POVERTY MAPPING WITH GEOGRAPHIC INFORMATION SYSTEMS : A CASE STUDY IN KEÇİÖREN DISTRICT, ANKARA

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ABSTRACT

POVERTY MAPPING IN GEOGRAPHIC INFORMATION SYSTEMS : A CASE STUDY IN KEÇİÖREN DISTRICT, ANKARA

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In the world today and in Turkey, poverty and its alleviation has become an important issue. As a result, detailed studies for the identification of poverty need to be done. In the recent years, the spatial aspect of the multidimensional character of poverty is gaining significance. For this purpose, in this thesis, spatial aspects of poverty are tried to be analysed using Geographic Information Systems (GIS) in the case of Keçiören District in Ankara.

Firstly, a digital map of the spatial distribution of the urban poor living in Keçiören is made and linked to the database to analyse the spatial distribution. The poverty database used in this study is based on the data collected by the Social Assistance and Solidarity Foundation in the district. It includes state of poverty and some socio-demographic characteristics of the households who applied for social assistance.

The analyses with respect to the methodology of this study aims at finding the common characteristics of poor settlements and the areas/households which are the "poorest of the poor" in Keçiören. The maps obtained as a result of spatial data analysis indicate the dense living areas of the poor, clusters of poor households, neighbourhood level poverty analysis and poor areas within neighbourhoods. There are also additional analyses which compare the characteristics of the

geographical distribution of the poor with other aspects, such as land values, roads and building conditions,.

Such a study can be helpful to re-allocate the poverty alleviation efforts more efficiently by determining priority areas.

Key Words: Poverty Alleviation, Poverty Mapping, GIS, Spatial Data Analysis, Keçiören-Ankara.

ÖZ

COĞRAFİ BİLGİ SİSTEMLERİ KULLANILARAK YOKSULLUĞUN HARİTALANMASI ÇALIŞMASI: ANKARA, KEÇİÖREN ÖRNEĞİ

Kalaycıoğlu, Mehmet
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Yoksulluğun azaltılması, günümüz dünyasında ve Türkiye'de, üzerinde sıkça durulan bir konu olmuştur. Ancak bunun gerçekleştirilebilmesi, yoksulluğun tespitine ilişkin detaylı çalışmalar yapmayı gerektirmektedir. Son yıllarda, çok boyutlu bir kavram olan yoksulluğun, mekanla olan ilişkisi ile ilgili araştırmalar önem kazanmıştır. Bu amaçla gerçekleştirilen bu tez çalışmasında yoksulluğun mekansal özellikleri, Coğrafi Bilgi Sistemleri (CBS) yardımıyla, Ankara'daki Keçiören İlçesi özelinde tespit edilmek istenmiştir.

Öncelikle, Keçiören ilçesi kentsel alanındaki nüfus içindeki yoksulların mekandaki dağılımı sayısal olarak haritalanmış, veritabanı ile ilişkisi kurulmuş ve bu dağılımın özellikleri analiz edilmiştir. Çalışmada kullanılan yoksulluk verisi, ilçede bulunan Sosyal Yardımlaşma ve Dayanışma Vakfı'nın veritabanından elde edilmiştir. Bu veritabanı; sosyal yardım için başvuranların yoksulluk durumu ve diğer bazı sosyo-demografik özelliklerini içermektedir.

Bu çalışmada oluşturulan metodoloji sonucunda yapılan analizler; Keçiören'de "yoksulun yoksulu" olan yerleri-haneleri ve yoksul yerleşimlerin ortak özelliklerini bulmayı amaçlamaktadır. Yapılan mekansal veri analizlerinin sonucunda oluşan haritalar; yoksulların yoğun olarak yaşadığı yerleri, yoksul hanelerin kümeleştiği

yerleri, mahallelere göre yoksulluğu, mahalle içinde daha yoksul olan yerleri göstermektedir. Bunların dışında kalan analizler ise yoksulların coğrafi dağılımının ilçedeki arsa birim değerleri, yol ağı ve bina durumları gibi diğer özelliklerle karşılaştırılmasını içermektedir.

Böyle bir çalışma; yoksulluğun azaltılması yönelik çabaların daha etkili bir şekilde organize edilmesi ve yoksulluğun mekansal dağılımına göre öncelikli alanlar belirlenebilmesi için kullanılabilir.

Anahtar Kelimeler: Yoksulluğun Azaltılması, Yoksulluğun Haritalanması, CBS, Mekansal Veri Analizi, Keçiören-Ankara

To My Family

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CHAPTER 1

INTRODUCTION

In order to understand the developments in the modern World, there is a need to conceptualize how the developed countries overcome initial difficulties which emerge from structural and socio-economic problems. The socio-economic problems of the societies generally coincide with the term "poverty". Poverty is a social problem in the entire world since the past. A classic definition of poverty according to the World Bank (1990) is "the inability to attain a minimal standard of living". Such a definition refers to the understanding of poverty as a problem which should be fought against not because of humanitarian reasons but mainly because a decent living is understood to be a basic human rights issue. Hence, any government who claims to be democratic and guaranteur of citizenship rights and welfare, needs to develop policies for combating poverty. Otherwise such a government will lose its legitimacy as a government, not fulfilling its tasks for "social contract". Therefore, poverty is becoming an important problem day by day as it also increases in severity due to the deficiency of World's resources. As a result of this situation, increasing number of surveys and studies mainly concerned with "poverty" has been done through the last decades by academics and agencies throughout the world.

