Do the Causes of Poverty Vary by Neighborhood Type?

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ABSTRACT

Increasing our understanding about the nature of poverty is important due to its severe consequences at the individual, neighborhood and community levels. The purpose of this dissertation is to understand whether, or the degree to which, the causes of poverty vary across different types of neighborhoods. To accomplish this goal, cluster analysis was used to identify unique types of metropolitan neighborhoods. Next, variables that correspond to the causes of poverty were identified and entered into a factor analysis. The resulting factors were used as explanatory variables in a regression analysis explaining the variation in poverty across the different types of metropolitan neighborhoods. Findings indicate that poverty causes do vary significantly by neighborhood type. The findings can help policy makers formulate targeted neighborhood level anti-poverty strategies for the optimal utilization of limited resources.

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CHAPTER I

INTRODUCTION

1.1. Background

Researchers often measure the economic health of an area using poverty rates (Rector, 2004). Improved knowledge about poverty is important because high poverty in an area has severe consequences at both the individual and neighborhood levels. Ever since the U.S. started measuring poverty in 1963, there has been continuing research and debate about the best approach to reducing poverty. Although there is no single approach that can reduce poverty, it is widely accepted that understanding the causes of poverty is crucial in determining how to respond to poverty (Miller and Myers, 2007).

The implementation of anti-poverty programs that are formulated based on the different causes of poverty, reduces poverty as an end result. Poverty is a complex social problem with many variants and different causes (Blank, 2003; Shaw, 1996). This makes the link between poverty and its causes even more critical. This dissertation therefore deepens our understanding about the causes of poverty and their spatial variation.

1.2 Poverty Definition and its Understanding

Almost all researchers in the past agreed that poverty is "multidimensional, extraordinarily complex and difficult to understand" (Teitz and Chapple, 1998). No single conceptual framework can incorporate all its causes. Root causes range from loss of employment opportunities due to economic changes (Kasarada, 1985; Wilson, 1996); human capital deficit (Kasarada, 1993; Moss and Tilly, 1995); employment discrimination (Becker, 1957; Carnoy, 1994; Reskin and Hartmann, 1986; Shulman, 1990); spatial mismatch (Kain, 1968; Kasarada, 1985; Turner, 1997; Wilson, 1987); out-migration of rich and middle-income residents (Coleman, 1990; Putnam, 1993; Wilson, 1996); endogenous growth deficit (Birch, 1987; Harrison, 1994; Porter, 1995); family disruptions (Massey, 1993; Wilson, 1987); poorly trained and educated labor force (Hanushek and Kim, 1995; NSF 2003); uneven distribution of public assistance (Bradford and Kelijian, 1973; Downs, 1994); and poor living conditions and affordability (Stone, 1994).

The present poverty measure adopted by US Census Bureau, do not have any adjustments for the neighborhood type. However, the supplemental measure accounts for housing cost differences over five years, using rental costs data recorded. The supplemental measure also includes adjustments for each Metropolitan Statistical Area (MSA) and non-MSA in each state. Until recently, poverty traditionally has been considered a central urban area problem rather than a non-urban problem. Although the suburbs and exurbs have multiple advantages, their disadvantages come in the form of aging housing stocks, poor economic bases, poor accessibility to community facilities (hospitals, schools, universities), and fewer businesses that help stabilize communities (Lucy and Phillips 2000). U.S. has seen major changes within the urban areas between 1970 and 1997 primarily due to differences in growth rates and movement of jobs away to the central cities (Leichenko, 2001). Further, the urban and suburban sprawl has led to higher levels of economic segregation for which the poor are less likely to respond to the economic changes resulting in concentrated poverty (Jargowsky, 2001). Poverty in rural and urban areas often has different causes and depends on understanding of the ruralness and urbanness of an area (Wang, Kleit, Cover and Fowler, 2009). If these poverty causes vary by neighborhood type[1], it is virtually impossible to frame a single set of appropriate anti-poverty policies.

1.3 Heterogeneity of US Suburbs

The first scientific study on poverty documented the powerful description of life in immigrant sections of an urban area in London (Harkavy and Puckett 1994; Abbott, 1917). Since then the study of poverty has been traditionally understood as an urban issue. This argument gained support with the Alonso/Muth model of the city (Alonso, 1964; Muth, 1969), which describes a city as a place where commuters trade off access to work against housing costs. This reigned until 2000, when Glaeser, Kahn and Rappaport affirmed the suburbanization of poverty in United States in their study, 'Why do the poor live in cities?' (Glaeser, Kahn and Rappaport, 2000).

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[1] Eleven different neighborhood types are identified that range from extreme urban to extreme rural in nature.

It was argued that the poor had always lived in cities as opposed to suburbs (Glaeser, 2000). One of the key explanations was that the poor traded off work access for housing-costs. Other causes included readily available basic amenities and services, concentrations of unskilled jobs in manufacturing industries, and easily accessible public transportation. However, later these cities lost residents due to the creation of amenities in the suburbs. Subsequently, as people's financial situation improved, they moved away from the cities to the suburbs, an upward movement. A typical suburb, as perceived by an American, is a clean and crime-free, small residential area away from industrial sites (Jackson, 1985) comprised of low-density housing (Logan and Messner, 1987).

Today, the landscape evident in the suburbs has changed to a large extent (Dreier, 2004). While few pockets of the suburbs are affluent, others suffer with extreme poverty. "Suburbs are no longer homogeneous affluent bedroom communities: they are very diverse in terms of employment, income, and racial composition" (Puentes, 2002).

1.4 Research Gap

There are two important gaps identified in the literature review regarding the current understanding of poverty.

1. Past poverty literature had little focus on non-urban areas. For the most part, the existing research specifically targets urban poverty.
2. There are no efforts at studying poverty causes specific to neighborhood characteristics.

1.5 Research Question

This dissertation examines the causes of poverty: specifically, whether these causes vary or are constant in each of the neighborhood types identified. Thus, the primary research question addressed in this dissertation is:

Q: Are the causes of poverty the same across different types of metropolitan neighborhoods?

1.6 Approach

Poverty in a location is the outgrowth of several factors. If the extent to which these factors contribute to total poverty varies across urban areas and their counterpart suburbs and exurbs, then a poverty reduction strategy based on neighborhood type would be more appropriate and might be needed by policy makers to address varying poverty across the neighborhood types. The focus of this dissertation is an evaluation of poverty causes across various geographies within the metropolitan areas of US using five-year American Community Survey (2005-2009 ACS) data. This dissertation addresses crucial research gaps in the poverty literature and helps policy makers understand the importance of resource utilization specifically to the areas that are struggling to combat chronic poverty with limited resources.

To accomplish this goal, cluster analysis is used to identify unique "types" of metropolitan neighborhoods. Seven variables are used as inputs, reflecting the demographic, housing, transportation, economic, and occupational nuances of the urban to rural continuum. Next, drawing on the poverty literature, variables are identified that correspond to the various causes of poverty (for example, structural economic shifts, low human capital, spatial mismatch, racial disparities, etc.) and these are entered into a factor analysis to uncover the underlying structure of the causes, and to eliminate redundancy in variation among the indicators. The resulting factors are used as explanatory variables in a regression explaining the variation in poverty rates across metropolitan neighborhoods. Then, the significant differences among poverty predictors across different types of neighborhoods are explored. This reveals which poverty causes are most/least prominent in specific types of metropolitan neighborhoods. The results can serve as an asset for policy makers as they search for targeted poverty solutions across increasingly complex local contexts.

The dissertation builds upon existing research and creates a framework to test the possible causes of poverty across distinct metropolitan geographies.

1.7 Contribution to the Literature

This study enhances the understanding of each poverty cause and its relevance in different types of neighborhoods within metropolitan areas. While much has been written and learned in the past about poverty in general and more specifically central city poverty, there is less research relating to poverty in suburbs, and even less relating to the variation in poverty causes across the different types of metropolitan neighborhoods. The outcome of this study is an important contribution to the poverty literature and holds substantial policy relevance. This study can help policy makers use available resources in more efficient manner.

1.8 Structure of the Dissertation

The rest of this dissertation is organized as follows. Chapter 2 begins with the review of previous poverty literature to understand the causes of poverty, the concepts of neighborhood types, and the classification mechanisms. The third chapter compiles the relevant poverty variables that can be measured and used in the present study and describes the research design for the dissertation and explanation of each model and its relevance for the study. Chapter 4 presents the data analysis and statistical findings and for the cluster and factor analyses. Further, the outcomes of regression models and test results are presented in this chapter. Finally, Chapter 5 concludes with discussion on conclusions and policy implications.

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

To design efficient policies and strategies aimed at reducing poverty, it is important to understand the nature of poverty in a neighborhood type. This understanding might seem incomplete without fully acknowledging the different types of geographies. This section sheds light on two areas of literature: the poverty causes that researchers have established in the past poverty literature and the methodologies used by researchers in classifying neighborhood types.

2.2 Poverty Definition and Causes of Poverty

Social researchers define poverty as a situation where people lack basic needs—food, clothing, housing, safe drinking water, sanitation facilities, health, education, and information (Kasarda, 1990; Massey and Denton, 1993; Wilson, 1996; and Jargowsky, 1996). Statistical definitions are based on income or consumption values. Others define poverty in relation to residents' voice and participation in their communities (Sen, 1981). Jargowsky (1996) sees poverty as having several definitions and the way poverty is defined depends on what we intend to do about it. However, a concise and universally accepted definition of poverty is largely elusive because of its complex and multi-dimensional nature (Teitz and Chapple, 1998).

The U.S. Census Bureau defines poverty using income thresholds based on annual inflation factors. This was calculated for the first time in 1963. Although the fundamental definition has not changed over the time, the threshold numbers are updated annually based on inflation (U.S. Census Bureau, 2000). According to the Census, a family is considered to be poor if its gross annual income is less than the income-defined poverty threshold based on family size. This income doesn't include noncash benefits such as Medicaid, public housing, food stamps, and employee-covered health insurance.

Poverty measurement has always been an issue of debate. The multi-dimensional nature of poverty makes it difficult to estimate the exact impact of each of these causes. This section of the dissertation reviews the varied causes of poverty within a metropolitan area. There are multiple theories to explain the causes of poverty, with stacks of empirical evidence justifying each.

In previous poverty studies, researchers discovered many factors that are responsible for the creation of poverty in an area. However, the exact role each factor plays in creating poverty is always a complex subject to understand (Teitz and Chapple, 1998). Further, different researchers in various disciplines define poverty differently. For example, for economists it is an issue of productivity, human capital, labor markets, and incentives and subsidies. Sociologists and anthropologists explain poverty in terms of social relations, voice heard, participation, behavior, and culture. For political scientists, it is about power and access to collective resources. City planners and urbanists define poverty as an effect of isolation, transportation access, accessibility to civic amenities, and urban structures (Teitz and Chapple, 1998).

Previous poverty research focused primarily on urban areas. It is only in recent years that poverty outside these central areas has become prime concern for researchers. The key researchers, Wilson (1987, 1996), Kasarda (1990, 1989), Massey and Denton (1993), and Jargowsky (1996), outlined the various causes of poverty. Wilson (1987, 1996) and Kasarda (1990, 1989) described poverty as the result of the combined forces of deindustrialization, suburbanization of job opportunities, racial and gender disparities, non-affordable and poor living conditions, and occupational bifurcations. On the other hand, Schultz (1969), Alba and Logan (1993, 1996 and 2000), and Agenor (1998) believe that people-based factors, such as educational attainment and the quality of labor force, plays an important role in the occurrence of poverty. Blakely's (1989) work on place-based poverty asserts that the endogenous growth deficit accelerates poverty in an area. Distribution of public expenditures to reduce the incidence of poverty also results in its increase to some extent (Bradford and Kelijian, 1973; Crane, 1991; and Downs, 1994).

The early studies by Booth in London (1886) and Rowntree (1901) in York looked at poverty based on estimates of nutritional and other basic requirements. In the 1960s, poverty was considered the result of poor income levels. In the 1970s, poverty became prominent as a result of the unequal distribution of wealth and the poor educational level of the labor force (MacNamara, 1973). Housing subsidies in the 1950s and 1960s, when suburban migration was greatest, were not equally distributed among the races and were particularly denied to Black Americans (Baldassare, 1986; Lucy and Phillips, 2000; and Mahler 1995).

Orshansky et al. (1976) related poverty to family size, education of household head, and the type of residence. The conclusion of these authors is straightforward and plausible: individuals hailing from large families, and /or natives of small towns or rural areas, tend to have less education. If they are current heads of households, then they are likely to be poorer than those hailing from smaller families or large cities.

Amartya Sen developed a capabilities-based theory to explain poverty. He emphasized that income is valuable only if it increases the capabilities of individuals. This laid a path for gender-based studies suggesting some causes of female poverty. The United Nations Development Programme (UNDP) extended the idea of human development based on 'voice' as a key factor in making an individual or a group poor. The past studies indicate that the poor people in U.S. are not homogenous but differ largely due to the differences in economic opportunities among different communities and social groups (Cottingham and Ellwood, 1989; Saenz and Thomas, 1991; Duncan, 1996; Tomaskovic-Devey and Roscigno, 1996; ; and Sandefur and Tienda, 1998). Also, aging infrastructure and diminished population growth contribute to poverty in a given area (Leigh and Lee, 2005; Puentes and Warren, 2006).

To summarize, the understanding of the causes of poverty is made simpler by grouping the causes under the themes discussed above. These themes are tailored to capture all the causes represented in the literature that are responsible for the persistence of poverty.

2.2.1 Structural Economic Shifts

The first theme attributes poverty to the change in traditional employment opportunities for low-skilled workers. By this reasoning, poverty is partly a result of changing economic conditions. This theme asserts that fundamental structural changes in an economy that lead to loss of employment in key sectors result in poverty (Kasarda, 1985; Wilson, 1996, 1987). Albrecht et al. (2000) found that the industrial transformation has resulted in the closure of manufacturing industries and the growth of service industries. Employment growth in service industries compared to that in manufacturing industries resulted in the loss in jobs, especially those with low wages and lower skill requirements (Sassen-Knob, 1984; Harrison and Bluestone, 1988; Mollenkopf and Castells, 1991; Carnoy, 1994).

There was a major shift in the economy from agriculture to manufacturing in the late nineteenth century. People in rural areas could not find work. This led the rural poor to migrate to urban areas to find non-skilled jobs, primarily in the manufacturing sector. Overcrowding in urban areas resulted in poor living conditions primarily around the manufacturing industries. This increased poverty in urban locations. In addition to other changes, the beginning of industrialization increased debt burdens on many families. The major economic shift in the late twentieth century is towards services such as healthcare and clerical services from manufacturing, which was declined from 33.7% in 1950 to 8.1% in 2010 of the total employment (Bureau of Labor Statistics, 2010). Increased demand for skilled and educated labor has been the key attribute behind all these shifts.

Job losses due to industrial transformation are key in understanding the shifts in the economy of a region (Kasarda, 1985; Wilson, 1996, 1987). The argument is that changes in the economy have caused shifts from manufacturing to services or from low-tech to high-tech industries. Those employed in conventional industries have lost work and were not able to adapt to the new changes. Therefore, employment change in the manufacturing industries can be an appropriate measure for this economic shift. Additionally, a recent poverty study by Brookings Institution adopted the poverty variable 'job change in manufacturing industries' as one of the measure for identifying rise in poverty rates amid the continuous job losses in manufacturing industries (Kneebone, Nadeau, and Berube**.** 2011). Potential measures of this factor include:

- Employment change in manufacturing industries
- Employment change in service industries

2.2.2 Endogenous Growth

The second theme is endogenous growth deficit. This theme sheds light on the lack of new job generating capacity in a region by facilitating a convenient business environment in which business can start and grow (Eisinger, 1988; Blakely, 1989; Teitz, 1994). In the United States, historically, regional economies revolved around creating new firms through external investments. Due to the decline in manufacturing, the prospects for this strategy have dimmed (Teitz, 1994). Further, Walker (1977) indicated that areas with high concentrations of African - Americans deterred firms from investing there. This left those communities with little choice in employment.

The argument that the endogenous growth deficit creates poverty can be argued in the opposite direction. In other words, that poverty is the principle behind the inability to attract external investment. Also it is difficult to deny Porter's theory from *The Competitive Advantage of Nations* (1995), which states that strong local enterprises create economic dynamism. He argues that the competitiveness of an area is based on local growth and development.

The competitiveness of an area depends on the investments made in local businesses (Porter, 1995). Investments needed to cater to start-up businesses and high-growth businesses, also termed 'Venture Capital.' Government expenditures per capita measure the economic growth and are responsible for reducing poverty in a region (Haltiwanger, Jarmin and Miranda, 2011). Potential measures include:

- Venture capital
- Federal and state spending per capita (most prominent expenditures)

2.2.3 Human Capital

Several factors related to human capital are grouped under this theme. It is based on the understanding that workers with more skills are likely to have higher productivity compared to those with fewer skills. Those who are not equipped with such capital are more likely to undergo a job loss and subsequently enter into poverty. Human capital is understood as a skill set defined by formal education, health status, and training or any informal education for individuals (Becker, 1975).

One of the pioneer studies on investment in human capital observed that human capital in western societies has grown at a much faster rate than non-human capital (Schultz, 1969). Kasarda (1993) investigated education levels of the population aged 25 years and above in the 100 largest central cities and found that 53 percent of those living in extreme poverty conditions had not completed high school. Other studies have also shown that a person with higher education tends to earn more money. Researchers have also pointed out that there is always the possibility that the higher incomes of those with higher education levels are due to differences in their aptitudes, social and family relations, and other factors (O'Neill, 1990). O'Neill (1990) and Smith and Welch (1989) opine that advanced schooling alone is inadequate and insufficient to push an individual out of the poverty. It is the quality of that education that enables an individual to compete and survive in the job market.

Human capital refers to the education and knowledge that an individual possesses (Lewis, 1954). Human capital is measured by the level of educational attainment and the years of experience in a job. However, due to the unavailability of data, only formal education is considered as a standard indicator in measuring human capital. Present school enrollment rates and educational levels of the working population are used to evaluate human capital's contribution to poverty. Recent studies indicate investments in education are key to reduce persistent poverty in a region (Zilak, 2007). Potential measures include:

- School enrollment rate
- Percent high school graduates of the working population aged 25+

- Percent bachelor’s and master’s degrees of the working population aged 25+
- Percent professional degrees of the working population aged 25+
- Percent doctoral degrees of the working population aged 25+

2.2.4 Quality of Labor Force

For the poor, whose main income-generating asset is labor, participation and the quality of labor are crucial. In the literature, both unemployment and the quality of the existing employed labor force are considered to be important links between poverty and labor markets. When an earning member of a poor family loses a job, the members of the family are more likely to enter into poverty (Cain, 1966; Mincer, 1962). This in turn depends on the educational levels of the population (covered in the earlier theme of Human Capital). A recent survey conducted by NSF of graduates who received their degrees between 1998 and 2000 suggest that the annual median salaries for science and engineering graduates are higher than for non-science and non-engineering graduates (Tsapogas, 2004). Additionally, the science and engineering graduates are more likely to be employed than the non-science and non-engineering graduates (Tsapogas, 2004). Those in non-science and non-engineering jobs do not have the skills to move into high-tech positions, have a higher risk of unemployment, and are more vulnerable to enter the poverty.

Although this theme is primarily related to the human capital of a region, this theme differs by the number of people participating in the labor force and the quality of the labor force. Labor force participation is the percentage of total working or actively seeking employment in the market. Further, as indicated by the NSF study, the key indicator that dictates the quality of education is the segregation of science and engineering and non-science and non-engineering degrees. Potential measures include:

- Percent Science and Engineering graduates of the total working population aged 25+

2.2.5 Spatial Mismatch

The fifth theme is based on the conjecture of spatial mismatch. Those firms that offer jobs for low skilled workers, specifically manufacturing jobs, moved from the inner cities to the suburbs leaving minority low-skilled workers behind. This is partly due to the costs of commuting and poor job search information. Several researchers, such as Kain (1968), Kasarda (1985), Wilson (1987), Abramson et al. (1995), and Turner (1997) developed this argument. Before 1980, the typical commuting pattern was suburb to downtown and was easy to serve with conventional road and rail transit. In the 1980's, the birth of edge cities diverted job locations for low-skilled workers from downtowns to the suburbs. Transit systems did not catch up with this employment transformation and thus created a spatial mismatch separating the low-skilled workers from their traditional jobs, which resulted to the concentration of poverty in the central cities.

Discrimination in the housing market is one of the prime causes of spatial mismatch that creates barriers to social mobility and racial segregation. This strengthens poverty as a result of the three spatial mismatch factors, poor accessibility by location, information, and transportation services. Suburban poverty partly resulted due to spatial isolation and the disadvantages of the suburbs in terms of poor access to shopping and other daily amenities. Most of the outlying suburban areas do not have appropriate public transportation systems. Also, the poor living in suburbs often do not own private vehicles and have to depend on public transportation. Many times, public facilities like public hospitals, schools, and poverty assistance programs are still overwhelmingly urban (Waller and Berube, 2001). A study conducted by The Brookings Institution, *Timing Out: Long-term Welfare Caseloads in Large Cities and Counties (2002)*, showed the concentration of welfare facilities in urban areas. Finding an affordable place to live becomes a bothersome task and an exasperating challenge, because most of the low-income subsidized housing in America was built in cities. This adds to the economic problems of poor minorities who are already battling an increased social isolation caused by racial discrimination, physical disorders, housing segregation, and other violent incidents. This has increased class-based residential segregation among the minorities. As a result, economic and social isolation has risen among the poorly educated minorities, causing an increase in the concentration of poverty. Within the suburban locations, large number of people living in poverty is found in neighborhoods that have low access to jobs (Raphael and Stoll, 2010).

This theme measures the monetary and non-monetary costs that are associated with the working and non-working labor force in reaching their work or potential work places. Spatial mismatch theory suggests that the work places of the poor and the low-skilled labor force do not match with their homes, leading to loss of jobs in the long run. Costs are measured in time, distance, and dollars invested to reach the work place. Potential measures include:

- Average distance travel to work place
- Time taken to reach work place
- Average expenditure for travel to work places

2.2.6 Migration

This theme covers two major causes of poverty: 1) The out-migration of the upper and middle-income groups, leaving the area poorer and 2) The in-migration of the educated, absorbing the newly created jobs. Migration can both cause and be caused by poverty (Skeldon, 2003). Wilson in *The Truly Disadvantaged* (1987) and *When Work Disappears* (1996) suggested that the departure of large numbers of African-American households results in spatial and social isolation, which in turn results in the concentration of unemployment, welfare dependency, family break-ups, teenage pregnancies, and high crime rates. Immigration is also considered an important factor in causing poverty by crowding neighborhoods and occupations. Further, new immigrants compete with long-term residents of the area and in many cases win the local jobs created (Waldinger, 1996).

Putnam (1993) defined ‘social capital’ as a concept of connections with people who engage in social interactions to create a sense of mutual confidence. The poor depend on such social capital as a survival strategy. Any outward movement of their connections, particularly the middle-income group, depletes their resources, making them poorer. This isolation reduces the chances of any social exchange of information about potential job opportunities (Granovetter, 1973; South, Crowder and Chavez, 2005).

