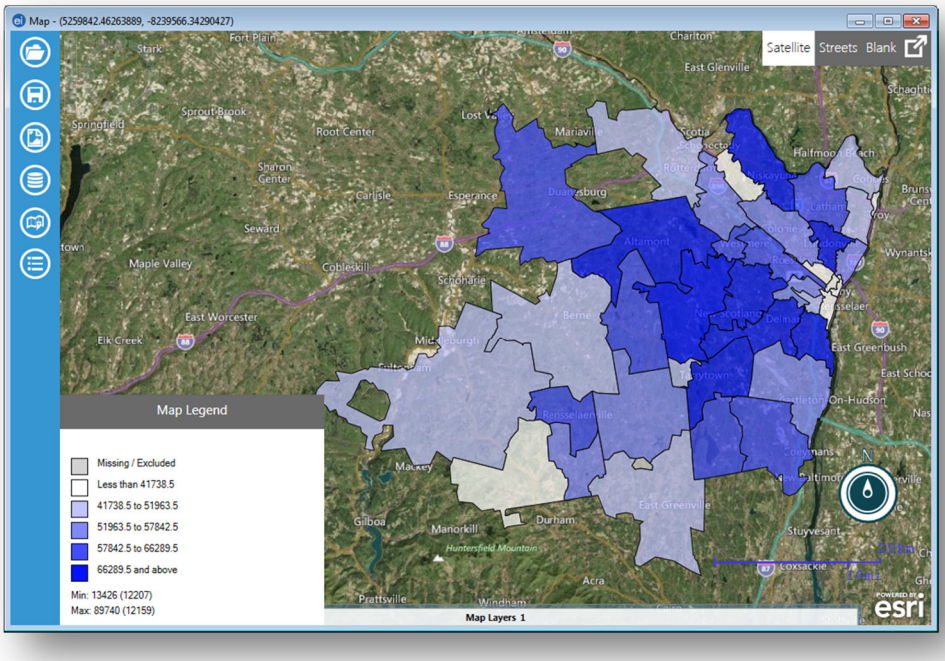
   - The demographic project has two tables. One contains income data and the other race and ethnicity data. You want to create a choropleth map using the income data. The income table contains a series of zip codes and the median income and per capita income for those zip codes. The median income is the value of family income with 50% of families above the value and 50% of the families below the value. Per capita income is the total income for that zip code divided by the population.

9. - Select INCOME.
10. Click OK.
11. Click on the Browse button next to the Shape File radio button in the Boundaries section.

12. Locate the file ALBZCTA_region.shp in the Epi Info 7/Resources/Training Projects/Community Health Assessment folder.
13. Click Open.
14. In the Data Source section, select ZIP from the Data Key Field drop down list.
    - ❖ This is the field inside your data that matches the shape file.
15. In the Data Source section, select MEDIANFAMILY From the Value Field drop down list,
    - ❖ This is the data field to be mapped.
    - ❖ NOTE: Information on zip code 12007 is not contained in the demographic project file.
16. From the Boundaries section, select Zip from the Feature Key Field drop down list.
    - ❖ This is the field inside the shape file that matches your data.
17. Keep the number of classes at 5. The number of classes shows how many divisions or groups into which your data will be divided on the map.
18. Click OK. The choropleth map appears. Your map should look like the one below.



19. Notice that there is no legend displayed when the map is first generated. In order to display the legend, click on Hide/Show Legend icon on the menu bar. The legend contains the color codes for the median family income per zip code. The darkest color represents the highest income range and the lightest color represents the lowest.



Note: Epi Info™ 7 can also generate maps using KML files. KML is a file format used to display geographic data in an Earth browser such as Google Earth, Google Maps, and Google Maps for - mobile. KML uses a tag-based structure with nested elements and attributes and is based on - the XML standard. -

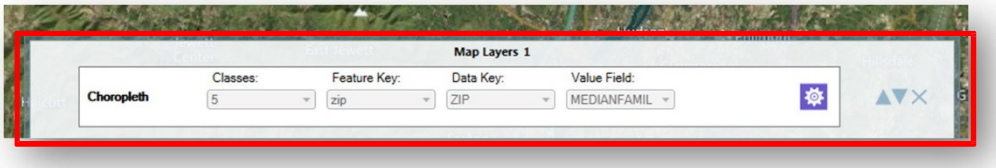
Changing Map Properties

Notice that your legend contains a breakdown on information based on five divisions of data. To extend the ranges and further customize the map, you can complete the following.

