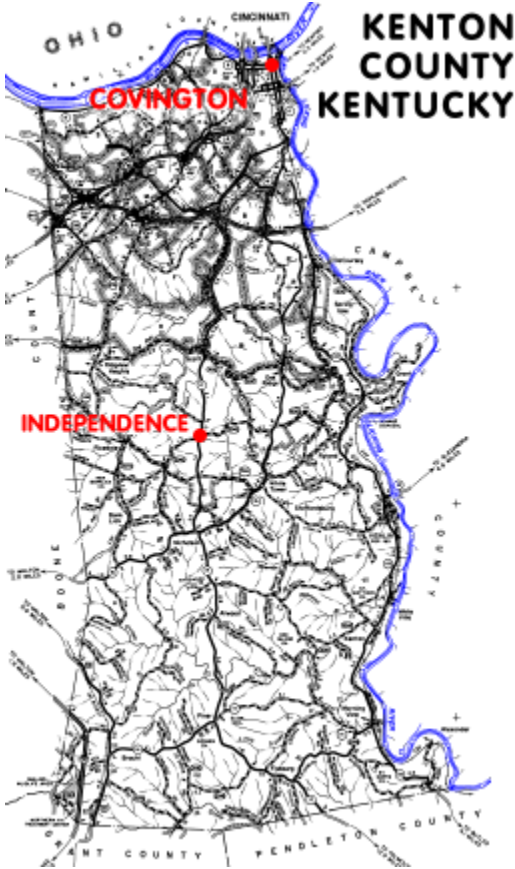


# Contracting Waste Collection in Kenton County: Will Inter- Municipal Cooperation Decrease Costs?

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## **EXECUTIVE SUMMARY**

Inter-municipal cooperation can be a valuable tool used by cities to decrease the costs of public services. An analysis of waste collection costs in Kenton County have indicated that using inter-municipal cooperation to change the contracting method from the sixteen cities individually contracting to the cities contracting as one unit (inter-municipal cooperation) will not decrease the cost of waste collection per household per year. Inter-municipal cooperation might still be appropriate given other criteria, such as equity, ensuring that all households have the same or similar waste collection services.

This study recommends that (1) the cities of Kenton County not proceed with providing waste collection services through inter-municipal cooperation with the intent to decrease per household per year cost of waste collection, and (2) study expected costs of providing other services through inter-municipal cooperation before making the assumption that it will decrease costs.

## INTROUCTION

The methods of delivery of public services are constantly evolving. Governmental agents regularly search for ways to come closer to meeting the criteria established by the decision making bodies of the municipality responsible for delivery of public services. Regions are becoming increasingly complex with many different layers of municipalities delivering these public services. In regions, governments are often fragmented between a county, city and state government. These municipalities contract with special districts to provide services, where the district will provide the service to a whole of one municipality and only part of another municipality. This results in fragmented services where the municipal district will cross the boundaries of some municipalities and remain within the boundaries of other municipalities. Particularly in urban or metropolitan areas, communities are fractured into many different municipalities where each municipality is responsible for the delivery of public services.

Municipal governments are expected to act rational and responsible in the delivery of public services. In determining the provision of public services, criteria are established either explicitly or implicitly by the decision making body of the municipality. The responsible municipality strives to deliver the most efficient public service per the criteria established for that public service. In a community that is fractured into many municipalities, more efficient delivery of public services can often be gained by using inter-municipal cooperation. In many of these communities, structures already exist where inter-municipal cooperation is being used to deliverer a

public service. The next step is exploring other public services that can increase the efficient delivery of services through inter-municipal cooperation.

Inter-municipal cooperation is the use of an agreement between authorities or municipalities to perform functions jointly. The function can be performed using formal agreements, such as a contract or inter-local agreement, or informal arrangements, such as verbal agreements between municipal administrators. Formal agreements are more regularly used and can evolve from contracts or inter-local agreements into formal organizations, such as special district or other organization.

Kenton County, Kentucky is a suburban community of over 150,000 people in the metropolitan community of Cincinnati, Ohio. Kenton County is comprised of 20 incorporated and 13 unincorporated cities, ranging in size from 150 to 43,000 people. Appendix A offers a map of the cities of Kenton County. The provision of public services in Kenton County is mostly governed by the incorporated cities. The exception is in the unincorporated areas of Kenton County where the county government provide some of the basic services that cities provide and other services are not provided by any municipality. The services are provided using differing methods, primarily through a public entity, such as fire coverage which is often established as fire district under control of a board or under control of the municipal government, or through private contracting, such as waste collection which is contracted by the municipal government.

Inter-municipal cooperation has increasingly been used to decrease the cost of public services in Kenton County. Cities have cooperated to provide services both

through public entities and through joint contracting to private entities. Many administrators and elected officials believe that public services can be more efficiently delivered by the cities of Kenton County through methods of inter-municipal cooperation. The assumption made when delivering public services through inter-municipal cooperation is that decreasing per capita costs will be realized through gaining of economies of scale and maintaining the other criteria established by the governing body of the cities.