The absolute migration totals, both inward and outward, by age group, education level, and income level are the prime indicators for this theme. Further, the new migrants could take advantage of opportunities that are created to reduce poverty among local residents. The employment status of the new migrants can help understand this "grabbing" factor (Waldinger, 1996). Potential measures include:

- Net migration of the working-age population
- Percent net immigrants with undergraduate degree
- Percent net immigrants with graduate degree
- Net migration of people with above average local household income
- Employment status of new immigrants

2.2.7 Racial and Gender Discrimination

This theme was built on the premise that persistent racial and gender discrimination increases and reinforces poverty. The most common model, which dealt with discrimination, demonstrates that poverty is caused by these factors (Teitz and Chapple, 1998). Racial and gender discrimination cause poverty by obstructing qualified workers from entering the labor force. (Teitz and Chapple, 1998). This plays a vital role in causing poverty in an indirect way. It results in segregation, and such segregation fosters earning disparities by increasing occupational segregation (England and Farkas, 1986). Paired test studies in the past illustrate that African-Americans and Latinos had a meager chance of receiving employment calls and offers (Cross et al., 1990; Turner, Fix and Struyk, 1991). The phrase "feminization of poverty" originated in U.S. debates around female-headed families. The female headed families are more vulnerable to illness and voilence (Wratten, 1995). There are numerous studies indicating the unequal distribution of resources (Wratten, 1995; Razavi, 1999; Baden and Milward, 2000). This is partly due to such factors as restrictions on access to credit and other productive resources that ultimately makes a family vulnerable to the poverty (Lourdes Beneria and Savitri Bisnath, 1996).

Race and Gender are the most important factors with respect to the probability of children experiencing poverty (Rynell, 2008). Although racial and gender discrimination is difficult to quantify, the growing body of research focuses on accessibility of employment by the African-American population and the female-male discrimination in wage and employment opportunities. Potential measures include:

- Employment rate for African-Americans/Employment rate for Whites.
- Average earnings for African-Americans/Average earnings for Whites.
- African-American employment in high tech/White employment in high tech.
- Employment rate for females/Employment rate for males.
- Average earnings for females/Average earnings for males.
- Female employment in high tech/Male employment in high tech.

2.2.8 Family Structure

Bane (1981) studied the degree to which the intensification of poverty can be caused due to variations in family structures. This change may be a result of increased marital breakup, more unwed mothers, and an autonomous livelihood of older women, each one resulting in a swing towards female-headed households.

Past Census data underscore the fact that female-headed households and women living independently represent over half of the total poverty population (Wilson and Neckerman, 1985). Wilson and Neckerman (1985) used 1940 Census data and were first to provide detailed information on family structure. The authors emphasized that teenage mothers, large families, families with more elderly people, and families where women are the sole bread winners have higher rates of poverty.

The number of children and elderly population living in poverty corresponds to the amount and quality of human and economic resources available to that family. Since women are often paid less than men. The aged and women are often engaged in low-productivity jobs and are more vulnerable to poverty. The U.S. Bureau of the Census used female-headed families; dependency rate, teenage motherhood, and age of the earning members to assess poverty rates in a report titled *Income, Poverty, and Health Insurance Coverage in the United States: 2007*. Potential measures include:

- Female-headed households
- Single-parent households
- Dependency rate
- Percent teenage mothers
- Family size
- Median age
- Percentage 65 and older and living alone

2.2.9 Distribution of Public Assistance

The next theme is related to the distribution of public expenditures. The money for public assistance comes from tax revenue based on the concept of redistribution of concentrated wealth. However, the improper distribution of this tax revenue can recreate the same wealth concentrations. It is agreed that increased or improper public spending can significantly reduce the economic growth of a region (Barro, 1990). On the other hand, the past medical insurance data indicate ensuring access to medical care helped reduce both the extent and depth of poverty (Park and Broaddus, 2012). Any public assistance program devised for the poor aims to act as safety net for those who would otherwise have entered into poverty. In some cases, they act also as a survival strategy for the poor.

Although there are several public assistance programs created by state and the federal government, the most noted are the Temporary Assistance to Needy Families (TANF), food stamps, and Medicaid programs. TANF makes monthly payments to families on a need basis. Food stamps provide families with electronic cards or vouchers to buy food at grocery stores. This program was aimed to prevent hunger and malnutrition for families with children. Lastly, the Medicaid assistance program covers medical care for the elderly, disabled, pregnant women, and children. Potential measures include:

- Percent TANF recipients of the total population living in poverty
- Percent Food stamps recipients of the total population living in poverty
- Percent Medicaid recipients of the total population living in poverty

2.2.10 Living Conditions and Affordability

The final theme is related to poor living conditions and housing affordability. Although most poor families have access to spacious housing, the housing in most of the cases is either dilapidated or unsafe (American Housing Survey, 2007). The most common problems are lack of a full kitchen and aged buildings. With the apparent surge of low-paying jobs in the economy, the poor, especially in the suburbs, are the working poor. Due to the shortage of public transportation facilities in most suburbs, people find it difficult to get to work (Cox, 2003; Dreier, 2004). Many of the poor living in suburbs have no or poor health insurance coverage. (Dreier, 2004; Eyal Press, 2007). Medicaid patients find it hard to locate doctors and health clinics that will accept them (Dreier, 2004). The suburban poor, due to the non-availability of subsidized housing, often spend more on housing than they can afford to (Keating, 1998). Federal programs in the past mainly focused on the poor in cities (Dreier, 2004) and ignored the suburban poor. Additionally, suburbs with high poverty rates also have a smaller tax base than larger cities (Dusansky and Nordell, 1975; Orfield, 1998). This hampers local officials in their efforts to provide services to address the needs of their residents (Dusansky and Nordell, 1975; Orfield, 1998). Majority of the housing units in these areas were built during the 1950s and now need major repairs, but the poor are not in a position to renovate them.

Additionally, low-income families often live in isolated rural and suburban areas. These areas in general have higher living costs compared to the other areas due to their limited commercial choices for daily needs. These families often pay higher prices for inferior goods and services (Stoll and Raphael, 2010).

Over-crowding is the most common factor responsible for poor living conditions in an area. Over-crowding lowers the quality of life and has a negative impact on the surrounding neighborhoods (Clark, Deuloo, and Dieleman, 2000). It also strains such services as trash collection, public safety, and civic amenities and many times results in high risks on health and high hospital bills. Further, such factors as housing quality, safety, and hygienic conditions add more value to sound living conditions in an area. Potential measures include:

- Occupancy rate per room
- Rental share in total income
- Crime rate per 1000 population
- Percentage population covered by health insurance

Table 2.1: Poverty Themes and Potential Measures

	Theme	Potential Measures
1	Structural Economic Shifts	Employment change by manufacturing industry
		Employment change in service industries
2	Endogenous Growth	Venture capital
		Federal and state spending per capita
3	Human Capital	School enrollment rate
		Percentage high-school graduates
		Percentage bachelor and master’s degrees
		Percentage professional degrees
		Percentage doctoral degree
4	Quality of Labor Force	Percentage Science and Engineering graduates
5	Spatial Mismatch	Average distance travel to work place
		Time taken to reach work place
		Average expenditure for travel
6	Migration	Net migration of the working-age population
		Percentage net immigrants with undergraduate degree
		Percentage net immigrants with graduate degree

		Net migration of people with above average local household income
		Employment status of new immigrants
7	Race and Gender	Employment rate for African-Americans/ Employment rate for Whites.
		Average earnings for African-Americans/ Average earnings for the Whites.
		African-American employment in high tech/ Whites employment in high tech.
		Employment rate for females/ Employment rate for males.
		Average earnings for females/ Average earnings for males.
		Female employment in high tech/Male employment in high tech.
8	Family Structure	Female-headed households
		Single-parent households
		Dependency rate
		Percent teenage mothers
		Family size
		Median age
		Percentage 65 and older and living alone
9	Distribution of Public Assistance	Percent TANF recipients
		Percent food stamps recipients
		Percent Medicaid recipients
10	Living conditions and Affordability	Occupancy rate per room
		Rental share in total income
		Crime rate per 1000 population
		Percentage population covered by health insurance

2.3 Neighborhood Types

An urban area is defined as "an area of continuous urban development" (U.S. Census Bureau). Although past literature made several attempts to define an "urban area," there is a fundamental problem in its understanding. What is an urban area in terms of space? Several researchers have addressed this question in the past by focusing on functional and socioeconomic variables.

Kevin Lynch (1961) argued that “an urban area need not be a unified pattern with a solid boundary.” Rossi (1984) suggested that “the formation of urban areas could be identified by understanding the historic process of urban growth of an area.” Hiller (1987) was the first to suggest that “movement rates within larger urban areas can help identify the core urban areas within the larger urban area.” The doctoral thesis of Kasemsook (2003) concluded that areas are categorized by the functions associated with them. Park (2007) proposed that area structure in a city could be understood by the street system of the city.

A typical suburb is defined as a residential area outside the main city or a town. The communities beyond them are generally a ring of prosperous rural communities that acts as commuter towns for the main city (Witold Rybczynski, 2005). Although the Census Bureau has not made any attempt to define suburban and exurban categories, past researchers defined the boundaries for the two categories based on several factors depending on the nature of the study carried out.

2.3.1 Urban and Rural

Urban areas refer to densely settled territory with population density of at least 1,000 people per square mile and adjacent block groups with a population density of at least 500 per square mile (U.S. Census Bureau). Rural areas are those outside the urban boundaries. According to the ACS 2005-2009 data released by U.S. Census Bureau, more than 80% of the U.S. population lives in urban areas. More than 93% (2009) of the total U.S. population lives in metropolitan statistical areas and encompasses both urban and rural areas.

2.3.2 Metropolitan Statistical Area

The Office of Management and Budget (OMB) defines Metropolitan Statistical Area (MSA) as a collection of adjacent counties that have at least one urban core area of at least 50,000 population and an adjacent territory that has a high degree of social and economic integration. These are the areas that represent county-based functional regions associated with a central urban core. More than half the metropolitan population in U.S. lives outside the central cities (Bernadette Hanlon, 2010). Traditionally viewed homogenous suburban areas do not exhibit similar nature anymore. Many suburbs now resemble the central city, both the declining central city and the revitalizing one. Additionally, these diverse suburbs increased by 37% in the nation's 50 largest metropolitan areas, an increase from 1,004 in 2000 to 1,376 in 2010 (Bernadette Hanlon, 2010). Immigration, demographic trends, increased importance of place and uniqueness indicate that suburban places are highly diverse than those existed fifteen years back (Strategic Economics, 2002). This makes both urban and suburban areas highly diverse internally (John, 1998) and needs further classification to understand the neighborhood diversity beyond the traditional classification of urban, suburban and rural. On the other hand, neighborhoods are the geographical units at which people interact with each other in daily life and share similar experiences making neighborhoods natural boundaries to observe and analyze the problems (Wilson, 2009).

Choosing a suitable methodology for classifying the neighborhood types is a complicated task with a number of different definitions in use. Although researchers in the past seemed to have focused on important aspects of neighborhood classification, not a single methodology encompasses all the definitions. Past studies suggest that the spatial factors involved in defining urban areas range from physical to non-physical characteristics of an area. However, none of the studies mentioned above have combined the physical and non-physical characteristics of an area to define the neighborhood type.

The classification system proposed by Kevin Lynch is close to the Census classification. The Census-defined TIGER (Topologically Integrated Geographic Encoding and Referencing) scheme of urban-rural classification is based on population density. The use of population density to identify spatial structure not only gives a clear delineation of boundaries but also explains the urban fringe, which is based on abrupt density changes. However, this method doesn't provide room for the non-physical characteristics of a place such as economic and occupational patterns.

2.4 Neighborhood Classification

The notably mentioned neighborhood characteristics in the past literature can be grouped under four broad themes. They are demographic, residential, transportation, and economic/occupational indicators (De-min, et al. 2004). Hess (2006) used "clustering" techniques to organize hundreds of metropolitan and "micropolitan" areas into groups with similar characteristics. These groups are characterized by size, economy, demography, geography, and cyclical forces which can potentially uncover differences within the metropolitan areas.

Demographic indicators: This encompasses population density patterns and the percentage of the population active in the labor force. While suburbs and exurbs have the benefit of more space, lower density, and less traffic, urban areas are characterized by high-density patterns. Exurban areas are sparser compared to the other two categories.

The Census Bureau defines an urban areas based on a combination of population size and density. This definition substantially differentiates geographies as urban and rural. However, this method considers the two groups as homogenous (Isserman, 2005, 2007).

Urban areas are typically characterized by office buildings and major employment centers. This is an attraction for the poor who cannot afford transportation costs to reach these work places. Hence they often live in urban areas to cut down on drive time and transport costs. (De-min, et al. 2004). Potential indicators include:

- Population density

Residential indicators: Owning a two-story house with a yard is expensive in an urban area but typical in most suburban areas. Exurbs have lower housing density but are often almost as expensive as urban housing. Urban areas are the original, older settlements compared to suburban and exurban settlements. Exurban places are the new developments outside the suburbs. This indicates that the median age of housing in urban areas is greater than that in the suburbs, which is, in turn, greater than that in the exurban areas.

High living costs in urban areas and affordable housing in suburban and exurban areas act as push factors for the non-working population from urban areas (Whitehead, 2000). Families with school-age children prefer suburban life due to availability of schools in areas with less traffic and lower density (Whitehead, 2000). Further, the elderly and disabled population prefers less density, lower traffic zones like suburbs and exurbs with good services as their residential areas (Duany, Zyberk and Jeff, 2000). One of the explanations attributed to the rapid growth of the suburbs is the availability of affordable housing and increased access to home ownership. Residents enjoy more space per person compared to urban areas (Duany, Zyberk and Jeff, 2000). People pay high cost for land in urban areas compared to the rural areas leading to shrinkage of lots in houses in urban locations and hence more single family homes in the suburban and rural areas (Stedman, Stephan and Benjamin, 2006). While the urban and rural areas are the original areas of developments, the suburban and exurban areas are relatively newer developments (Robert, 2006).

- Housing type (Single detached single attached, houses with more than 1 units, etc)
- Median age of housing

<u>Transportation indicators:</u> Road density, traffic volume, and means of transport are key transportation measures to understand neighborhood types. Road density was used as one of the important measures to detect the change in neighborhood type in one previous study (Zhang, et al., 2002). Narrow roads with congested traffic are a typical urban characteristic with greater dependency on public transit as a means of transportation. Additionally, due to extensive sprawl in the suburbs, public transit is absent in many areas. This forces the suburban working population to depend on the private vehicle ownership to reach their work places. The increased urban sprawl resulted in many transit systems that connect core urban areas to the suburban residential locations as well as

connecting different parts of the city (Rodrigue, Comtois and Slack, 2009). Lack of transportation is one of the most frequently cited problems facing people with disabilities living in rural areas. About 66% of the rural residents either do not have access or have inadequate access to public transportation. One out of six households in large urban areas doesn't own a car, but the availability of public transportation makes a personal vehicle unnecessary.

- Traffic volume in local roads
- Road density
- Percent population dépendent on public transportation

<u>Economic and occupational indicators:</u> Neighborhood types also vary by economic and occupation patterns. While urban areas are characterized by mixed occupations other than farming, suburbs mostly have extended occupations from urban areas and fewer occupations either directly or indirectly connected with the farming sector. Most farming activities are seen in the exurban areas with fewer spread to suburban areas. These areas typically include residential and farming areas (Fuguitt, 1985; Heimlich & Brooks, 1989).

- Percentage involved in farm activities
- Percentage employed in service industries

Table 2.2: Indicators for Neighborhood Classification

	Theme	Potential Measure
1	Demographic	Population density
2	Residential	Housing type
		Median age of housing
3	Transportation	Percent population dépendent on public transportation

4	Economic and Occupational	Percentage population involved in farm activities Percent businesses compared to the residential.

In a nutshell, the four themes used for neighborhood classification attributes the spatial differences among the common geographic indicators, population, housing, transportation and economy. Population density, a variable used by Census was chosen to represent the population size of the census tract. The variables, housing type and housing age indicate the life style relative to social and cultural contradictions (De-min, et al. 2004). Transportation indicator, percent population dependent on public transportation, represents the level of connectivity and indicates the regional characteristics of a place. Percent involved in farm occupations and percent businesses over residential addresses indicate the socio-economic nature of the place (De-min, et al. 2004).

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

The research design answers the key question of the dissertation: "Are the causes of poverty the same across different types of metropolitan neighborhoods?" This dissertation involves an analysis of poverty in various neighborhood types within metropolitan areas of United States. The study uses cluster analysis for the classification of neighborhood types. This dissertation also uses factor analysis to determine the sub variables for each poverty cause identified from the past literature and a multiple-regression model to test the hypotheses.

3.1 Identification of Poverty Factors

While there are several factors that cause poverty as identified in the previous poverty literature, the challenge is to reduce them to a manageable number that can encompass all or most of the factors. Each poverty factor has several causes, which makes the generalization of causes a difficult task. A big challenge is finding appropriate variables for each of poverty themes.

3.1.1 Selection of Variables for Poverty Themes

The difficulty in choosing the variables to represent each poverty cause is that each of the poverty themes that evolved out of the literature review is explained in isolation. The only criterion for selection is the data availability factor at the Census tract level from ACS 2005-2009 data. A few of the selected variables will correlate with the other variables selected. This poses the problem of double counting and collinearity. A factor analysis of all the variables for the themes would uncover any overlapped causes. For example, while racial isolation is considered to be one of the important poverty factors, the same is highly correlated with the education levels, In other words, part of the poverty explained by the racial factor is explained by their lower education levels.

3.1.2 Factor analysis Procedure

Factor analysis is used in the present study to uncover the relationships among the several variables describing the poverty themes. Additionally, factor analysis is expected to reduce the number of variables by eliminating any inter-correlated variables. The key advantage of the factor analysis is that it identifies the hidden constructs for each variable and this can help avoid duplication of variables that may not be possible from direct analysis. The analysis is carried out with the goal of discovering the relationship among the dependent variables. Thus, the factors produced in the factor analysis method will be orthogonal.

There are different methods for factor analysis: principal component analysis, un-weighted least square method, generalized least square method, maximum likelihood method, principal axis factoring method, alpha method and image factoring method. (Richard, 1983). The rationale behind choosing principal component method over the other methods is that the method adopts factor extractions to form uncorrelated linear combinations of the input variables. Further, the method helps in identifying data problems and maximizes the variance between one factor and the other for easy visibility of differences across the factors yielded (Bradley, Philip, Stuart and Maxine, 1982). There are three main steps involved in a factor analysis based on the principal component analysis method.

a) Calculate initial factor loadings: This can be done in many ways; however, the two most common methods are the principal component method and principal axis factoring. While the first method looks for a set of factors that can account for the total variability in the original variables, the second method tries to find the lowest number of factors. After the initial extraction of factors, the factor rotation is conducted by one of two rotation methods, orthogonal or oblique rotations (Dunteman, 1989).
b) Factor rotation: The goal of the factor rotation is to ensure that all the variables have high loadings only on one factor. Orthogonal rotations, such as varimax and equimax, impose the restriction that the factors that they are not correlated with each other. For example, promax, allows the factors to be correlated with one another. Varimax is used to maximize the variance of each of the factors.
c) Calculation of factor scores: When calculating the factor scores, a decision needs to be made as to how many factors should be included. Although this is done by several methods, all the factors with Eigen values greater than one are chosen as the most

commonly used. This measure the total variation in the sample as accounted for by each factor. The final factor scores are calculated using a regression-based approach.

3.2 Identification of Neighborhood Types: Cluster Analysis

The first step in understanding poverty across multiple geographies is to identify the boundaries of these neighborhood types. One option would be to rely on the Census-defined TIGER scheme of urban-rural classification, based on population density. Areas with population density above 1,000 per square mile are defined as "urban" and the rest as rural (U.S. Census, 2000). This method does not allow for suburban or exurban categories, which are geographic entities with the greatest impact on the development process and on the Census-defined urban and rural categories (Andre, 2000; Maret and Dakan, 2003). Further, classifications using population density as the only criteria cannot reflect the complexity of an area's characteristics (Hathout, 2002).

This dissertation uses a Census tract level cluster model to classify neighborhood types based on demographic, residential, transportation, and economic and occupational indicators. The Census tracts included for the cluster analysis are those located within the metropolitan statistical areas defined by the U.S. Census Bureau. Similar models have been used in the past to delineate geographic types in California (Zhou, Xu, Radke and Mu, 2004). Their model was developed to classify the urban-rural continuum for a sample area in central California. Demographic, residential and spatial characteristic variables were used to identify the geographic types. The output map showed three major geographic categories, namely urban, suburban and rural.

The clustering technique selected for the classification purpose is more appropriate as it includes almost all the variables that define the characteristic features of the neighborhood types. Furthermore, the model allows for any future variable adjustments that might be needed for different regions and different economic and social conditions (Johnson and Wichern, 2001). This methodology is in line with Lawrence's statement that Areas with similar demographic characteristics have similar tastes, lifestyles, and consumer behavior. These behaviors can be measured and used for classification purposes (Lawrence, 2003).

3.2.1 Selection of Study Areas

The goal of understanding poverty causes across neighborhood types could be achieved by selecting study areas that exhibit the full range of the urban to rural continuum, while at the same time capturing a major portion of U.S population. As of 2009, 94% of the U.S. population lives in 366 metropolitan areas. Further, these areas are a collection of adjacent counties that have at least one urban core area of at least 50,000 population and an adjacent territory that has a high degree of social and economic integration, encompassing census defined rural and urban areas. Accordingly, the census tracts within the metropolitan areas of the Unites States are chosen for the study purpose. The total number of census tracts in the 48 continuous states plus Washington, D.C., is 52,652 which is more than 80% of the total metro and non-metro census tracts (total number of census tracts, 65,738)

3.2.2 Selection of Variables (Characteristics)

The most common variables used for regional planning usually include demography, residential, transportation, economic and occupational indicators as discussed in the literature chapter. Six variables are chosen as potential variables of neighborhood classification from these 5 indicators. Cluster analysis on these six variables would critically classify the census tracts in the metropolitan areas into several neighborhood categories. To avoid any misinterpretation of numbers due to varying tract sizes, the percentages of the same are adopted for this study. That is, the absolute numbers of the data for the variables are expressed in terms of percentages.

3.2.3 Cluster Analysis Procedure

Each metropolitan area is comprised of several smaller neighborhoods, represented in this research as Census tracts. Cluster analysis is used to identify relatively homogeneous groups of tracts based on several characteristics to form single clusters. By analyzing the characteristics of each census tract, the metropolitan areas are divided into various neighborhood categories. Tracts with the most similar characteristics are clustered together as a result of this quantitative multivariate analysis (Alan and Vladimir, 1998). A hierarchical distribution method involves nesting smaller clusters within larger clusters of less closely related tracts. This is the most commonly used clustering method (as compared to a non-hierarchical distribution method) (Alan, 1998). Non-hierarchical methods are based on non-overlapping groups without any hierarchical relationships. This method is less popular as the model needs a number of clusters as an input parameter that can yield poor results if the choice of this number is incorrect (Johnson and Wichern, 2001).

Agglomerative hierarchical method proceeds in stages producing a sequence of partitions. It begins with each observation as a cluster by itself and merges to the nearest neighbor in a multidimensional variable space (agglomerative method) based on Euclidean distance of Ward's method. This method involves an agglomerative clustering algorithm and uses an analysis of variance approach. At each step, a pair of observations or clusters is combined together based on the minimum Euclidean distance between the two groups. This method continues until no observations are left to merge. This method is more appropriate when the variables are quantitative in nature. There is no completely satisfactory method for determining the number of clusters (Everitt 1979; Hartigan 1985; Bock 1985). However Milligan and Cooper (1985) and Cooper and Milligan (1988) compared several methods and found the pseudo F statistic, pseudo t^2 statistic and the cubic clustering criterion (CCC) methods as best in estimating the number of clusters.

3.3 Multiple Regression Analysis

A series of regression analyses are carried out, one for each cluster type (neighborhood type) identified and one for the overall population combining all cluster groups. Poverty in a location is taken as a dependent variable depending on the poverty factors identified in the factor analysis. The regression model is built for each of the neighborhood types to compare the factors and their variability, if any.