1. - To view the information on the current layer, place your cursor around the Map Layer slide-

out gadget located in the bottom section of the screen.

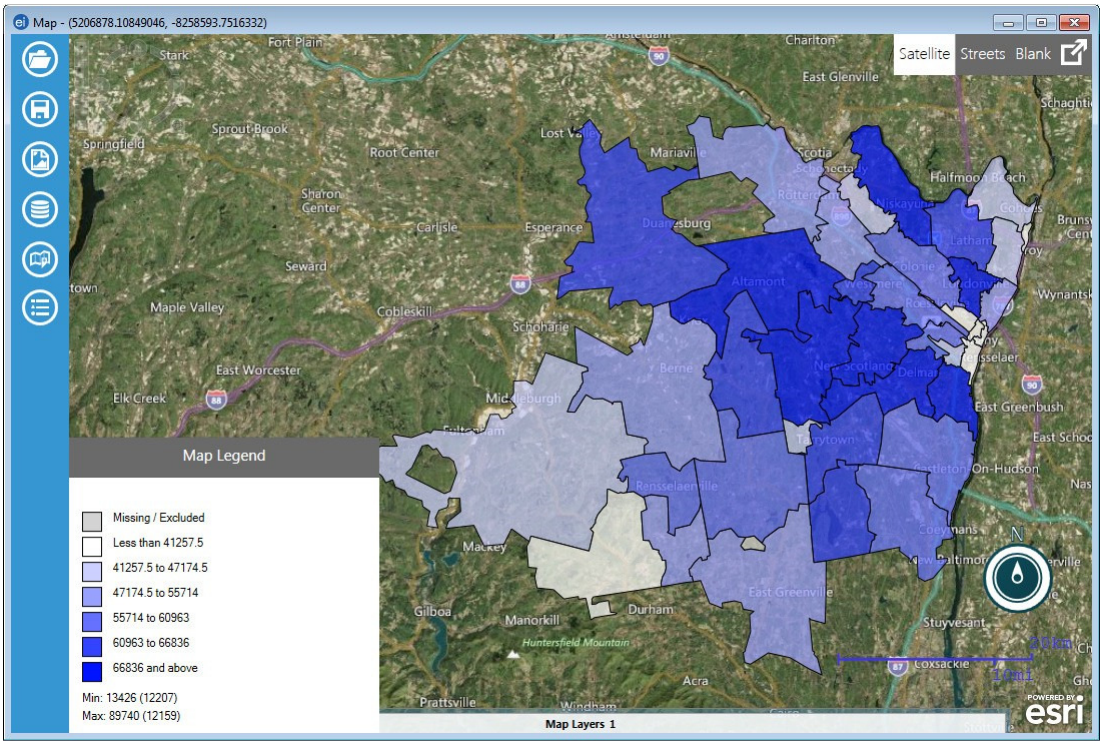
2. - To change the number of classes, click on the gear icon.



3. - From the Classes drop-down list, select 6. As mentioned before, the number of classes listed shows how many divisions or groups into which your data will be divided on the map.

The color legend on the bottom shows the lightest to darkest colors for the map codes and allows changing the colors on the map. You can use the color dialog box to change colors inside the map. Experiment with the different colors.

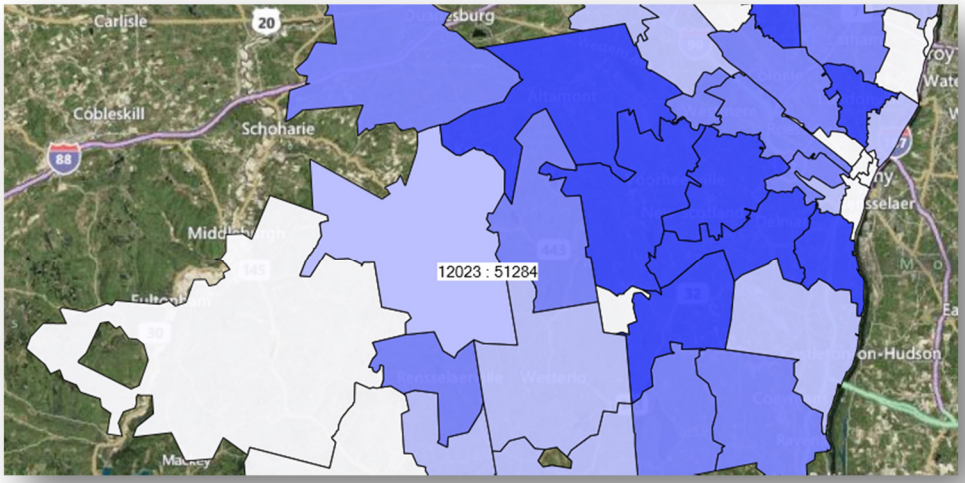
Your map should look similar to the following:



