Street Kids

Geography and risk for homelessness

— by Deden Rukmana

Introduction

Problem

Homelessness among children and youth has been increasing the past two decades. The number of homeless youth continues to grow, with about 2 million youths per year spending some period of time in emergency shelters or on the streets. Homeless children 12 years old or under are the fastest-growing subgroup of this population (Kidd and Davidson 2006; Witkin et al. 2005).

Homeless youths are concentrated primarily in large urban centers and frequently have histories of domestic violence, parental criminality and substance abuse, and poverty (Kidd and Davidson 2006). They also are vulnerable to negative physical and mental health problems (Cauce et al. 2000; Ensign and Bell 2004; Hyde 2005).

The contemporary study of homeless children and youth has produced a static representation of a dynamic homelessness problem. It has identified where and in what condition children and youth end up as homeless, but not where they come from or go to. It has not assessed the social processes that contribute to the vulnerability of children and youth to homelessness.

Where do homeless children and youth come from?

What makes them vulnerable to homelessness?

Where might homelessness prevention programs most benefit children and youth?

Location

Miami-Dade County, Florida

Keywords: homelessness, homeless youth and children, residential origins, neighborhoods, demographic factors, socioeconomic factors, geocoding, spatial statistics, mean, median, standard deviational ellipse, Ordinary Least Squares (OLS)

Time to complete the lab

Three to four hours

Prerequisites

- Familiarity with ArcGIS 10
- Understanding of spatial statistics
- Understanding of ordinary least squares (OLS) regression

Data used in this lab

- Miami-Dade Case Study (Rukmana 2008): A shapefile for Miami-Dade County, Florida, including geocoded residential origins of 217 homeless families with their children
- 2000 US Census data

Student activity

Homelessness has been a significant social problem in the United States since the early 1980s. It has proven to be an intractable and highly visible social problem. The programs and services to eradicate homelessness problems were expanded considerably, but the number of homeless has yet to decrease.

Homeless youth ranging in age from approximately 12 to 24 years old is one of the subgroups of the homeless population that continues to grow, with about 2 million youths per year spending some period of time in emergency shelters or on the streets. Homeless youths are concentrated primarily in large urban centers and frequently have histories of domestic violence, parental criminality and substance abuse, and poverty.

Homeless children 12 years old or under are also the fastest growing subgroup of the homeless population. They are still dependent on their parents and experience homelessness along with their parents, particularly with their mothers. Children in homeless families have histories of abuse, being victims of violence, and witnessing much of the violence experienced by their mothers.

The contemporary study of homeless children and youth has produced a static representation of a dynamic homelessness problem. It has identified where and in what condition children and youth end up as homeless, but not where they come from or go to. It has not assessed the social processes that contribute to the vulnerability of children and youth to homelessness.

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

1. How is the spatial distribution of residential origins of homeless children and youth?
2. Where to target homelessness prevention programs for children and youth?
3. What factors contribute to the vulnerability of children and youth to homelessness?

CREATE DENSITY SURFACES

1 Start ArcMap.

2 Add the shapefile *County Boundary*.

3 Add the shapefile *Streets*.

Your view should look similar to the image below.

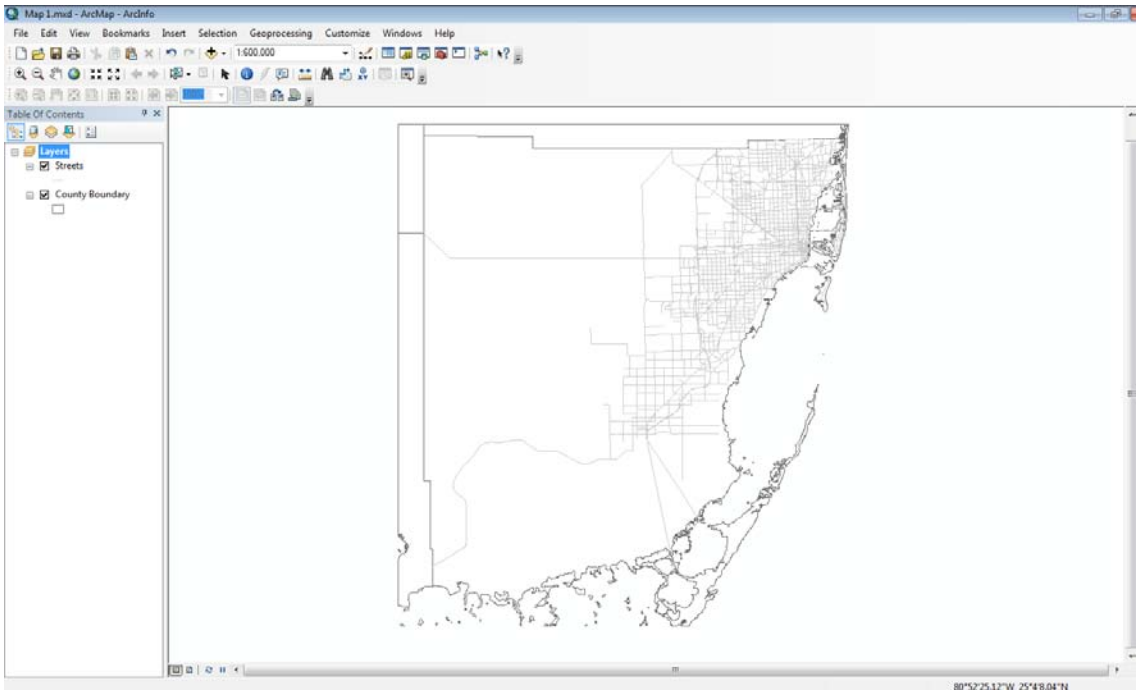


Figure 1. Streets of Miami Dade County.

4 Add the shapefile *Youth.*

The dots represent the addresses of homeless youth and children. You can right-click *Youth* in the *Table of Contents* and click *Open Attribute Table,* and you will see the 217 addresses of homeless youth and children.

For privacy, the addresses have been transformed into the XY coordinates (the longitude and latitude coordinates).

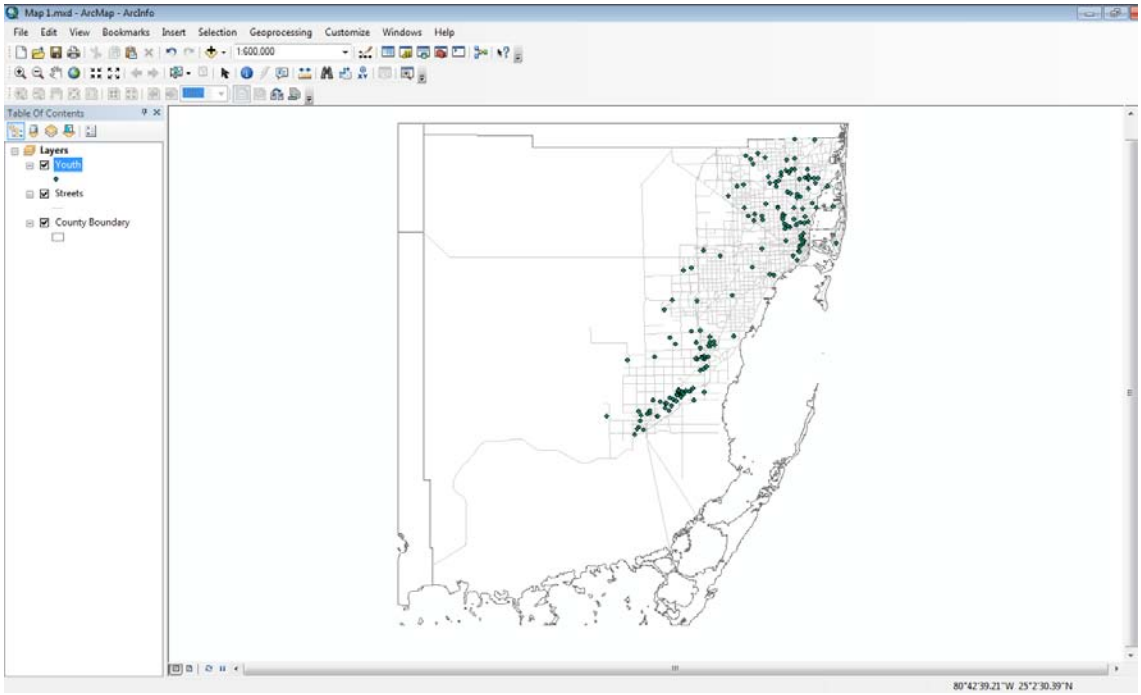


Figure 2. Address locations of homeless youth and children.

5 Save the above map as ***HomelessY&C.mxd***.

The dot mapping, as shown above, reveals where homeless youth and children resided before becoming homeless. Dots at the same addresses or neighboring addresses overlap and hide high-concentration areas. In this lab, you will use a density-based spatial clustering technique called *hot-spot analysis*. The hot-spot analysis provides a picture of spatial concentration of residential origins of homeless youth and children and reveals density variation at a small area level. The following steps are how to create density surfaces or hot-spot analysis.