Additionally, the interactions among the neighborhood types for each of the poverty factors explain the relative importance of poverty factors under various neighborhood settings.

The typical regression for each neighborhood type is as shown below:

$$P_n = B_{0n} + B_{1n} F_1 + B_{2n} F_2 + \ldots\ldots\ldots + B_{Kn} F_K + \varepsilon \qquad \text{A1}$$

Where,

n = Number of neighborhood types derived in cluster analysis

P_n = Poverty in neighborhood type n

$F_1, F_2, F_3, \ldots.., F_K$ = Poverty factors from factor analysis.

$B_0, B_1, B_2, \ldots.. B_K$ = Beta coefficients for the poverty factors.

ε = Error component (unexplained portion of poverty)

3.4 Hypothesis Testing: Chow Test

The Chow Test is a statistical and econometric test of whether the coefficients in two linear regressions on different data sets are equal (Dougherty, 2007). In poverty factor evaluations, the Chow Test is used to determine whether the combined effect of poverty factors have different impacts in models segregated by neighborhood type.

The residual sum of squares and degrees of freedom from the regressions for each neighborhood type and combined population are used to compute the chow test. The test result is compared to the F statistic to reject or fail to reject null hypothesis that the regression intercept and slope are both independent of the neighborhood type.

3.5 Comparison of Explanatory Factors across Neighborhood Types

The comparison of regression coefficients (explanatory factors) across neighborhood types is relevant to the present study and of interest to policy makers. Although the Chow Test gives an aggregate understanding of the difference in explanatory factors as a whole across models, the difference in the effect of these explanatory variables individually for each neighborhood type is not understood.

Turner and Martinez (1977) created a linear model to predict occupational attainment and compare the fitted regression coefficients across the two subsamples. A similar method is used for this study. However, Turner and Martinez used their model to compare the coefficients across two subgroups, while the present study compares regression coefficients among the neighborhood types resulting from cluster analysis to test the null hypothesis:

H_0: $B_{1n1} = B_{1n2} = B_{1n3} = \ldots B_{1n}$ (In other words, there is no difference in the regression coefficient on poverty factor "1" across the n neighborhood types)

$B_{1n1} =$ Beta coefficient for poverty factor 1 in neighborhood type 1

$B_{1n2} =$ Beta coefficient for poverty factor 1 in neighborhood type 2 and so on

A T-test is performed to test whether the beta coefficients across the regressions are statistically different from each other (McClendon, 1994). That is, this test answers the question of whether the poverty factors are statistically different across the neighborhood types.

CHAPTER IV

DATA ANALYSIS AND RESULTS

This chapter explains the results of each methodology presented in the previous chapter (cluster analysis, factor analysis, regressions and the diagnostic tests) to test the hypothesis regarding variability of poverty causes across the neighborhood types.

4.1 Cluster Analysis

Cluster analysis was conducted in order to group the heterogeneous metropolitan neighborhoods into homogeneous groups. The census tract is the smallest geographical unit for which most of the data needed for the study are available and has become an obvious choice for selection as a unit of analysis. The data used in this dissertation were from the 2005-2009 American Community Survey (ACS 2005-2009) released in 2010. A total of 52,652 (80% of the total U.S. census tracts) metropolitan tracts were considered for the study located within 48 continuous states and Washington D.C. However, about 13,664 (26%) tracts have either '0' population or missing values for at least one of the variables used either for the cluster or factor analyses leaving 38,988 tracts after exclusions.

The variables used for clustering analysis were – population density, median age structure built, percent detached single unit structures, percent farm occupations, percent dependent on public transportation and percent business addresses. The descriptive statistics for the cluster variables are in the table 4.1.

Table 4.1: Descriptive Statistics for Cluster Variables

Variable	N	Min	Max	Mean	Coefficient of Variance
Population density	38,988	0.49	216,653.68	7,054.29	195.17
Median age of the structures	38,988	7	73	45.51	37.21
% single housing units	38,988	0.00	100.00	57.21	48.36
% farm activities	38,988	0.00	56.62	0.47	421.16
% depend on public transport	38,988	0.00	89.03	7.40	182.05
% businesses	38,988	0.00	100.00	7.90	99.85

Population density in the study tracts ranges from as low as less than 0.5 persons per square mile to as high as over 216,653 persons per square mile with an average density of 7,054 persons per square mile. The median age of the structures built in the study year 2012 ranges from 7 to 73 years with an average age of 45 years. Farm occupations has highest coefficient of variance which is a measure of variability of standard deviation (standard deviation divided by mean) indicating high dispersion in farm occupation percentages around the mean.

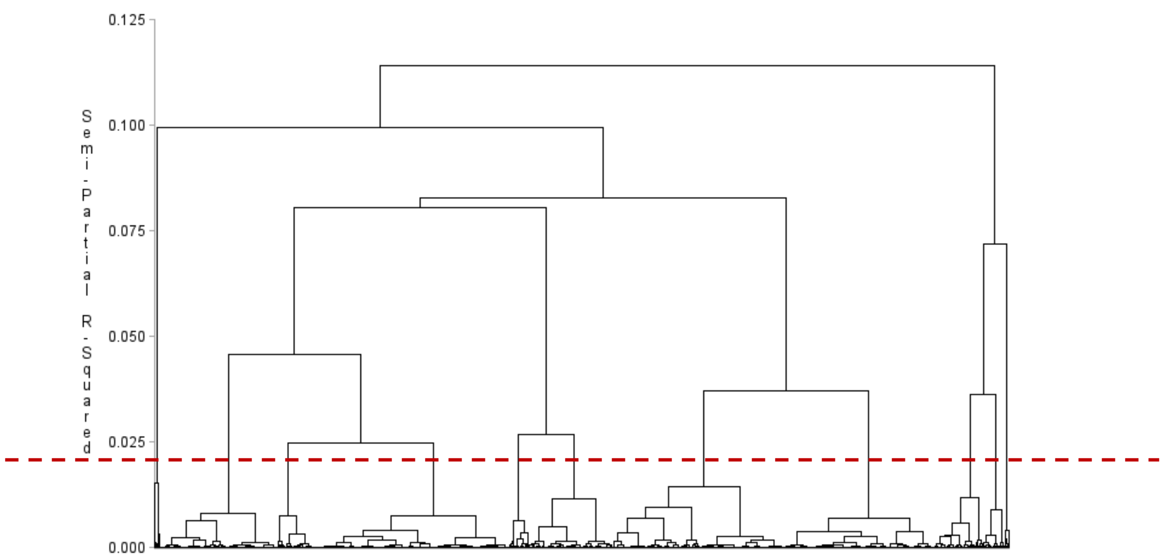
As the first step of the modeling, correlation coefficients were computed for the six variables used for cluster analysis to detect if the variables were highly correlated. Although the variable population density correlates significantly with the percent dependent on public transportation, both variables are retained, due to the importance of the two variables, making the choice of six variables to be appropriate to classify metropolitan tracts into distinct neighborhood types.

Table 4.2: Correlation Matrix for Cluster Variables

	Population density	Median age of the structures	% single housing units	% farm activities	% depend on public transport	% businesses
Population density	1.000	0.343	-0.489	-0.048	0.762	-0.050
Median age of the structures		1.000	-0.227	-0.043	0.410	0.101
% single housing units			1.000	0.035	-0.542	-0.217
% farm activities				1.000	-0.065	0.005
% depend on public transport					1.000	0.028
% businesses						1.000

Ward's agglomerative hierarchical clustering procedure is used to group the tracts of homogeneous nature where the criterion for choosing the pair of clusters to merge at each step is based on the optimal value to minimize the total within-cluster variance. At each step the pair of clusters with minimum cluster distance is merged. The error sums of squares (ESS) are computed to compare the individual observation to the cluster mean for each variable. When ESS for two observations is close, the observations indicate they are like units falling into one cluster. This linkage joins observations with small variances and produce clusters with similar variance. Similarity between two clusters is measured with ESS which is a measure of how each observation in a cluster differs from the centroid of the respective cluster. On the other hand, the total sum of squares (TSS) is computed comparing the individual observation in a cluster to the mean value of the variable in all clusters to interpret R^2. R^2 derived explains the heterogeneity of the cluster solution. The large value for R^2 means the clusters obtained at a given point differ largely indicating that the two observations or clusters cannot be combined to form one cluster. At each iteration, the observations or the clusters are combined based on Eigen value such that the error from the squares in the cluster is at minimum, which will maximize the R^2 value. This iteration continues until all the observations are combined into one single cluster as shown in the dendrogram. The tree dendrogram is shown in the illustration 4.1.

Figure 4.1: Tree Dendrogram for Cluster Classification



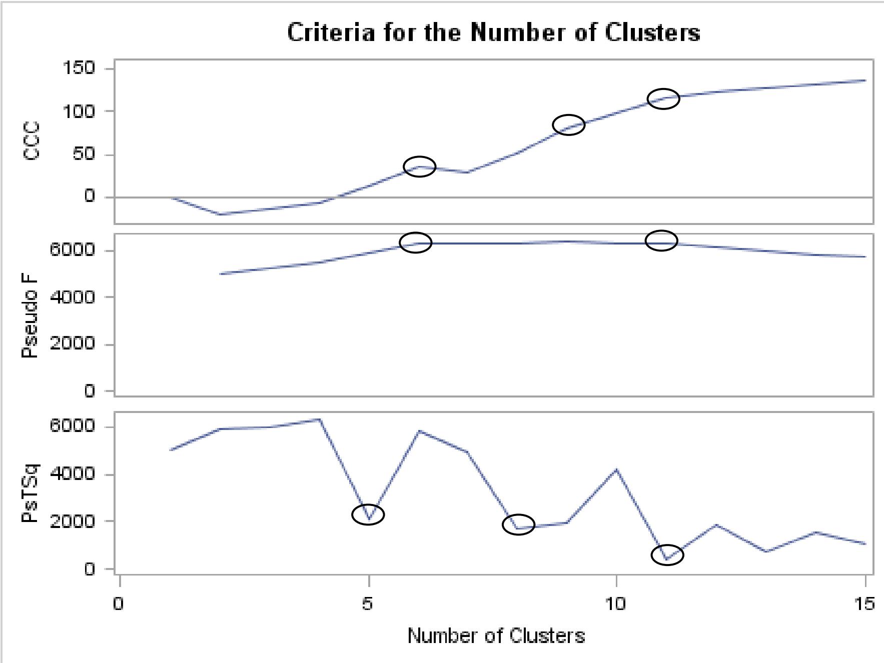
The dendrogram in figure 4.1 represents two dimensional inverted tree with the largest cluster at the top containing all the tracts. The heights of the clusters indicate the similarity of two clusters joined. The horizontal dotted line indicates the cut of the dendrogram where the number of clusters is yielded.

Three statistics are used to decide on the number of clusters, Sarle's cubic clustering criteria, Pseudo-F statistic, and Pseudo-T^2 statistic. Sarle's cubic clustering criterion (CCC) tests the null hypothesis that the data has been sampled from a uniform distribution. Positive CCC values indicate the sampling was from a uniform distribution and hence reject null hypothesis. The near and clear peaks in the CCC plot, 6, 9 or 11 are considered as possible solutions as the number of clusters. The Pseudo-F Statistic (PSF) measures the compactness of a cluster and gives an average value over all clusters. Large Pseudo-F statistic indicates compact cluster solution. In other words, peak values on the plot indicate well separated cluster solution. The large PSF values 6 and 11 (peaks) in the PSF plot in figure 4.2 are the possible solutions. If the pseudo-T^2 statistic value is large, then the two clusters being considered cannot be combined as the mean vectors for the two are regarded as different. The values, markedly smaller than the next values in the plot, are selected as the cluster solution. The potential solutions according to this criterion are 5, 8 and 11.

- According to the CCC criterion, values 6, 9 and 11 indicate potential number of clusters.
- The pseudo-F statistic indicates the peak values 6 and 11 as possible number of clusters.
- Pseudo-T^2 statistic in the plot indicates 5, 8 and 11 as potential number of clusters.

11clusters are considered after taking into account the three criteria to decide on the number of clusters. Mean values for each variable for 11 clusters are listed in the table 4.3.

Figure 4.2: CCC, Pseudo F and Pseudo square plots



peaks – 6, 9, **11**

peaks – 6, **11**

trough before a large peak – 5, 8, **11**

Table 4.3: Mean Values for Cluster Variables								
Cluster	N	% of MSA Tracts	Population density	Median age of the structures	% Single housing units	% Farm activities	% Depend on public transport	% Businesses
1	5,402	13.86%	4,401	30.3	37.8%	0.3%	4.7%	5.0%
2	8,956	22.97%	2,241	31.0	80.6%	0.2%	1.5%	4.6%
3	1,592	4.08%	3,024	40.6	69.2%	4.0%	2.8%	6.2%
4	3,830	9.82%	3,430	41.4	48.5%	0.2%	3.8%	18.2%
5	894	2.29%	3,344	48.3	46.7%	0.2%	7.3%	40.4%
6	7,766	19.92%	7,955	55.7	43.9%	0.2%	5.0%	7.2%
7	6,939	17.80%	4,669	58.9	78.4%	0.2%	5.4%	5.9%
8	2,237	5.74%	15,593	64.2	27.7%	0.1%	36.1%	8.0%
9	945	2.42%	59,386	64.2	6.4%	0.1%	58.5%	6.9%
10	204	0.52%	119,030	64.1	1.1%	0.1%	53.9%	6.5%
11	223	0.57%	3,521	39.7	61.9%	20.7%	2.9%	7.9%
All Metro	**38,988**	**100%**	**7,054**	**45.5**	**57.2%**	**0.5%**	**7.4%**	**7.9%**

Four types of neighborhood comprise 75% of the total tracts used for the study (29,063 census tracts from cluster types 1, 2, 6 and 7). The remaining 25% of the tracts are classified into seven more neighborhood types. About 23% of census tracts have population density of 2,241 which is 315% less than the national average of 7,054 and about 9% of the tracts have population densities over 220% more than the national average. 37% of the total housing stock in US has median age less than the national median age by 15 years and about 9% of the stock is old by 19 years than the national median age. While, an average of 57% of the total housing units is comprised of single families in U.S., about 50% of the census tracts have the average single families either higher than 75% or lower than 50%. The differences in demographic, housing, transportation, economic and occupational characteristics form the basis for the neighborhood classification. The summary characteristics of the 11 neighborhood groups clusters are listed in the Table 4.4.

Table 4.4: Neighborhood Description for 11 cluster groups

Cluster	Neighborhood Description
1	Low density new neighborhoods with low percentage of single family units
2	Least density new neighborhoods dominated by single family units
3	Low density neighborhoods with significant percentage of farm activities
4	Low density businesses dominated neighborhoods
5	Low density core business districts
6	Old neighborhoods with low percentage of single family units
7	Low density older neighborhoods dominated by single family units
8	Medium density old neighborhoods with high dependency on public transportation
9	High density old structures, and highest dependency on public transportation
10	Highest dense older neighborhoods with highest dependency on public transportation
11	Low density dominated largely by farm activities and single family units

The ‘percentage tracts included in study’ in tables 4.5 to 4.15 indicates the percentage of census tracts included in the study after excluding tracts with missing data or zero population. The ‘percentage of cluster tracts’ indicate the percentage of tracts in a given neighborhood type to the total tracts selected for the study. The spatial distributions of the 11 neighborhood types identified are shown in the maps provided in Appendix 28.

Table 4.5: Top 10 MSAs in Cluster 1 Neighborhoods
Low density new neighborhoods with low percentage of single family units

MSA	% Tracts Included in Study	% of Cluster Tracts
Hinesville-Fort Stewart, GA	81.8%	88.89%
Naples-Marco Island, FL	57.7%	56.67%
College Station-Bryan, TX	92.5%	51.35%
Jacksonville, NC	69.2%	50.00%
Myrtle Beach-North Myrtle Beach-Conway, SC	72.1%	48.39%
Sumter, SC	90.9%	45.00%
Greenville, NC	80.0%	45.00%
Florence, SC	97.7%	41.86%
Fargo, ND-MN	60.0%	41.67%
Ames, IA	50.0%	40.00%

About 13.9% of the total metropolitan tracts fall under cluster 1 neighborhoods. The neighborhoods are low density (38% lower than national average) new suburbs (33% lesser average median age than national average) with low percentage of single family units (34% lower than national average). The top 10 metropolitan areas that have large share of metropolitan tracts in this group are listed in the table 4.5. Hinesville-Fort Stewart, GA ranks top with about 89% of its census tracts under cluster 1. The spatial distribution of the neighborhoods within the metropolitan areas indicates that the neighborhoods have consistent presence throughout these smaller metropolitan areas. This neighborhood type has its presence in 320 out of the 358 metropolitan areas

included in the study indicating the presence of low density new neighborhoods in most of the metropolitan areas.

Table 4.6: Top 10 MSAs in Cluster 2 Neighborhoods Least density new neighborhoods dominated by single family units		
MSA	% Tracts Included in Study	% of Cluster Tracts
Coeur d'Alene, ID	23.8%	80.00%
Barnstable Town, MA	45.8%	68.18%
Winchester, VA-WV	57.1%	66.67%
St. George, UT	33.3%	66.67%
Punta Gorda, FL	65.2%	66.67%
Gainesville, GA	81.8%	61.11%
Carson City, NV	50.0%	60.00%
Bend, OR	42.9%	55.56%
Brownsville-Harlingen, TX	22.9%	52.63%
Pascagoula, MS	90.6%	51.72%

The highest share of metropolitan census tracts (23%) fall under cluster 2 neighborhoods. The neighborhoods in this group have least density (68% lower than national average) new suburbs (32% lesser average median age than national average) with high percentage of single family units (41% higher than national average). Additionally, these neighborhoods have least (80% lower than the national average) access to public transportation or not dependent on public transportation. The top 10 metropolitan areas that have large share of metropolitan tracts in this group are listed in the table 4.6. Coeur d'Alene, ID ranks top with about 80% of its census tracts under cluster 2. The spatial distribution of the neighborhoods in this group have similar pattern as that of cluster 1 neighborhoods. They range from inner ring suburbs to the outer ring suburbs. This neighborhood type has its presence in 352 out of the 358 metropolitan areas included in the study indicating very high presence of low density new neighborhoods dominated by single family households in most of the metropolitan areas.

Table 4.7: Top 10 MSAs in Cluster 3 Neighborhoods Low density neighborhoods with significant percentage of farm activities		
MSA	% Tracts Included in Study	% of Cluster Tracts
Idaho Falls, ID	23.1%	50.00%
El Centro, CA	55.2%	50.00%
Wenatchee-East Wenatchee, WA	40.0%	50.00%
Napa, CA	48.1%	46.15%
Longview, WA	39.1%	44.44%
Hanford-Corcoran, CA	80.8%	42.86%
Greeley, CO	32.4%	41.67%
Modesto, CA	74.2%	40.91%
Salem, OR	42.9%	40.74%
Jonesboro, AR	75.0%	40.00%

About 4.1% of the total metropolitan tracts fall under cluster 3 neighborhoods. The neighborhoods are low density (57% lower than national average) with low percentage of single family units (21% lower than national average). The neighborhoods are also characterized by a significant percentage (700% more than national average) of farm activities. The top 10 metropolitan areas that have the largest share of metropolitan tracts in this group are listed in the table 4.7. Idaho Falls, ID and El Centro, CA ranks top with about 50% of their census tracts under cluster 3. The spatial distribution of the neighborhoods in this cluster group indicates these neighborhoods are clear outer ring or exurban in nature. This neighborhood type has its presence in 328 out of the 358 metropolitan areas included in the study indicating high presence of low density new neighborhoods with significant farm activities in most of the metropolitan areas.

Table 4.8: Top 10 MSAs in Cluster 4 Neighborhoods Low density businesses dominated neighborhoods		
MSA	% Tracts Included in Study	% of Cluster Tracts
Flagstaff, AZ	33.3%	66.67%
Santa Fe, NM	20.0%	50.00%
Laredo, TX	25.0%	37.50%

Bend, OR	42.9%	33.33%
McAllen-Edinburg-Mission, TX	20.0%	31.25%
Myrtle Beach-North Myrtle Beach-Conway, SC	72.1%	29.03%
Fort Smith, AR-OK	59.6%	25.81%
Deltona-Daytona Beach-Ormond Beach, FL	74.3%	25.45%
Farmington, NM	34.8%	25.00%
Bowling Green, KY	72.7%	25.00%

About 9.8% of the total metropolitan tracts fall under cluster 4 neighborhoods. The neighborhoods are low density (51% lower than national average), low dependency on public transportation (49% lower than the national average) with high percentage of businesses (130% more than the national average). The top 10 metropolitan areas that have large share of metropolitan tracts in this group are listed in the table 4.8. Flagstaff, AZ ranks top with about 67% of its census tracts under cluster 4. The spatial distribution indicates these neighborhoods are the central cities of smaller metropolitan areas and suburban smaller cities of bigger metropolitan areas. This neighborhood type has its presence in 334 out of the 358 metropolitan areas included in the study indicates the presence of low density business dominated neighborhoods in most of the metropolitan areas.

Table 4.9: Top 10 MSAs in Cluster 5 Neighborhoods Low density core business districts		
MSA	% Tracts Included in Study	% of Cluster Tracts
Farmington, NM	34.8%	12.50%
Casper, WY	47.1%	12.50%
Laredo, TX	25.0%	12.50%
Missoula, MT	47.4%	11.11%
Wausau, WI	37.0%	10.00%
Corvallis, OR	52.6%	10.00%
Dubuque, IA	47.8%	9.09%
Tyler, TX	91.7%	9.09%
San Luis Obispo-Paso Robles, CA	52.3%	8.70%

Billings, MT	37.5%	8.33%

About 2.3% of the total metropolitan tracts fall under cluster 5 neighborhoods. The neighborhoods are low density (53% lower than national average) with very high percentage of businesses (411% higher than the national average). The top 10 metropolitan areas that have large share of metropolitan tracts in this group are listed in the table 4.9. Farmington, NM, Casper, WY and Laredo, TX ranks top with about 13% of their census tracts under cluster 5. The spatial distribution of these neighborhoods indicates they have similar patterns as that of the neighborhoods in cluster 4. They occupy central locations of smaller cities as well as the outer ring suburbs of the bigger metropolitan areas. This neighborhood type has its presence in 307 out of the 358 metropolitan areas included in the study indicating the presence of low density high business activity neighborhoods in most of the metropolitan areas. Their low percentages in the MSA areas but presence in most of the metropolitan areas indicate smaller sizes and smaller number of neighborhoods of this category as a common pattern most of the metropolitan areas.

Table 4.10: Top 10 MSAs in Cluster 6 Neighborhoods
Old neighborhoods with low percentage of single family units

MSA	% Tracts Included in Study	% of Cluster Tracts
Pittsfield, MA	53.7%	68.18%
Great Falls, MT	34.8%	62.50%
Worcester, MA	72.6%	62.18%
Providence-New Bedford-Fall River, RI-MA	74.8%	61.57%
Scranton--Wilkes-Barre, PA	57.1%	60.42%
Williamsport, PA	74.1%	60.00%
Lebanon, PA	58.6%	58.82%
Oshkosh-Neenah, WI	52.6%	55.00%
Allentown-Bethlehem-Easton, PA-NJ	77.3%	53.97%
Harrisburg-Carlisle, PA	82.0%	53.85%

Neighborhoods in this group have the second largest (20%) share of metropolitan tracts. These neighborhoods have population densities (13% higher than the national average) close to national average with low percentage of single family units (23% lower than the national average). The top 10 metropolitan areas that have large share of metropolitan tracts in this group are listed in the table 4.10. Pittsfield, MA ranks top with about 68% of its census tracts under cluster 6. The spatial distribution of these neighborhoods indicates these neighborhoods are located in the inner ring suburbs of the metropolitan areas unlike the neighborhood types 1-3. This neighborhood type has its presence in 298 out of the 358 metropolitan areas included in the study indicating the presence of low density older neighborhoods a common neighborhood type in most of the inner ring suburbs of the metropolitan areas.