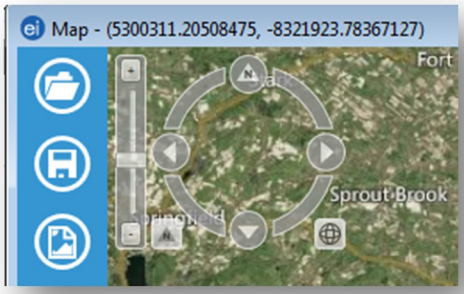
Viewing Map Information

Displaying values

The ALBZCTA_region shape file contains census data as part of the associated .dbf file. Use your mouse button to hover over different map regions and the value associated with the data file will be displayed (as shown below):



You can use the Zoom In/Zoom Out control located on the left hand side of the screen to change the dimensions of the map.



Saving a Map File

Save your map in interactive mode as a .map7 file for future editing.

Click on the floppy disk icon  located on the Epi Map menu. The Save Map File window opens.

1. Name your file IncomeAsthma.
2. Click Save.

Creating a Case Cluster Map

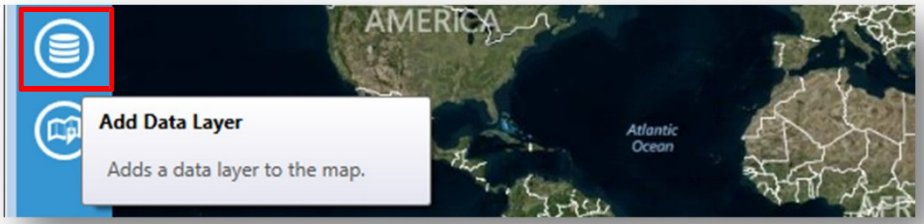
Case cluster maps can be made if you have geographic data for the longitude and latitude measurements of your map

corresponding to the region. Latitude and longitude coordinates are developed with GIS tracking information.

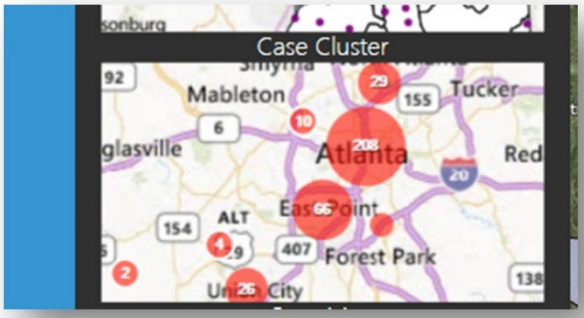
In this lesson, we will incorporate to the existing map a case cluster layer corresponding to the location of the households of the children interviewed. We will then incorporate an additional layer to map, as a spot map, for the hospital and school locations in the region. We will use different symbols to represent these categories into the map. This will help illustrate which zip codes had more cases of asthma and the median income corresponding to those zip codes.

First, we will incorporate the location of the households.

1. - From the Epi Map menu, click on the Add Data Layer option.