6 On the *Geoprocessing* menu, click *ArcToolbox*.

7 Double-click *Spatial Analyst Tools*.

***Ensure that you have the Spatial Analyst extension: click* Customize » Extension *and select the* Spatial Analyst check box.**

8 Double-click *Density*.

9 Double-click *Kernel Density* to display the dialog box as shown below.

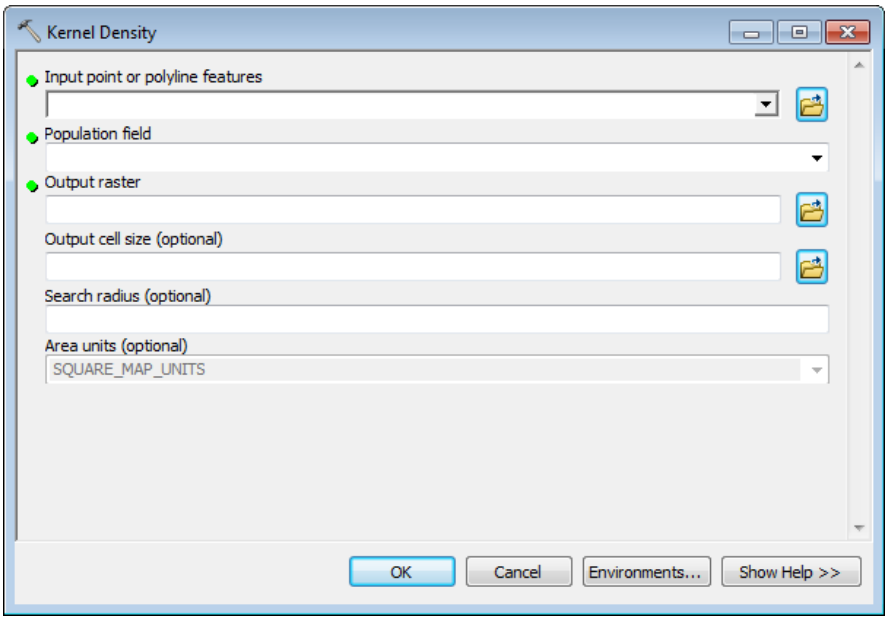


Figure 3. *Kernel Density* dialog box.

10 Set *Input point or polyline features* to the shapefile *Youth*. Now all fields in the *Kernel Density* dialog box will be populated automatically. You can use this automatic default.

11 Click *OK*.

Your view should look similar to the image below.

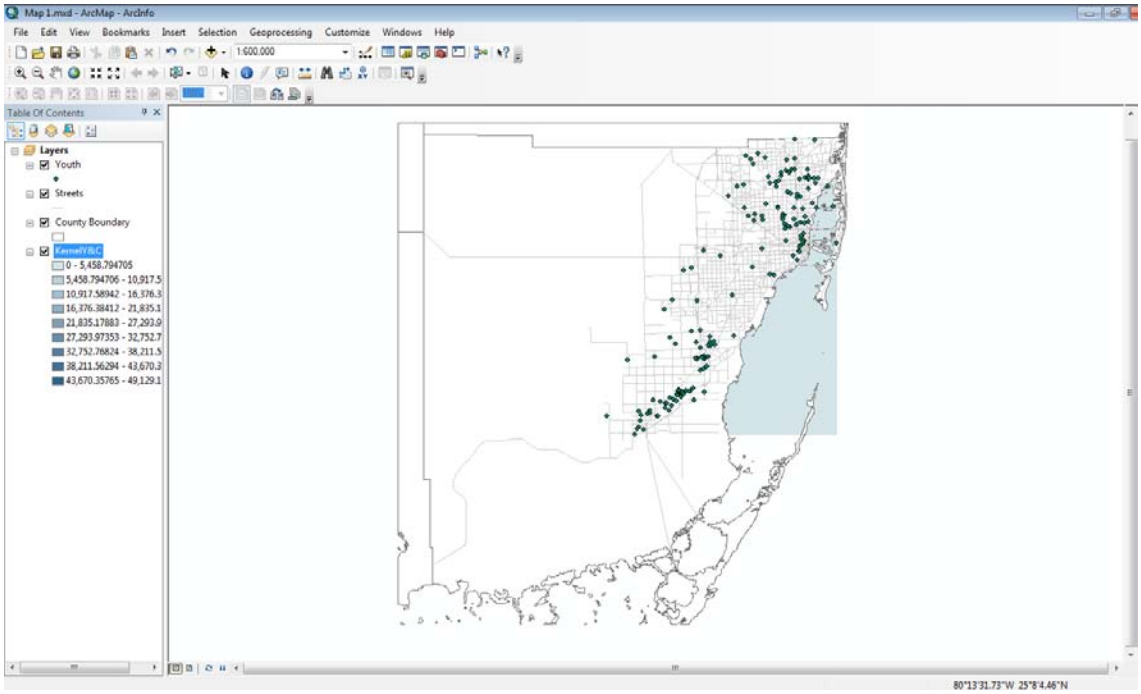


Figure 4. Kernel density map 1.

12 Move the newly created shapefile from the kernel density procedure to the top of the *Table of Contents*. Your view should look similar to the image below.

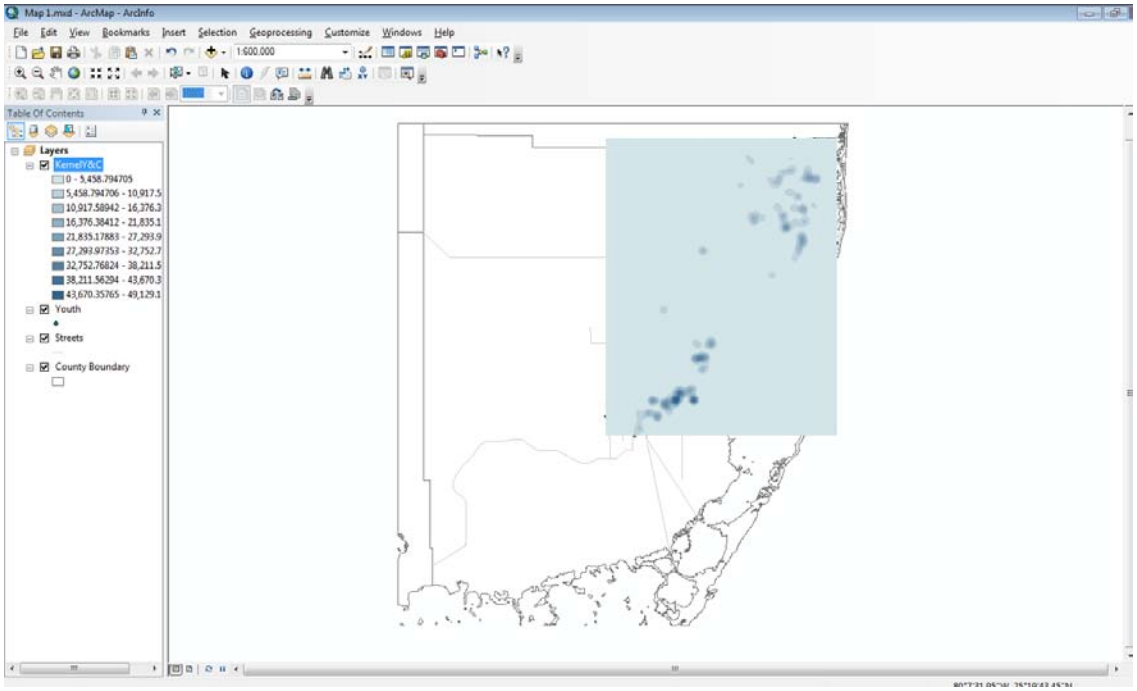


Figure 5. Kernel density map 2.

13 Right-click the first color box under *KernelY&C*. In the *Color* window that appears, click *No Color*.

14 In the Table of Contents, clear the shapefile *Youth* check box.

Question 1: *What is the spatial distribution of residential origins of homeless children and youth in Miami-Dade County?*

DETERMINE MEAN CENTER, MEDIAN CENTER, AND STANDARD DEVIATIONAL ELLIPSE

1 Open *HomelessY&C.mxd*. You created this file earlier on page 4 of this exercise.

2 In the *Table* of *Contents*, clear the shapefile *Youth* check box.

3 Click *Geoprocessing* » *ArcToolbox*.

4 Double-click *Spatial Statistics Tools*.

5 Double-click *Measuring Geographic Distribution*.

6 Double-click *Mean Center* to display the *Mean Center* dialog box as shown below.

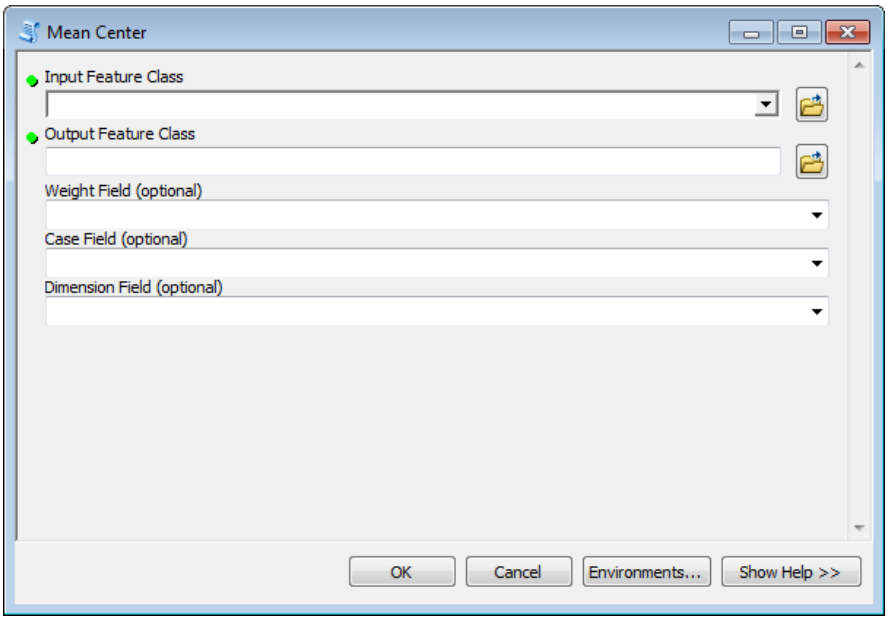


Figure 6. Mean Center dialog box.