Table 4.11: Top 10 MSAs in Cluster 7 Neighborhoods
Low density older neighborhoods dominated by single family units

MSA	% Tracts Included in Study	% of Cluster Tracts
Altoona, PA	55.9%	68.42%
Weirton-Steubenville, WV-OH	59.0%	65.22%
Danville, IL	68.0%	58.82%
Youngstown-Warren-Boardman, OH-PA	71.4%	55.00%
Johnstown, PA	58.3%	53.57%
Canton-Massillon, OH	78.2%	50.00%
Decatur, IL	86.1%	48.39%
Huntington-Ashland, WV-KY-OH	53.3%	47.50%
Saginaw-Saginaw Township North, MI	83.9%	46.81%
Battle Creek, MI	70.0%	46.43%

About 17.8% of the total metropolitan tracts fall under cluster 7 neighborhoods. The neighborhoods are low density (34% lower than national average) older suburbs (29% older than national average) with high percentage of single family units (37% higher than the national average). The top 10 metropolitan areas that have a large share of

metropolitan tracts in this group are listed in the table 4.11. Altoona, PA ranks top with about 68% of its census tracts under cluster 7. The spatial distribution of these neighborhoods indicates they are the adjacent locations to the central locations of the cities and the business districts. However, this neighborhood type has its presence in less number (88 out of the 358) of metropolitan areas included in the study indicating not many metropolitan areas have older neighborhoods dominated by single family households.

Table 4.12: Top 10 MSAs in Cluster 8 Neighborhoods
Medium dense old neighborhoods with high dependency on public transportation

MSA	% Tracts Included in Study	% of Cluster Tracts
New York-Northern New Jersey-Long Island, NY-NJ-PA	75.3%	22.81%
Washington-Arlington-Alexandria, DC-VA-MD-WV	82.5%	22.67%
Boston-Cambridge-Quincy, MA-NH	75.5%	21.51%
Chicago-Naperville-Joliet, IL-IN-WI	68.8%	19.33%
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	81.4%	15.36%
Pittsburgh, PA	72.0%	14.07%
San Francisco-Oakland-Fremont, CA	80.3%	13.96%
Atlantic City-Hammonton, NJ	86.0%	12.24%
Baltimore-Towson, MD	82.5%	10.67%
Trenton-Ewing, NJ	93.2%	10.29%

5.7% of the metropolitan census tracts fall under cluster 8 neighborhoods. These neighborhoods are characterized with high population densities (121% higher than the national average), low percentage of single family units (52% lower than the national average), very low dependency on farm activities (80% lower than the national average) and very high dependency on public transportation (388% higher than the national average). These neighborhoods are also older compared to the national average median age (41% older than the national average). The top 10 metropolitan areas that have large share of metropolitan tracts in this group are listed in the table 4.12. New York-Northern New Jersey-Long Island, NY-NJ-PA ranks top with about 23% of its census tracts under cluster 8. The spatial distribution of these neighborhoods indicates they are the central cities of bigger metropolitan areas. However, this neighborhood type has its presence only in 9 out of the 358 metropolitan areas. This indicates that the neighborhoods with medium densities and high dependency on public transportation are highly unique.

Table 4.13: Top 5 MSAs in Cluster 9 Neighborhoods
Highest density with old structures and high dependency on public transportation

MSA	% Tracts Included in Study	% of Cluster Tracts
New York-Northern New Jersey-Long Island, NY-NJ-PA	75.3%	5.49%
San Francisco-Oakland-Fremont, CA	80.3%	0.86%
Boston-Cambridge-Quincy, MA-NH	75.5%	0.58%
Los Angeles-Long Beach-Santa Ana, CA	76.0%	0.35%
Chicago-Naperville-Joliet, IL-IN-WI	68.8%	0.21%

2.4% of the metropolitan census tracts fall under cluster 9 neighborhoods. These neighborhoods are characterized with very high population densities (742% higher than the national average), very low percentage of single family units (89% lower than the national average), very low dependency on farm activities (80% lower than the national average) and very high dependency on public transportation (691% higher than the national average). These neighborhoods are also older compared to the national average median age (41% older than the national average). The top 10 metropolitan areas that have large share of metropolitan tracts in this group are listed in the table 4.13. New York-Northern New Jersey-Long Island, NY-NJ-PA ranks top with about 6% of its census tracts under cluster 9. The spatial distribution of these neighborhoods indicates they are the adjacent locations to the neighborhood types in cluster 8. They are located in the central cities of five bigger metropolitan areas. Their presence in just 5 out of the 358 metropolitan areas indicates these neighborhoods highly unique and stands out clearly in terms of their densities. The very low percentages indicate very small number of neighborhoods in the five metropolitan areas.

Table 4.14: Top 10 MSAs in Cluster 10 Neighborhoods High density old structures, and highest dependency on public transportation		
MSA	% Tracts Included in Study	% of Cluster Tracts
New York-Northern New Jersey-Long Island, NY-NJ-PA	75.3%	25.70%
San Francisco-Oakland-Fremont, CA	80.3%	2.59%
Los Angeles-Long Beach-Santa Ana, CA	76.0%	1.60%
Boston-Cambridge-Quincy, MA-NH	75.5%	1.45%
Chicago-Naperville-Joliet, IL-IN-WI	68.8%	1.06%
Washington-Arlington-Alexandria, DC-VA-MD-WV	82.5%	0.48%
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	81.4%	0.25%
Pittsburgh, PA	72.0%	0.19%
Minneapolis-St. Paul-Bloomington, MN-WI	77.5%	0.17%

About 0.5% of the total metropolitan tracts fall under cluster 10 neighborhoods. These neighborhoods are characterized with highest population densities (1587% higher than the national average), very low percentage of single family units (98% lower than the national average), very low dependency on farm activities (80% lower than the national average) and very high dependency on public transportation (628% higher than the national average). These neighborhoods are also older compared to the national average median age (41% older than the national average). All neighborhoods under this category are located in only five metropolitan areas listed in the table 4.14. New York-Northern New Jersey-Long Island, NY-NJ-PA ranks top with about 26% of its census tracts under cluster 10. Similar to the neighborhoods in cluster 8 and 9, the spatial distribution of the neighborhoods indicates they are the central locations of the big cities. However,

this neighborhood type has its presence in a large number of metropolitan areas, 227 out of the 358 metropolitan areas included in the study indicating most of the metropolitan areas have high density older neighborhoods with high dependency on public transportation.

Table 4.15: Top 10 MSAs in Cluster 11 Neighborhoods Low density dominated largely by farm activities and single family units		
MSA	% Tracts Included in Study	% of Cluster Tracts
Yakima, WA	52.9%	55.56%
Madera-Chowchilla, CA	63.2%	50.00%
Visalia-Porterville, CA	46.1%	48.57%
Wenatchee-East Wenatchee, WA	40.0%	37.50%
Merced, CA	83.0%	35.90%
Hanford-Corcoran, CA	80.8%	33.33%
Salinas, CA	66.3%	23.64%
Kennewick-Pasco-Richland, WA	59.5%	22.73%
Bakersfield, CA	65.7%	18.48%
Napa, CA	48.1%	15.38%

0.6% of the metropolitan census tracts fall under cluster 11 neighborhoods. These neighborhoods are low density (50% lower than the national average) with very high farm activity (4040% higher than the national average). The top 10 metropolitan areas that have a large share of metropolitan tracts in this group are listed in the table 4.15. Yakima, WA ranks top with about 56% of its census tracts under cluster 11. The spatial distribution of the neighborhoods in this cluster group indicates the neighborhoods are located in the outer rings and exurban locations of the smaller metropolitan areas. This neighborhood type has its presence in 62 out of the 358 metropolitan areas included in the study indicating low presence of farm activities dominated low density neighborhoods.

4.2 Factor Analysis

A number of theories linking to poverty suggested several causes of poverty and are explained with a great number of variables. While many of these variables correlate with each other, a few basic variables and propositions central to understanding the causes of poverty need to be determined. Factor analysis can manage several of these variables and resolve them into distinct patterns of occurrence on the basis of 'common factor' analysis.

Descriptives for the variables used in factor analysis are listed in the table 4.16,

Table 4.16: Descriptive Statistics for Variables use in Factor Analysis

Variable description	N	Min	Max	Mean	Coefficient of Variation
Change in manufacturing employment between the years 2000 and 2005-2009	38,988	-88.6%	34.5%	-2.6%	-190.4%
Percent no school enrollment for children aged between 5 to 17	38,988	0.0%	100.0%	3.6%	132.3%
Percent no school enrollment for children aged between 5 to 19	38,988	0.0%	100.0%	7.1%	91.4%
Percent less than high school education for 25+ aged population	38,988	0.0%	83.2%	16.7%	74.3%
Percent with high school education for 25+ aged population	38,988	0.0%	67.0%	28.7%	36.5%
Percent highly (minimum BA) educated for 25+ aged population	38,988	0.2%	94.1%	27.5%	66.3%
Percent working population taking more than 40 minutes to reach work place	38,988	0.0%	84.9%	18.8%	68.0%
Percent population not lived in the same house a year back	38,988	0.0%	89.2%	16.3%	57.8%
Percent net migration who have less than high school education	38,988	0.0%	100.0%	15.0%	93.2%
Percent net migration who have more than BA education	38,988	0.0%	100.0%	13.8%	82.9%
Percent net migration who earn less than 150 times the poverty threshold	38,988	0.0%	96.4%	18.9%	67.8%
Ratio of Black to White employment	38,988	0.0%	13.1%	1.0%	22.9%
Ratio of Black to White incomes	38,988	0.0%	19.0%	0.8%	77.6%

Ratio of female to male employment	38,988	0.0%	4.3%	0.8%	25.9%
Ratio of female to male incomes	38,988	0.0%	3.3%	1.0%	9.4%
Percent those aged 65 plus and living alone	38,988	0.0%	100.0%	29.5%	51.9%
Percent family size of 5 or more	38,988	0.0%	68.9%	10.2%	70.4%
Percent single parent households	38,988	0.0%	100.0%	31.1%	54.5%
Percent unmarried teen births	38,988	0.0%	100.0%	0.9%	321.6%
Percent those who paid at least 35% of their income towards rent	38,988	0.0%	91.6%	15.5%	76.4%
Percent housing units with at least 1.51 occupancy per room	38,988	0.0%	53.7%	1.0%	242.8%
Ratio of percent public assistance received to poverty rate	38,988	0.0%	20.0%	0.3%	156.1%

The negative sign for 'change in manufacturing employment' indicate the percentage of manufacturing jobs lost between the years 2000 and 2005-2009. The expected relationship with poverty rate is positive with an exception of seven variables (percent highly (minimum BA) educated for 25+ aged population, percent net migration who have more than BA education, ratio of Black to White employment, ratio of Black to White incomes, ratio of female to male employment and ratio of female to male incomes and Ratio of percent public assistance received to poverty rate) and unknown for one variable (Percent population not lived in the same house a year back). The gender and racial discrimination variables are measured as a ratio of disadvantaged group to the advantaged. Therefore lower the value for these variables expects higher poverty rate. The high coefficient of variance (over 100%) for five variables (Change in manufacturing employment between the years 2000 and 2005-2009, Percent no school enrollment for children aged between 5 to 17, Percent unmarried teen births, Percent housing units with at least 1.51 occupancy per room and Ratio of percent public assistance received to poverty rate) indicate high dispersion among the variables across the census tracts.

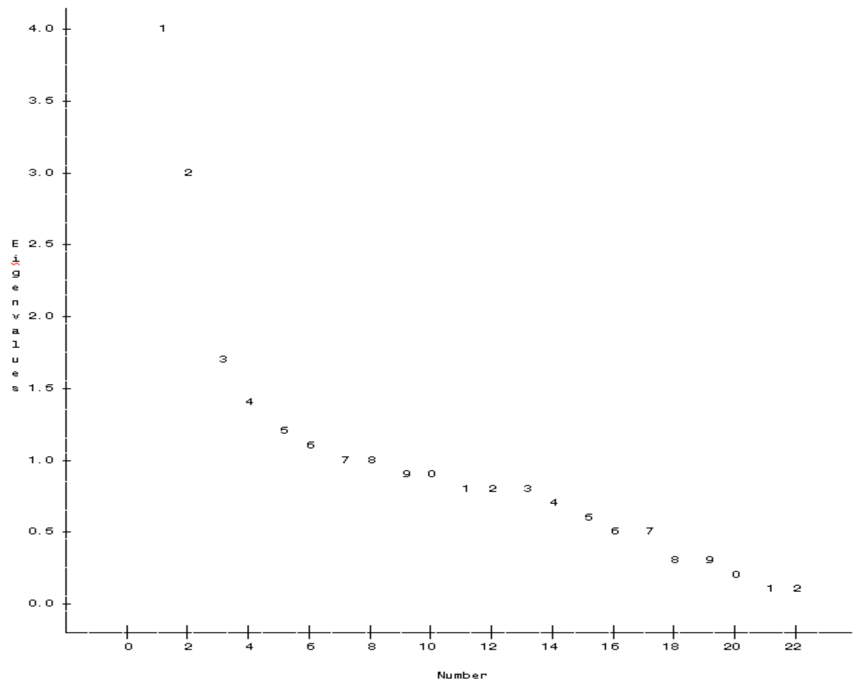
Factor analysis procedure starts with the initial factoring method (iterated principal component method) that is used for analysis, specifying rotation method (varimax rotation method) to ensure that each variable is highly loaded on only one factor representing a distinct construct for each factor. A scree plot of the eigen values shows the construct. Factor analysis combines correlated variables into a single factor. In principal component analysis, after one factor has been extracted, other factors are extracted that have minimal variability and maximal variability across the factors. These factors extracted are uncorrelated or orthogonal to each other. The standardized variance associated with a particular factor, also called as Eigen value, is used to decide on the number of factors. According to the minimum Eigen rule (Kaiser, 1960), the Eigen value greater-than-one is used to determine the number of factors. Each factor is a linear combination of variables (in a regression sense, where the total factor score is the dependent variable and the poverty variables are the independent variables). SAS software is used to run the factor analysis. Eigen values of the correlation matrix are listed in the table 4.17. Seven factors are retained with a condition of Eigen values greater than 1.

Table 4.17: Eigen values of the Correlation Matrix for Factor Variables

	Eigen value	Difference	Proportion	Cumulative
1	4.03	1.08	0.18	0.18
2	2.96	1.26	0.13	0.32
3	1.7	0.28	0.08	0.39
4	1.42	0.24	0.06	0.46
5	1.17	0.08	0.05	0.51
6	1.09	0.07	0.05	0.56
7	1.02	0.04	0.05	0.61
8	0.98	0.03	0.04	0.65
9	0.95	0.02	0.04	0.7
10	0.92	0.08	0.04	0.74

11	0.84	0.01	0.04	0.78
12	0.83	0.04	0.04	0.81
13	0.79	0.05	0.04	0.85
14	0.74	0.17	0.03	0.88
15	0.57	0.07	0.03	0.91
16	0.49	0.03	0.02	0.93
17	0.47	0.15	0.02	0.95
18	0.31	0.04	0.01	0.97
19	0.27	0.03	0.01	0.98
20	0.24	0.11	0.01	0.99
21	0.13	0.05	0.01	1
22	0.08		0	1

Figure 4.3: Scree Plot of Eigen Values



The factor loading for a variable is based on it's correlation with the factor to which it is combined. The square of the loadings indicate the amount of variance shared by the poverty variable and the factor to which it is combined. The scree plot 4.3 shows the cumulative proportions of the variances. The number of factors above the 'elbow' is taken as the factor solution, which is above the eigen value of 1.0.

The varimax rotation pattern maximizes the loading of variables on only one factor and significantly lower loadings on the other factors to make factor interpretation easier. This is shown in the table 4.18.

Table 4.18: Rotated Factor Pattern

	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7
Percent population not lived in the same house a year back	0.88	-0.01	0.24	-0.08	0.09	-0.02	-0.04
Percent net migration who earn less than 150 times the poverty threshold	0.87	-0.06	0.17	-0.07	0.07	-0.03	-0.03
Percent net migration who have less than high school education	0.72	0.08	-0.07	0.03	0.06	0.01	0.08
Percent net migration who have more than BA education	0.54	-0.18	0.28	0.03	0.05	0.01	-0.05
Percent working population taking more than 40 minutes to reach work place	-0.41	-0.16	0.17	0.37	-0.03	0.1	0.2
Percent with high school education for 25+ aged population	-0.12	0.86	0.04	-0.16	0.13	0.05	0
Change in manufacturing employment	-0.01	-0.25	0.02	-0.1	0.04	0.03	-0.04
Percent highly (minimum BA) educated for 25+ aged population	0.01	-0.9	-0.2	-0.18	-0.16	-0.06	0.03
Percent those who paid at least 35% of their income towards rent	0.38	0.09	0.73	0.26	0.04	-0.02	-0.05
Percent single parent households	0.18	0.44	0.69	0.11	0.09	0	0.07
Percent those aged 65 plus and living alone	0.15	-0.03	0.61	-0.39	0.04	-0.09	-0.15
Ratio of female to male incomes	0	0.02	0.52	0.13	0.1	0.1	0.08
Percent family size of 5 or more	-0.1	0.29	-0.13	0.77	-0.01	0.07	0.05
Percent housing units with at least 1.51 occupancy per room	0.02	0	0.3	0.73	0.02	0.01	-0.11
Percent less than high school education for 25+ aged population	0.07	0.53	0.39	0.57	0.13	0.02	-0.09
Percent no school enrollment for children aged between 5 to 17	0.03	-0.02	0.03	-0	0.91	0.02	-0.04
Percent no school enrollment for children aged between 5 to 19	0.15	0.13	0.11	0.03	0.89	-0	-0.03
Percent unmarried teen births	0.07	0.18	0.12	0.02	0.22	-0.11	0.09

Ratio of Black to White employment	-0.01	-0.06	-0.04	-0.1	-0.03	0.81	-0.07
Ratio of Black to White incomes	-0.02	0.06	0.09	0.2	-0	0.66	0.07
Ratio of percent public assistance received to poverty rate	-0.01	-0.01	-0.16	0.15	0.03	0.01	0.76
Ratio of female to male employment	-0.05	0.11	0.23	-0.27	-0.06	-0.02	0.58

Factor 1 represents poverty due to mobility disadvantages. The variables, percent population not lived in the same house a year back (loading of 0.88) and percent net migration who earn less than 150 times the poverty threshold (loading of 0.87) have very high and almost equal loadings on the factor. The other three variables, percent net migration who have less than high school education (loading of 0.72), percent net migration who have more than BA education (loading of 0.54) and percent working population taking more than 40 minutes to reach the work place (negative loading of 0.41 indicate that the factor is loaded with short commutes), also have considerably high loadings on the factor. The three highly loaded variables on mobility indicate poverty due to factor 1 is due to poor and low educated in-migrants and mobility disadvantages.

Factor 2 represents poverty due high levels of high-school education and low levels of highly educated and negative changes in manufacturing employment. The high loadings for this factor comes from Percent with high school education for 25+ aged population (loading of 0.86) and Percent highly (minimum BA) educated for 25+ aged population (negative loading of 0.9 indicate that the factor is loaded with low percentage of highly educated). Change in manufacturing employment (loading of -0.25) indicate a considerable share of the factor represents loss of manufacturing jobs. The three variables on skills of the working population indicate that the poverty due to factor 2 is due to low levels of highly educated and high levels of high-school educated working population.

Factor 3 represents poverty due to high cost of living and disadvantaged households. This factor combines 4 variables; percent those who paid at least 35% of their income towards rent (loading of 0.73), percent single parent households (loading of 0.69), percent those aged 65 plus and living alone (loading of 0.61) and ratio of female to male incomes (loading of 0.52). The three variables with high loadings indicate that the factor represents poverty due to high cost of living and due to disadvantaged households.

Factor 4 represents poverty due to overcrowding and high school drop-outs. This factor represents 3 variables; percent family size of 5 or more (loading of 0.77), percent housing units with at least 1.51 occupancy per room (0.73) and percent less than high school education for 25+ aged population (0.57). The high loadings from the variables indicate poverty due to factor 4 is primarily due to overcrowding and high school drop-outs in the working population.

Factor 5 represents poverty due to uneducated teenage population and teenage pregnancies. This factor combines 3 variables; percent no school enrollment for children aged between 5 to 17 (loading of 0.91), percent no school enrollment for children aged between 5 to 19 (loading of 0.89) and percent unmarried teen births (loading of 0.22). The high loadings from the two variables, percent no school enrollment for children aged between 5 and 17 and percent no school enrollment for children aged between 5 and 19 indicate the factor represents no school-going teenage population. The positive loading from the variable teenage pregnancies could be partly explained due to the low education levels of population aged under-19.

Factor 6 represents poverty due to racial discrimination. This factor combines 2 variables; ratio of Black to White employment (loading of 0.81) and ratio of Black to White incomes (loading of 0.66). The combined variables indicate poverty due to factor 6 is due to racial discrimination due to differences in employment and earnings between Blacks and White working population.

Factor 7 represents poverty due to poor distribution of public assistance and gender discrimination. This factor combines 2 variables; ratio of percent public assistance received to poverty rate (loading of 0.76) and ratio of female to male employment (loading of 0.58). The combined variables indicate poverty due to factor 7 is due to poor distribution of public assistance and gender discrimination in employment. The summary characteristics of the 7 poverty factors are listed in the table 4.19.

Table 4.19: Description of Poverty Factors Yielded in Factor Analysis

Factor	Description	Expected Relationship to Poverty Rate
1	Poverty due to low educated, low income in-migrants and due to mobility disadvantages	+
2	Poverty due to high levels of high-school-only educated and low levels of highly educated working population	+
3	Poverty due to high cost of living and disadvantaged households	+
4	Poverty due to overcrowding and high school drop-outs in the working population	+
5	Poverty due to no-schooling teenage population and teenage pregnancies	+
6	Poverty due to racial discrimination in employment and earnings	-
7	Poverty due to poor distribution of public assistance and gender discrimination	-

The negative relationship between the factors 6 and 7 is due the reason that these factors pool variables that measure ratio of disadvantaged group to the advantaged. In other words, if there is discrimination between the groups, the value for the variables will be low (away from 100 and towards 0) indicating lower values representing higher discrimination. That is, the lower values for factor 6 and 7 expects higher poverty rate.

4.3 Regressions

In order to evaluate the yielded factors of poverty across the different neighborhood types that resulted from cluster analysis, 11 regressions were built, one for each neighborhood type. This quantifies the relationship between the neighborhood poverty rate and the seven poverty factors for each of the 11 neighborhood types separately. Poverty in a neighborhood type is taken as a dependent variable which is explained by the seven poverty factors (independent variables). The summary of 11 regressions built are listed in the table 4.20 with their corresponding Adjusted R-square, significance values (p), and the respective beta coefficients for the poverty factors.