Examples of inter-municipal cooperation in Kenton County can be found to exist between cities within the county, between the cities within local counties, between the local counties and the cities, and between the cities and the county. The Lakeside Park/Crestview Hills Police Department is the only joint police department in Kentucky. This department was created from two separate departments to take advantage of overlap to better provide police coverage by these two cities. Eight cities have created an agreement to jointly contract paramedic services in an effort to decrease its costs. These cities were unable to fund the service individually, and a contractor was unable to compete for the service without the contract being a certain size, which through joint agreement it became large enough to find a contractor. The Northern Kentucky Planning Commission and Tri-County Economic Development Corp. (Tri-Ed) are examples of where the cities and local counties have used inter-municipal cooperation to create entities to provide services and regulation jointly. Southbank Partners is an example of cities in Kenton County and neighboring Campbell County using inter-municipal cooperation to promote riverfront

development. The motivation for inter-municipal cooperation in these examples was often in part to expected decreases in cost, but also was a result of expectations of improving other criteria, such as effectiveness and equity.

Kenton County is relatively homogenous community, the provision public services provided by Kenton County cities are relatively homogenous, replicating many of the criteria, the specifications and decision making factors such as cost and equity, that are used in the provision of the public service. If cities provide public services at a decreased cost while maintaining other criteria they have established for the particular public service, they are considered to be delivering that service more efficiently. It is the responsibility of the municipality to provide efficient public services, i.e. it is the responsibility of a municipality to efficiently spend municipal taxes. If through inter-municipal cooperation, the cities of Kenton County can more efficiently provide public services that are homogenous between the cities, they should provide that service through inter-municipal cooperation.

Waste collection is a public service that is mandated by ordinance in Kenton County to be provided universally. The specifications of each city are similar and have resulted in service that is relatively homogenous throughout the incorporated cities. The incorporated cities provide waste collection by contracting with private companies. The unincorporated area of Kenton County does not contract waste collection to a private company, but requires households to contract on their own for waste collection. Since waste collection is relatively homogenous through the incorporated cities of Kenton County, the question arises as to whether they could

decrease the cost of providing the public service through inter-municipal cooperation. Could the cities of Kenton County contract waste collection as one unit (inter-municipal cooperation) versus many smaller units to decrease the cost of providing waste collection to the citizens of Kenton County?

Before determining whether waste collection could be more efficiently delivered through inter-municipal cooperation, one must consider why a city would want to deliver services more efficiently. Tiebout theorized that efficiency in providing public services was gained by smaller units of government providing public services (Tiebout 1956). His theory suggested that the government units would compete for citizens by providing high quality of services for low costs or taxes. This theory assumes that people are mobile and can easily move from one municipality to another, it also assumes that people are aware of the differences of public services between municipalities. This theory does not dismiss inter-municipal cooperation as a means for efficiently delivering municipal services, the theory would support cases where the small units are voluntarily taking part in this alternative to more efficiently deliver the services, and therefore could not participate if it could deliver the services more efficiently. The theory would not support the dissolution of the municipalities to provide public services.

Public service provision, according to Warner and Hefetz, is concerned with efficiency, equity, democracy and community building (Warner and Hefetz, 2002). Each of these is important to municipalities in their decision making process, but this proposal is interested in the efficiency, the efficiency being the cost to deliver the



public service. Warner and Hefetz argue that cooperation enhances efficiency. Lower expenditures is the result of economies of scale being gained through a large unit providing the public service. Siegel discusses that cooperation primarily occurs in public service areas with well defined and clear objectives (Siegel 1999). He says that solid waste collection can be 35% more efficient by using cooperation because it allows for economies of scale to be better maximized. Maniccia writes that in addition to public services with clear objectives, good candidates should be activity-based costing (Maniccia 2002).

Collin et al argue that regions where councils of governments or voluntary cooperation agencies are found will be more successful in providing public services through inter-municipal cooperation (Collin et al 2002). Members of these organizations feel they can discuss various issues, opportunities, or common problems. The federal requirement for metropolitan planning organizations in many regions will increase intern-municipal cooperation in delivering public services. Warner and Hefetz discuss that the higher density of governments, such that exists in urban areas, are more likely to increase efficiency by using inter-municipal cooperation (Warner and Hefetz 2002).

## **METHODOLOGY**

### **Objective**

The objective of the data analysis is to model the relationship between the cost of waste collection per household in the cities of Kenton County and the independent

variables that determine the cost. The modeled relationship will seek to determine if the factors that determine the waste collection costs would be such that inter-municipal cooperation could decrease the cost of waste collection per household in Kenton County. SPSS, version 12.0 for Windows, will be used to perform a simple linear regression, first using the Enter method and then the Stepwise method.

### **Research Questions**

1. What variables are important in determining the cost of waste collection per household in Kenton County?
2. Given the model, is Kenton County likely to decrease the cost of waste collection per household through inter-municipal cooperation?

### **Unit of Analysis**

The population size allows for a complete sample of the twenty (20) cities of Kenton County to be used in this data analysis. Four (4) cities were determined to be unable to be used in the data analysis. Ryland Heights, Latonia Lakes, Fairview and Visalia were unable to be included because they do not provide waste collection as a public service to their citizens. The administrators of these cities have stated that this is because of the relative size and the ability of its citizens to contract directly with waste collection companies similar to the citizens of unincorporated Kenton County.

The following cities have been included in the analysis:

- Bromley
- Covington
- Crescent Springs
- Crestview Hills

- Edgewood
- Elsmere
- Erlanger
- Fort Mitchell
- Fort Wright
- Independence
- Kenton Vale
- Lakeside Park
- Ludlow
- Park Hills
- Taylor Mill
- Villa Hills

### **Dependent Variables**

The dependent variable in the data analysis is the cost of waste collection per household in the community in 2005. The information was gathered from waste collection contracts provided by each respective city. Appendix B and C provides the cost of waste collection per household in 2005 by city. Three companies, Rumpke, Bavarian and CSI, provide waste collection to the cities of Kenton County, Appendix D shows the provider of waste collection services for each city.