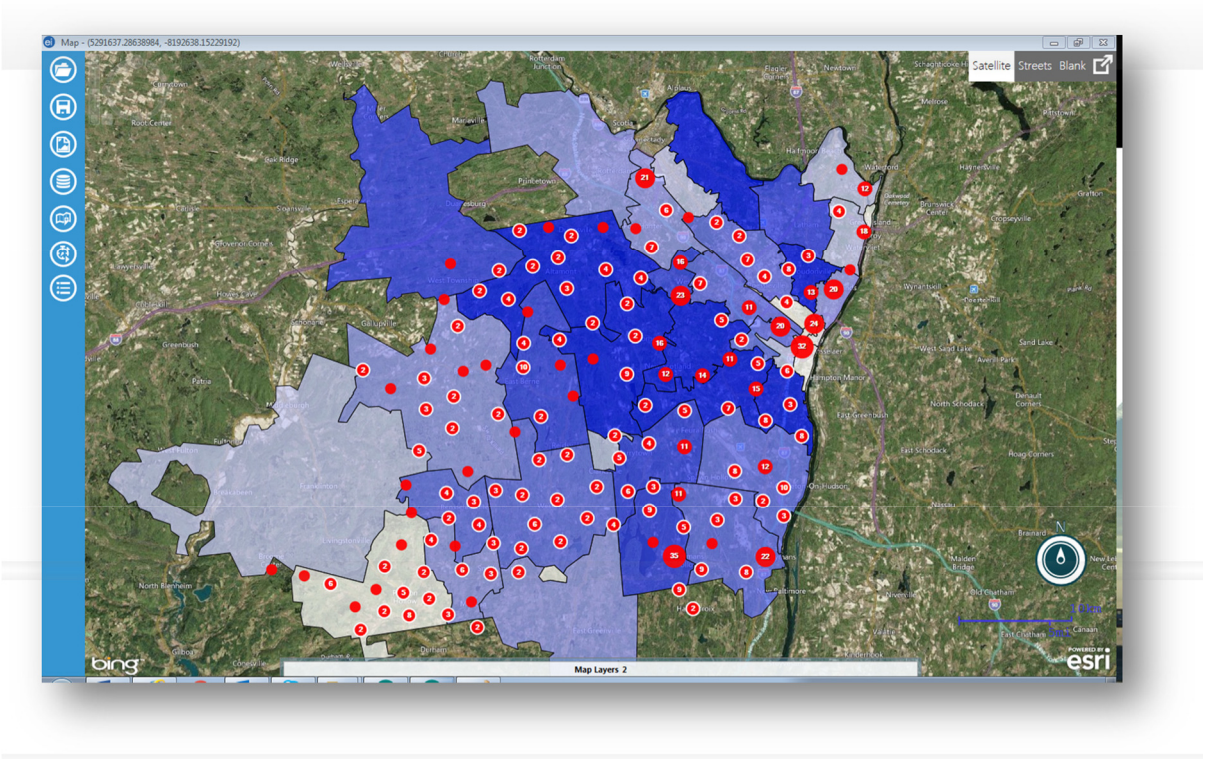
2. Click on Case Cluster. -



3. - Click on the Browse button
4. - Select Epi Info 7™ as the Database Type.
5. - Locate the Community Health Assessment.PRJ file in the Epi Info 7/Resources/Training Projects/Community Health Assessment folder.
6. - Select the PreInterventionSurvey form.
7. - Click OK.
8. - The Latitude and Longitude window opens. Select Latitude from the Latitude drop down list.
9. - Select Longitude from the Longitude drop down list.
10. Type Cases in the *Legend Description* box.
11. Change the Color Representation parameter to Red.
12. Click OK.

Epi Map will immediately display the household locations on the map. The locations are represented with red dots.

- Notice that large clusters of cases appear as bigger circles with the total case count contained inside of them.
- Notice that an additional layer has been added to the workspace.
- You can switch between street and satellite views using the selector located in the top-right corner of the map window.
- The case cluster map was placed on top of the income choropleth. Does the map indicate a correlation between income and asthma in the survey data?



Adding More Layers/ Spot Map to display Hospitals

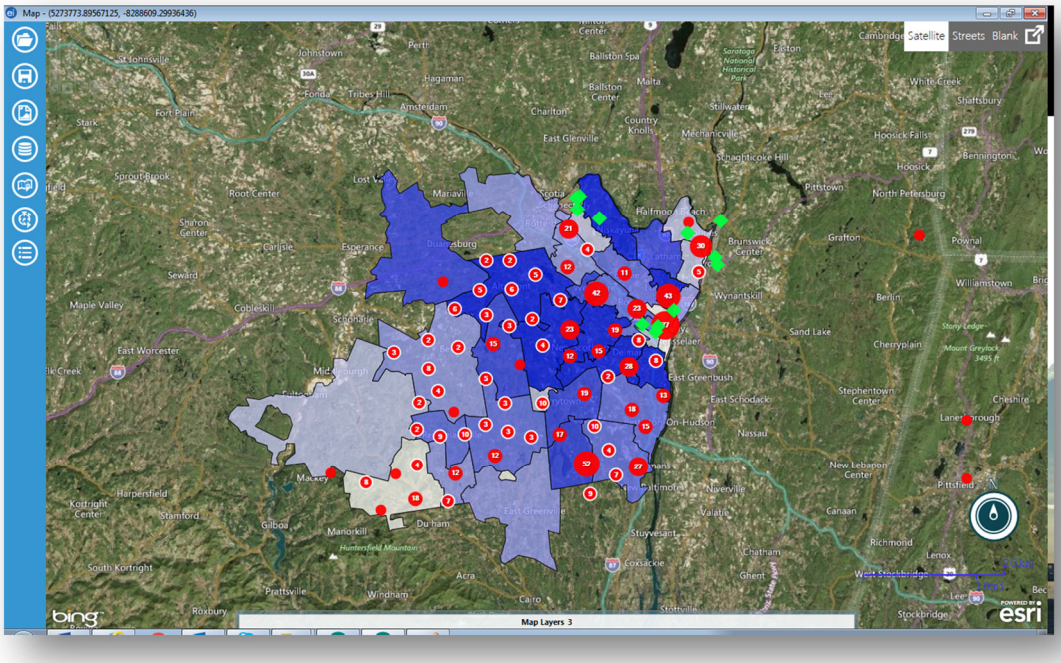
Using latitude and longitude measurements, we will now incorporate an additional layer to represent hospitals in the area. This would allow us to demonstrate if there is a lack of healthcare facilities in the region. This layer would be incorporated as a Spot Map.