Table 4.20: Summary of Regressions

Cluster	N	R-Sq	1. Low educated, low income in-migrants 2. Mobility disadvantages	1. High levels of high-school-only educated 2. Low levels of highly educated	1. High cost of living 2. Disadvantaged households	1. Overcrowding 2. High school drop-outs	1. No-schooling teenage population 2. Teenage pregnancies	1. Racial discrimination	1. Poor distribution of public assistance 2. Gender discrimination
Low density new neighborhoods low percentage of	5,402	0.55	3.68	4.55	6.99	2.95	0.82	-1.21	-1.57

single family units									
Least density new neighborhoods dominated by single family units	8,956	0.55	2.53	3.20	5.32	2.30	1.21	-0.46	-0.68
Low density neighborhoods significant percentage of farm activities	1,592	0.67	3.64	6.12	7.65	2.44	1.67	-0.46	-1.12
Low density neighborhoods businesses dominated	3,830	0.61	4.27	4.92	7.44	2.17	1.49	-0.74	-1.41
Low density neighborhoods core business districts	894	0.56	4.02	5.43	6.42	2.33	1.70	-1.16	-2.28
Old neighborhoods low percentage of single family units	7,766	0.58	5.58	4.91	7.8	1.73	1.29	-0.59	-1.53
Low density older neighborhoods dominated by single family units	6,939	0.67	4.82	4.51	7.85	2.63	1.7	-0.55	-0.88
Medium density old neighborhoods High dependency	2,237	0.64	5.20	6.12	7.20	2.02	1.42	-0.89	-1.46

on public transportation.									
High density old structures Highest dependency on public transportation.	945	0.56	4.52	6.12	8.32	0.60	1.71	-0.06*	-1.13
High density old structures, and highest dependency on public transportation	204	0.71	2.91	6.68	5.96	1.52	1.32	-0.35*	-1.32*
Low density single family neighborhoods, dominated largely by farm activities	223	0.61	2.85	9.61	9.86	2.14	1.23*	-0.62*	-1.67
* p value (significance) > 0.05									

The size of the beta coefficients in the table explains the size of the effect that the factor has on poverty in a particular neighborhood type. In other words, the beta coefficient of a particular factor, say F_i, tells how much the poverty is expected to increase when that factor, F_i, increases by one unit, holding all the other six factors constant. R-square explains the variation in poverty that is accounted by the seven poverty factors which were used as independent variables to estimate poverty. The significance level tells the confidence level of the model. However, racial discrimination is not statically significant in three of the 11 regressions. Also no-schooling teenagers and teenage pregnancies and poor distribution of public assistance are also not statistically significant in two and one regressions respectively indicating the relations might have occurred by chance. The very low (<0.001) significance values for other variables indicate that the effects of the poverty factors on poverty did not happen by chance. Although the R-square values for the regressions fall above the acceptable range (55% being the least and 71% the highest), the marginal percentages indicates that the omitted poverty variables for factor analysis due to non-availability of data are costing the fitness of the model. In other words, the seven poverty factors derived from the factor analysis are not explaining the total variation in poverty indicating other poverty factors need to be included for better fitness.

The two factors, racial discrimination and poor distribution of public assistance and gender discrimination have negative signs. A negative beta coefficient indicates that the factors are negatively correlated with poverty. Since the smaller values for the variables indicate higher poverty, the negative relationship evident in the model is obvious. In other words, the beta coefficient tells how much the poverty is expected to decrease when the factors increase (decrease in discrimination) by a unit holding all other factors constant.

For the convenience of comparison across the poverty factors and neighborhood types, the standardized coefficients are listed in the illustration 4.4 with blue color indicating positive effect of a factor on poverty in a particular neighborhood type and red color for negative effect.

The illustration in figure 4.4 shows the relative importance of within cluster poverty factors. The seven poverty factors, listed with the actual causes, are on the horizontal axis and the 11 neighborhood types, listed with the neighborhood characteristics on the vertical axis. The value and the depth of the shade in the cell indicate the impact level of a particular poverty factor in the corresponding neighborhood type. Factor 3 occupies most important share of poverty cause in almost all the clusters other than in neighborhood type 10, highest density older neighborhoods with highest dependency on public transportation, where factor 2 is more important than factor 3. Factor wise discussion for the 11 neighborhood types is listed below.

The poverty factors derived from the factor analysis combine both variables that originate from empirical literature and a theoretical basis. Factor 1 variables, 'percent population not lived in the same house a year back' (Skeldon, 2003), 'percent net migration who have more than BA education' (Waldinger, 1996) and 'percent working population taking more than 40 minutes to reach work place' (Raphael and Stoll, 2010) come from empirical research. The two variables 'percent net migration who earn less than 150 times the poverty threshold' and 'percent net migration who have less than high school education' come from theoretical base.

The three variables that are grouped under factor 2, 'percent high school graduates of the working population aged 25+' (Kasarda, 1993), 'percent bachelor degrees of the working population aged 25+' (Zilak, 2007) and 'change in manufacturing employment between the years 2000 and 2005-2009' (Kneebone, Nadeau and Berube, 2011) have empirical support from the past literature.

Factor 3 has three variables coming from empirical research, 'percent single parent households' (Wilson and Neckerman, 1985) 'percent those aged 65 plus and living alone' (Wilson and Neckerman, 1985) and 'ratio of female to male incomes' (Wilson and Neckerman, 1985) and one variable from theoretical base, 'percent those who paid at least 35% of their income towards rent'.

The factor 4 poverty variables, 'percent housing units with at least 1.51 occupancy per room' (Clark, Deuloo, and Dieleman, 2000) and 'percent less than high school education for 25+ aged population' (Zilak, 2007) have empirical evidence and the variable 'percent family size of 5 or more' come from theoretical base.

The three variables grouped under factor 5, 'percent no school enrollment for children aged between 5 to 17' (O'Neill, 1990), 'percent no school enrollment for children aged between 5 to 19' (Smith and Welch, 1989) and 'percent unmarried teen births' (Wilson and Neckerman, 1985) have empirical evidence in past poverty research.

The variables 'ratio of Black to White employment' (Turner, Fix and Struyk, 1991) under factor 6 and 'ratio of female to male employment' (Turner, Fix and Struyk, 1991) under factor 7 come from past empirical research and the variables 'ratio of Black to White incomes' of factor 6 and 'ratio of percent public assistance received to poverty rate' of factor 7 originate from theoretical base.

4.4 Discussion

For the factors comprised exclusively of variables established in the empirical literature, factors 2, 3, and 5, discussions of causality are appropriate. The theoretical foundation has been established, and the variables were demonstrated to be significant in previous empirical work. These factors are the combination of variables previously established as having a causal relationship to poverty. Their significance here would further the body of evidence supporting their role in the prevalence of poverty.

For factors that are comprised of variables from both the empirical and theoretical literature, factors 1, 4, 6, and 7, discussion of causality would be premature. In addition to variables established in the empirical literature, these factors contain variables not previously tested to be a significant cause of poverty. Since the resulting factors are a combination of the tested and untested input variables, assigning causality to the input variables would be inappropriate, even where the factor itself is significant. Significance of the factor cannot be attributed to the component variables.

Figure 4.4: Relative Importance of Poverty Factors Across the Neighborhood Types

		1. Low educated, low income in-migrants 2. Mobility disadvantages	1. High levels of high-school-only educated 2. Low levels of highly educated	1. High cost of living 2. Disadvantaged households	1. Overcrowding 2. High school drop-outs	1. No-schooling teenage population 2. Teenage pregnancies	1. Racial discrimination	1. Poor distribution of public assistance 2. Gender discrimination
1	Low density new neighborhoods with low percentage of single family units	0.35	0.36	0.54	0.19	0.07	-0.09	-0.11
2	Least density new neighborhoods dominated by single family units	0.27	0.41	0.47	0.24	0.12	-0.06	-0.12
3	Low density neighborhoods with significant percentage of farm activities	0.26	0.35	0.58	0.25	0.14	-0.04	-0.09
4	Low density businesses dominated neighborhoods	0.36	0.37	0.52	0.17	0.14	-0.06	-0.10
5	Low density core business districts	0.36	0.37	0.49	0.16	0.22	-0.08	-0.17
6	Old neighborhoods with low percentage of single family units	0.44	0.39	0.53	0.16	0.11	-0.05	-0.10
7	Low density older neighborhoods dominated by single family units	0.32	0.39	0.51	0.19	0.13	-0.05	-0.07
8	Medium density old neighborhoods with high dependency on public transportation	0.35	0.48	0.49	0.13	0.10	-0.07	-0.12
9	High density old structures, and highest dependency on public transportation	0.27	0.46	0.63	0.06	0.11	-0.01	-0.08
10	Highest dense older neighborhoods with highest dependency on public transportation	0.17	0.56	0.42	0.17	0.09	-0.02	-0.07
11	Low density dominated largely by farm activities and single family units	0.21	0.43	0.72	0.27	0.08	-0.07	-0.11

It is of note, however, that none of the factors included in the regression are comprised entirely of variables sourced from the theoretical literature. Thus, there is a basis for causality in all factors included in this dissertation.

The ANOVA tables are provided in the appendix A.3 for each neighborhood type separately. The summary standardized parameter estimates for the poverty factors are listed in the figure 4.4. Blue color indicates positive relation with the poverty rate and red indicates negative relation. The depth of the color indicates the level of effect of that particular factor has on overall poverty in a neighborhood type. Factor wise discussion is as follows:

Factor 1 – The poverty variables 'percent population not lived in the same house a year back', 'percent net migration who earn less than 150 times the poverty threshold', 'percent net migration who have less than high school education', 'percent net migration who have more than BA education' and 'percent working population taking more than 40 minutes to reach work place' have high degree of association with older neighborhoods with medium densities, low-density new neighborhoods and low-density business areas.

This factor has mixed effects on age of structures and density patterns. However, it has highest impact in the older neighborhoods with low single families and medium density locations with high dependency on public transportation. Poverty in older neighborhoods is explained as migration effect. That is, when rich move out of these older neighborhoods leaving the poor behind, the places become natural destinations for the low-income families because of the falling rents (Skeldon, 2003; Wilson, 1996). Supplementing to the distressed conditions, the new migrants compete with long-term residents of the area in winning the local jobs (Waldinger, 1996). Poverty in low density new suburbs can be explained with the mobility disadvantages. People in these neighborhoods don’t have easy access to the jobs due to poor transportation facilities and many times depend on the nearby low paying jobs. This is also partly due to ‘no information’ due to their spatial isolation (Kain 1968 and Kasarda 1985).

Factor 2 – The poverty variables 'percent with high school education for 25+ aged population', 'change in manufacturing employment' and 'percent highly (minimum BA) educated for 25+ aged population' have the highest influence among the high density older neighborhoods.

The top three neighborhood types in which this factor has its highest influence are all high density older neighborhoods with high dependency on public transportation. The old cities, once dependent heavily on manufacturing jobs faced severe turmoil due to the structural shifts. This affected the neighborhoods with high number of high-school-only educated working population who were not able to accept the shift in terms of skills needs to enter the growing jobs in service industries (Cohen and Zysman, 1987). The significantly large coefficients in low density neighborhoods can also be explained by the high percentage of high-school only educated working population who possess low job skills restricting their job change (Kasarda, 1993).

Factor 3 – The poverty variables 'percent those who paid at least 35% of their income towards rent', 'percent single parent households', 'percent those aged 65 plus and living alone' and 'ratio of female to male incomes' have highest impact on neighborhoods dominated by farm activities and older neighborhoods with high population density.

Families that are financially troubled, spending a large portion of their incomes towards rent and disadvantaged households are considered most important poverty causes compared to any other in almost all the neighborhood types with an exception of highest density older neighborhoods with highest dependency on public transportation. The findings in these neighborhoods are in line with the past research on disadvantaged families that the neighborhoods with large number of families with more elderly people and single parent families have higher rates of poverty (Wilson and Neckerman, 1985). The non availability of transportation facilities, high cost of access to the basic services (Dreier, 2004) and little choice on affordable housing explain the factor for its highest presence in low density neighborhoods dominated by farm occupations and with low dependency on public transportation (Stoll and Raphael, 2010).

Factor 4 – The poverty variables 'percent family size of 5 or more', 'percent housing units with at least 1.51 occupancy per room', 'percent less than high school education for 25+ aged population' are high in low density neighborhoods with dominated farm activities

This poverty factor has its highest loadings coming from ‘large family sizes’ and ‘overcrowding’ variables. Although large family sizes may not push a family into poverty, it ‘deepens and prolongs poverty’ and contribute to ‘multi-generational poverty’ (Wilson and Neckerman, 1985). The findings for the large family sizes and overcrowding in low density neighborhoods with dominated farm activities comply with the past research. The factor is also loaded with low educated working population indicating low education levels of the working population making them difficult to enter high paying jobs in the service industries

Factor 5 – The poverty variables 'percent no school enrollment for children aged between 5 to 17', 'percent no school enrollment for children aged between 5 to 19' and 'percent unmarried teen births' are a major poverty contributor in core business districts.

This is an interesting finding, that the teenage pregnancies are high in core business districts contributing significantly to the local poverty. Most of the teenage pregnancies could be unintentional. Part of this can be attributed to the lack of basic literacy and sex-education among the teenage population. This factor has least presence in low density new suburbs with low percentage of single families and low density neighborhoods with dominated farm activities. This indicate the possible absence of low education levels of the teenage population and teenage pregnancies in these neighborhoods.

Factor 6 – The poverty variables 'ratio of Black to White employment' and 'ratio of Black to White incomes' have least influence on poverty

Racial discrimination is measured as the ratio of Black employment and incomes to that of White. Values significantly lower than 1 for the two variables indicate higher discrimination. In other words, as the values for the variables decreased, the poverty in a place increased and hence the negative signs for the factors. The absolute coefficient values indicate the influence level on neighborhood poverty. Racial discrimination has least influence compared to any other poverty factor in creating poverty. However, the high and highest density old neighborhoods with high dependency on public transportation have poverty partly explained by racial discrimination. No significant evidence was found that racial discrimination can cause poverty in a location.

Factor 7 – The poverty variables 'ratio of percent public assistance received to poverty rate' and 'ratio of female to male employment' have high degree of presence in low density core business districts

Gender discrimination and poor distribution of public assistance to the people living in poverty are measured in ratios. The lower the ratios indicate higher poverty in a neighborhood and hence the negative sign for the coefficients in the table. This factor has similar influence across the different neighborhood types. However, it has slightly higher influence among the high density older neighborhoods and low density older neighborhoods dominated by single family households. No significant evidence was found that poor distribution of public assistance and gender discrimination can cause poverty in a location.

4.5 Chow Tests

This is an application of an F-test in which the sum of squared errors (SSE) for each of the 11 regressions and one for all the groups together in one regression are measured to test whether the groups stand out from the combined pool or not. The coefficients of one neighborhood type (group) are tested with the coefficients of other neighborhood types (groups). These groups, in the present context, the neighborhood types are the break points in a data. The problem is posed as a partitioning of the data into 11 parts of different sizes. The null hypothesis to be tested is

$H_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = \beta_9 = \beta_{10} = \beta_{11} = \beta$

Where β_n is the respective parameter estimates each of the 11 clusters

The data are sorted by neighborhood type and the breakpoints we have from cluster analysis are 5402, 4358, 15950, 19780, 20674, 28440, 35379, 37616, 38561 and 38765. In other words, the cluster type changes at these observation numbers corresponding to the 11 neighborhood types chosen from the preceding analysis. A total of 12 regressions are carried out on the 11 neighborhood types and the 12^{th} on all the neighborhood types together.

Table 4.21: Ordinary Least Squares Estimates			
SSE	2,219,022.9	DFE	38,980
MSE	56.92722	Root MSE	7.54501
SBC	268,300.39	AIC	268,231.82
MAE	5.4678104	AICC	268,231.82
MAPE	69.38394	Regress R-Square	0.6349
Durbin-Watson	1.4848	Total R-Square	0.6349

The table 4.21 displays the results of overall regression that includes all cluster neighborhood types. R-square value of 0.6349 implies that all the factors together explain more than 63% of the variation in poverty rate.

Table 4.22: Structural Change Test					
Test	Break Point	Num DF	Den DF	F Value	Pr > F
Chow	5,403	8	38972	37.99	<.0001

Chow	14,359	8	38972	110.94	<.0001
Chow	15,951	8	38972	94.03	<.0001
Chow	19,781	8	38972	92.26	<.0001
Chow	20,675	8	38972	93.60	<.0001
Chow	28,441	8	38972	64.57	<.0001
Chow	35,380	8	38972	55.05	<.0001
Chow	37,617	8	38972	18.78	<.0001
Chow	38,565	8	38972	9.37	<.0001
Chow	38,766	8	38972	9.74	<.0001

F-test indicates whether the residual sum of squares for the overall regression is less than that of when 11 different regressions are built. The high F values, exceeding the critical F value at a 0.05 significance level indicate we reject the null hypothesis that the beta coefficients are same for all the groups. In other words, we reject the assumption that there is no difference among the different neighborhood types. The Chow test is highly significant for the break points, 14,359, 15,951, 19,781 and 20,675, which correspond to the neighborhood types 1-2, 2-3, 3-4 and 4-5. The other break points are significant too with the corresponding F values concluding that there is an overall agreement about the neighborhood types that there is a significant difference among them.

4.6 Tukey's Post-hoc Test

Once the differences among the neighborhood types are asserted using the Chow test, the poverty factors and the neighborhood types are put to 'Tukey's post-hoc test' to evaluate factor wise differences across the 11 neighborhood types. Tukey's multiple comparisons test for pairwise differences is used to identify factor wise differences across the neighborhood types. In other words, each of the 7 poverty factors is tested against a pair of neighborhood types to identify any differences in the mean of the poverty factor that may exist.

Figure 4.5: Summary of Tukey's Post-hoc Test Results

		Low dense new neighborhoods with low number of single family units	Least dense new neighborhoods dominated by single family units	Low dense neighborhoods with significant number of farm activities	Low dense businesses dominated neighborhoods	Low dense core business districts	Old neighborhoods with low number of single family units	Low dense older neighborhoods dominated by single family units	Medium dense old neighborhoods with high dependency on public transportation	High dense old structures, and highest dependency on public transportation	Low dense older neighborhoods dominated by single family units	Low dense dominated largely by farm activities and single family units
		A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
Low dense new neighborhoods with low number of single family units	**1**			**Factor 4**				**Factor 4 Factor 5 Factor 6 Factor 7**			**Factor 4**	
Least dense new neighborhoods dominated by single family units	**2**									**Factor 3**	**Factor 3**	
Low dense neighborhoods with significant number of farm activities	**3**				**Factor 5 Factor 6 Factor 7**	**Factor 1 Factor 3**	**Factor 1**	**Factor 2 Factor 4**			**Factor 1 Factor 4**	
Low dense businesses dominated neighborhoods	**4**							**Factor 3**			**Factor 4**	
Low dense core business districts	**5**						**Factor 1 Factor 5**	**Factor 1**	**Factor 4 Factor 6 Factor 7**	**Factor 4**	**Factor 1 Factor 4 Factor 5 Factor 6 Factor 7**	**Factor 4**
Old neighborhoods with low number of single family units	**6**									**Factor 4**	**Factor 1 Factor 4**	**Factor 4**
Low dense older neighborhoods dominated by single family units	**7**										**Factor 4**	
Medium dense old neighborhoods with high dependency on public transportation	**8**									**Factor 1 Factor 2 Factor 5 Factor 6 Factor 7**	**Factor 5 Factor 6 Factor 7**	**Factor 1 Factor 2 Factor 4**
High dense old structures, and highest dependency on public transportation	**9**										**Factor 1 Factor 3 Factor 4 Factor 5 Factor 6 Factor 7**	**Factor 1 Factor 2 Factor 4**
Low dense older neighborhoods dominated by single family units	**10**											**Factor 4 Factor 5 Factor 6 Factor 7**
Low dense dominated largely by farm activities and single family units	**11**											

The summary matrix (figure 4.5) indicates the poverty factors that have similar effects in the respective neighborhood pairs. For example, the cell C-1 indicates that poverty factor 4, ‘Overcrowding and high school drop-outs’, has similar effects in the pair of neighborhoods, 1 and C, ‘Low dense new neighborhoods with low percentage of single family units’ and ‘Low dense core business districts’. G-1 indicates that poverty factor 4 - 'Overcrowding and high school drop-outs', factor 5 - 'Uneducated younger generation and teenage pregnancies', factor 6 - 'Racial discrimination' and factor 7 - 'Poor distribution of public assistance and gender discrimination' have similar effects in the pair of neighborhoods, 1 and G, ‘Low dense new neighborhoods with low percentage of single family units’ and ‘Old neighborhoods with low percentage of single family units’. For every pair with no factors listed in the cells indicate no coefficients that are statistically equal. So the null hypothesis that the betas are the same is rejected in each case.

Mobility and spatial mismatch have different effects on 44 (80%) pairs of neighborhood types of the total 55 possible pairs. Low education and low job skills have different effects on 51 (93%) pairs of neighborhood types of the total 55 possible pairs. High cost of living and disadvantaged households have different effects on 50 (91%) pairs of neighborhood types. Overcrowding and high school drop-outs have different effects on 38 (69%) pairs of neighborhood types of the total 55 possible pairs. The last three poverty factors, uneducated teenagers and teenage pregnancies, racial discrimination and poor distribution of public assistance and gender discrimination have different effects on 47 (85%) pairs of neighborhood types of the total 55 possible pairs.

The evidence provided by the 'Tukey's post-hoc test' indicate the poverty factors have high differences among the different neighborhood types and hence reject the null hypothesis that the poverty factors have similar effects in different neighborhood types. In other words, the explanations of poverty do have differences across the neighborhood types.

CHAPTER V

CONCLUSIONS AND POLICY IMPLICATIONS

The prime objective of the dissertation in investigating the poverty causes in different types of neighborhoods is to advance past poverty research in the context of heterogeneous neighborhood types. The consistency in differences in poverty causes across the neighborhood types can help evolve a location specific anti-poverty policy. This approach can help local governing bodies spend their limited resources in the most optimal way.

The cluster analysis method used for neighborhood classification exposed the presence of highly heterogeneous neighborhood types within the metropolitan areas. The differences in neighborhood characteristics help gain better understanding of the key strengths and problems of the neighborhoods. While few neighborhoods have very unusual population densities, few have extremely low densities. Few neighborhoods have predominantly old structures with very high dependency on public transportation. Few neighborhoods are very strong in business activities and few in farm activities. Few neighborhoods have exceedingly high single families. The robust nature of the findings and their statistical significance underscores the importance of neighborhood classification in tailoring neighborhood specific policies and programs.

A new approach was developed to group the several poverty causes to a manageable number of poverty factors without losing any of the available explanations. The variable reduction from 21 poverty causes to seven poverty factors suggests the fuzzy boundaries among the different causes of poverty. The factors resulted are uncorrelated and represent different dimensions of poverty that are tested across the different neighborhood types.

In order to evaluate the causes of poverty across the different neighborhood types, regressions were built with the poverty rate as the dependent variable and the seven poverty factors as the explanatory variables. This provided more detailed insight into the differences in poverty causes across the 11 neighborhood types. The standardized coefficients shed light on the relative importance of one poverty factor over the other in a particular neighborhood type. The certainty and accuracy of the statistical methods were asserted with the help of chow test. Tukey's post-hoc test underscored the differences in poverty factors for two neighborhood types taken at a time.

High cost of living, single parenting, aged population living alone and the gender discrimination are consistently the most important poverty causes across the neighborhood types with an exception of densely populated older neighborhoods with highest dependency on public transportation. Structural shifts in jobs from manufacturing to service industries occupied the second most important cause of poverty. Spatial mismatch and migration issues play important role in low density new neighborhoods.

Teenage pregnancies and no school going children are one of the most important poverty concerns in the older neighborhoods with highest population density. Racial discrimination has almost no effect on poverty creation. Poor distribution of public assistance and gender discrimination in employment has high impact in the highest dense older neighborhoods compared to the other types.