### **Independent Variables**

The variables included in this analysis were the service specifications included within the contracts and the demographics of each city. McDavid explains that the factors that are most significant in determining the cost of waste collection per household are service levels, geographic factors and demographic factors (McDavid,

1998). Geographic level is not necessary to explore because this analysis is geographic unique in that the data is from this geographic region and is not expected to be generalized to other geographic regions. For example, labor costs are a constant across this region and need not be included in the analysis. Service levels are included because difference exists between the cities and would therefore be expected to impact the cost of waste collection. Demographic variables are included because the cities vary in each of the variables included.

The independent variables are the demographics of each city and the specific services that are included in the waste collection contract with the private companies providing the service on behalf of the cities as follows:

- Municipal Population
- Municipal Square Miles (land)
- Municipal Population Density
- Number of Households within the Municipality
- Street Mileage (State, County and Local)
- Universal Municipal Recycling
- Limited Number of Waste Containers
- Diversion of Yard Waste
- Municipal-wide Annual Spring Clean-Up
- Number of Waste Pick-ups per Week
- Required Waste Collection Containers
- Franchisee Bills Residence
- Free Waste Collection at Municipal Properties

The demographics were gathered from 2000 U.S. Census Data and the street mileage was provided by the Northern Kentucky Area Planning Commission. The

independent variables relating to services provided by the contract sought to be inclusive of all services provided to the city and were determined from the contract provided by each respective city. The demographic variables by city are attached in Appendix E. The service level by city is attached in Appendix F.

The expected relationship between the independent variables are that some will have a positive effect and others will have a negative effect, meaning that some will increase the cost and others will decrease the cost of waste collection. The service variables are expected to have a positive effect on the cost except required waste collection containers and limited number of waste collection containers. These variables are expected have a negative effect on waste collection costs. The reason for this expected positive effect is that the increased services increase costs to provide the services, recycling has real costs associated with its provision. The two variables that are expected to have negative effects because these service levels decrease costs because they decrease the needed amount of labor and the tonnage of garbage produced. The demographic variables are expected to have mixed negative and positive effects. Street mileage and municipal square miles is expected to have a positive effect. Municipal population, number of households and population density are expected to have negative effects.

It is expected that service variables will not be important to lowering waste collection costs using inter-municipal cooperation because cities can lower their costs through service level changes without inter-municipal cooperation. The demographic variables are expected to decrease cost by using inter-municipal cooperation. Inter-

municipal cooperation will create economies of scale, which will decrease costs. This is expected because it will compound demographic variables with negative effect on the per household cost of waste collection.

## RESULTS

Using the Stepwise method of simple linear regression, three variables were determined to be statistically significant in determining the cost of waste collection per household in Kenton County. Those variables are (1) Required Waste Collection Containers [ $X_1$ ], (2) Municipal Square Miles (land) [ $X_2$ ] and (3) Free Waste Collection at Municipal Properties [ $X_3$ ]. The adjusted R Square for this model was .501, the model explains 50.1% of the variation observed. The model:

$$Y = \$76.63 - \$83.01X_1 + \$43.16X_2 + \$1.11X_3 \quad \text{Error: } \pm \$18.88$$

The first independent variable, required waste collection containers, shows a negative relationship to cost. For waste collection contracts in Kenton County, municipalities that have required waste collection containers would roughly decrease the cost of waste collection by \$83.01 per household per year. The second variable, free waste collection at municipal properties has a positive relationship to cost. For municipalities that require this service, the cost of the contract increases by \$43.16 per household per year. Both of these variables are related to the service type specifications in the waste collection contract. These variables are not expected to impact the cost of providing waste collection by cities individually or through inter-municipal cooperation.

The demographic variables would be expected to impact the cost difference between individual cities and the expected cost of providing waste collection through inter-municipal cooperation. The only demographic variable that was determined to be statistically significant was municipal square miles of land. A positive relationship to cost was determined to exist for this variable, for each additional square mile of land, cost increased by \$1.11 per household per year. This relationship means that as municipalities increase in size the cost also increases.

If the incorporated cities of Kenton County who currently contract waste collection were to use inter-municipal cooperation to contract waste collection the expected cost would be \$194.54 per household per year plus or minus \$18.88. The median cost of waste collection is currently \$117, with a range of \$51 to \$148.

According to the results of this data analysis, it would not decrease cost to deliver waste collection services to the citizens of Kenton County through inter-municipal cooperation as a result of advantages of size and economies of scale. The results imply that it could increase the cost of waste collection to provide waste collection through inter-municipal cooperation because it would increase the square miles of the municipality seeking a contract for waste collection. Kenton County, therefore, would not likely decrease the cost of waste collection per household by changing the method of delivery from individual cities contracting the service to inter-municipal cooperation where the public service is contracted as one unit for all of the cities.

Waste collection costs may increase when fewer units are seeking contracts. The market may move further away from a market with perfect competition and therefore closer to an imperfect market. The multiple cities seeking contracts could create a more competitive market for waste collection services. The increased competition might therefore decrease costs.

The analysis might have missed potential for cost savings through inter-municipal cooperation. Other variables relevant to the variation in contracting might have favored inter-municipal cooperation. For example, the distance to transfer stations or dump sites might have been a factor in cost of waste collection. The analysis was based on the logic that the cities would act rationally to accept the lowest cost for waste collection that met their criteria, specifications and preferences. If the decision makers did not act rationally in accepting a contract, the results could vary. For example, a city might accept a contract that is more expensive if they have the preference for maintaining the contract with a specific company. This act might be rational although it would then suggest that there were unrevealed preference by the cities in choosing waste collection contracts.