The recent studies figure out that poverty is a multi-dimensional phenomena. It can be argued that spatial aspects constitute one of the major dimensions of poverty. The continuous progress in Geographical Information Technologies, eases the studies for analyzing the spatial dimension of poverty. In a general perspective, this thesis aims to analyze the distribution of the poor within a specific geography as a case study. Before continuing with any further explanation of the poverty analysis in this study, the importance of poverty and its spatial dimension have to be clearly described.

United Nations (UN) had a Millennium Declaration, in the year 2000, which was adopted by 189 nations worldwide. The first goal of the declaration is "to eradicate extreme poverty and hunger". In order to achieve this goal, the efforts to alleviate poverty have been considered more seriously by many nations and institutions.

Besides pointing to the need for the alleviation of poverty, UN also contributed to the measurement of poverty through creating various new indicators. For this reason, since 1998, UN is working to define poverty by considering indicators other than the income distribution. Human Development Index (HDI) is a product of these efforts. HDI measures poverty not only according to the level of income distribution but also considers the level of education and state of health of the individuals and similar factors. Newly established studies for analyzing poverty tend to define poverty according to composite indices as the UNDP's HDI. These kinds of indices can be used to make comparisons between and within countries and provide a detailed investigation of poverty. In this type of study, a generally applied technique is mapping. After defining degrees of poverty using such indices, mapping techniques are performed to display the spatial characteristics of the phenomena. New poverty map studies, more than just defining the location of poverty visually, aim at determining the major factors leading to poverty with respect to spatial and locational differences. As mentioned above, as a result of these studies poverty is accepted as a multidimensional problem. Hence, there is a need for more detailed analysis of poverty through finding out its different components.

Most of the studies dealing with poverty try to reduce its effects, but this objective can be realized if only characteristics of poverty are known. The first aspect to be determined is "who is the poor?". Secondly, the locations where the poor lived have to be found. If the answers to these two questions can be determined (as HDI indicates above) then the alleviation of poverty problem can be possible. Just at this point, another factor comes into the analysis. This is the need of sustainable methods to alleviate poverty. The method which suggests transfers in kind and in

cash to all the poor can not be a long lived alternative as resources are limited. Sustainable alleviation of poverty means efficient allocation of resources. For this reason, identification of vulnerable spaces for poverty and priorities is needed. Another task is to find out to whom and where the financial support should be given after understanding the differentiation in the reasons of poverty in different locations of poverty. Such efforts will improve the implementation of poverty reduction policies of local governments especially by enabling them to choose most in need sections of the population for cash transfers and better allocation of services. To realize these efforts, a high priority task is to find out the locations where the poor are concentrated and also to find out the similarities between the settlement areas of the poor. A study undertaken with this purpose will aim to conceive the spatial dimension of poverty. However, such a task might confront with some difficulties. Firstly, it must be admitted that to find out common geographic characteristics of the regions where the poor live is difficult because the same geographic characteristic may effect different households differently. For example, it may lead the poor to select to live in that place intentionally or not, because poverty is a human and a social problem. Especially, it will be difficult to compare the populations living in close geographic proximity to each other in the urban areas rather than those living in rural areas. A second problem will emerge in giving a decision about which geographic features are significant for the analysis. No matter which geographic feature is fixed and decided, there will be still many others effective in analysing poverty as a multi-dimensional phenomenon. Urban - rural difference is a valid example for this condition, hence it is almost not possible to determine similar geographic features. Third problem is that, there is a need to know the particular history of the country and the urbanization processes where the work on poverty should be done. Without such knowledge it will be imposible to understand the reasons why the poor settled in those places. Despite all these difficulties, such a pioneering study is needed to be accomplished and appropriate environment to carry out this study is “Geographical Information Systems (GIS)” for conceiving the spatial trends of poverty. GIS is the latest and most common technology to manipulate, integrate, analyze and visualize spatial data with its high capabilities increasing everyday.

In these respects, this thesis aims to develop a methodology to find out the poorer areas, patterns of poor settlements and the common settlement characteristics of the poor in urban areas, by the help of GIS, using the specific case of *Keçiören* District in *Ankara*. Additionally, this study tries to point out if households with similar conditions of poverty select places of location closer to each other by the help of GIS. More than visualizing, the critical usage of GIS in this thesis is due to the investigation of the change in statistical measures of poor in relation to distance or within a defined area in order to perceive an idea of the settlement pattern properties of poor residents or to assess the poorest ones. A formal methodology for this exploration process in the case study, is tried to be established. On contrary, the efforts in this study do not involve an index formation exercise by weighting certain indicators of poverty. In this thesis, there exists a poverty data of the households who are the applicants of social assistance in *Keçiören* and by using this data the distribution of the poor in space is analyzed. Using such household data is significant because it represents the single person or household, thus the poverty realm occurs in the smallest unit. Upper levels of poverty such as at the level of disctrict or neighbourhood, can be found through adding up the household data. If the data existed at the neighbourhood level, it would be difficult to find the smallest unit since the neighbourhood does not necessarily represent or reflect the poverty degree of each household.