Policy makers tend to formulate policies and plan programs addressing all the causes of poverty or at times the most important causes of poverty that were evident in national studies with equal importance irrespective of neighborhood type. For example, large family sizes, overcrowding and high-school drop outs are one of the alarming concerns in neighborhoods dominated by business activities and farm occupations while these causes rank least in older neighborhoods with high dependency on public transportation. However, if the variation in these concerns is not understood by the policy makers, they may tend to allocate resources in all the neighborhoods equally. This dissertation urges the policy makers respond to location-specific needs to reduce poverty.

The key findings of this dissertation are,

- Using advanced statistical methods, 11 different types of neighborhoods were discovered. Six neighborhoods of the 11 have low population densities but contrasting business activities, farm occupations, median age of the structures and percentages of single families. The other five neighborhoods range from medium to very high population densities with differences in dependency on public transportation and median age of the structures.

- The long list of poverty causes were effectively condensed to seven non-correlated poverty factors using factor analysis model. The main themes of the seven factors derived are spatial mismatch and mobility, low educational levels and job skills, high living costs and disadvantages households, overcrowding and high school drop-outs, uneducated young adults and teenage pregnancies, racial discrimination and poor distribution of public assistance and gender discrimination.
- The poverty variables 'percent population not lived in the same house a year back', 'percent net migration who earn less than 150 times the poverty threshold', 'percent net migration who have less than high school education', 'percent net migration who have more than BA education' and 'percent working population taking more than 40 minutes to reach work place' have high degree of association with older neighborhoods with medium densities, low-density new neighborhoods and low-density business areas.
- The poverty variables 'percent with high school education for 25+ aged population', 'change in manufacturing employment' and 'percent highly (minimum BA) educated for 25+ aged population' have highest influence among the high density older neighborhoods.
- The poverty variables 'percent those who paid at least 35% of their income towards rent', 'percent single parent households', 'percent those aged 65 plus and living alone' and 'ratio of female to male incomes' have highest impact on neighborhoods dominated by farm activities and older neighborhoods with high population density.

- The poverty variables 'percent family size of 5 or more', 'percent housing units with at least 1.51 occupancy per room', 'percent less than high school education for 25+ aged population' are high in low density neighborhoods with dominated farm activities
- The poverty variables 'percent no school enrollment for children aged between 5 to 17', 'percent no school enrollment for children aged between 5 to 19' and 'percent unmarried teen births' are a major poverty contributor in core business districts.
- The poverty variables 'ratio of Black to White employment' and 'ratio of Black to White incomes' have least influence on poverty
- The poverty variables 'ratio of percent public assistance received to poverty rate' and 'ratio of female to male employment' have high degree of presence in low density core business districts.

As with any large research undertaking, several considerations for future research have arisen during the course of the research. The cluster analysis procedure used in this dissertation, the seven input variables were given equal weightage, and thus assumed to have equal importance in classifying neighborhoods. This assumption could be explored in future research. For the cluster and factor analysis, it is worth noting that omission of a few variables due to the non-availability of data at census tract level might have produced results different than what could have been if all data were available.

Specifically, for the factor analysis, the non-availability of variables that represent endogenous growth (venture capital and federal and state spending per capita), quality of labor force (science and engineering graduates), living conditions (crime rate and population covered by health insurance) etc. may have dropped the overall fitness of the regression models (R-square value for the 11 neighborhoods range from 0.55 to 0.71). Future research might explore suitable proxies for these unavailable data.

A final point for consideration is that while the neighborhood types derived from the cluster analysis are an acceptable representation of "neighborhoods", they are not administrative boundaries. Although the classification purpose was primarily to expose the heterogeneous nature of the urban geographies within the metropolitan areas, connecting the neighborhood clusters derived in this dissertation to the existing administrative boundaries would add further value to the poverty research.

Despite of these limitations, the research described herein provides detailed and robust empirical evidence that the causes of poverty do vary by neighborhood type. Further, the evidence suggests specific ways in which this occurs across neighborhoods, yielding a poverty policy pathway to be further explored.

APPENDIX

A1. Poverty variables included in Factor Analysis		
Poverty Measures	Included in Cluster Analysis	Reason
Employment change by manufacturing industry	YES	NA
Employment change in service industries	NO	Highly correlated
Venture capital	NO	No tract level data
Federal and state spending per capita	NO	No tract level data
School enrollment rate	YES	NA
Percentage high-school graduates	YES	NA
Percentage bachelor and master's degrees	YES	NA
Percentage professional degrees	YES	NA
Percentage doctoral degree	YES	NA
Percentage Science and Engineering graduates	NO	No tract level data
Average distance travel to work place	NO	Highly correlated
Time taken to reach work place	YES	NA
Average expenditure for travel	NO	Highly correlated
Net migration of the working-age population	YES	NA
Percentage net immigrants with undergraduate degree	YES	NA
Percentage net immigrants with graduate degree	YES	NA
Net migration of people with above average local household income	YES	NA
Employment status of new immigrants	NO	No tract level data
Employment rate for African-Americans/ Employment rate for Whites.	YES	NA
Average earnings for African-Americans/ Average earnings for the Whites.	YES	NA
African-American employment in high tech/ Whites employment in high tech.	YES	NA
Employment rate for females/ Employment rate for males.	YES	NA
Average earnings for females/ Average earnings for males.	YES	NA

Female employment in high tech/Male employment in high tech.	YES	NA
Female-headed households	NO	Highly correlated
Single-parent households	YES	NA
Dependency rate	NO	Highly correlated
Percent teenage mothers	YES	NA
Family size	YES	NA
Median age	NO	Highly correlated
Percentage 65 and older and living alone	YES	NA
Percent TANF recipients	NO	No tract level data
Percent food stamps recipients	NO	No tract level data
Percent Medicaid recipients	NO	No tract level data
Occupancy rate per room	YES	NA
Rental share in total income	YES	NA
Crime rate per 1000 population	NO	No tract level data
Percentage population covered by health insurance	NO	No tract level data

A2. Neighborhood Characteristics included in Cluster Analysis

	Potential Measure	Data Source
1	Population density	2005-2009 ACS data
2	Housing type Median age of housing	2005-2009 ACS data 2005-2009 ACS data
3	Percent population dépendent on public transportation	2005-2009 ACS data
4	Percentage population involved in farm activities Percent businesses compared to the residential.	2005-2009 ACS data HUD Aggregated USPS Administrative Data

A3: ANOVA and Parameter Estimates – Cluster 1

Low dense new neighborhoods with low percentage of single family units

ANOVA Table					
	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	421859	60266	955.26	<.0001
R-Square	- 0.5535		Adj R-Sq -	0.5529	

Parameter Estimates						
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Variance Inflation
Intercept	1	14.3417	0.11881	120.71	<.0001	0
Factor1	1	3.68144	0.09772	37.67	<.0001	1.04682
Factor2	1	4.54452	0.11683	38.9	<.0001	1.05063
Factor3	1	6.98911	0.11885	58.81	<.0001	1.02407
Factor4	1	2.94538	0.13924	21.15	<.0001	1.01967
Factor5	1	0.8213	0.10546	7.79	<.0001	1.00235
Factor6	1	-1.20795	0.12864	-9.39	<.0001	1.00492
Factor7	1	-1.56689	0.13049	-12.01	<.0001	1.00805

The p-value of the F-test indicates that the model is statistically significant, that is, the differences in means for the poverty factors are real and did not occur by chance. The null hypothesis that the means for the poverty factors are equal is rejected based on the high F value. R-square value of 0.5529 indicates that approximately 55% of the variability for the dependent variable, '**below_pov**' is explained by the seven poverty factors. The parameter estimates for the poverty factors indicate the amount of change one could expect in poverty rate given a one-unit change in the value of that poverty factor, given that all other poverty factors in the model are held constant.

A.4: ANOVA and Parameter Estimates – Cluster 2 Least dense new neighborhoods dominated by single family units					
ANOVA Table					
	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	212225	30318	1559.1	<.0001
R-Square -	0.5495		Adj R-Sq -	0.5491	
Parameter Estimates					

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Variance Inflation
Intercept	1	13.28719	0.0849	156.5	<.0001	0
Factor1	1	2.53057	0.06997	36.17	<.0001	1.08073
Factor2	1	3.20274	0.05704	56.15	<.0001	1.06856
Factor3	1	5.3208	0.08623	61.7	<.0001	1.13535
Factor4	1	2.29761	0.0713	32.22	<.0001	1.11885
Factor5	1	1.20598	0.06958	17.33	<.0001	1.0176
Factor6	1	-0.45829	0.05495	-8.34	<.0001	1.00726
Factor7	1	-0.68362	0.04454	-15.35	<.0001	1.1331

The p-value of the F-test indicates that the model is statistically significant, that is, the differences in means for the poverty factors are real and did not occur by chance. The null hypothesis that the means for the poverty factors are equal is rejected based on the high F value. R-square value of 0.5491 indicates that approximately 55% of the variability for the dependent variable, '**below_pov**' is explained by the seven poverty factors. The parameter estimates for the poverty factors indicate the amount of change one could expect in poverty rate given a one-unit change in the value of that poverty factor, given that all other poverty factors in the model are held constant.

A.5: ANOVA and Parameter Estimates – Cluster 3 Low dense neighborhoods with significant percentage of farm activities					
ANOVA Table					
	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	150864	21552	471.33	<.0001
R-Square -		0.6756	Adj R-Sq -		0.6742

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Variance Inflation
Intercept	1	15.4199	0.23241	66.35	<.0001	0
Factor1	1	3.64214	0.20923	17.41	<.0001	1.06747
Factor2	1	6.11776	0.25252	24.23	<.0001	1.0373
Factor3	1	7.65141	0.19361	39.52	<.0001	1.03605

Factor4	1	2.44017	0.1444	16.9	<.0001	1.09824
Factor5	1	1.67163	0.17807	9.39	<.0001	1.03122
Factor6	1	-0.456	0.15852	-2.88	0.0041	1.02103
Factor7	1	-1.11787	0.18975	-5.89	<.0001	1.01865

The p-value of the F-test indicates that the model is statistically significant, that is, the differences in means for the poverty factors are real and did not occur by chance. The null hypothesis that the means for the poverty factors are equal is rejected based on the high F value. R-square value of 0.6742 indicates that approximately 67% of the variability for the dependent variable, '**below_pov**' is explained by the seven poverty factors. The parameter estimates for the poverty factors indicate the amount of change one could expect in poverty rate given a one-unit change in the value of that poverty factor, given that all other poverty factors in the model are held constant.

A.6: ANOVA and Parameter Estimates – Cluster 4
Low dense businesses dominated neighborhoods

ANOVA Table

	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	378026	54004	860.43	<.0001
R-Square -		0.6118	Adj R-Sq -		0.6111

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Variance Inflation
Intercept	1	14.02654	0.14325	97.92	<.0001	0
Factor1	1	4.26948	0.12112	35.25	<.0001	1.00247
Factor2	1	4.92128	0.13426	36.66	<.0001	1.00996
Factor3	1	7.43964	0.14412	51.62	<.0001	1.01052
Factor4	1	2.17226	0.13014	16.69	<.0001	1.02507
Factor5	1	1.48453	0.10917	13.6	<.0001	1.00164
Factor6	1	-0.74077	0.12158	-6.09	<.0001	1.00254
Factor7	1	-1.41197	0.14412	-9.8	<.0001	1.00869

The p-value of the F-test indicates that the model is statistically significant, that is, the differences in means for the poverty factors are real and did not occur by chance. The null hypothesis that the means for the poverty factors are equal is rejected based on the high F value. R-square value of 0.6111 indicates that approximately 61% of the variability for the dependent variable, '**below_pov'** is explained by the seven poverty factors. The parameter estimates for the poverty factors indicate the amount of change one could expect in poverty rate given a one-unit change in the value of that poverty factor, given that all other poverty factors in the model are held constant.

A.7: ANOVA and Parameter Estimates – Cluster 5
Low dense core business districts

ANOVA Table

	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	125916	17988	161.69	<.0001
R-Square -		0.5609	Adj R-Sq -		0.5574

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Variance Inflation
Intercept	1	15.59673	0.40904	38.13	<.0001	0
Factor1	1	4.02226	0.2515	15.99	<.0001	1.04798
Factor2	1	5.42505	0.32684	16.6	<.0001	1.02829
Factor3	1	6.41879	0.30765	20.86	<.0001	1.09751
Factor4	1	2.33328	0.33584	6.95	<.0001	1.10959
Factor5	1	1.69644	0.17811	9.52	<.0001	1.06223
Factor6	1	-1.16239	0.31561	-3.68	0.0002	1.01481
Factor7	1	-2.28015	0.29811	-7.65	<.0001	1.02782

The p-value of the F-test indicates that the model is statistically significant, that is, the differences in means for the poverty factors are real and did not occur by chance. The null hypothesis that the means for the poverty factors are equal is rejected based on the high F value. R-square value of 0.5574 indicates that approximately 56% of the variability for the dependent variable, '**below_pov'** is explained by the seven poverty factors. The parameter estimates for the poverty factors indicate the amount of change one could expect in poverty rate given a one-unit change in the value of that poverty factor, given that all other poverty factors in the model are held constant.

A.8: ANOVA and Parameter Estimates – Cluster 6 Old neighborhoods with low percentage of single family units					
ANOVA Table					
	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	720719	102960	1531.5	<.0001
R-Square -		0.5802	Adj R-Sq -		0.5798

Parameter Estimates						
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Variance Inflation
Intercept	1	14.23704	0.10515	135.39	<.0001	0
Factor1	1	5.578	0.09492	58.77	<.0001	1.02345
Factor2	1	4.91197	0.09326	52.67	<.0001	1.03826
Factor3	1	7.80062	0.10827	72.05	<.0001	1.01542
Factor4	1	1.72531	0.08017	21.52	<.0001	1.01656
Factor5	1	1.29332	0.08602	15.03	<.0001	1.00643
Factor6	1	-0.58453	0.08844	-6.61	<.0001	1.00365
Factor7	1	-1.52945	0.11277	-13.56	<.0001	1.02881

The p-value of the F-test indicates that the model is statistically significant, that is, the differences in means for the poverty factors are real and did not occur by chance. The null hypothesis that the means for the poverty factors are equal is rejected based on the high F value. R-square value of 0.5798 indicates that approximately 58% of the variability for the dependent variable, '**below_pov'** is explained by the seven poverty factors. The parameter estimates for the poverty factors indicate the amount of change one could expect in poverty rate given a one-unit change in the value of that poverty factor, given that all other poverty factors in the model are held constant.

A.9: ANOVA and Parameter Estimates – Cluster 7 Low dense older neighborhoods dominated by single family units					
ANOVA Table					
	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	689512	98502	1973.6	<.0001
R-Square -		0.6659	Adj R-Sq -		0.6656

Parameter Estimates						
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Variance Inflation
Intercept	1	16.3625	0.09425	173.61	<.0001	0
Factor1	1	4.82356	0.10709	45.04	<.0001	1.04786
Factor2	1	4.50743	0.08394	53.7	<.0001	1.08777
Factor3	1	7.84689	0.11009	71.28	<.0001	1.081
Factor4	1	2.6298	0.09855	26.68	<.0001	1.03288
Factor5	1	1.70001	0.09334	18.21	<.0001	1.00292
Factor6	1	-0.54898	0.0837	-6.56	<.0001	1.00237
Factor7	1	-0.87613	0.08243	-10.63	<.0001	1.01023

The p-value of the F-test indicates that the model is statistically significant, that is, the differences in means for the poverty factors are real and did not occur by chance. The null hypothesis that the means for the poverty factors are equal is rejected based on the high F value. R-square value of 0.6656 indicates that approximately 67% of the variability for the dependent variable, '**below_pov**' is explained by the seven poverty factors. The parameter estimates for the poverty factors indicate the amount of change one could expect in poverty rate given a one-unit change in the value of that poverty factor, given that all other poverty factors in the model are held constant.

A.10: ANOVA and Parameter Estimates – Cluster 8 Medium dense old neighborhoods with high dependency on public transportation

ANOVA Table					
	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	368057	52580	572.74	<.0001
R-Square -		0.6427	Adj R-Sq -		0.6416

Parameter Estimates						
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Variance Inflation
Intercept	1	18.00397	0.32229	55.86	<.0001	0
Factor1	1	5.20045	0.19164	27.14	<.0001	1.01802
Factor2	1	6.12306	0.16963	36.1	<.0001	1.08546
Factor3	1	7.19747	0.19813	36.33	<.0001	1.12421
Factor4	1	2.02173	0.20726	9.75	<.0001	1.08329
Factor5	1	1.41713	0.18945	7.48	<.0001	1.00688
Factor6	1	-0.89134	0.16715	-5.33	<.0001	1.00746
Factor7	1	-1.46324	0.1598	-9.16	<.0001	1.06826

The p-value of the F-test indicates that the model is statistically significant, that is, the differences in means for the poverty factors are real and did not occur by chance. The null hypothesis that the means for the poverty factors are equal is rejected based on the high F value. R-square value of 0.6416 indicates that approximately 64% of the variability for the dependent variable, '**below_pov**' is explained by the seven poverty factors. The parameter estimates for the poverty factors indicate the amount of change one could expect in poverty rate given a one-unit change in the value of that poverty factor, given that all other poverty factors in the model are held constant.

A.11: ANOVA and Parameter Estimates – Cluster 9 High dense old structures and highest dependency on public transportation					
ANOVA Table					
	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	90255	12894	175.35	<.0001
R-Square -		0.5671	Adj R-Sq -		0.5639
Parameter Estimates					

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Variance Inflation
Intercept	1	16.63924	0.73013	22.79	<.0001	0
Factor1	1	4.51724	0.38614	11.7	<.0001	1.14215
Factor2	1	6.12114	0.32039	19.11	<.0001	1.27082
Factor3	1	8.32308	0.29431	28.28	<.0001	1.07809
Factor4	1	0.59474	0.22968	2.59	0.0098	1.27815
Factor5	1	1.71238	0.33084	5.18	<.0001	1.0275
Factor6	1	-0.06308	0.2244	-0.28	0.7787	1.05358
Factor7	1	-1.1279	0.36324	-3.11	0.002	1.32573

The p-value of the F-test indicates that the model is statistically significant, that is, the differences in means for the poverty factors are real and did not occur by chance. The null hypothesis that the means for the poverty factors are equal is rejected based on the high F value. R-square value of 0.5639 indicates that approximately 56% of the variability for the dependent variable, '**below_pov'** is explained by the seven poverty factors. The parameter estimates for the poverty factors indicate the amount of change one could expect in poverty rate given a one-unit change in the value of that poverty factor, given that all other poverty factors in the model are held constant. However, the significance value of over 0.05 for factor 6 indicate the effect of poverty factor 6 occurred by chance and not a real relationship.

A.12: ANOVA and Parameter Estimates – Cluster 10 Low dense older neighborhoods dominated by single family units						
ANOVA Table						
	DF	Sum of Squares	Mean Square	F Value	Pr > F	
Model	7	30478	4353.981	71.96	<.0001	
R-Square -		0.7199		Adj R-Sq -	0.7099	
Parameter Estimates						
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Variance Inflation

Intercept	1	21.28403	1.82188	11.68	<.0001	0
Factor1	1	2.90726	0.73916	3.93	0.0001	1.36493
Factor2	1	6.67942	0.67172	9.94	<.0001	2.18661
Factor3	1	5.95952	0.62592	9.52	<.0001	1.36725
Factor4	1	1.52222	0.46365	3.28	0.0012	1.88273
Factor5	1	1.32349	0.60625	2.18	0.0302	1.08238
Factor6	1	-0.34809	0.64237	-0.54	0.5885	1.09812
Factor7	1	-1.32197	0.8732	-1.51	0.1317	1.35306

The p-value of the F-test indicates that the model is statistically significant, that is, the differences in means for the poverty factors are real and did not occur by chance. The null hypothesis that the means for the poverty factors are equal is rejected based on the high F value. R-square value of 0.7099 indicates that approximately 71% of the variability for the dependent variable, '**below_pov**' is explained by the seven poverty factors. The parameter estimates for the poverty factors indicate the amount of change one could expect in poverty rate given a one-unit change in the value of that poverty factor, given that all other poverty factors in the model are held constant. However, the significance value of over 0.05 for factors 6 and 7 indicate that the effects of poverty factors 6 and 7 occurred by chance and not real relationships.

A.13: ANOVA and Parameter Estimates – Cluster 11 Low dense dominated largely by farm activities and single family units					
ANOVA Table					
	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	19681	2811.58	50.35	<.0001
R-Square -		0.6211	Adj R-Sq -		0.6088

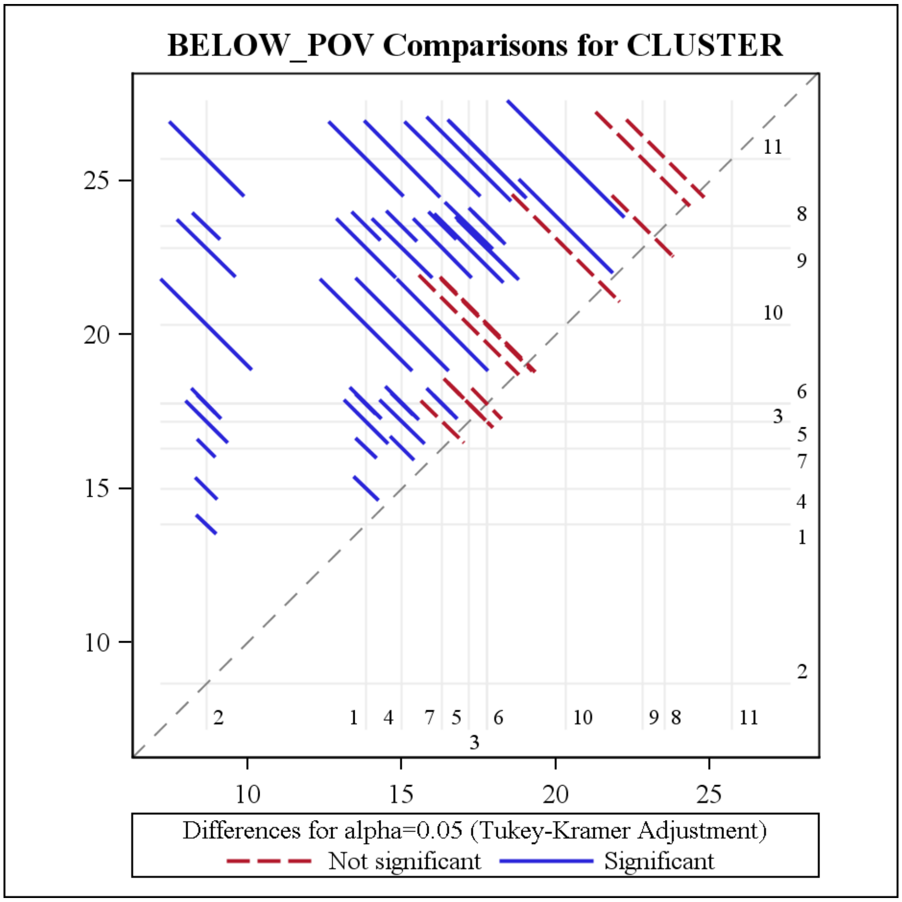
Parameter Estimates						
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Variance Inflation
Intercept	1	15.92908	1.16526	13.67	<.0001	0
Factor1	1	2.85172	0.58938	4.84	<.0001	1.07061
Factor2	1	9.60864	1.06425	9.03	<.0001	1.30064

Factor3	1	9.8595	0.62576	15.76	<.0001	1.19212
Factor4	1	2.14298	0.36902	5.81	<.0001	1.20565
Factor5	1	1.227	0.63407	1.94	0.0543	1.07744
Factor6	1	-0.61516	0.36007	-1.71	0.089	1.07871
Factor7	1	-1.66462	0.6879	-2.42	0.0164	1.10683

The p-value of the F-test indicates that the model is statistically significant, that is, the differences in means for the poverty factors are real and did not occur by chance. The null hypothesis that the means for the poverty factors are equal is rejected based on the high F value. R-square value of 0.6088 indicates that approximately 61% of the variability for the dependent variable, '**below_pov**' is explained by the seven poverty factors. The parameter estimates for the poverty factors indicate the amount of change one could expect in poverty rate given a one-unit change in the value of that poverty factor, given that all other poverty factors in the model are held constant. However, the significance value of over 0.05 for factors 5 and 6 indicate that the effects of poverty factors 5 and 6 occurred by chance and not real relationships.