### **Limitations of the Study**

The study is primarily limited in its ability to be generalized, either for other municipalities and communities and for other types of public services. The study is limited to its applicability to Kenton County. Waste collection varies geographically because of factors ranging from environmental impact fees to labor costs. This study was able to negate those factors by using data from one geographic region. The



impact is that the results are not able to be applied to cost of waste collection outside of Kenton County. Inter-municipal cooperation is popular topic in government, particularly in Kenton County and Northern Kentucky. The results of this study are limited to this one public service and are not indicative of the possible impact of inter-municipal cooperation on cost for other public service areas.

The study is also limited because  $n=16$ , there are nearly as many variables as subjects. This requires that the statistical significance that is used in data analysis becomes 90%, where  $p \leq 0.10$ . Therefore, any variable that has a statistical significance greater than 0.10 would be rejected from the model. By increasing the p-value, it increases the probability that the relationship between the observed relationship and the population is not statistically significant. The p-value is still within an acceptable level.

## **RECOMMENDATIONS**

Kenton County would not be able to decrease the cost of waste collection as a result of inter-municipal cooperation, and therefore should not seek to do so with the intention of decreasing per household cost of waste collection. The administrators and elected officials may be interested in providing waste collection through an inter-municipal cooperation to meet other criteria, but further research would be needed to determine if inter-municipal cooperation could allow cities to meet other criteria.

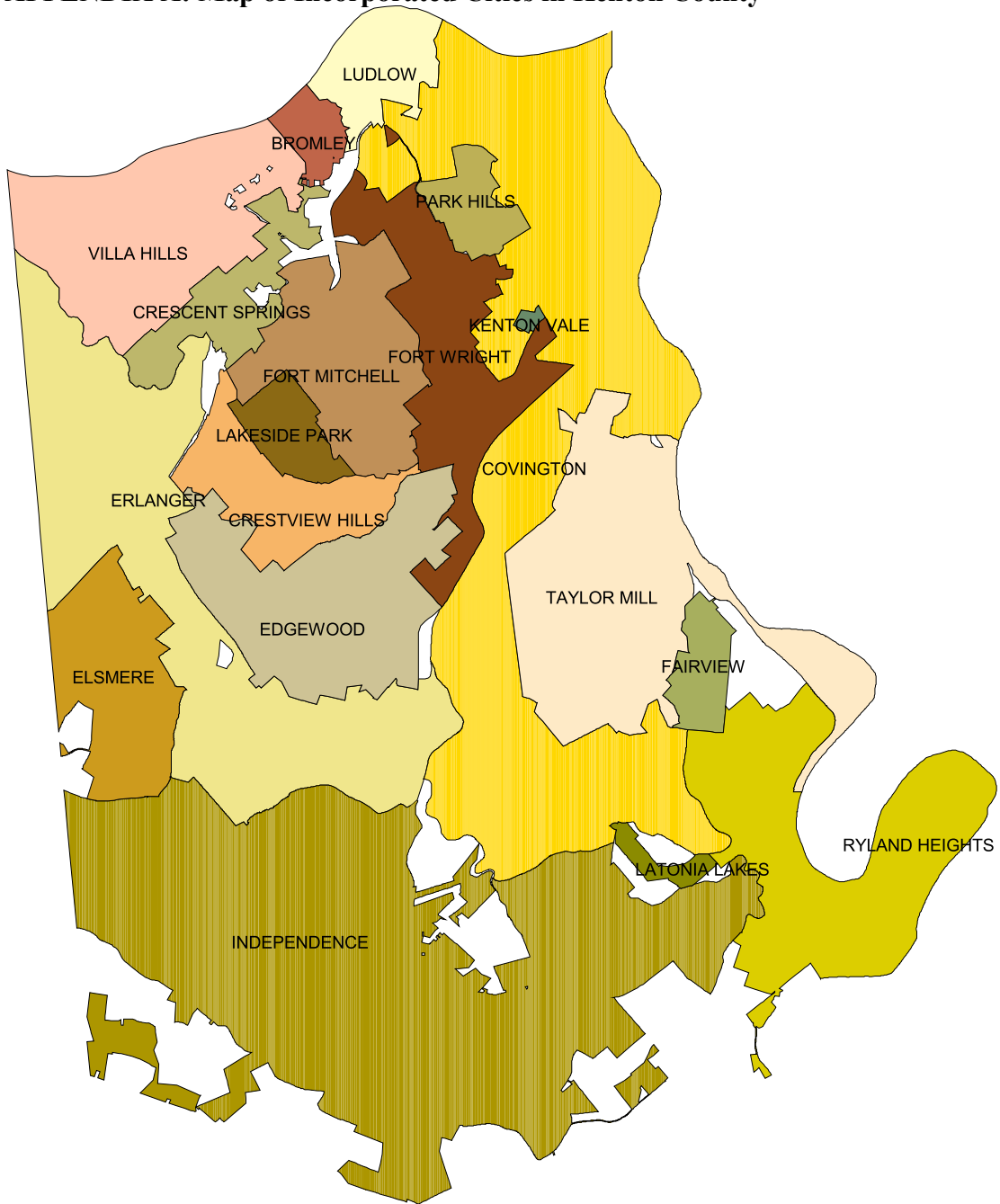
Inter-municipal cooperation has become increasingly used to address problems encountered by cities. The analysis of data on waste collection has shown

that it cannot always be assumed that inter-municipal cooperation can decrease costs of providing services. Municipalities should therefore conduct research to determine whether the provision of a public service can better serve the citizens of the municipality by participating in inter-municipal cooperation before it makes the assumption that inter-municipal cooperation is better.