The second chapter of the thesis represents “different definitions of poverty”, “poverty and poverty alleviation in Turkey” and “spatial dimension of poverty and its assessment based on household level data” together with the “importance of GIS and previous studies”.

In the third chapter, “the properties of the selected site (*Keçiören*)” and “the data of the study and its processing period and limitations” are described. The study area is described in terms of its geography, urban development history and population. *Keçiören* is the selected site, primarily because middle-income groups live nearby the poor ones in the district, which represent a need for geographical targeting of

the poor. The most significant data used in the study is an initial non-spatial poverty data that was obtained from Social Assistance and Solidarity Encouragement Foundation (SYDV) under *Keçiören* Local Governors' Office. SYDV in *Keçiören* collected and registered all the persons who applied for social assistance and conditional cash transfers (up to 2005) and afterwards social work experts rank the poverty situation of the applicants by applying questionnaires to them. Other important data layers of this thesis which are also mentioned in this chapter are; neighborhoods, roads, buildings, services, and centers.

The fourth chapter is the "case study" chapter which begins with the "methodology of the study" and involves all the "explorative spatial data analysis" established with GIS for the data and other analyses of the data, and the chapter ends with the "discussion of the results of the analyses" with respect to the characteristics of the study area. In this case study, the first task is to add the spatial components to initial non-spatial data. In this chapter, poverty is mapped using GIS for neighborhood level and household level and relationships between these levels are investigated. Moreover, densities, patterns and clusters of poor are analyzed. Furthermore, the distribution of poor is analyzed in comparison with the accessibility to certain urban features that are; health, education facilities, transport, and infrastructure, centers. GIS is the major tool for implementing these kinds of analyses.

Finally, the last chapter is the "conclusion" in which, findings of the analysis in the previous chapter are summarised and interpreted with respect to the relation between the assessment of the spatial dimension of poverty and GIS usage. Afterwards, recommendations for further studies are introduced as a result of lacking of complementary issues in this study.

CHAPTER 2

DESCRIPTION OF THE POVERTY ASSESSMENT

This chapter includes concepts that are related to "poverty" and its analysis in order to develop an appropriate methodology for the study. Different definitions of poverty are summarised in the beginning of the chapter. The chapter continues with initial findings which represent poverty and poverty alleviation policies and implementations in Turkey. Other parts of the chapter consider the spatial dimension of poverty and its relation with GIS.

2.1. Definition of Poverty

Poverty is generally defined with respect to two definitions. First one deals with the purchasing power in order to obtain basic material needs namely as the *income poverty* and the second one which is a newer concept which deals with the person's ability to cope with poverty and vulnerability to poverty, named often as the *human poverty* (a concept which is introduced by UN).

Income poverty refers to the condition of getting access to adequate nutrition, shelter, education and health. Under this concept, World Bank defines the case of *extreme (absolute) poverty* as satisfaction of basic needs or 'living on less than one dollar a day' as a poverty line approach, especially defined for basic food needs. Purchasing power is important for another concept, named as relative poverty. Relative poverty is measured by reference to the living standards of the majority in any given society (Oyen, 1992). Thus, definition of relative poverty refers not only to the satisfaction of basic needs but takes a general standard of living in a country including infrastructural, health needs as well as social, cultural and political needs. Since it is hard to measure these dimensions in concrete terms relative poverty is not preferred and used as an indicator by the policy makers.

According to the definition of World Bank in 2002 and UNDP Poverty Report in 2000, Akinyemi (2004) defines "human poverty" as; lack of basic human capabilities which are illiteracy, malnutrition, abbreviated life span, poor maternal health, illness from preventable diseases. Indirect measures are lack of access to goods, services and infrastructure-energy, sanitation, education, communication, drinking water, all necessary to sustain basic human capabilities. Akinyemi (2004) further states that; income measures are unable to capture aspects of welfare such as health, access to social services, water or household composition such as household size.

These definitions of poverty emerged from the multidimensional nature of poverty. Hence, it is argued in most of the literature that, this is the major reason for the difficulty of defining poverty and the poor. When poverty is defined only as the absolute poverty, with the degree of income or according to calorie in take, other dimensions of poverty like social and moral aspects are neglected. Therefore, being deprived of the opportunities and facilities for leading an acceptable and good quality of life should be the starting point of poverty. Such deprivations not only prevent individuals from leading a physically healthy life but also hinder their participation into political and social life. For this reason, poor person/s are isolated from others and excluded from the society as they can not afford the minimum cost of expenditures needed for a humane living.

Another problem, which is equally difficult as its definition, is the measurement of poverty. There are many efforts throughout the world initiated by international agencies, mostly by United Nations (UN) and the World Bank, to capture the multidimensional nature of poverty. The new approaches to measurement and analysis of poverty are trying to combine different data sources (censuses, household surveys) and using more and more indicators to be able to obtain a better representation of poverty.

The most common poverty indicators in the world according to UN are given below in Figure 2.1, p.8: (1-people who are income poor, 2-people lacking safe water, 3-illiterate adults, 4-people lacking health services, 5-people not expected to survive age 40, 6-malnourished children).