A.14: Least Squares Means for Cluster Effect for Factor 1											
Pr > |t| for H0: LSMean(i)=LSMean(j)											
i/j	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
1		<.0001	0.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
2			<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
3				<.0001	**0.9810**	**1.000**	<.0001	<.0001	<.0001	**0.2120**	<.0001
4					<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
5						**0.9574**	**0.6526**	<.0001	<.0001	**0.0616**	<.0001
6							<.0001	<.0001	<.0001	**0.1635**	<.0001
7								<.0001	<.0001	0.0007	<.0001
8									**0.9868**	0.0294	**0.1675**
9										**0.4336**	**0.0748**
10											0.0003
11											

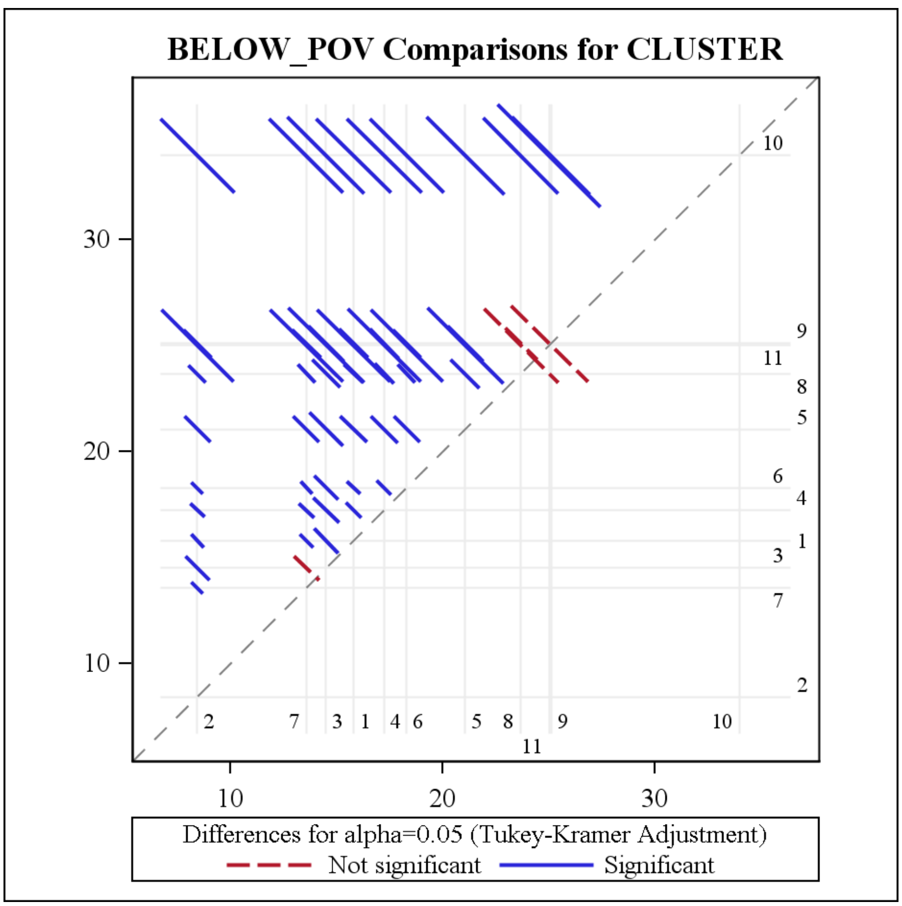
A.15: Diffogram Display of Neighborhood Effect for Factor 1



The diffogram in A.15 indicates statistical significance of the pairs of neighborhood types for factor 1. The numbers on vertical and horizontal axes indicate neighborhood types. The lsmeans for each neighborhood type are plotted. The line pairs touching the 45 degree reference line are not statistically significant. The solid line indicates the difference in lsmeans is statistically significant and the dashed line for not significant. The lengths of the lines indicate width of the confidence interval. The values greater than 0.05 (table A.14) indicate that the corresponding neighborhoods have similar effects on the poverty factor 1, that is, 11 out of 55 pairs have similar effects (denoted with dashed lines in the plot). Solid lines in the plot indicate the cluster pairs are have differences in poverty factor tested.

A.16: Least Squares Means for Neighborhood Effect for Factor 2											
Pr > |t| for H0: LSMean(i)=LSMean(j)											
i/j	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
1		<.0001	0.0155	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
2			<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
3				<.0001	<.0001	<.0001	**0.2345**	<.0001	<.0001	<.0001	<.0001
4					<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
5						<.0001	<.0001	<.0001	<.0001	<.0001	0.0164
6							<.0001	<.0001	<.0001	<.0001	<.0001
7								<.0001	<.0001	<.0001	<.0001
8									**0.0720**	<.0001	**0.9786**
9										<.0001	**1.000**
10											<.0001
11											

A.17: Diffogram Display of Neighborhood Effect for Factor 2

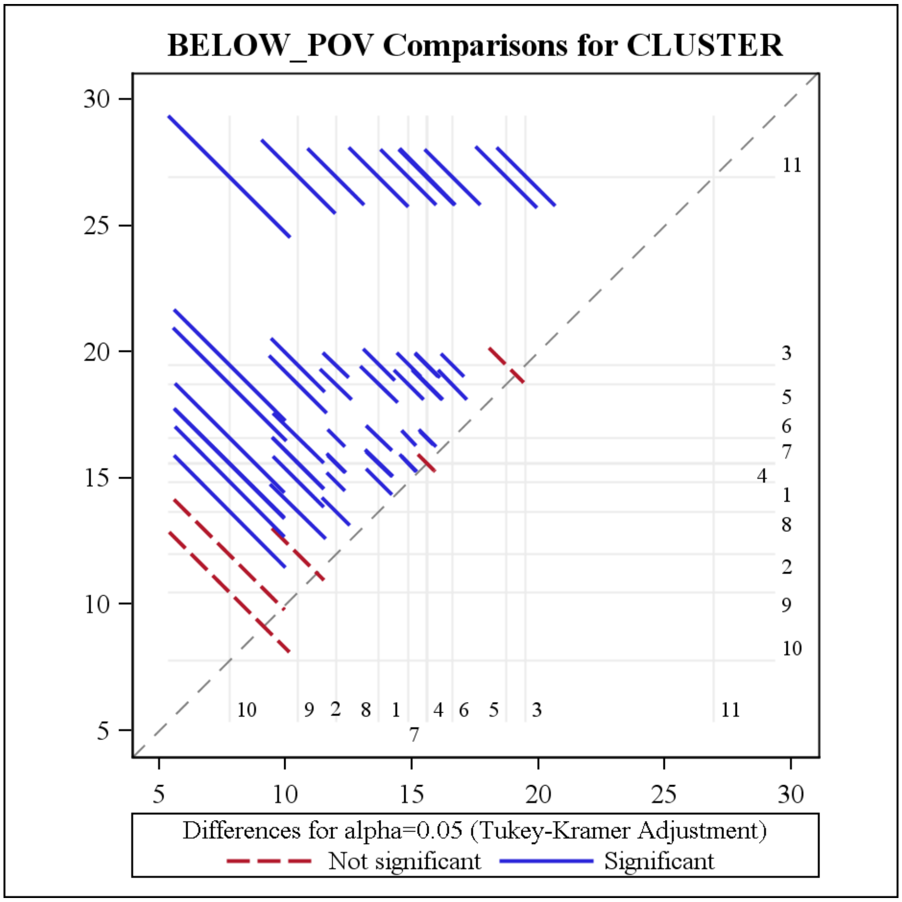


The diffogram in A.17 indicates statistical significance of the pairs of neighborhood types for factor 2. The numbers on vertical and horizontal axes indicate neighborhood types. The lsmeans for each neighborhood type are plotted. The line pairs touching the 45 degree reference line are not statistically significant. The solid line indicates the difference in lsmeans is statistically significant and the dashed line for not significant. The lengths of the lines indicate width of the confidence interval. The values greater than 0.05 indicate that the corresponding clusters have similar effects on the poverty factor 2, that is, 4 out of 55 pairs have similar effects (denoted with dashed lines in the plot). Solid lines in the plot indicate the cluster pairs are have differences in poverty factor tested.

A.18: Least Squares Means for Neighborhood Effect for Factor 3											
Pr > |t| for H0: LSMean(i)=LSMean(j)											
i/j	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
1		<.0001	<.0001	0.0204	<.0001	<.0001	0.0047	0.0116	<.0001	<.0001	<.0001
2			<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	**0.3939**	**0.0690**	<.0001
3				<.0001	**0.7892**	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
4					<.0001	<.0001	**1.000**	<.0001	<.0001	<.0001	<.0001
5						<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
6							<.0001	<.0001	<.0001	<.0001	<.0001
7								<.0001	<.0001	<.0001	<.0001
8									0.0001	0.0009	<.0001
9										**0.7582**	<.0001
10											<.0001
11											

The diffogram in A.19 indicates statistical significance of the pairs of neighborhood types for factor 3. The numbers on vertical and horizontal axes indicate neighborhood types. The lsmeans for each neighborhood type are plotted. The line pairs touching the 45 degree reference line are not statistically significant. The solid line indicates the difference in lsmeans is statistically significant and the dashed line for not significant. The lengths of the lines indicate width of the confidence interval. The values greater than 0.05 indicate that the corresponding clusters have similar effects on the poverty factor 3, that is, 5 out of 55 pairs have similar effects (denoted with dashed lines in the plot). Solid lines in the plot indicate the cluster pairs are have differences in poverty factor tested.

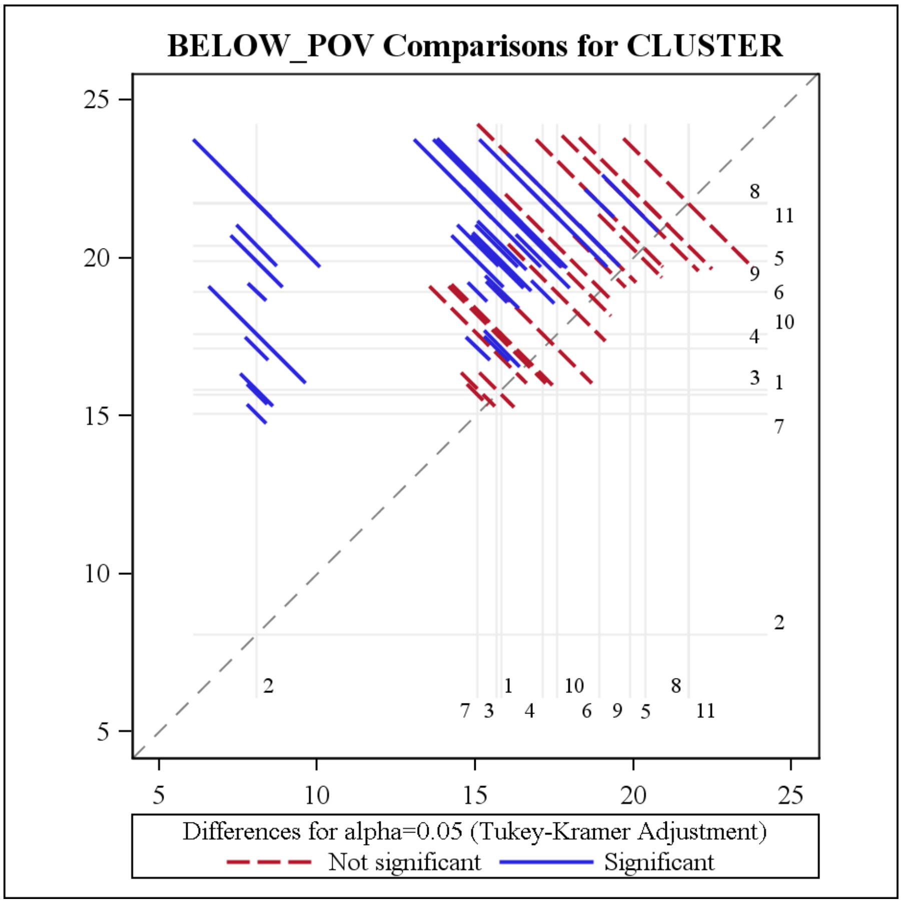
A.19: Diffogram Display of Neighborhood Effect for Factor 3



A.20: Least Squares Means for Neighborhood Effect for Factor 4											
Pr > |t| for H0: LSMean(i)=LSMean(j)											
i/j	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
1		<.0001	**1.000**	<.0001	<.0001	<.0001	**0.1310**	<.0001	<.0001	**0.6598**	<.0001
2			<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
3				0.0102	<.0001	<.0001	**0.4181**	<.0001	<.0001	**0.8034**	0.0002
4					<.0001	<.0001	<.0001	<.0001	<.0001	**1.000**	0.0112
5						0.0129	<.0001	**0.1117**	**0.9994**	**0.1726**	**0.9945**

6							<.0001	<.0001	**0.7177**	**0.9457**	**0.4673**
7								<.0001	<.0001	**0.2340**	<.0001
8									0.0340	0.0010	**1.000**
9										**0.5241**	**0.9531**
10											**0.2155**
11											

A.21: Diffogram Display of Neighborhood Effect for Factor 4

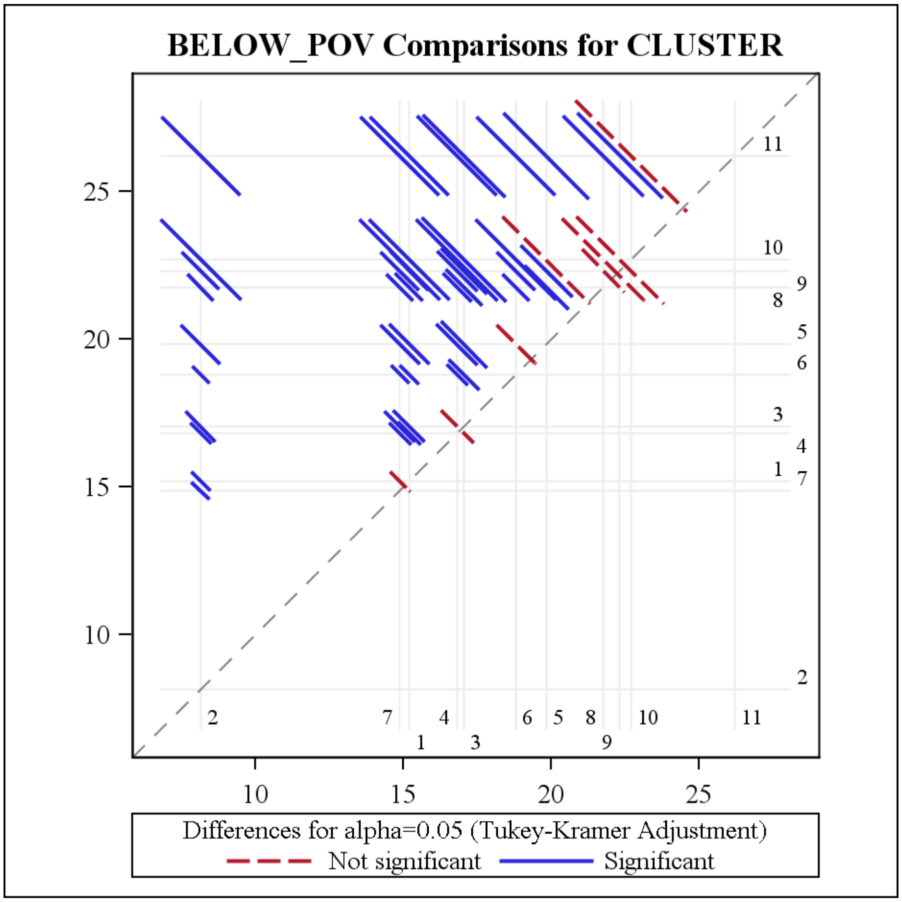


The diffogram in A.21 indicates statistical significance of the pairs of neighborhood types for factor 4. The numbers on vertical and horizontal axes indicate neighborhood types. The lsmeans for each neighborhood type are plotted. The line pairs touching the 45 degree reference line are not statistically significant. The solid line indicates the difference in lsmeans is statistically significant and the dashed line for not significant. The lengths of the lines indicate width of the confidence interval. The values greater than 0.05 indicate that the corresponding clusters have similar effects on the poverty factor 4, that is, 18 out of 55 pairs have similar effects (denoted with dashed lines in the plot). Solid lines in the plot indicate the cluster pairs are have differences in poverty factor tested.

A.22: Least Squares Means for Neighborhood Effect for Factor 5											
Pr > |t| for H0: LSMean(i)=LSMean(j)											
i/j	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
1		<.0001	<.0001	<.0001	<.0001	<.0001	**0.9231**	<.0001	<.0001	<.0001	<.0001
2			<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
3				**0.9999**	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
4					<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
5						**0.3178**	<.0001	0.0015	0.0003	**0.0709**	<.0001
6							<.0001	<.0001	<.0001	0.0002	<.0001
7								<.0001	<.0001	<.0001	<.0001
8									**0.9782**	**0.9928**	<.0001
9										**1.000**	0.0008
10											**0.0895**
11											

The diffogram in A.23 indicates statistical significance of the pairs of neighborhood types for factor 5. The numbers on vertical and horizontal axes indicate neighborhood types. The lsmeans for each neighborhood type are plotted. The line pairs touching the 45 degree reference line are not statistically significant. The solid line indicates the difference in lsmeans is statistically significant and the dashed line for not significant. The lengths of the lines indicate width of the confidence interval. The values greater than 0.05 indicate that the corresponding clusters have similar effects on the poverty factor 5, that is, 8 out of 55 pairs have similar effects (denoted with dashed lines in the plot). Solid lines in the plot indicate the cluster pairs are have differences in poverty factor tested.

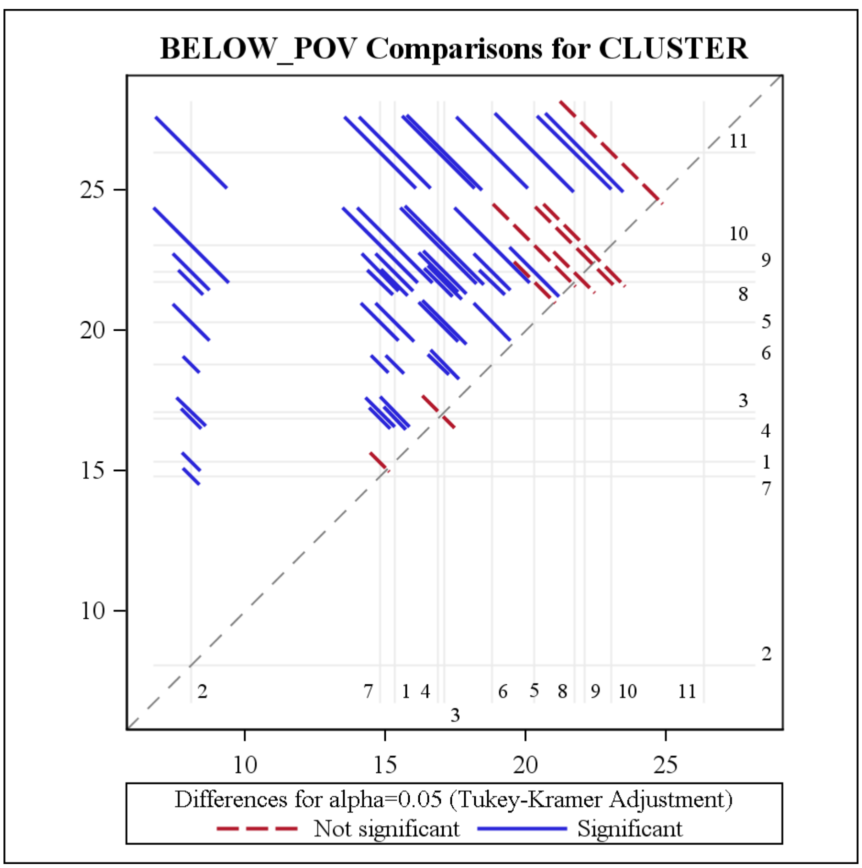
A.23: Diffogram Display of Neighborhood Effect for Factor 5



A.24: Least Squares Means for Neighborhood Effect for Factor 6											
Pr > |t| for H0: LSMean(i)=LSMean(j)											
i/j	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
1		<.0001	<.0001	<.0001	<.0001	<.0001	**0.3105**	<.0001	<.0001	<.0001	<.0001
2			<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
3				**0.9999**	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
4					<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
5						0.0117	<.0001	**0.0782**	0.0474	**0.0949**	<.0001
6							<.0001	<.0001	<.0001	<.0001	<.0001
7								<.0001	<.0001	<.0001	<.0001
8									**0.9994**	**0.9096**	<.0001
9										**0.9938**	<.0001
10											**0.1167**
11											

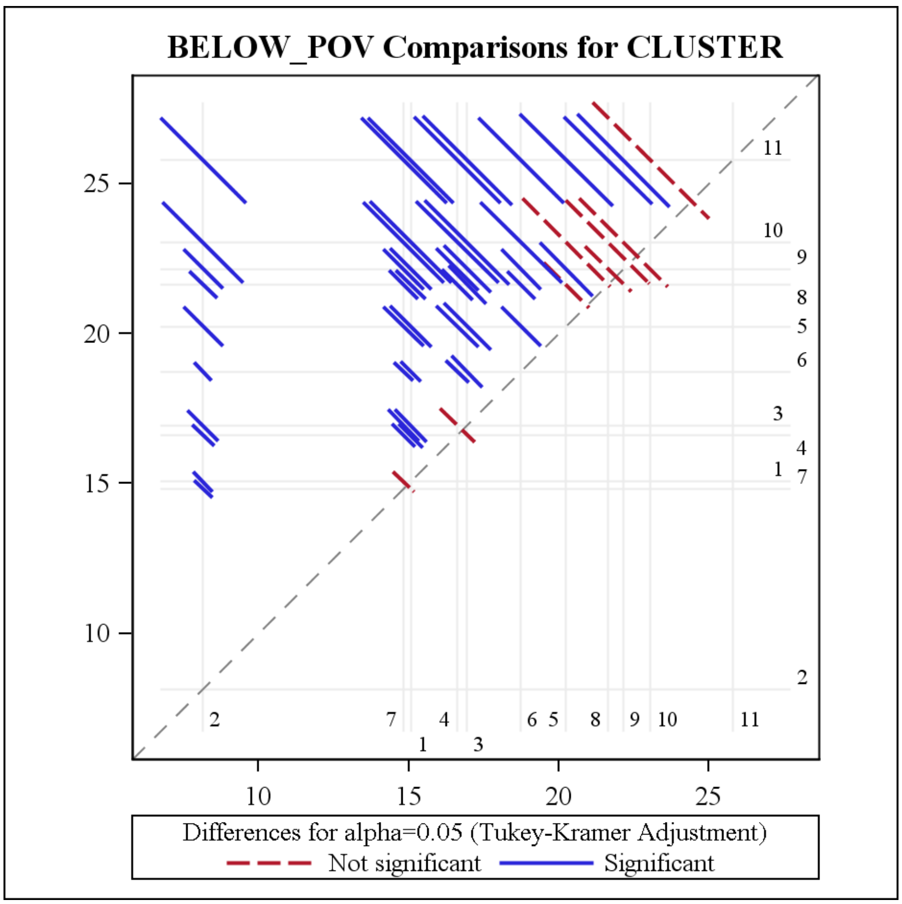
The diffogram in A.25 indicates statistical significance of the pairs of neighborhood types for factor 6. The numbers on vertical and horizontal axes indicate neighborhood types. The lsmeans for each neighborhood type are plotted. The line pairs touching the 45 degree reference line are not statistically significant. The solid line indicates the difference in lsmeans is statistically significant and the dashed line for not significant. The lengths of the lines indicate width of the confidence interval. The values greater than 0.05 indicate that the corresponding clusters have similar effects on the poverty factor 6, that is, 8 out of 55 pairs have similar effects (denoted with dashed lines in the plot). Solid lines in the plot indicate the cluster pairs are have differences in poverty factor tested.