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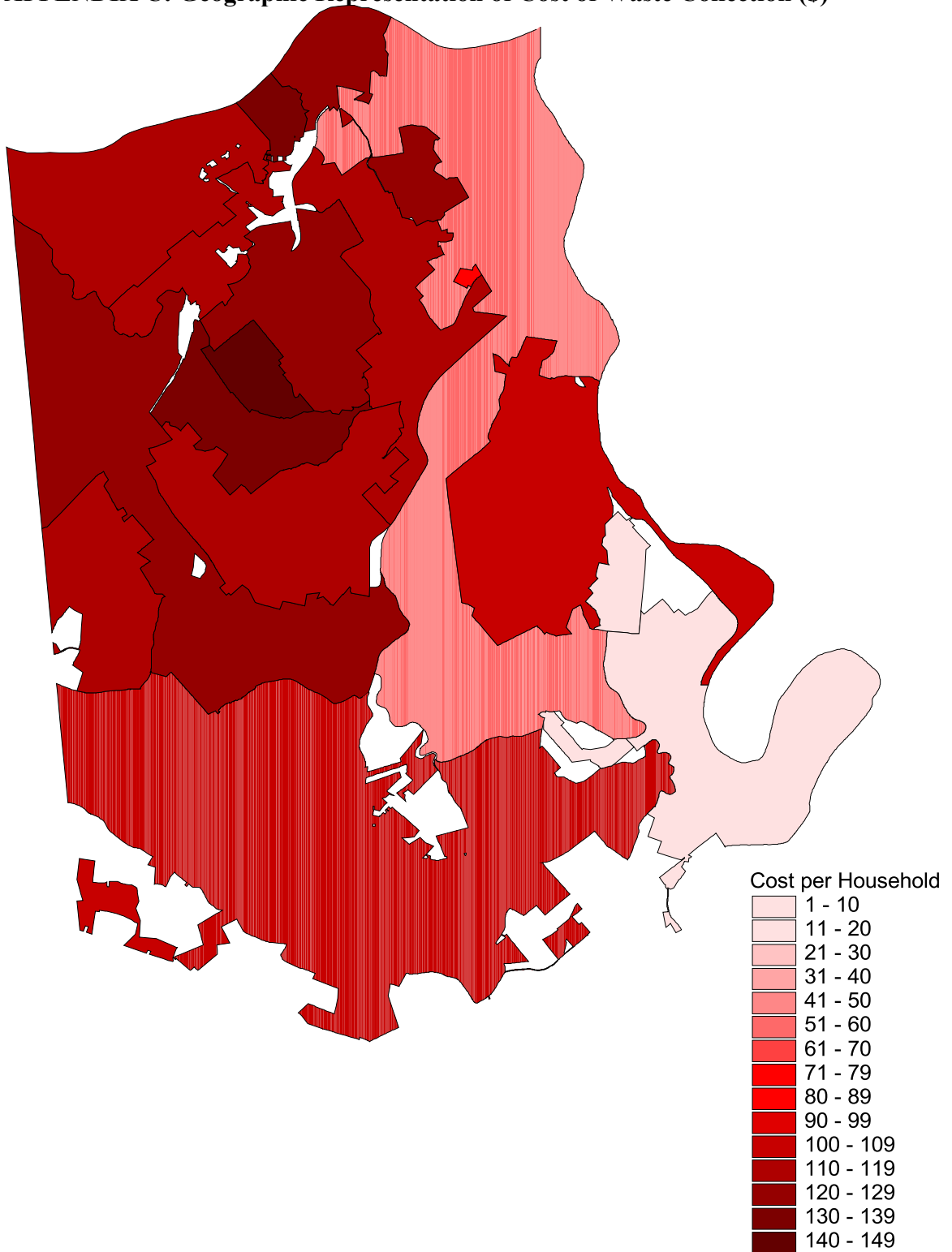
**APPENDIX A: Map of Incorporated Cities in Kenton County**