Add the hospital points to the map

1. - Select the Add Data Layer option from the Epi Map menu.
2. - Click on Spot Map.
3. - Click on Browse button.
4. - Select MS Access 200-2003 as the Database Type.
5. - Locate the file CommunityHealthAssessment.mdb in the Epi Info 7/Resources/Training Projects/Community Health Assessment folder.
6. - Click Open.

7. - Click OK.
8. - Select the HospitalPoints table.
9. - Click OK.
10. The Latitude and Longitude selection window opens.
11. Select LAT from the Latitude drop down list.
12. Select LON from the Longitude drop down list.
13. Type Hospitals in the *Legend Description* box.
14. Change the Color Representation parameter to Green.
15. Select Diamond from the Select Shape: drop down list.
16. Click OK.

This map will immediately be displayed incorporating the new layer. Your map might look like this:



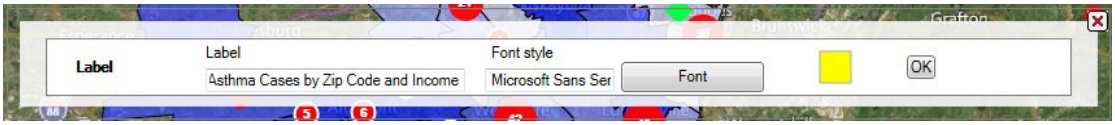
- ❖ When you save the points as a new layer, they will appear in the Map Manager as an editable layer.
- ❖ In the list of layers, the hospital layer must be the top layer. You can move layers up and down using the Map Layer control in the bottom section of the Epi Map workspace. Use the up and down arrows to move layers accordingly.

Adding text to a map

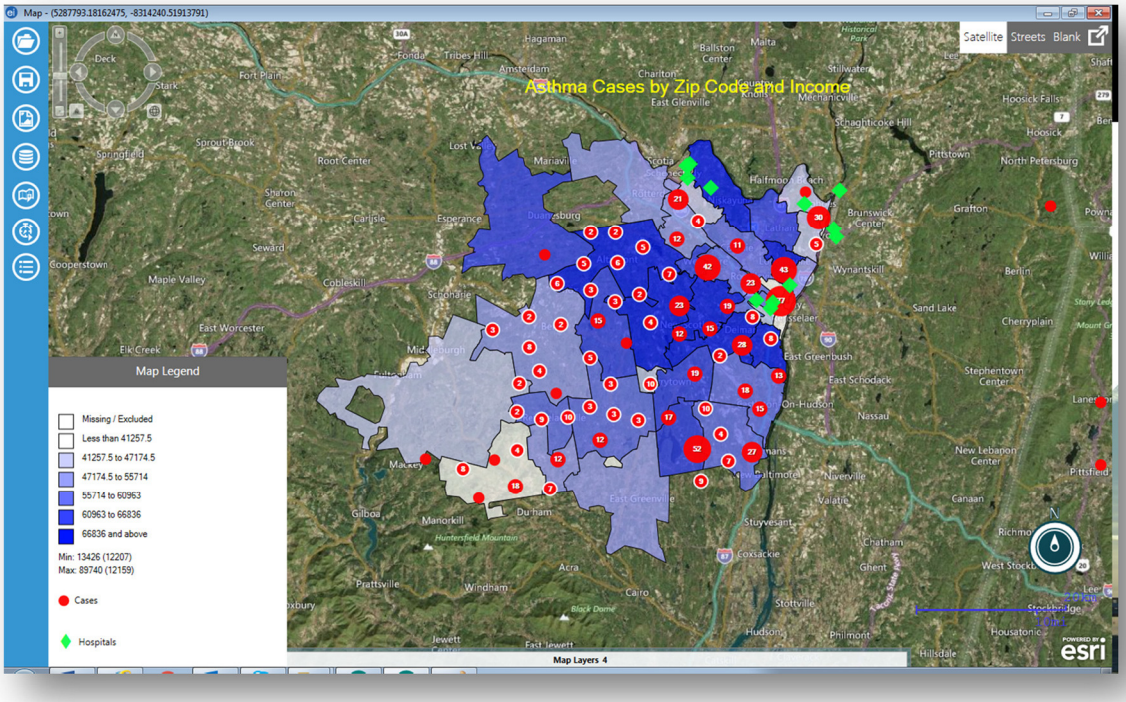
You will create a title for the asthma and income map.