7 Set *Input Feature Class* to the shapefile *Youth*. All other fields in the *Mean Center* dialog box will be populated automatically, including the *Output Feature Class* (i.e., Youth_MeanCenter).

8 Click *OK*.

9 Double-click *Median Center* to display the *Median Center* dialog box as shown below.

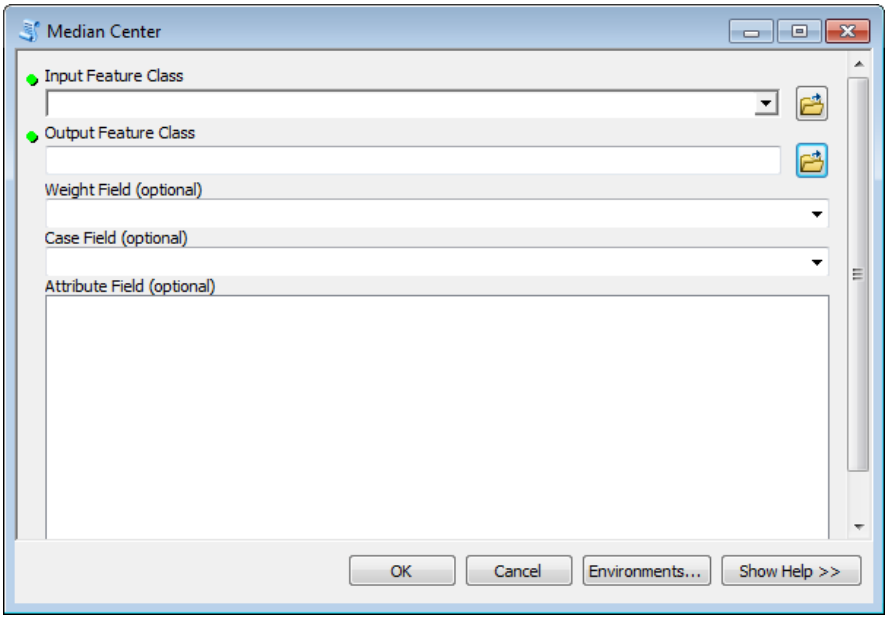


Figure 7. *Median Center* dialog box.

10 Set *Input Feature Class* to the shapefile *Youth*.

11 Click *OK*.

12 Double-click *Directional Distribution (Standard Deviational Ellipse)*.

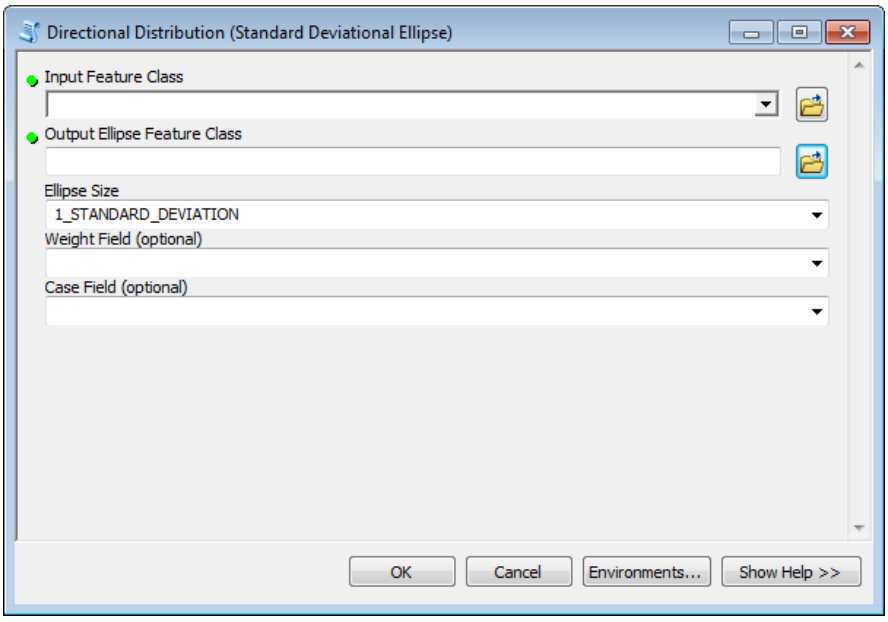


Figure 8. *Directional Distribution* dialog box.

13 Set *Input Feature Class* to the shapefile *Youth*.

14 Click *OK*.

You will see three newly created shapefiles (*Mean Center*, *Median Center*, and *Directional Distribution*). Click *Open Attribute Table* and answer question 2.

Question 2: *What are the mean and median (in XY coordinates) of residential origins of homeless youth and children in Miami-Dade County?*

Question 3: *From the output of the standard deviational ellipse, describe the distribution of the residential origins of homeless youth and children in Miami-Dade County. Calculate* Number of Points in a Polygon*.*

DETERMINE RESIDENTIAL ORIGINS OF HOMELESS YOUTH AND CHILDREN

In this section, you will use the dataset of the 217 addresses of homeless youth and children from the previous section and calculate the number of addresses in each census tract group. The results of this section will become the dependent variables of the regression model in this lab.

1 Open *HomelessY&C.mxd.*

2 In the *Table of Contents,* clear the shapefile *Street* check box.

3 Add the shapefile *Censustractgroups.* (Please note that census tract group is a geographical unit that is created by merging adjoining census tracts. There are 111 census tract groups that are created from 347 census tracts in Miami-Dade County.)Your view should look similar to the image below.

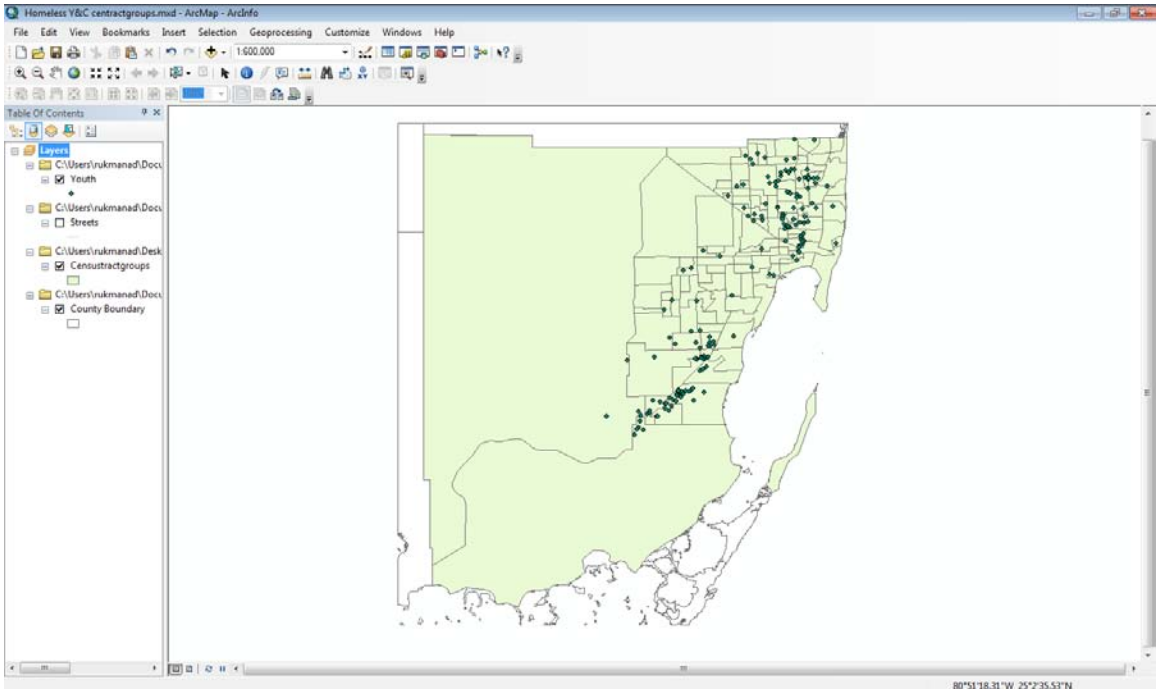


Figure 9. Census tract groups in Miami-Dade County.