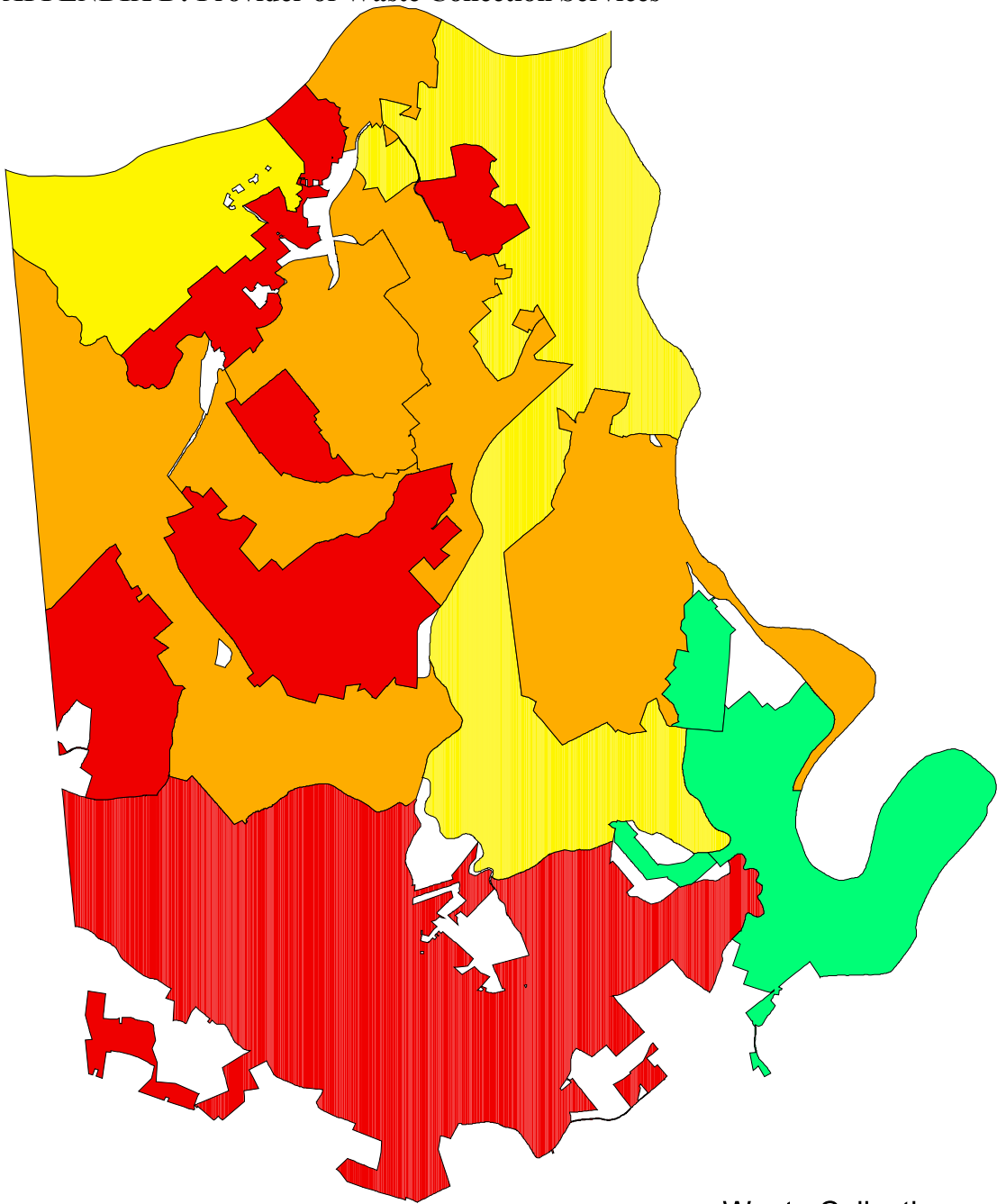
**APPENDIX B: Cost of Waste Collection per Household per city in 2005**

| <b>City</b>      | <b>Cost of Waste Collection per Household in 2005 (\$)</b> |
|------------------|--|
| Bromley          | \$132.84   |
| Covington        | \$51.41  |
| Crescent Springs | \$111.24   |
| Crestview Hills  | \$136.80   |
| Edgewood         | \$117.72   |
| Elsmere          | \$110.76   |
| Erlanger         | \$123.12   |
| Fort Mitchell    | \$123.12   |
| Fort Wright      | \$116.88   |
| Independence     | \$105.84   |
| Kenton Vale      | \$76.73  |
| Lakeside Park    | \$148.80   |
| Ludlow           | \$127.00   |
| Park Hills       | \$126.84   |
| Taylor Mill      | \$107.40   |
| Villa Hills      | \$113.40   |

### APPENDIX C: Geographic Representation of Cost of Waste Collection (\$)



**APPENDIX D: Provider of Waste Collection Services**



**Waste Collection Companies**

- Rumpke
- CSI
- Bavarian
- No Contract

**APPENDIX E: Demographic Variables by City**

| <b>Municipality</b> | <b>Street Mileage (miles)</b> | <b>Municipal Population</b> | <b>Municipal Square Miles (miles<sup>2</sup>)</b> | <b>Households within Municipality</b> | <b>Population Density</b> |
|---------------------|-------------------------------|-----------------------------|---|---------------------------------------|---------------------------|
| Bromley             | 5.9                           | 838                         | 0.31  | 362                                   | 2702.8                    |
| Covington           | 204.2                         | 43370                       | 13.14   | 19117                                 | 3301.3                    |
| Crescent Springs    | 21.4                          | 3931                        | 1.43  | 867                                   | 2741.3                    |
| Crestview Hills     | 34.4                          | 2889                        | 1.92  | 1100                                  | 1503.1                    |
| Edgewood            | 51.1                          | 9400                        | 4.18  | 3149                                  | 2250.8                    |
| Elsmere             | 66.5                          | 8139                        | 2.5   | 2657                                  | 3256.2                    |
| Erlanger            | 105                           | 16676                       | 8.33  | 5077                                  | 2002.4                    |
| Fort Mitchell       | 51.6                          | 8089                        | 3.13  | 1847                                  | 2581.8                    |
| Fort Wright         | 53.4                          | 5681                        | 3.46  | 2573                                  | 1642.1                    |
| Independence        | 133.4                         | 14982                       | 16.77   | 5391                                  | 893.3                     |
| Kenton Vale         | 0.8                           | 156                         | 0.06  | 59                                    | 2694.5                    |
| Lakeside Park       | 11.4                          | 2869                        | 0.77  | 1064                                  | 3746.8                    |
| Ludlow              | 16.7                          | 4409                        | 0.86  | 1888                                  | 5141.5                    |
| Park Hills          | 15.3                          | 2977                        | 0.78  | 1085                                  | 3840.2                    |
| Taylor Mill         | 58.2                          | 6913                        | 6.26  | 2604                                  | 1104.8                    |
| Villa Hills         | 38.9                          | 7948                        | 3.71  | 2300                                  | 2144.3                    |