A.25: Diffogram Display of Neighborhood Effect for Factor 6



A.26: Least Squares Means for Neighborhood Effect for Factor 7											
Pr > |t| for H0: LSMean(i)=LSMean(j)											
i/j	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
1		<.0001	<.0001	<.0001	<.0001	<.0001	**0.9893**	<.0001	<.0001	<.0001	<.0001
2			<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
3				**0.9975**	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
4					<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
5						0.0117	<.0001	**0.0999**	0.0227	**0.0748**	<.0001
6							<.0001	<.0001	<.0001	<.0001	<.0001
7								<.0001	<.0001	<.0001	<.0001
8									**0.9898**	**0.8623**	0.0003
9										**0.9964**	0.0070
10											**0.4535**
11											

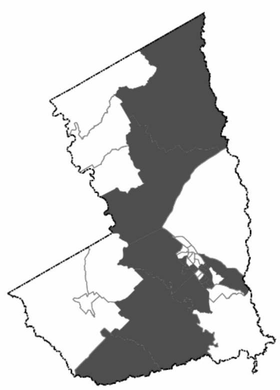
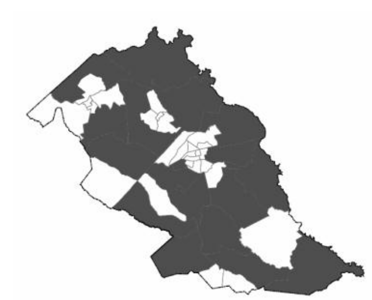
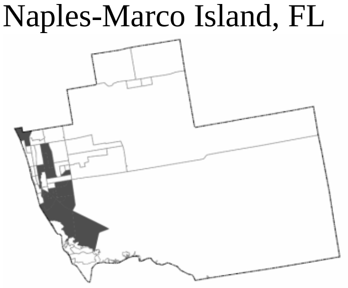
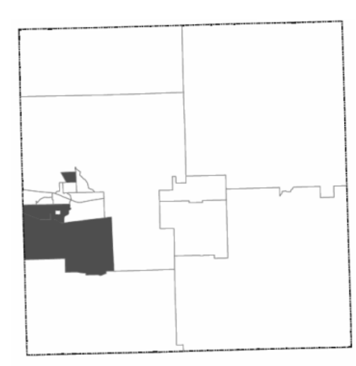
A.27: Diffogram Display of Neighborhood Effect for Factor 7

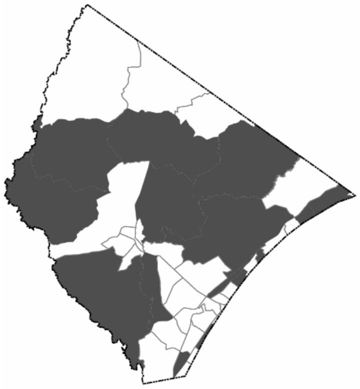
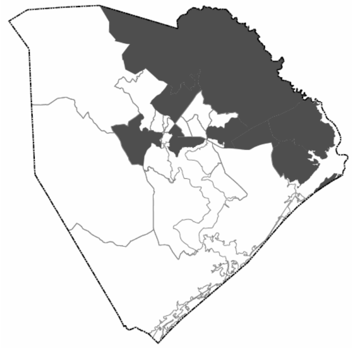
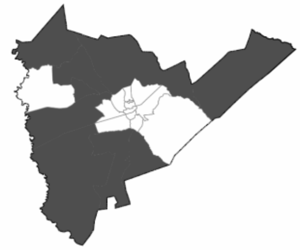
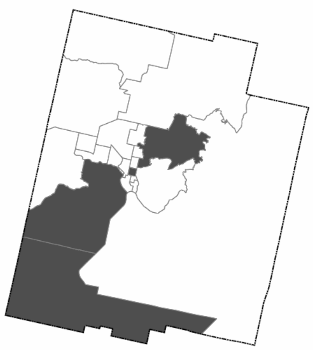
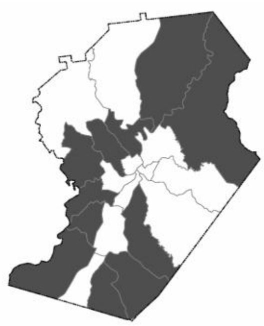
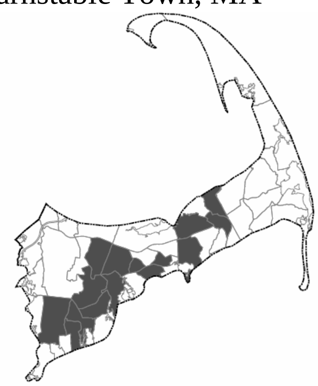
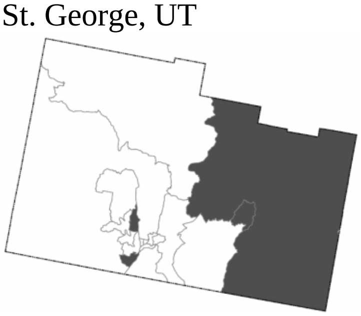
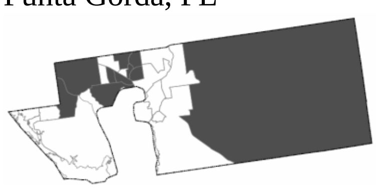
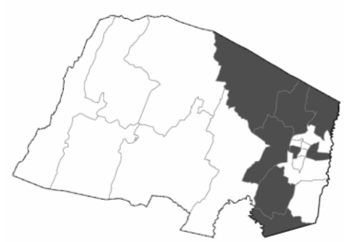
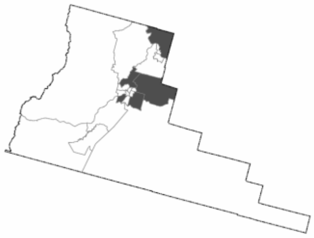
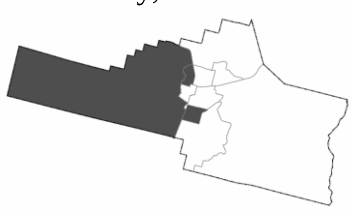
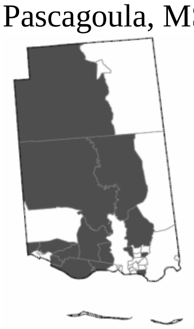


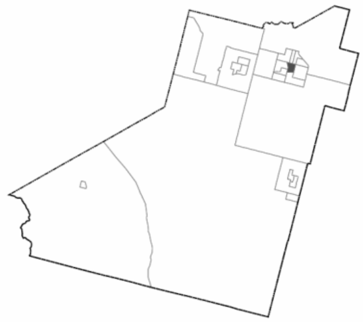
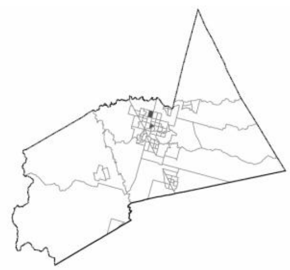
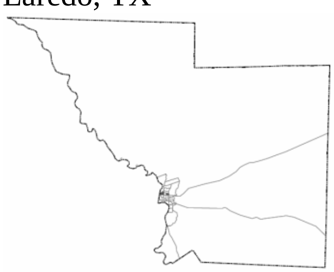
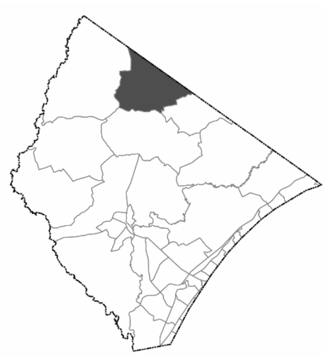
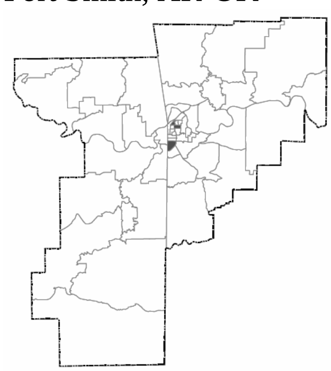
The diffogram in a.27 indicates statistical significance of the pairs of neighborhood types for factor 7. The numbers on vertical and horizontal axes indicate neighborhood types.

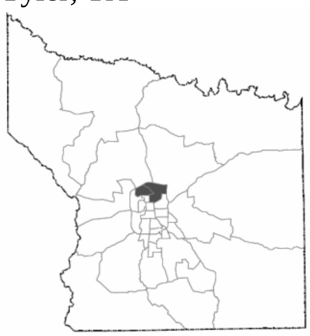
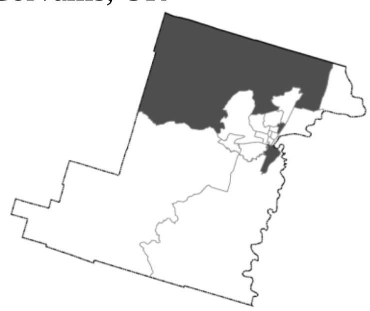
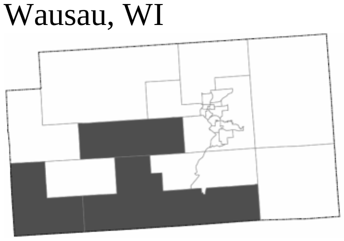
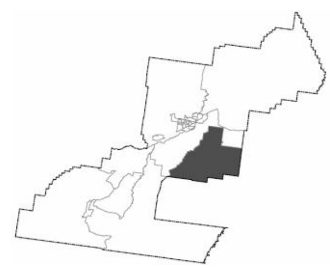
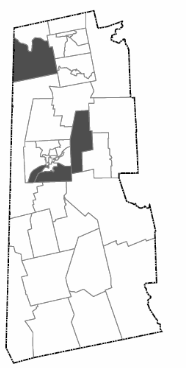
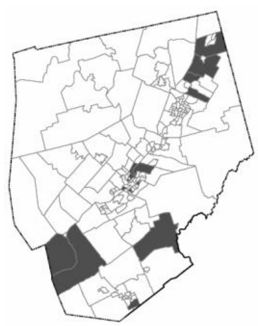
The lsmeans for each neighborhood type are plotted. The line pairs touching the 45 degree reference line are not statistically significant. The solid line indicates the difference in lsmeans is statistically significant and the dashed line for not significant. The lengths of the lines indicate width of the confidence interval. The values greater than 0.05 indicate that the corresponding clusters have similar effects on the poverty factor 7, that is, 8 out of 55 pairs have similar effects (denoted with dashed lines in the plot). Solid lines in the plot indicate the cluster pairs are have differences in poverty factor tested.

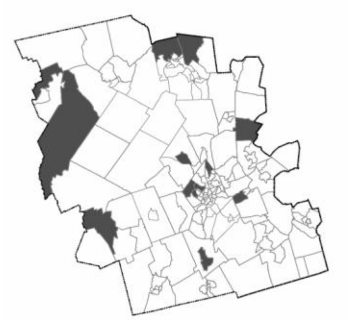
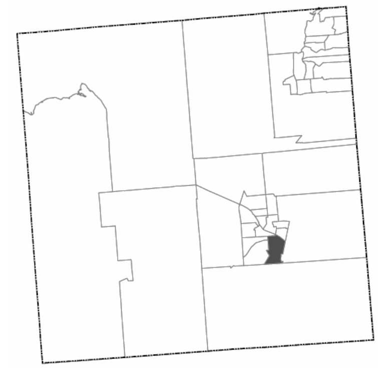
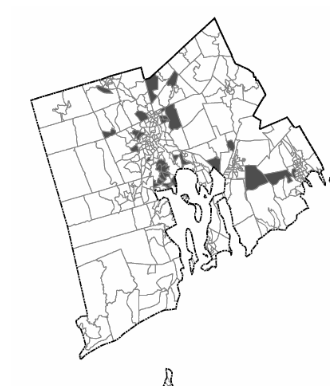
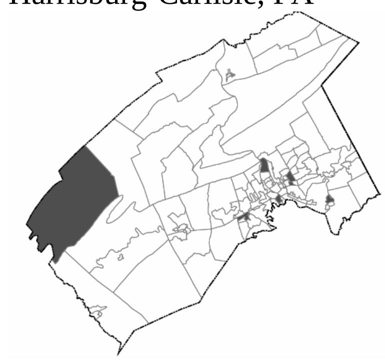
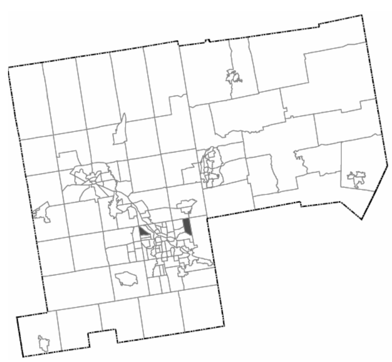
A.28: Spatial Distribution of 11 Neighborhood Types in selected Metropolitan Areas

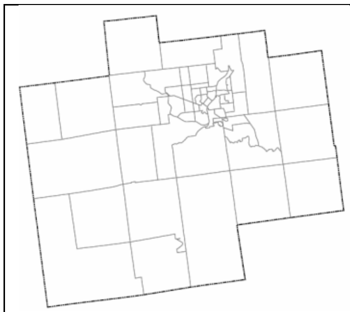
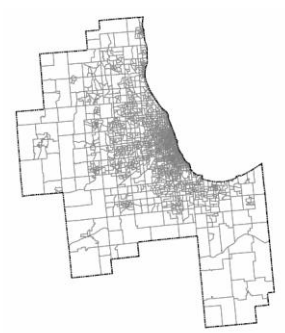
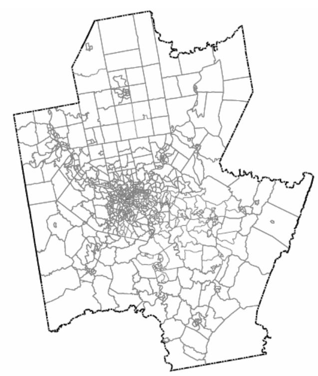
Cluster 1 -		
College Station-Bryan, TX 	Florence, SC 	Hinesville-Fort Stewart, GA 
Naples-Marco Island, FL 	Greenville, NC 	Ames, IA 

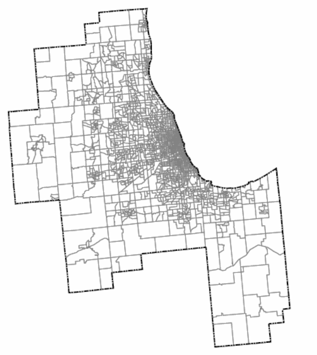
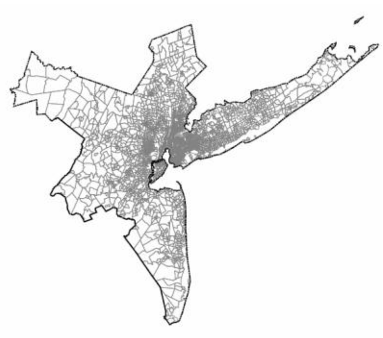
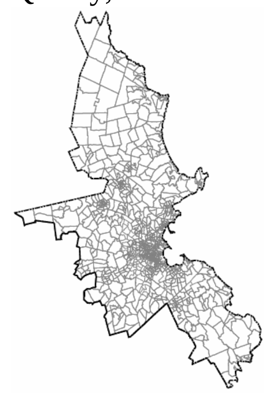
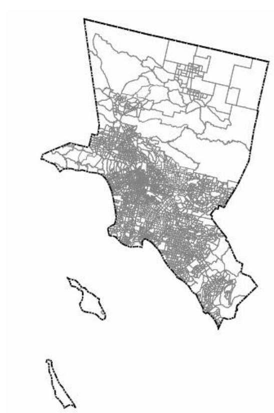
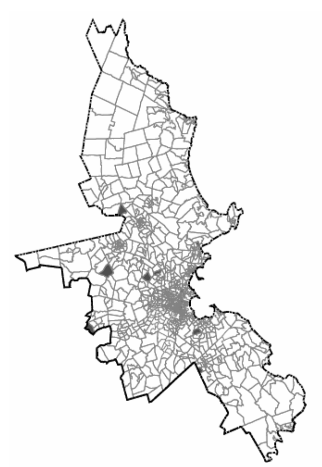
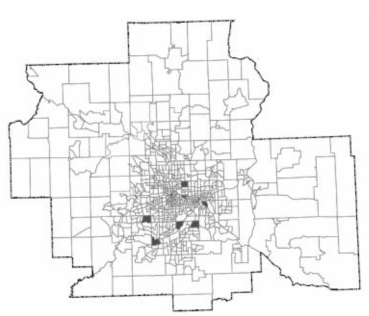
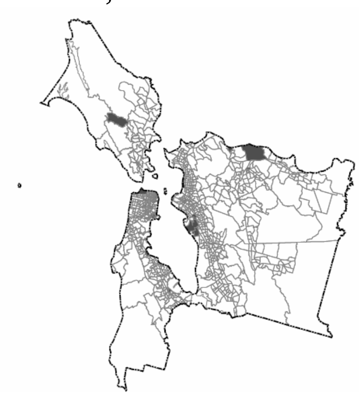
Myrtle Beach-North Myrtle Beach-Conway, SC 	Jacksonville, NC 	Sumter, SC 
Cluster 2 -		
Coeur d'Alene, ID 	Gainesville, GA 	Barnstable Town, MA 
St. George, UT 	Punta Gorda, FL 	Winchester, VA-WV 
Bend, OR 	Carson City, NV 	Pascagoula, MS 

Cluster 3 -		
Idaho Falls, ID 	Hanford-Corcoran, CA 	El Centro, CA 
Salem, OR 	Modesto, CA 	Jonesboro, AR 
Cluster 4 -		
Laredo, TX 	Myrtle Beach-North Myrtle Beach-Conway, SC 	Fort Smith, AR-OK 
Deltona-Daytona Beach-Ormond Beach, FL	Farmington, NM	Bowling Green, KY

		
Cluster 5 -		
Tyler, TX 	Corvallis, OR 	Missoula, MT 
Wausau, WI 	San Luis Obispo-Paso Robles, CA 	Billings, MT 
Cluster 6 -		
Pittsfield, MA 	Allentown-Bethlehem-Easton, PA-NJ 	Scranton--Wilkes-Barre,  PA

Worcester, MA 	Oshkosh-Neenah, WI 	Providence-New Bedford-Fall River, RI-MA 
Williamsport, PA 	Harrisburg-Carlisle, PA 	
Cluster 7 -		
Canton-Massillon, OH 	Youngstown-Warren-Boardman, OH-PA 	Huntington-Ashland, WV-KY-OH 
Saginaw-Saginaw Township North, MI		

		
Cluster 8 -		
New York-Northern New Jersey-Long Island, NY-NJ-PA 	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD 	Washington-Arlington-Alexandria, DC-VA-MD-WV 
Chicago-Naperville-Joliet, IL-IN-WI 	Boston-Cambridge-Quincy, MA-NH 	Pittsburgh, PA 
San Francisco-Oakland-Fremont, CA 	Baltimore-Towson, MD 	

Cluster 9 -		
Chicago-Naperville-Joliet, IL-IN-WI 	New York-Northern New Jersey-Long Island, NY-NJ-PA 	Boston-Cambridge-Quincy, MA-NH 
San Francisco-Oakland-Fremont, CA 	Los Angeles-Long Beach-Santa Ana, CA 	
Cluster 10 -		
Boston-Cambridge-Quincy, MA-NH 	Minneapolis-St. Paul-Bloomington, MN-WI 	San Francisco-Oakland-Fremont, CA 

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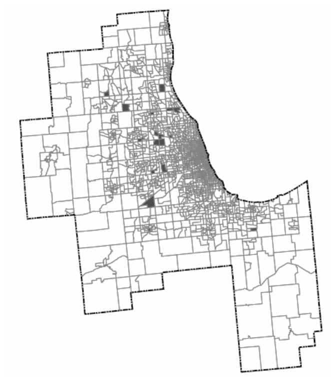		
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	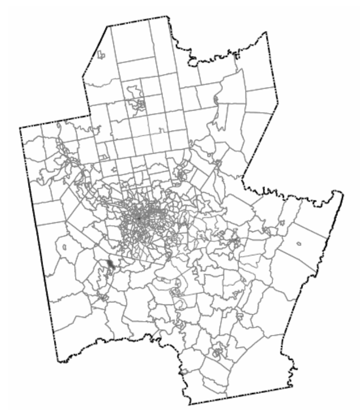	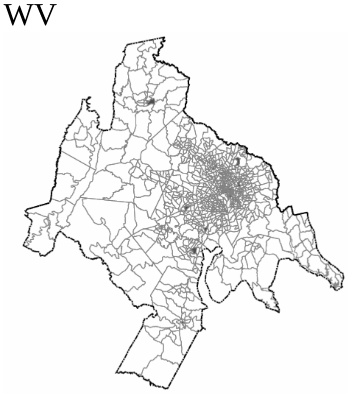
Cluster 11 -		
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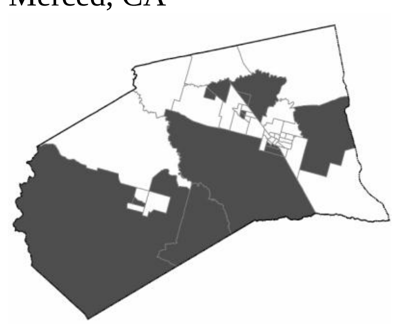
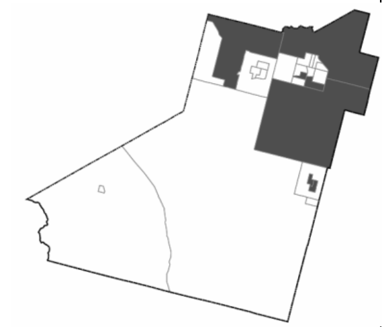
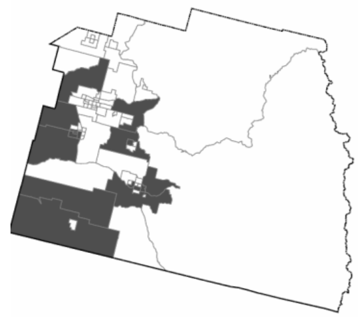
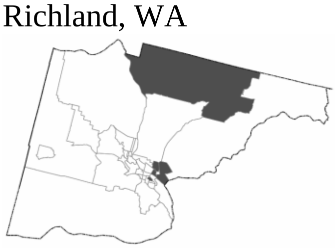
		

Salinas, CA 	Bakersfield, CA 	Hanford-Corcoran, CA 
Madera-Chowchilla, CA 	Wenatchee-East Wenatchee, WA 	Visalia-Porterville, CA 
Kennewick-Pasco-Richland, WA 		

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