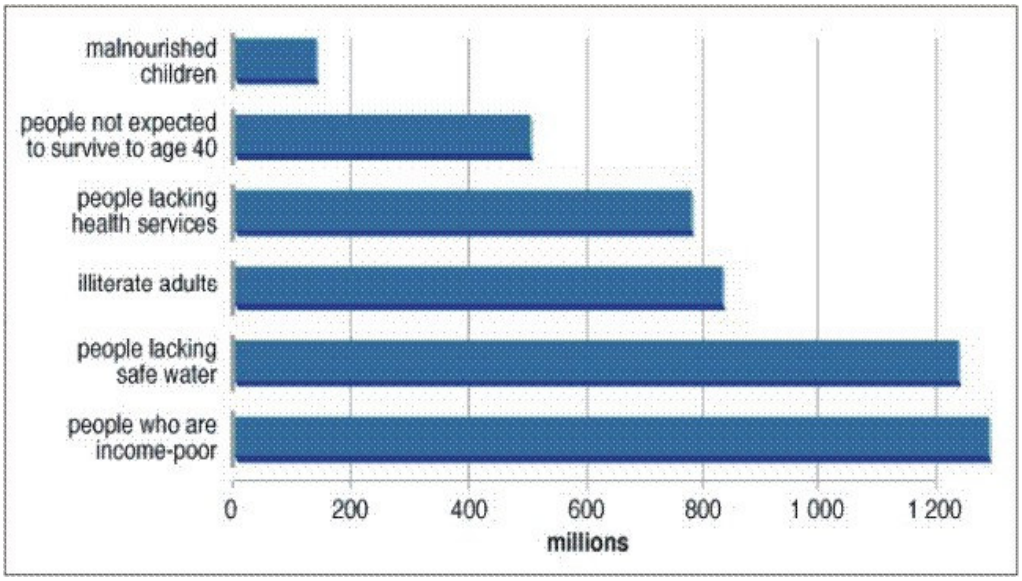

Figure 2.1 The most common poverty indicators according to Human Development Index of UN (source: Human Development Index, 2003)

These indicators are much more conceptualized as "composite index approaches" to better represent poverty. The definition of poverty which had been popular in 1970s and which can be named as the "lack of satisfaction of basic needs" has given its place to the "human poverty" concept. As a result of this, Human Development Index (HDI), developed by United Nations, starting from 1990s, and which is a pioneer to represent poverty by composite indicators of social wellbeing contrasts the "poverty line" approach. HDI measures poverty not only according to the level of income distribution but also considers the level of education and employment, state of health of the individuals, especially of the children and women, access to clean water, as well as factors like women's political participation, degree of

women's involment in decision making, degree of income earning opportunities of women and many other factors. Each of these factors influences poverty in a different way and in relation to each other.

Besides HDI, a strong relationship between education and employment is often referred to as a factor contributing to poverty. If there is low level of attainment of education, or a bad quality education, the level of employment is also effected. So it is not only the question of being employed but getting a secure and regular employment where the earnings are adequate for a decent standard of living. In other words, being employed does not always mean being well off since the factors such as education level and health are directly related to the situation by generating more or less vulnerable spaces to cope with poverty. In general, higher education levels and better health conditions are assumed to indicate less poor in terms of living standards.

Following the example of the Human Development Index introduced by UNDP, many countries have developed composite indices. However, attempts to capture the multidimensionality of poverty with the help of composite indices have often been vitiated by the problem of arbitrary weighting of its components (May, 2001).

In addition, Human Poverty Index (HPI), is another evaluation method of poverty developed and used by UNDP since 1998. The reason behind using this concept is the need to measure poverty, not only according to monetary or income indicators but instead according to the degree of exclusion from minimum social welfare rights. HPI can be useful in measuring: the vulnerability to death at a relatively early age as represented by the percentage of people expected to die before age 40; being excluded from the world of reading and communication measured by the percentage of adults who are illiterate; decent standard of living as the percentage of people with access to health services and to safe water and the percentage of malnourished children under five (UNDP, 1998). Still, despite the efforts in recent years, the poverty analysts recognized that these index approaches are not sufficient to assess all the effects of social exclusion on poverty .

Poverty has to be described not only with its causes but also with its consequences. One major consequence of poverty is that it leads to social exclusion as poverty often isolates people, making it difficult to participate in social institutions. For example, if long term unemployment is a major cause of poverty, the longer a person is unemployed, the less likely he or she is to find employment and the greater the social isolation.

Many consider social exclusion due to poverty to be a recent phenomenon, traceable to the global economic restructuring, family dissolution and strained social contracts of the last two decades. It is thus sometimes conflated with a 'new poverty' or 'structural' unemployment that persists and even worsens despite resumed economic growth (Buğra and Keyder, 2003). Exclusion as a result of poverty may lead to multiple deprivations like breaking of family ties and social relationships, loss of identity and purpose. In the literature, it is also argued that poverty in recent years is an outcome of a change of social contract between the social state and the citizens. As governments decided to withdraw from the western model of the welfare state after 1980s with the effect of neo-liberal economic policies, the conditions of some sections of the population worsen bringing the concept of social citizenship into the discussions (Esping-Andersen, 1996).