4 Save the above map as ***CTGroupHomelessY&C.mxd***.

5 In *ArcToolbox*, click *Analysis Tools » Overlay*.

6 Double-click *Spatial Join.* Your view should look similar to the image below.

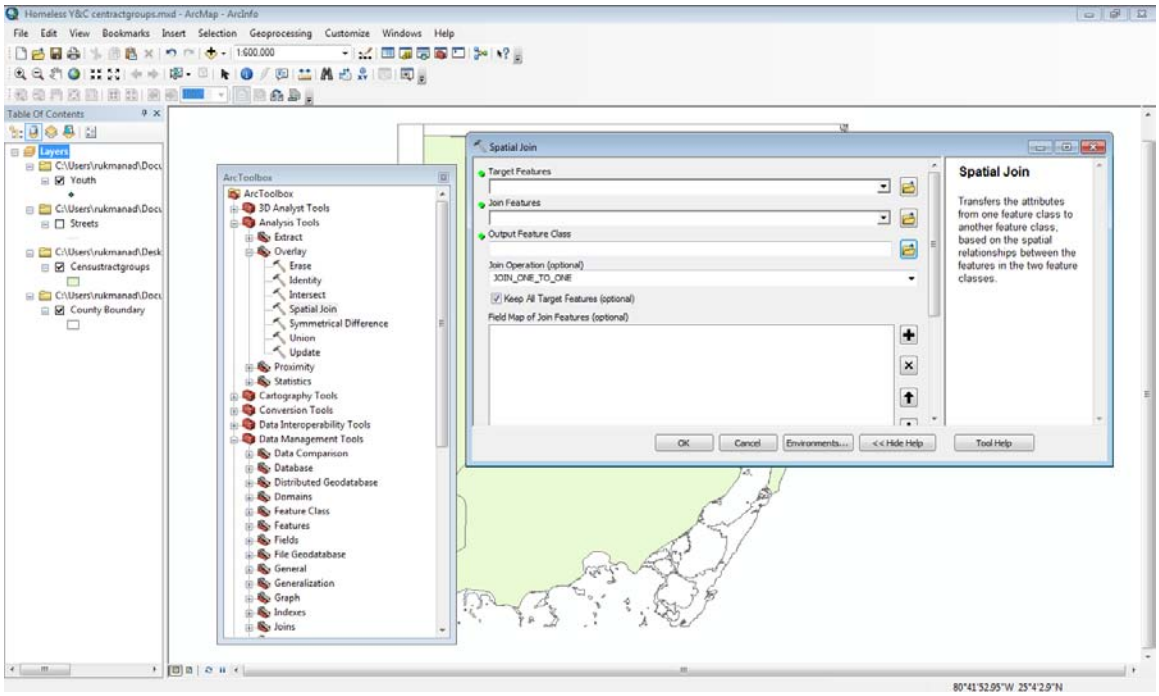


Figure 10. *Spatial Join* dialog box.

7 Set *Target features* to the shapefile *Censustractgroups.*

8 Set *Join Features* to the shapefile *Youth.*

9 Set *Output Feature Class* to the shapefile automatic default output.

10 Click *OK.*

11 Save your map as ***CountHomelessY&C.mxd***.

12 In the *Table of Contents*, right-click *CountYC*.

13 Click *Open Attribute Table* to find the answers to the following questions:

Question 4: *Which census tract group has the highest number of residential origins of homeless youth and children in Miami-Dade County?*

Question 5: *How many census tract groups in Miami-Dade County do not have any residential origins of homeless youth and children?*

RETRIEVE DEMOGRAPHIC AND SOCIOECONOMIC SPATIAL DATA FROM THE US CENSUS

You now have a distribution of residential origins of homeless youth and children in Miami-Dade County by census tract group, and it can be used as the dependent variable. For independent variables, you need to identify demographic and socioeconomic factors associated with the risk for homelessness at the census tract group level.

You can create demographic and socioeconomic spatial data from the US Census Bureau's American FactFinder website. In this exercise, you will use a number of demographic and socioeconomic factors from the 2000 US Census as follows:

- Proportion of persons below 75% of poverty level
- Proportion of unemployment
- Proportion of households with public assistance income
- Proportion of persons without high school diploma
- Proportion of female-headed households with children under six years old

1 Use your web browser to go to `factfinder2.census.gov`.

2 In the left panel, click *Geographies*.

3 Click the drop-down list for *geographic type* and click *Census Tract.*

4 Click the state list and click *Florida.*

5 Click the county list and click *Miami-Dade.*

6 Click *All Census Tracts within Miami-Dade County, Florida*, and your view should look similar to the image below.

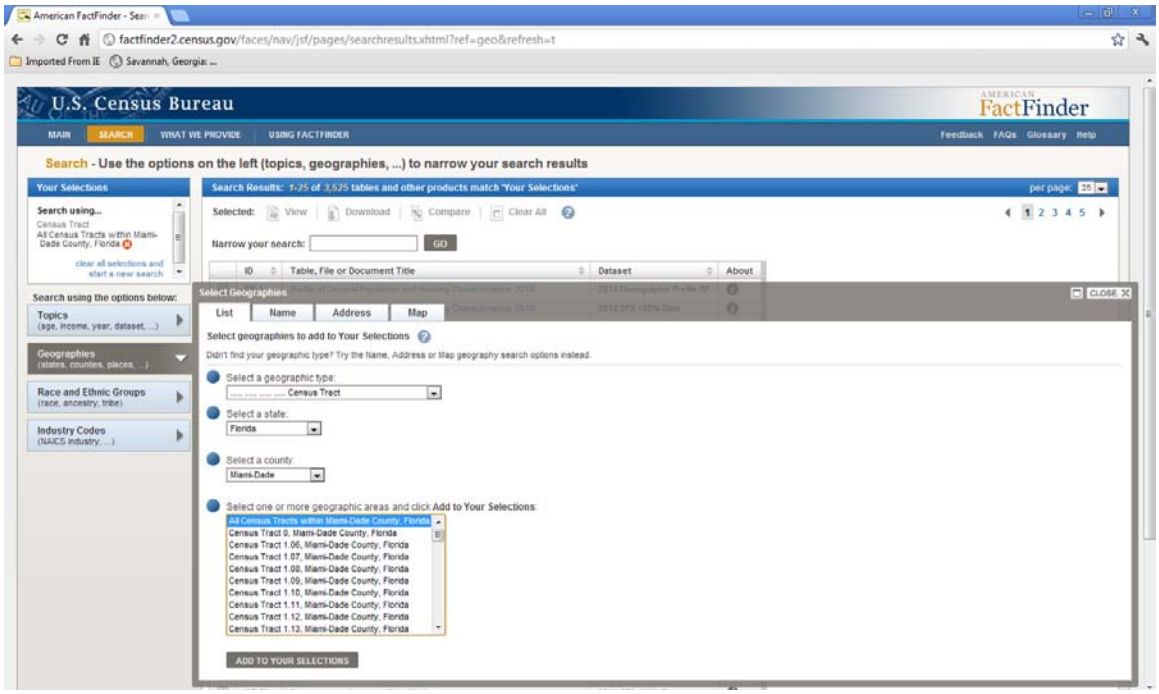


Figure 11. American FactFinder geographic selection.

7 Click *ADD TO YOUR SELECTIONS.*

8 In the left panel, click *Topics*.

9 Click *Year* and click *2000.*

You will see the search results: 1–25 tables from a total of 1,583 tables. Your view should look similar to the image below.