1. - From the Epi Map workspace, right click on the exact area where you would like to place a Map Title. A series of options will be available. Select Add label. The Add label dialog box opens.

2. - In the Label field, type Asthma Cases by Zip Code and Income.



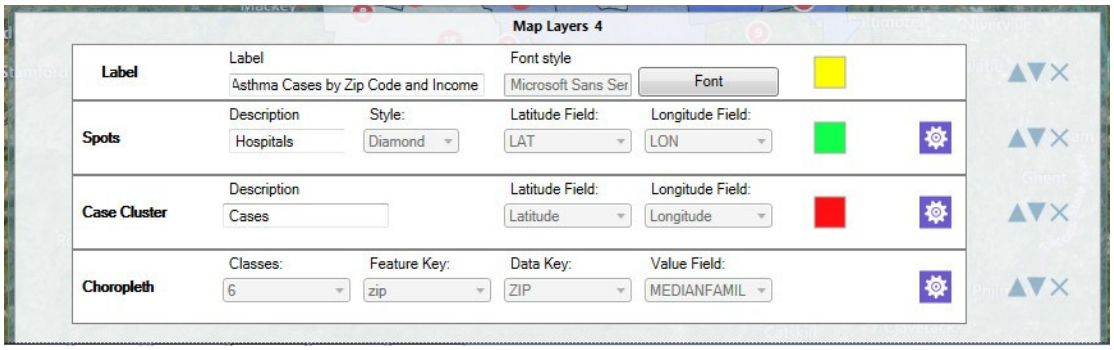
3. - Click on Font button to modify font settings. Select font type and font size.
4. - Click OK. The title appears on your map in the exact location where you right clicked.



- Once the label has been created, a new layer is displayed in the bottom section of the Epi Map workspace. To make any modifications to your label, retrieve the layer and make the desired modifications.

- Please note that the label can't be dragged and moved around the map. You would need to delete the layer and create a new layer placing the label on the desired location.

- Notice that a new layer has been added to the Map Layer gadget.