Concept of social citizenship developed in Western Europe in the decades following World War II. The initial formulation of social citizenship is attributed to Marshall, 1983. In his thesis, he establishes a match between the historical development of citizenship and that of capitalism, suggesting a kind of solution to inequalities inherent in capitalism through citizenship rights which he regards as a system of equality. According to Marshall, there are three groups of rights. Civil rights define the rights of individuals to 'thought, expression, faith, and rule of law and property and to engage in various agreements'. Political rights, on the other hand entitle citizens to take part in political power, to elect and to be elected. Social rights entail equal access to compulsory education, employment, health and social services and ensuring civil and quality of life confirming high standards to future generations as a social right (Marshall, 1983). Hence, poverty is being deprived of all these three groups of rights.

In addition to all these efforts and discussions to define and measure the multidimensional aspects of poverty, another significant problem is the scale at which poverty is needed to be understood. On this issue, it is argued that poverty should be understood generally in two but specifically in five levels. More than being a multi-dimensional phenomenon, poverty can be understood in macro (global and national), mezzo (provincial / regional and local) and micro (household or individual level) levels according to the national scale (Erdogan, 2002; Anand and Sen, 1997; Şenses, 1996).

In other words, poverty could be examined in three levels theoretically: macro, mezzo and micro levels. In the macro level, it is a well-known fact that a country's economic and political situation cannot be handled without considering the global, that is, each country is a part of the international system. The national level includes; decreasing expenditure on the improvement of working conditions and social services, unstable employment, increasing subcontracted workers, growing informal economy, deregularization of wages, uncontrollable working conditions, diminished unionization of workers. The Mezzo level is another significant stage of comparison of poverty, which is realized within a country according to the local differences of the poverty and development indicators such as employment and education rates, life expectancy, health especially for children between provinces, cities etc. The micro level represents the household level of poverty by indicators of quality of life, such as education level, health, adequate shelter, income (Erdogan, 2002; Anand and Sen, 1997; Şenses, 1996).

Since both macro and mezzo level issues according to the national scale are beyond the scope of this thesis study, they will not be included in the analyses of poverty. On the other hand, results of this study will have implications for policy development for combatting poverty at both macro and mezzo levels. As the conception of poverty can never be complete without understanding the individual level of it, this study examines the micro level which deals with the poverty of the households. The household level can be further recognized as the scale of

investigation for poverty and a different conceptualization of macro-mezzo-micro levels can be defined all over with respect to the household level.

Another important concept is the differentiation between the rural and urban forms of poverty. Both of them are important and must be analysed. Poverty in the rural is based on ownership and non-ownership of land. Also size of plots and fertility of land is significant (Cardoso and Helwege, 1992). Additionally, lack of facilities like schools, health care and infrastructural amenities and clean water are also indicators of rural poverty. Also, lack of access to civil, political and social rights in Marshall's terms is negatively effecting well being in the rural. Urban poverty on the other hand is mainly based on level of employment and education and household size (SIS, 2004). A good level of education and a decent job with adequate income should buy the households good quality housing, infrastructural facilities, access to health and the like. So in fact, in the urban the people are closer to the opportunities provided by the modern urban society. However, some sections can not reach these opportunities even if they live in the urban area. Hence, "unemployment" does not exist in the rural but it is the major discourse of the urban. For this reason, this thesis is engaged with the poverty that happens in inner urban areas of Third World countries which are the continuing habitats of the poor. Furthermore, a study of the micro/individual level of poverty in an urban area is also important for recognizing the conditions of the rural to urban migrants which usually live in squatter settlements in the periphery of large cities in Third World countries (Erdogan, 2002; Anand and Sen, 1997; Şenses, 1996).

Usually, in the developed countries, poor neighborhoods in an urban area (see Figure 2.2, p.13) which are the "poverty clusters", are not dotted around but heavily concentrated in older industrial urban areas, with all signs of decay, contamination, neglect and environmental damage as mentioned by Power (2005) for cities of UK. In developing countries, however, this situation may not be sufficient to define the urban poverty realm. Turkey can be a good representative to illustrate this difference. Turkey has experienced a huge rate of rural-to-urban migration related to fast "de-peasantization". People moved to the major cities which were not

previously prepared for receiving migrant populations to find regular income earning jobs or to find the opportunity of a decent schooling for their children etc. Hence, majority of first generation migrants had to build their own houses, roads and other infrastructural facilities on public land in an illegal status. This was very effective for the emergence of a different urbanization process in the large cities of Turkey, mostly resulting in the emergence of "*gecekondu*" areas. "*Gecekondu*" areas are squatter settlements which are situated in the peripherial areas around the city without legal permission from the authority. Today, most of these areas are no longer in the fringes of the cities, as a result of urban sprawl. Moreover, these areas become enlargened in and around the Turkish cities due to continuing mass migration to major cities. Afterwards some of them were legalized as administratively recognised neighbourhoods and some rehabilitation efforts have started. Even if, there has been some physical upgrading of these squatter areas, the poverty of the households stays as a major problem to be solved in the heart of the cities. On the other hand, the efforts to alleviate poverty are increasing in the recent years in Third World Countries such as Turkey by poverty alleviation programs etc.