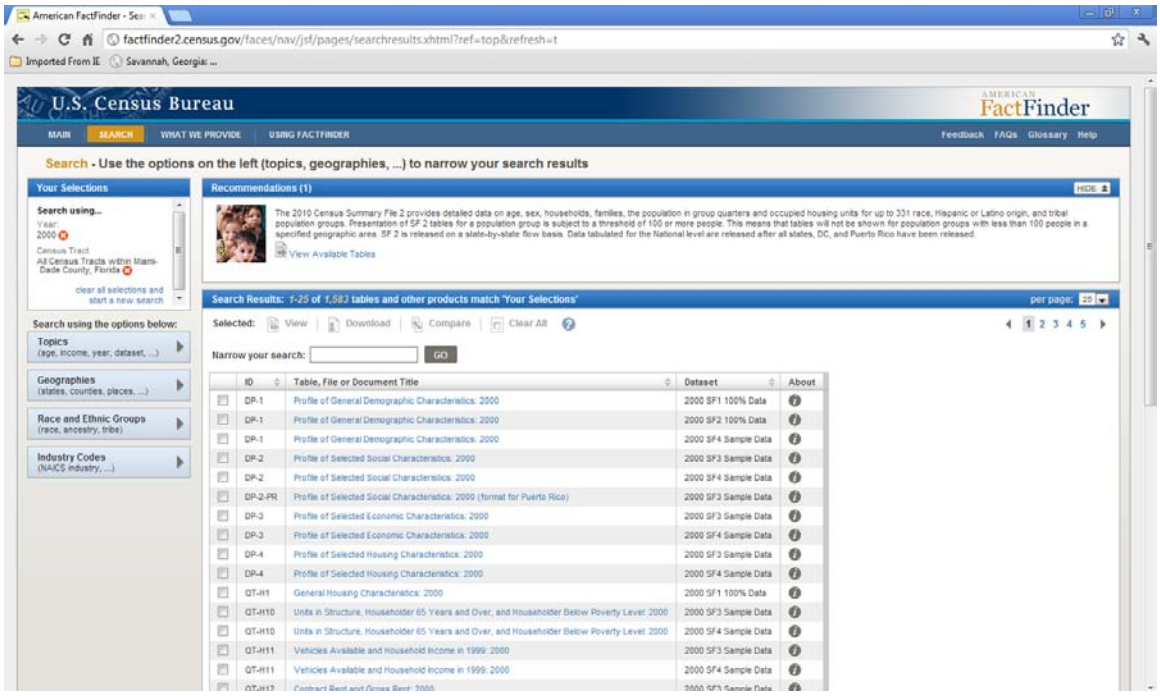
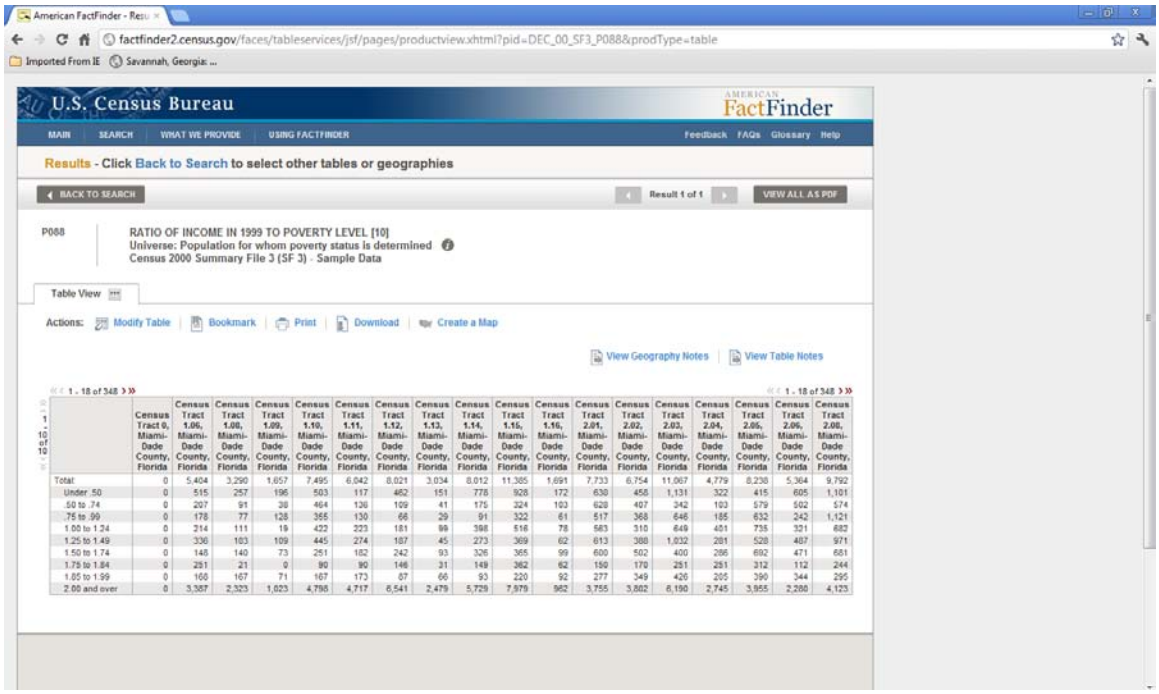


Figure 12. American FactFinder search results.

Now, from the full list of 1,583 tables, you need to find the table showing the proportion of persons below 75% of poverty level.

10 In the *Narrow your search* box, type ***Income to Poverty*** and click *GO.*

11 Click *RATIO OF INCOME IN 1999 TO POVERTY LEVEL [10]*, and your view should look similar to the image below.



	Census Tract 0, Miami-Dade County, Florida	Census Tract 1.06, Miami-Dade County, Florida	Census Tract 1.08, Miami-Dade County, Florida	Census Tract 1.09, Miami-Dade County, Florida	Census Tract 1.10, Miami-Dade County, Florida	Census Tract 1.11, Miami-Dade County, Florida	Census Tract 1.12, Miami-Dade County, Florida	Census Tract 1.13, Miami-Dade County, Florida	Census Tract 1.14, Miami-Dade County, Florida	Census Tract 1.15, Miami-Dade County, Florida	Census Tract 1.16, Miami-Dade County, Florida	Census Tract 2.01, Miami-Dade County, Florida	Census Tract 2.02, Miami-Dade County, Florida	Census Tract 2.03, Miami-Dade County, Florida	Census Tract 2.04, Miami-Dade County, Florida	Census Tract 2.05, Miami-Dade County, Florida	Census Tract 2.06, Miami-Dade County, Florida	Census Tract 2.08, Miami-Dade County, Florida
Total	0	5,404	3,290	1,657	7,495	6,042	8,021	3,034	8,012	11,385	1,691	7,733	6,754	11,067	4,779	8,238	5,364	9,792
Under .50	0	515	257	196	503	117	462	151	778	928	172	630	456	1,131	322	415	605	1,101
.50 to .74	0	297	91	38	464	136	109	41	175	324	193	628	407	342	183	579	502	574
.75 to .99	0	178	77	128	365	130	66	29	91	322	61	517	368	646	185	632	242	1,121
1.00 to 1.24	0	214	111	19	422	223	181	99	398	516	78	583	310	649	451	735	321	682
1.25 to 1.49	0	336	183	109	445	274	187	45	273	369	62	613	388	1,032	281	528	487	971
1.50 to 1.74	0	146	140	73	251	182	242	93	326	365	99	600	502	400	286	692	471	681
1.75 to 1.84	0	251	21	0	90	90	146	31	149	362	62	150	170	251	251	312	112	244
1.85 to 1.99	0	160	167	71	167	173	67	66	93	220	92	277	349	426	205	390	344	295
2.00 and over	0	3,387	2,323	1,023	4,798	4,717	6,541	2,479	5,729	7,979	962	3,755	3,802	6,190	2,745	3,955	2,288	4,123

Figure 13. American FactFinder data download

12 Click *Download.*

13 Ensure that *Data and annotations in a single file* is checked and click *OK.*

> Please note that you cannot select a download format in Microsoft Excel because the data contains 348 columns, which exceeds the Excel limit of 230 columns.

14 You can continue to download the other demographic and socioeconomic factors from the US Census Bureau's American FactFinder website.

IDENTIFY THE RELATIONSHIP BETWEEN THE DISTRIBUTION OF RESIDENTIAL ORIGINS AND THE DEMOGRAPHIC AND SOCIOECONOMIC FACTORS

In this exercise, you will identify the relationship between the distribution of residential origins of homeless youth and children in Miami-Dade County, Florida (the dependent variable), and the demographic and socioeconomic factors (the independent variables) and apply OLS linear regression. The dependent variable for the regression model is the result you generated from the steps in "Determine residential origins of homeless youth and children," and the independent variables are the result of steps you performed in "Retrieve demographic and socioeconomic spatial data from the US Census."

1 Open *CountHomelessY&C.mxd.*

From the steps in "Retrieve demographic and socioeconomic spatial data from the US Census," you could have created a spreadsheet that contains census tract groups and all independent variables. For brevity, this lab supplies an Excel file named *Homeless YC.xls* with one sheet, *GISBook*.