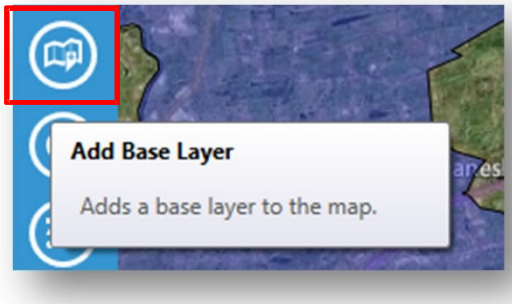


- To remove the label, retrieve the corresponding layer and click on the X. -

Adding a Reference Shape Layer

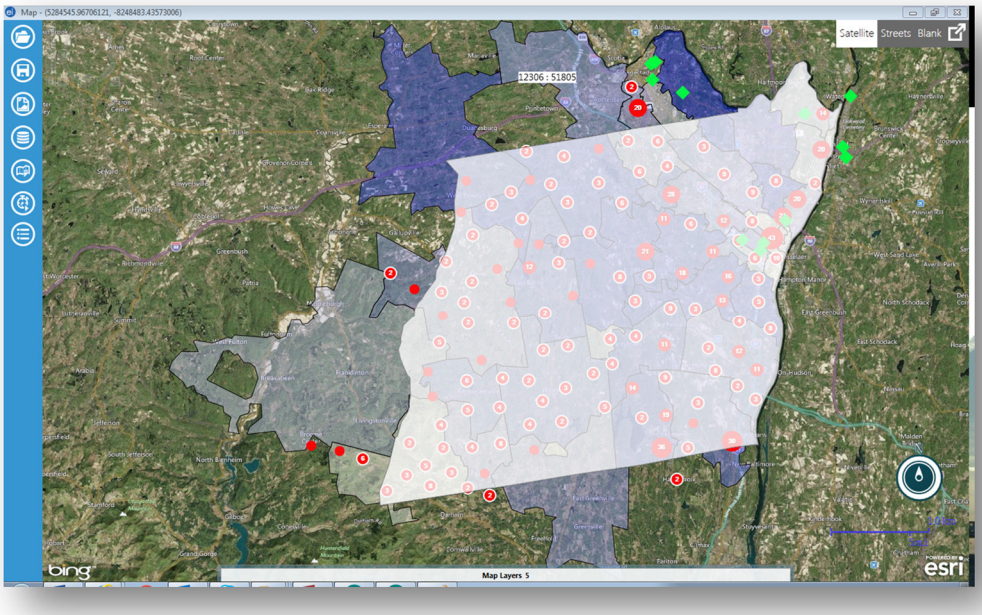
The data and zip codes contained in the survey information crossed county lines. To see how this affects the locations of the schools in the survey, you can place the county shape over the region shape.

1. - Select the Add Base Layer from the Epi Map menu.



2. - Click on the Shape File radio button.
3. - Click Browse.
4. - Select from Shape File.
5. - Locate the file Albany County Boundary_region.shp in the Epi Info 7/Resources/Training Projects/Community Health Assessment folder.
6. - Click Open.
7. - Click OK.

The map should look similar to the following:

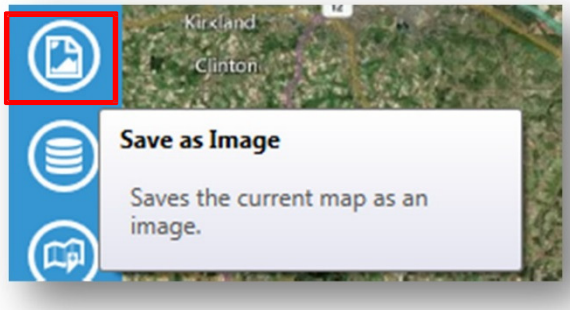


- In the list of layers, move the latest layer three levels down in order to display the different stratifications properly. You can move layers up and down using the Map Layer control located in the bottom section of the Epi Map workspace. Use the up and down arrows to move layers accordingly.

Saving a Map as a Graphic File

To save a map to be used in presentations or documents, save it as a .png file.

1. - Click on the Save as Image icon.



2. - Name the file SchoolPointsMap.
3. - Click Save.

Student Exercise

You have been shown how to incorporate layers into a map. In this exercise, you will add a Point of interest layer to

represent the locations of the schools that students are attending. Navigate to the Epi Info 7/Resources/Training Projects/Community Health Assessment folder. In the database CommunityHealthAssessment.mdb, find a table called SchoolPoints. Use these data.

Quiz

The following questions will see how much you have learned about using the Epi Map module.

Questions

1. - Epi Map allows users to generate the following type of maps:
    a. - Dot density
    b. - 3D Visualization
    c. - Choropleth
    d. - Case cluster
    e. - Topographic
    f. - None of the above
    g. - All of the above
    h. - A, C and D

2. - To map data contained in an MS Excel file, I must import the Excel file as an Epi Info 7 project in order to map the data.
    a. - True
    b. - False

3. - Shape files are:
    a. - Packaged with Epi Info 7 and available for use at no cost
    b. - Widely available on the Internet for a low fee per shape file
    c. - Widely available on the Internet at no cost

4. - In order to display data accurately in a map data, the user must have:
    a. - A data key and shape key that doesn't need to match and a required numeric variable to display
    b. - A data key and shape key that doesn't need to match and a required text variable to display
    c. - A data key and shape key that must match and a required numeric variable to display
    d. - A data key and shape key that must match and a required text variable to display is required
    e. - A data key and shape key that must match

5. - The *Create Time Lapse* feature can be used with any data field type in a dataset?
    a. - True
    b. - False

6. - Can multiple map type layers be overlaid or superimposed in the same map?
    a. - True
    b. - False
7. When using Case Cluster maps, can users view the information of a specific data point in a map?
    a. True
    b. False