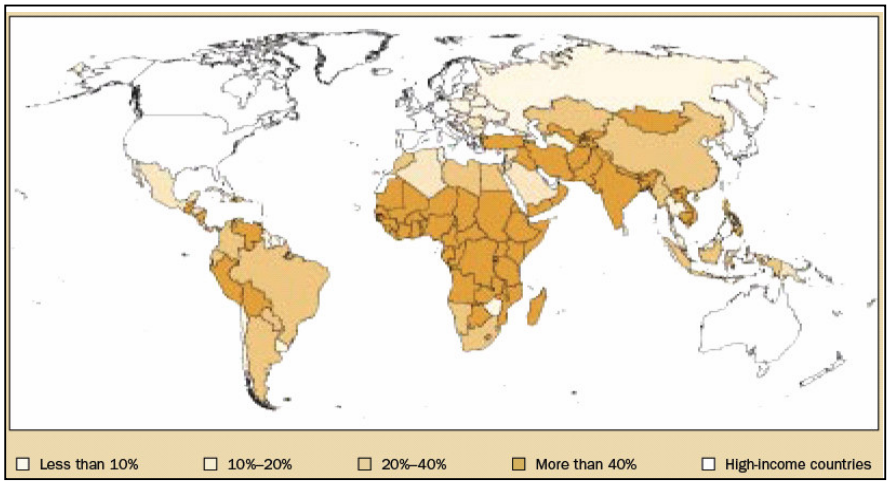

Figure 2.2 Percentage of Urban Population Living in Slums in Different Countries, (source: UN-Habitat, 2003)

2.2. Poverty and Poverty Alleviation In Turkey

Poverty, as defined and discussed above, either in the urban or in the rural, is a factor which reduces the quality of life of the individuals. This fact motivates the efforts for preventing and reducing poverty. The efforts which can reach to broader sections and more numbers of the population are those realized by the national or international level public organizations. In the last years, poverty is understood as a global problem and as a result of international agreements, many programs to alleviate poverty have been determined and started to be implemented. The newly, most popular method for poverty reduction are the social assistance-cash transfer programmes. According to Bigman et. al. (2000, p.5); "..the principle that guides policymakers in planning programmes of this type is how to use the available resources in order to provide the greatest possible amount of assistance to those who need it most". Turkey is one of the countries suffering poverty, where these efforts of alleviation have been increased in the recent years. Therefore, the principle mentioned above should be considered more seriously in Turkey to efficiently maintain the poverty alleviation efforts (see 2.2.2).

2.2.1. Reasons and the Size of Poverty in Turkey

Buğra and Keyder (2005, p.20) state that: "According to a study released by the "Eurostad" in 2004, relative poverty, measured by less than 60 percent of the median income in the country, is 23 percent in Turkey. This is the highest figure among all the older and newer members of the EU, as well as among the candidate countries". This clearly figures out, why Turkey has to consider alleviating poverty seriously.

According to the poverty study by State Institute of Statistics (DİE or SIS, 2004), the percentage of the population below poverty line (not being able to get food and non-food necessities) is 26,96% and the percentage of the population below the hunger line (not being able to get basic food needs) is 1,35% in Turkey. Furthermore, "one dollar a day", which is internationally accepted standard for

absolute poverty, seems to be constituting a very low ratio for the population in Turkey. The poverty ratio tends to increase when the criteria are raised to 2.5 $ or to 4,3 $. Poverty in the rural areas are higher than the urban. Especially, when urban population is analysed poverty is rising seriously as household size is increasing. On the other hand, as level of education is rising poverty rate is decreasing.

Table 2.1 Poverty according to Different Measurements in 2002 for Turkey (source: SIS 2004)

	Poor individuals (thousands)			**Proportion of poor persons (%)**		
Methods	Turkey	Urban	Rural	Turkey	Urban	Rural
Food Poverty (hunger line)	926	376	550	1,35	0,92	2,01
Food and non-food poverty	18 441	9 011	9 429	26,96	21,95	34,48
Persons below $1 per day*	136	10	126	0,2	0,03	0,46
Persons below $2.15 per day*	2 082	971	1 111	3,04	2,37	4,06
Persons below $4.30 per day*	20 721	10 106	10 615	30,3	24,62	38,82
Relative Poverty **	10 080	4 651	5 430	14,74	11,33	19,86

* For the year 2002 1 $ according to the purchasing power parity (PPP) is equavalent 618 281 TL.

** Relative Poverty is defined as 50 % of the median value of equivalent consumption expenditure per capita

Table 2.2 Poverty* Ratio according to Household Size in Urban Areas of Turkey, in 2002 (source: SIS 2004)

Household Size	Household			Persons		
	Total Number (Thou.)	Number of Poor (Thou.)	Ratio of Poor (%)	Total Number (Thou.)	Number of Poor (Thou.)	Ratio of Poor (%)
Total	10 093	1 754	17,38	41 048	9 011	21,95
1-2	1 807	131	7,24	3 201	229	7,16
3-4	5 014	649	12,94	17 994	2 382	13,24
5-6	2 449	635	25,94	13 074	3 461	26,47
7+	823	339	41,15	6 778	2 939	43,36

* Represents food and non-food consumption

PS: The ratios can not be added up to 100 because of approximations.