2 Add the data *Homeless YC.xls* and add the sheet *GISBook$.*

3 Add the shapefile *CountYC .*

4 In the *Table of Contents,* right-click *CountYC*.

5 Click *Joins and Relates » Join.*

6 In box no. 1, select *GROUP_Sep2*.

7 In box no. 2, select *GISBook$*.

8 In box no. 3, select *GROUPS*, and your view should look similar to the image below.

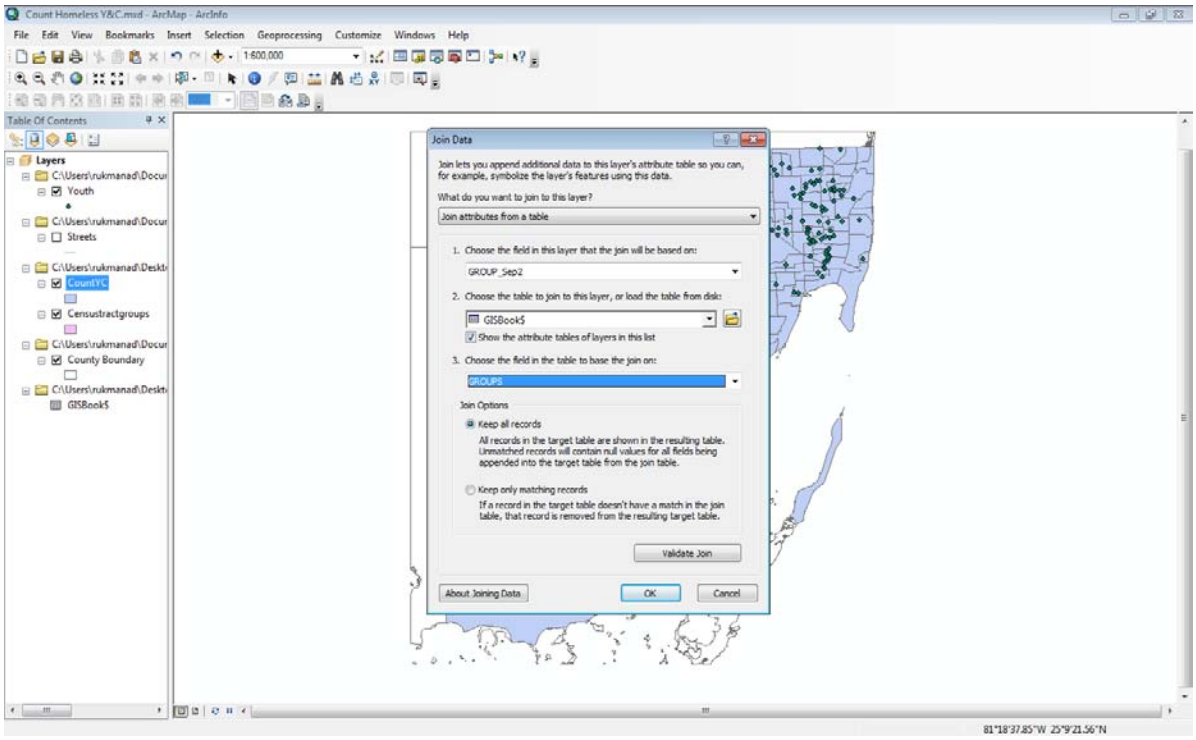


Figure 14. Join Data dialog box.

9 Click *OK.*

You have added data from the table *HomelessYC.xls* to the attribute table of shapefile *CountYC* and now are ready to use the application of OLS linear regression to identify the relationship between the distribution of residential origins of homeless youth and children (the dependent variable) and the demographic and socioeconomic factors (the independent variables).

The OLS regression model in this exercise can be written as follows:

$$Y_i = a + b(X_{1i}) + c(X_{2i}) + \ldots + z(X_{ni}) + \varepsilon_i$$

Where Y_i is the number of residential origins of homeless youth and children in census tract group i; X_{1i} is the first demographic and socioeconomic variable in tract i; X_{2i} is the second demographic and socioeconomic variable in tract group i; X_{ni} is the nth demographic and socioeconomic variable in tract group i; a is intercept; b, c, and z are sets of the coefficients corresponding to the independent variables, X_1, X_2, and X_n, respectively; and ε_i is the errors in tract group i.

10 Click *Geoprocessing »Arc Toolbox.*

11 Double-click *Spatial Statistics Tools.*

12 Double-click *Modeling Spatial Relationships.*

13 Double-click *Ordinary Least Squares.*

14 Set *Input Feature Class* to *CountYC.*

15 Set *Unique ID Field* to *CountYC.GROUP_Sep2.*

16 Set *Dependent Variable* to *CountYC.Join_Count.*

17 Set *Explanatory Variables* to one of the following variables:

- Proportion of persons below 75% of poverty level (*PNOPOV*)
- Proportion of unemployment (*PUNEMP*)
- Proportion of households with public assistance income (*PHHPAI*)
- Proportion of persons without high school diploma (*PNOHIGH*)
- Proportion of female-headed households with children under six years old (*PFYOUCHD*)

If you choose *PNOPOV* for *Explanatory Variables, y*our view should look similar to the image below.

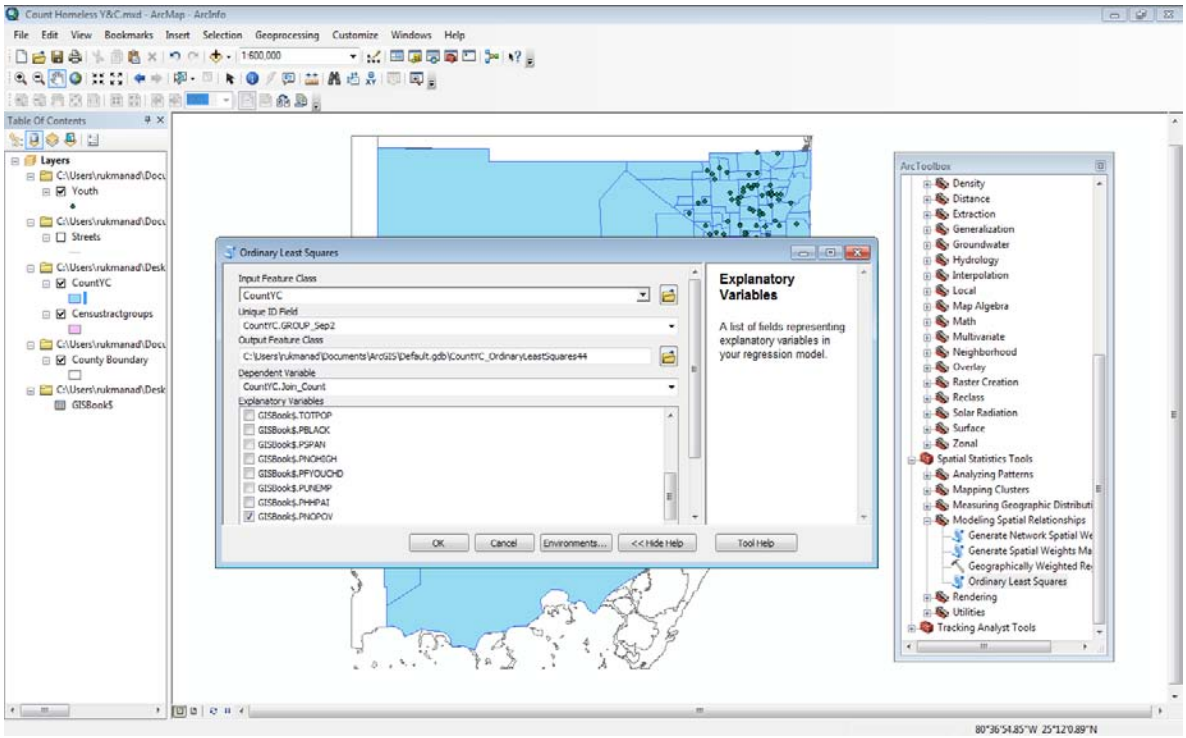


Figure 15. Ordinary Least Squares dialog box.

18 Click *OK.*

19 In a few seconds, a small window will appear in the lower-right (or left) corner. Click in it. Enlarge the window, and you can see the result of OLS regression, as shown in the image below.

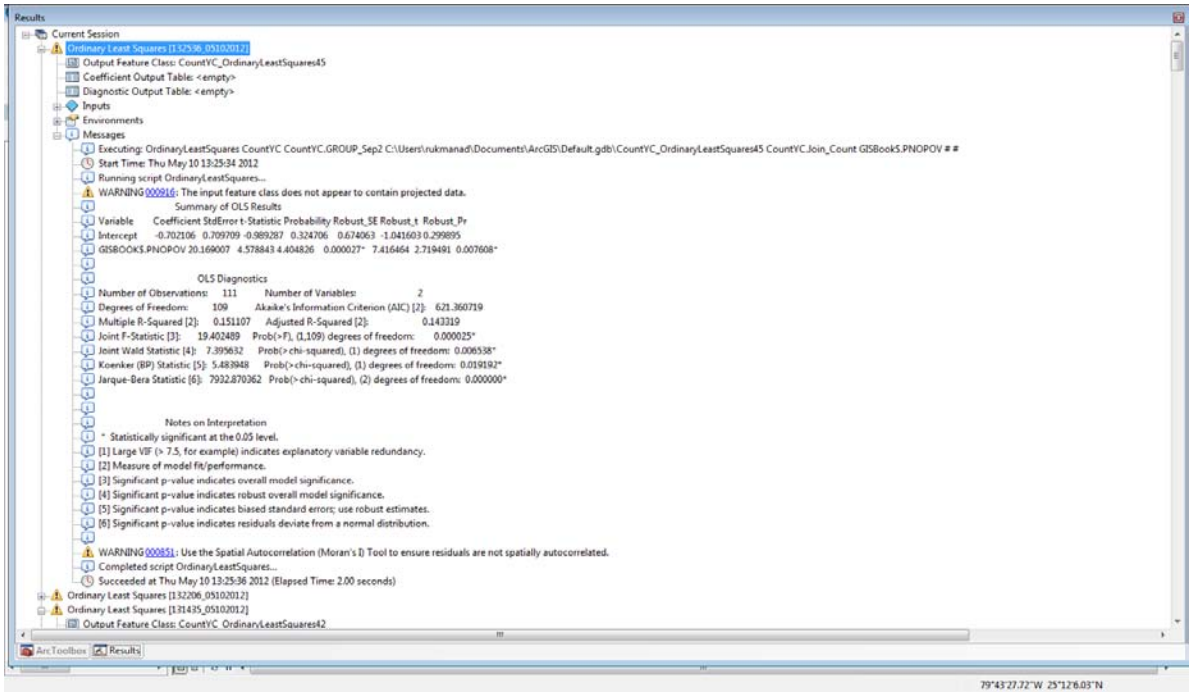


Figure 16. Result of OLS regression.