APPENDIX F: Service Levels by City

| <b>Municipality</b>     | <b>Recycling</b> | <b>Limit to the number of containers</b> | <b>Divert Yard Waste</b> | <b>Required Containers</b> | <b>Free collection at city property</b> | <b>Spring Clean up</b> | <b>Pick-ups per week</b> | <b>Franchisee Bills Residence</b> |
|-------------------------|------------------|--|--------------------------|----------------------------|---|------------------------|--------------------------|-----------------------------------|
| <b>Bromley</b>          | No               | No                                       | No                       | No                         | Yes                                     | Yes                    | 2                        | No                                |
| <b>Covington</b>        | No               | Yes                                      | No                       | Yes                        | No                                      | No                     | 1                        | No                                |
| <b>Crescent Springs</b> | Yes              | No                                       | No                       | No                         | Yes                                     | No                     | 1                        | Yes                               |
| <b>Crestview Hills</b>  | Yes              | No                                       | Yes                      | No                         | Yes                                     | No                     | 2                        | No                                |
| <b>Edgewood</b>         | No               | No                                       | No                       | No                         | Yes                                     | No                     | 1                        | No                                |
| <b>Elsmere</b>          | Yes              | No                                       | No                       | No                         | Yes                                     | Yes                    | 1                        | No                                |
| <b>Erlanger</b>         | No               | No                                       | Yes                      | No                         | Yes                                     | No                     | 2                        | Yes                               |
| <b>Fort Mitchell</b>    | Yes              | No                                       | No                       | No                         | Yes                                     | Yes                    | 2                        | No                                |
| <b>Fort Wright</b>      | Yes              | No                                       | No                       | No                         | Yes                                     | No                     | 1                        | No                                |
| <b>Independence</b>     | No               | No                                       | No                       | No                         | Yes                                     | Yes                    | 1                        | No                                |
| <b>Kenton Vale</b>      | Yes              | No                                       | No                       | No                         | No                                      | No                     | 1                        | No                                |
| <b>Lakeside Park</b>    | Yes              | No                                       | No                       | No                         | Yes                                     | Yes                    | 2                        | No                                |
| <b>Ludlow</b>           | No               | No                                       | No                       | No                         | No                                      | Yes                    | 2                        | No                                |
| <b>Park Hills</b>       | Yes              | No                                       | Yes                      | No                         | Yes                                     | No                     | 1                        | No                                |
| <b>Taylor Mill</b>      | Yes              | No                                       | No                       | No                         | No                                      | No                     | 1                        | No                                |
| <b>Villa Hills</b>      | Yes              | No                                       | Yes                      | No                         | Yes                                     | No                     | 1                        | No                                |

## APPENDIX G: SPSS Results

### Variables Entered/Removed(a)

| Model | Variables Entered                | Variables Removed | Method  |
|-------|----------------------------------|-------------------|---|
| 1     | Required Containers              | .                 | Stepwise (Criteria: Probability-of-F-to-enter <= .100, Probability-of-F-to-remove >= .200). |
| 2     | Free Collection at City Property | .                 | Stepwise (Criteria: Probability-of-F-to-enter <= .100, Probability-of-F-to-remove >= .200). |
| 3     | Square Miles (Land)              | .                 | Stepwise (Criteria: Probability-of-F-to-enter <= .100, Probability-of-F-to-remove >= .200). |

a Dependent Variable: 2005 Cost per HH

### Model Summary

| Model | R       | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|---------|----------|-------------------|----------------------------|
| 1     | .575(a) | .330     | .300              | \$22.35669                 |
| 2     | .699(b) | .489     | .440              | \$19.98829                 |
| 3     | .752(c) | .566     | .501              | \$18.88231                 |

a Predictors: (Constant), Required Containers

b Predictors: (Constant), Required Containers, Free Collection at City Property

c Predictors: (Constant), Required Containers, Free Collection at City Property, Square Miles (Land)

### ANOVA(d)

| Model |            | Sum of Squares | df | Mean Square | F      | Sig.    |
|-------|------------|----------------|----|-------------|--------|---------|
| 1     | Regression | 5425.477       | 1  | 5425.477    | 10.855 | .003(a) |
|       | Residual   | 10996.079      | 22 | 499.822     |        |         |
|       | Total      | 16421.556      | 23 |             |        |         |
| 2     | Regression | 8031.392       | 2  | 4015.696    | 10.051 | .001(b) |
|       | Residual   | 8390.164       | 21 | 399.532     |        |         |
|       | Total      | 16421.556      | 23 |             |        |         |
| 3     | Regression | 9290.722       | 3  | 3096.907    | 8.686  | .001(c) |
|       | Residual   | 7130.834       | 20 | 356.542     |        |         |
|       | Total      | 16421.556      | 23 |             |        |         |

a Predictors: (Constant), Required Containers

- b Predictors: (Constant), Required Containers, Free Collection at City Property  
 c Predictors: (Constant), Required Containers, Free Collection at City Property, Square Miles (Land)  
 d Dependent Variable: 2005 Cost per HH