Table 2.3 Poverty* as Percentages (%) according to the Level of Education of the Individuals of Households in Turkey, in 2002

Level of Education	Share of Population**			Poverty Ratio		
	Turkey	Urban	Rural	Turkey	Urban	Rural
Total	100	100	100	26,96	21,95	34,48
Persons below 6 years of age	10,04	10,79	8,91	33,17	31,18	36,79
Illiterate	11,27	9,53	13,89	41,07	35,88	46,42
Literate without a school education	19,32	18,81	20,08	34,6	29,96	41,13
Elementary school	33,57	29,95	39,01	26,12	21,81	31,08
Primary Education(8 years)	4,7	4,68	4,74	26,47	21,22	34,25
Secondary or equivalent vocational school	6,11	7,08	4,66	18,77	13,8	30,11
High School or equivalent vocational school	11,19	13,8	7,28	9,82	7,06	17,65
University, Vocational School of Higher Education, Master and Ph.D	3,79	5,37	1,43	1,57	1,07	4,37

* Represents food and non-food consumption

** Represents the share of the educational groups within the total population

As the recent quantitative figures of the poor in Turkey are summarized above, background of this poverty picture and the struggle against poverty in the case of Turkey has to be emphasized at this point.

Till the economic crisis in 2001, Turkey had experienced a fast growth rate of urbanization together with rural-to-urban migration. During this period to cope with emerging problems, especially unemployment, the most significant factor is the dynamism of the informal sector in Turkey. The newcomers to the city through integrating into the social and economic networks of the earlier migrants, managed to some extent to stand on their feet in the city, especially in finding work, employment and housing. The early comers to the city, who arrived with the first waves of migration, developed social and economic networks and strengthened their positions and managed to overcome poverty while transfering their poverty to the new / later coming migrants (Işık and Pınarcıoğlu, 2003).

After 1980s, poverty increased in Turkey. According to Işık and Pınarcıoğlu (2001) some reasons for the increasing rate of poverty can be listed as:

1. Changes in the economic policy and implementations
2. The changes in the reasons of migration after 1985
3. Decreasing opportunities for the new comers after 1985s compared with the early migrants
4. Decreasing real wages in the large cities
5. The rising inequalities in the income distribution

Hence new poor groups emerged in the urban areas and the urban middle classes were losing their positions and socio-economic status.

The increasing rate of poverty in Turkey after 1990s is also argued by Buğra and Keyder. According to them, various governments during the 1990-2004 period recognized the fact that poverty is no longer a transitory problem and that it has an

increasing tendency. Based on the recognition of increasing rate of poverty, since 1999, rethinking and restructuring of the existing welfare programs, especially focusing on poverty alleviation, by the state has started (Buğra and Keyder, 2003).

If the results of the study made by World Bank is investigated in order to assess the impact of 1999 earthquake on Turkey, as well as assessing the effects of 2000 and 2001 economic crisis on urban poverty and the emerging coping strategies with poverty, it can be easily seen that;

1. The economic crisis between the years 1994-2001 caused the increase of poverty in urban areas
2. While %2.5 of the population in the year 1994 and % 1.8 in the year 2001 was surviving with one US Dollar a day and below, in the year 2001 this figure was %3 (about 2,6 million persons) (World Bank, 2003).

According to the Human Development Report prepared by UN (2003), Turkey is in the 69. rank in 1995 in the Human Development Index. It was lowered to 86. rank in 1999 among 174 countries and lowered further in the Development Index to 96. rank in 2003. Even if it has raised to 88. rank in 2004 among 177 countries, its overall backward position in comparison to 1995 values has not been changed.

While Turkey is losing in the overall level of development, there is also a differentiation within Turkey among regions. Here the most significant differentiation is between the West and the East. It is possible to observe this differentiation between the regions and the cities from 1997 HDI values. Regarding this fact, the geographical/regional dimension of poverty in Turkey is also an important characteristic.

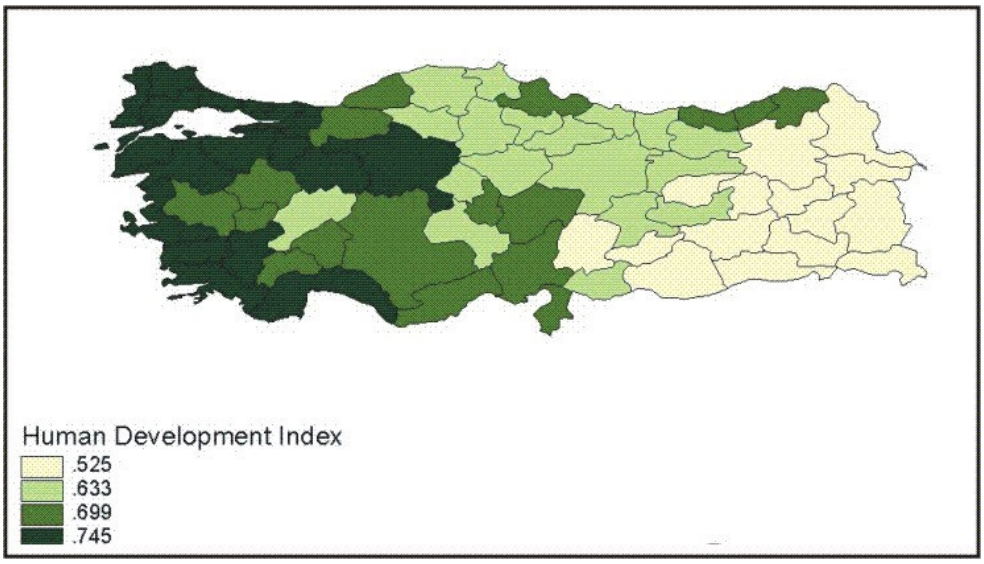

Figure 2.3 Human Development Index for Cities of Turkey in 1997 (source: Turkey Human Development Report (2001)