20 Set other variables individually (one variable at a time) in *Explanatory Variables* and record the results.

21 From your completed bivariate regression models, answer the following questions:

Question 6: *Which variables have a positive association with the number of residential origins of homeless youth and children?*

Question 7: *Which variables have a statistically significant association (at least at the 0.05 level) with the number of residential origins of homeless youth and children?*

Question 8: *Which variable has the largest percentage in explaining the variance of the number of residential origins of homeless youth and children?*

The next step is to identify multiple regression models that can best predict the variance of the number of residential origins of homeless youth and children.

22 Set the combinations of two or more variables in *Explanatory Variables.*

23 You will have a lot of combinations of two or more explanatory variables. Try as many combinations of explanatory variables as possible.

24 Record all the results.

25 When appending an additional explanatory variable to the model, please note the changes in coefficient signs of each variable, statistically significant levels of each variable, and the Multiple R-squared value of the model.

26 Set all five variables in *Explanatory Variables,* record the results, and answer the following questions:

Question 9: *Which variables have a consistent association (either positive or negative) with the number of residential origins of homeless youth and children?*

Question 10: *Which variables have a consistent statistically significant association (at least at the 0.05 level) with the number of residential origins of homeless youth and children?*

Question 11: *What is the most important explanatory variable(s) in predicting the number of residential origins of homeless youth and children?*

Conclusion

Homelessness among children and youth continues to grow, and about 2 million youths per year spend some period of time in emergency shelters or on the streets. The results of this lab should assist in addressing the question of where to target homelessness prevention programs particularly for homeless children and youth. Using the application of Geographic Information Systems (GIS), the geographic distribution of the prior addresses of homeless children and youth can be identified. You can also identify the socioeconomic and demographic factors that contribute to the vulnerability of children and youth to homelessness.

You can map the geographic distribution of the prior addresses of homeless children and youth in Miami-Dade County, Florida. The prior addresses of homeless children and youth in Miami-Dade County are not concentrated in only one or two neighborhoods. The prior addresses are located in 61 census tract groups. The results can answer the question of where to target homelessness prevention programs for children and youth. In addition, the spatial statistics, including mean, median, and standard deviational ellipse, reveal statistical information on the distribution of the prior addresses of homeless children and youth.

The lab uses five socioeconomic and demographic factors, including (1) proportion of persons below 75% of poverty level, (2) proportion of unemployment, (3) proportion of households with public assistance income, (4) proportion of persons without high school diploma, and (5) proportion of female-headed households with children under six years old. The five factors above are hypothesized to be associated with the homelessness among children and youth. The results of OLS regression models in this lab can answer what factors contribute to the vulnerability of children and youth to homelessness.

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Submit your work

Submit the following to your instructor:

- HomelessY&C.mxd
- CTGroupHomelessY&C.mxd
- CountHomelessY&C.mxd
- Answers to questions 1 through 11
- Brief essays explaining each of the following:
  - What is the spatial distribution of residential origins of homeless children and youth?
  - Where do you recommend targeting homelessness prevention programs for children and youth?
  - What factors contribute to the vulnerability of children and youth to homelessness?

Credits

Sources of supplied data

Censustractgroups.shp, courtesy of US Census Bureau.
County Boundary.shp, courtesy of US Census Bureau.
Homeless YC.xls, created by Deden Rukmana.
Streets.shp, courtesy of Florida Geographic Data Library (`www.fgdl.org`).
Youth.shp, created by Deden Rukmana.

Instructor resources

Data for this lab was obtained from a point-in-time homelessness survey in Miami-Dade County conducted on January 27, 2005. The survey identifies 254 homeless families accompanied by their children under 18 years old. One of the survey's questions is, "What was the address of the last house or apartment you lived in?" and is followed by street address, city, state, and ZIP Code. The addresses of residential origins of homeless families with their children are geocoded in conjunction with the database of street files for Miami-Dade County. The geocoding procedure results in 217 matched addresses of residential origins of homeless families that will be used in this lab.

The seven demographic and socioeconomic factors used as independent variables are retrieved from the US 2000 Census data available at the US Census Bureau's American FactFinder website. The factors are as follows:

- Proportion of persons below 75% of poverty level
- Proportion of unemployment
- Proportion of households with public assistance income
- Proportion of Blacks
- Proportion of Hispanics
- Proportion of persons without high school diploma
- Proportion of female-headed households with children under six years old

The variable of proportion of persons below 75% of 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 75% of poverty level to the total population. According to Census 2000, poverty status was determined for all people except such people as institutionalized people, people in military group quarters, people in college dormitories, and unrelated individuals under 15 years old. They were excluded when calculating poverty rates. These people are considered neither "poor" nor "nonpoor." This variable was obtained from SF-3 table P88. This variable includes persons who live below 50% of the poverty line and 50% to 74% of the poverty line.

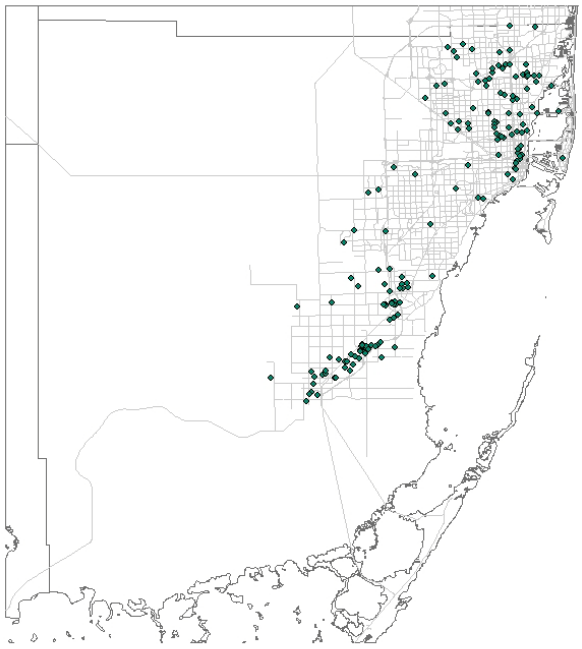
The variable of proportion of unemployment is derived from the ratio of the number of population age 16 years old and over who were unemployed to the total population age 16 years old and over. This unemployment includes unemployed people classified as members of the labor force but excludes people who are not classified as members of the labor force. This variable was obtained from SF-3 table P43.

The variable of proportion of households with public assistance income is to represent the extent of poverty in the neighborhoods. Households that are eligible for public assistance income are those who earn income much less than the 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. According to Census 2000, public assistance income includes general assistance and Temporary Assistance to Needy Families (TANF). This excludes Supplemental Security Income (SSI). This variable was obtained from SF-3 table P64.

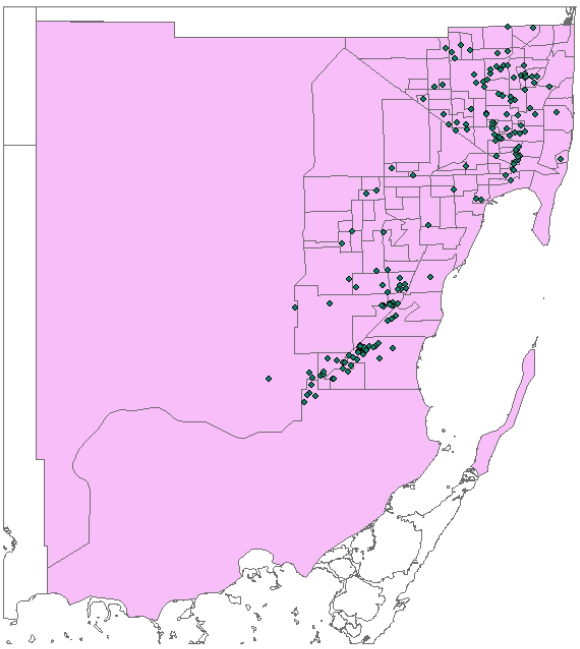
The variable of proportion of persons without a high school diploma is derived from the ratio of the number of population age 18 years or over whose highest educational attainment is ninth to 12th grade without a diploma or less than ninth grade to the total population. This variable was obtained from SF-3 table PCT25. 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 female-headed households with young children is derived from the ratio of the number of households headed by females with the presence of children age under six years to the total number of households. The children may include the householder's own children and other children who are related to the householder. This variable was obtained from SF-1 table P35.