**Coefficients(a)**

| Model |                                  | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig. |
|-------|----------------------------------|-----------------------------|------------|---------------------------|--------|------|
|       |                                  | B                           | Std. Error | Beta                      |        |      |
| 1     | (Constant)                       | 126.656                     | 4.662      |                           | 27.170 | .000 |
|       | Required Containers              | -75.242                     | 22.838     | -.575                     | -3.295 | .003 |
| 2     | (Constant)                       | 76.730                      | 19.988     |                           | 3.839  | .001 |
|       | Required Containers              | -77.511                     | 20.438     | -.592                     | -3.793 | .001 |
|       | Free Collection at City Property | 52.195                      | 20.438     | .399                      | 2.554  | .018 |
| 3     | (Constant)                       | 76.663                      | 18.882     |                           | 4.060  | .001 |
|       | Required Containers              | -83.014                     | 19.527     | -.634                     | -4.251 | .000 |
|       | Free Collection at City Property | 43.164                      | 19.896     | .330                      | 2.170  | .042 |
|       | Square Miles (Land)              | 1.111                       | .591       | .289                      | 1.879  | .075 |

a Dependent Variable: 2005 Cost per HH

**Excluded Variables(d)**

| Model |                                  | Beta In  | t      | Sig. | Partial Correlation | Collinearity Statistics |
|-------|----------------------------------|----------|--------|------|---------------------|-------------------------|
|       |                                  |          |        |      |                     | Tolerance               |
| 1     | Street Mileage                   | .366(a)  | 1.975  | .062 | .396                | .782                    |
|       | Municipal Population             | .421(a)  | 1.567  | .132 | .324                | .395                    |
|       | Square Miles (Land)              | .369(a)  | 2.283  | .033 | .446                | .976                    |
|       | House Holds within Municipality  | .596(a)  | 1.858  | .077 | .376                | .266                    |
|       | Population Density               | -.208(a) | -1.175 | .253 | -.248               | .952                    |
|       | Recycling Included               | .108(a)  | .589   | .562 | .128                | .939                    |
|       | Spring Clean-up                  | .378(a)  | 2.292  | .032 | .447                | .939                    |
|       | Free Collection at City Property | .399(a)  | 2.554  | .018 | .487                | .998                    |
|       | Divert Yard Waste Program        | -.101(a) | -.567  | .577 | -.123               | .989                    |
|       | Pick-ups per week                | .045(a)  | .252   | .803 | .055                | .982                    |

|                           |  |           |        |      |       |      |
|---------------------------|--|-----------|--------|------|-------|------|
| 2                         | Franchisee Bills Residence Street Mileage          | -.184(a)  | -1.054 | .304 | -.224 | .994 |
|                           | Municipal Population Square Miles (Land)           | .251(b)   | 1.379  | .183 | .295  | .706 |
|                           | House Holds within Municipality Population Density | .225(b)   | .842   | .410 | .185  | .346 |
|                           | Recycling Included Spring Clean-up                 | .289(b)   | 1.879  | .075 | .387  | .919 |
|                           | Divert Yard Waste Program                          | .372(b)   | 1.162  | .259 | .251  | .234 |
|                           | Pick-ups per week                                  | -.160(b)  | -.994  | .332 | -.217 | .937 |
|                           | Franchisee Bills Residence Street Mileage          | .183(b)   | 1.130  | .272 | .245  | .912 |
|                           | Municipal Population Square Miles (Land)           | .289(b)   | 1.823  | .083 | .377  | .873 |
|                           | House Holds within Municipality Population Density | -.148(b)  | -.935  | .361 | -.205 | .976 |
|                           | Recycling Included Spring Clean-up                 | -.011(b)  | -.071  | .944 | -.016 | .963 |
|                           | Divert Yard Waste Program                          | -.219(b)  | -1.425 | .169 | -.304 | .987 |
|                           | Pick-ups per week                                  | -1.063(c) | -1.593 | .128 | -.343 | .045 |
|                           | Franchisee Bills Residence Street Mileage          | -.844(c)  | -1.667 | .112 | -.357 | .078 |
|                           | Municipal Population Square Miles (Land)           | -1.279(c) | -1.551 | .137 | -.335 | .030 |
| 3                         | House Holds within Municipality Population Density | .197(c)   | .762   | .455 | .172  | .332 |
|                           | Recycling Included Spring Clean-up                 | .255(c)   | 1.690  | .107 | .361  | .872 |
|                           | Divert Yard Waste Program                          | .189(c)   | 1.044  | .310 | .233  | .662 |
|                           | Pick-ups per week                                  | -.074(c)  | -.468  | .645 | -.107 | .897 |
|                           | Franchisee Bills Residence Street Mileage          | .163(c)   | .945   | .356 | .212  | .738 |
|                           | Municipal Population Square Miles (Land)           | -.186(c)  | -1.265 | .221 | -.279 | .971 |
|                           | House Holds within Municipality Population Density |           |        |      |       |      |
|                           | Recycling Included Spring Clean-up                 |           |        |      |       |      |
|                           | Divert Yard Waste Program                          |           |        |      |       |      |
|                           | Pick-ups per week                                  |           |        |      |       |      |
|                           | Franchisee Bills Residence Street Mileage          |           |        |      |       |      |
|                           | Municipal Population Square Miles (Land)           |           |        |      |       |      |
|                           | House Holds within Municipality Population Density |           |        |      |       |      |
|                           | Recycling Included Spring Clean-up                 |           |        |      |       |      |
| Divert Yard Waste Program |  |           |        |      |       |      |

a Predictors in the Model: (Constant), Required Containers

b Predictors in the Model: (Constant), Required Containers, Free Collection at City Property

c Predictors in the Model: (Constant), Required Containers, Free Collection at City Property, Square Miles (Land)

d Dependent Variable: 2005 Cost per HH