Answers

1. - h
2. - (b) Epi Map can import data from any of the data type formats supported by Epi Info 7 in order to represent the data in a map.
3. - (e) Most shape files are widely available at no cost on the Internet. Sites like - https://www.census.gov/cgi-bin/geo/shapefiles2010/main and - http://www.gadm.org/country contain shape files for different layers at no cost. -
4. - (b) A data key and shape key that must match is required. If the user does not have a numeric variable to use for displaying the map, the user can select the RECORD COUNT option to display aggregate counts in the map.
5. - (b) The Create Time Lapse feature will only work with date fields
6. - (a) Epi Map supports adding multiple layers to a map. The Map Manager regulates the adding and removing of map layers. Layer levels can be adjusted "front to back" or "back to front" in the Map Manager depending on the order desired.
7. - (a) When accessing Epi Map through the Enter Data module, double clicking on a specific data point in the map retrieves the exact record the data point represents displaying the information to the user. This only applies to Epi info 7 projects.

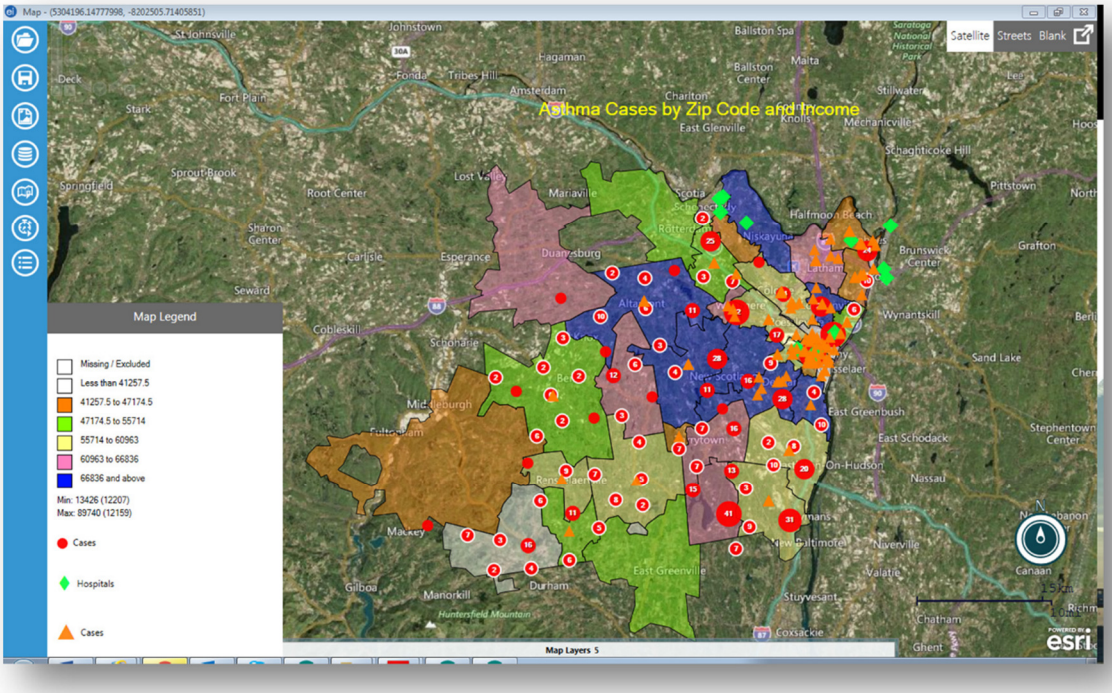
Student Practice – Step By Step Instructions

Student Practice-Lesson 5

Let's incorporate an additional layer to the map we created in Lesson 5.

1. - Select the Add Data Layer>Spot Map option from the top menu.
2. - Select MS Access 200-2003 as the Database Type.
3. - Locate the file CommunityHealthAssessment.mdb in the Epi Info 7/Resources/Training Projects/Community Health Assessment folder.
4. - Click Open.
5. - Click OK.
6. - Select the SchoolPoints table.
7. - Click OK.
8. - Select LAT from the Latitude drop down list.
9. - Select LON from the Longitude drop down list.
10. Select any color from the palette (except red or any other you have previously used).
11. Select Triangle from the Select Shape: drop-down.
12. Click OK.

The map will immediately get displayed incorporating the new layer. Your map should look like this:



Appendix

The US Census TIGER/Line web site is a good source of US Shape files with population variables:

- https://www.census.gov/cgi-bin/geo/shapefiles2010/main
- http://www.census.gov/geo/maps-data/data/tiger-data.html
- http://www.census.gov/cgi-bin/geo/shapefiles2010/main
- http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t

For shape files for other countries, you can try:

- http://www.diva-gis.org/gData