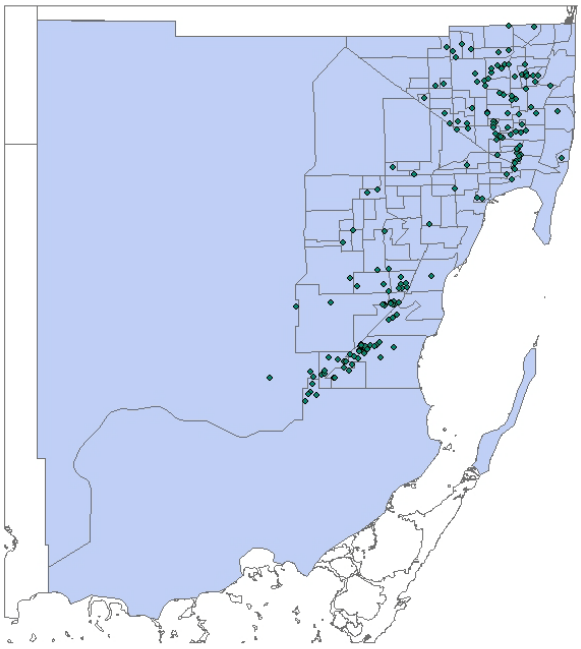
Map results



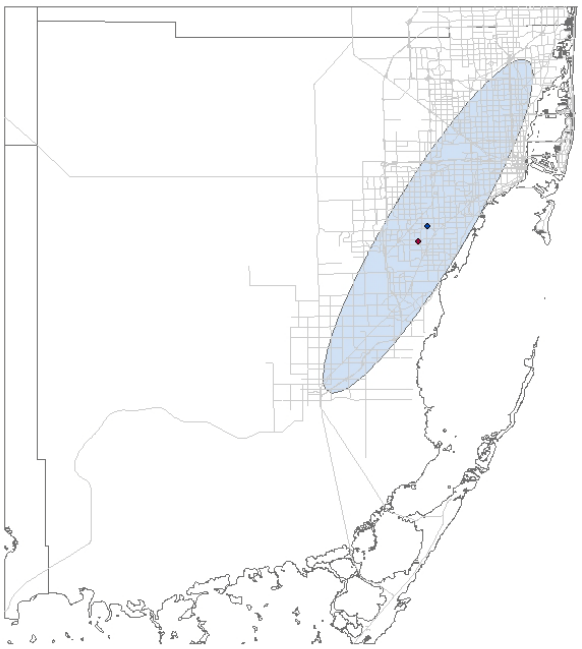
HomelessY&C.



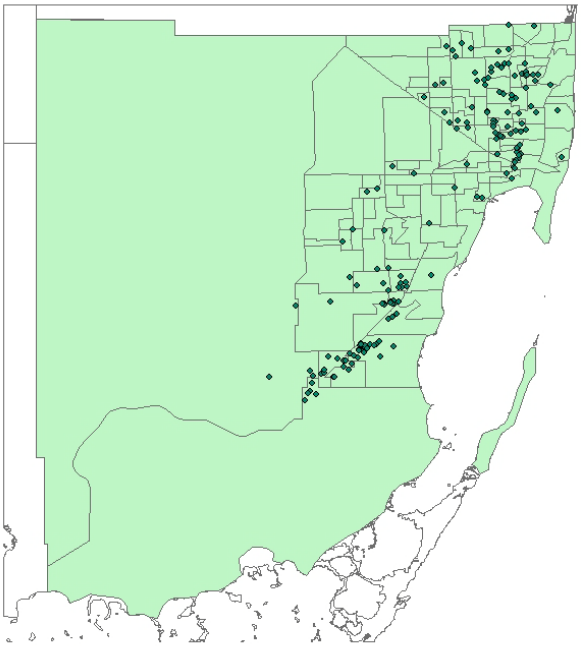
CTGroupHomelessY&C.



CountHomelessY&C.



HomelessY&C spatial stats.



OLS Homeless Y&C.

Answers to questions

Question 1: *What is the spatial distribution of residential origins of homeless children and youth in Miami-Dade County?*

Answer: The residential origins of homeless children and youth are not heavily concentrated in one neighborhood. The concentrations of the prior addresses of homeless children and youth are distributed equally in northern and southern parts of Miami-Dade County. In northern parts of Miami-Dade County, the residential origins of homeless children and youth are concentrated in downtown Miami and north Miami. In southern parts of Miami-Dade County, the residential origins of homeless children and youth are concentrated in Homestead.

Question 2: *What are the mean and median (in XY coordinates) of residential origins of homeless youth and children in Miami-Dade County?*

Answer: Mean is -80.324875, 25.691843, and median is -80.338394, 25.669884.

Question 3: *From the output of the standard deviational ellipse, describe the distribution of the residential origins of homeless youth and children in Miami-Dade County.*

Answer: The residential origins of homeless children and youth in Miami-Dade County are distributed equally between the northern and southern parts of Miami-Dade County.

Question 4: *Which census tract group has the highest number of residential origins of homeless youth and children in Miami-Dade County?*

Answer: Census tract group 107 with a total of 37 residential origins of homeless youth and children.

Question 5: *How many census tract groups in Miami-Dade County do not have any residential origins of homeless youth and children?*

Answer: Fifty of 111 census tract groups do not have any residential origins of homeless youth and children, including census tract groups 1, 2, 3, 4, 5, 13, 16, 18, 29, 33, 34, 36, 38, 39, 41, 42, 43, 44, 45, 46, 47, 49, 51, 54, 55, 57, 58, 62, 63, 65, 66, 67, 68, 70, 71, 73, 77, 80, 83, 86, 87, 88, 89, 90, 93, 94, 96, 97, 98, and 99.

Question 6: *Which variables have a positive association with the number of residential origins of homeless youth and children?*

Answer:

- Proportion of persons below 75% of poverty level (20.169007)
- Proportion of unemployment (109.419815)
- Proportion of households with public assistance income (24.433101)
- Proportion of persons without high school diploma (6.860236)
- Proportion of female-headed households with children under six years old (117.546630)

Question 7: *Which variables have a statistically significant association (at least at the 0.05 level) with the number of residential origins of homeless youth and children?*

Answer:

- Proportion of persons below 75% of poverty level (0.000027)
- Proportion of unemployment (0.000000)
- Proportion of households with public assistance income (0.012202)
- Proportion of persons without high school diploma (0.008278)
- Proportion of female-headed households with children under six years old (0.000000)

Question 8: *Which variable has the largest percentage in explaining the variance of the number of residential origins of homeless youth and children?*

Answer: Of the five explanatory variables, the proportion of unemployment has the largest percentage in explaining the variance of the number of residential origins of homeless youth and children (Adjusted R-squared = 0.393982).

Question 9: *Which variables have a consistent association (either positive or negative) with the number of residential origins of homeless youth and children?*

Answer:

- Proportion of unemployment (*PUNEMP*)
- Proportion of female-headed households with children under six years old (*PFYOUCHD*)

Question 10: *Which variables have a consistent statistically significant association (at least at the 0.05 level) with the number of residential origins of homeless youth and children?*

Answer:

- Proportion of unemployment (*PUNEMP*)—this variable has a consistent statistically significant association with the number of residential origins of homeless youth and children in *all multiple regression models.*
- Proportion of female-headed households with children under six years old (*PFYOUCHD*)—this variable has a consistent statistically significant association with the number of residential origins of homeless youth and children in *all multiple regression models, except Model 7.*

Question 11: *What is the most important explanatory variable(s) in predicting the number of residential origins of homeless youth and children?*

Answer: Proportion of unemployment (*PUNEMP*).

Multiple regression models

Students need to develop multiple regression models that can predict the variance of the number of residential origins of homeless youth and children. Students can set the combinations of two, three, four, or all five explanatory variables in their multiple regression models. The following tables are 10 multiple regression models that combine two, three, four, and all five explanatory variables. Please note that students can develop more multiple regression models than the 10 models below—for example, the combination of the explanatory variables of *PNOPOV* and *PHHPAI*.

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Intercept	-3.815953*	-3.782704*	-3.555213*	-3.193910*	-3.768654*
PUNEMP	88.894767*	129.346692*	125.844272*	124.908854*	108.602055*
PFYOUCHD	35.142805				81.988802*
PNOPOV		-8.154097			-19.260086*
PHHPAI			-17.440024		
PNOHIGH				-4.345750	
Adjusted R^2	0.399459	0.399056	0.407401	0.404664	0.438004

	Model 6	**Model 7**	**Model 8**	**Model 9**	**Model 10**
Intercept	-3.473171*	-3.167354*	-3.606917*	-3.586137*	-3.882402*
PUNEMP	100.146943*	103.613736*	109.054900*	110.867246*	104.385660*
PFYOUCHD	54.608110*	38.004232	79.360489*	78.096818*	85.894888*
PNOPOV			-14.108039	-17.320258*	-14.274738
PHHPAI	-24.019534*		-12.219882		-22.048298
PNOHIGH		-4.598582		-1.327827	2.950554
Adjusted R^2	0.428466	0.413321	0.438557	0.433889	0.435302

*Statistically significant at the 0.05 level.