As discussed by Işık and Pınarcıoğlu (2003), social and economic networks and informal relationships to combat poverty were effective till the 2001 economic crisis. After the crisis this strategy was no longer helpful. However, the crisis was not the only factor to bring this change to the mechanism based on informal relations. Additional factors were the slowing down of the migration to the cities and the gradual decrease in the amount of the urban public land which can be illegally occupied in the outskirts of the large cities. (Işık and Pınarcıoğlu, 2003)

Poverty which emerged after the crisis has a broader base and includes more sections of the population. The newly appeared poverty is not only causing problems for the newcomers to the city, but more than that, it started to effect negatively the sections of the population who have been living within formal relations in the urban. Thus, the increase in poverty has shown a change in terms of quality rather than quantity (Işık and Pınarcıoğlu, 2003).

Buğra and Keyder (2003) named the poverty which emerged after the economic crisis as "new poverty". According to this definition, new poor are not only poor but they have other chracteristics, such as being subjected to the risks of social exclusion, marginalization, and the increasing difficulty of integration in terms of economic relations.

As a result, Turkey which has not developed a comprehensive social security system and well developed policies to combat poverty before the crisis, was forced to develop such policies and implementations very fast. In addition, Turkey made use of the examples and opportunities, like credits from the world about combatting poverty.

As Buğra and Keyder (2003) also discuss, one other reason why Turkey started to think seriously about the poverty alleviation programs is the accession and integration program to European Union. As they claim, when Turkey is trying to integrate, the country has to follow the developments and achievements of the welfare regimes in other Southern European countries. A major development in those countries was the increasing importance of "social assistance component of social policy" and based on this understanding increasing importance of income support to poor families.

In Turkey poverty alleviation programs have started recently, mainly after 1999 as explained above. Some of the major implementations of these programs will be explained below.

2.2.2. Poverty Alleviation Programs in Turkey

As Poverty Alleviation Programs are rather recent in Turkey, the most important institutional implementation is the Social Risk Mitigation Project (*Sosyal Riski Azaltma Projesi - SRMP*) which started under the Social Assistance and Solidarity Encouragement Fund (*Sosyal Yardımlaşma ve Dayanışmayı Teşvik Fonu - SYDTF*).

The Social Assistance and Solidarity Encouragement Fund (SYDTF) is established in 1986 and continuing its activities with affiliated 931 Social Assistance and Solidarity Foundations (SYDVs) in provinces and sub-province centers. For more effective implementation of the social assistance and benefits, the Fund has been given an official status as Social Solidarity General Directorate on 9th of December 2004, by the law number 5263. These foundations work under the governor in the cities and under the mayor in the sub-regions.

After a major economic crisis in February 2001, which caused a series of bankruptcies and massive unemployment, the World Bank has also begun to contribute to social assistance provision by the Fund through the so-called Social Risk Mitigation Project. (Buğra and Keyder, 2005)

The Social Risk Mitigation Loan Project has started to alleviate the impact of the recent economic crisis on poor households, and improve their capacity to withstand such risks in the future (World Bank, SRAP).

The social assistance scheme of the Social Assistance and Solidarity Encouragement Fund (SSF) and Social Risk Mitigation Project is summarized by Kalaycıoğlu (2006, p.243) as:

1) Assistance for Health

a) Support for green card(*) owners for buying medicines

b) General health coverage for those who do not own any land, house or property and no income.

c) Medical help for rehabilitation needs, especially for the disabled people and military personnel who are in need.

2) Conditional transfers : reproductive health for mother and child

a) Assistance for those families who can not make the check ups for their children of 0-6 years of age: there is payment of 17 million T.L. per child (10 Euros)

b) Assistance to the pregnant woman during pregnancy : 17 million T.L. all months through the pregnancy and 55 million (32 euros) if the birth is taking place in a hospital.

3) Conditional transfers: education

a) Educational assistance to children who are continuing their education in elementary school (8 years compulsory education has become the law in 1999 and encouraged) : for each boy 18 million T.L. (10.5 euros) and for each girl 22 million T.L.is paid to the poor families if they send their children to school. For the secondary education the figures respectively are 28 million T.L. and 39 million T.L. Every year these amounts are updated. The educational assistance is paid for 12 months.

4) Transfers of coal: minimum 500 kg or more coal can be given to those households in need.

5) Microcredit projects for the poor families which should be coordinated by the women

6) Support for income earning projects especially for the *poor households* to cope.

(*) Green Card Program is introduced in 1992, to provide health services to poor people who are not covered by any social assistance program.

Conditional Cash Transfers (CCTs) are payments made to the mothers of poor children, providing the children to attend school or visit health clinics. State Institute of Statistics of Turkey (2004, p.12) announced that; "..when the CCT program is fully operational across Turkey, 1 million children will be beneficiaries. As of May 2004, there were nearly 169,000 eligible families, with 420,000 child beneficiaries, so the program is halfway toward its goal". (Worldbank - DİE (State Institute of Statistics) 2004, Joint Poverty Assessment Report (JPAR), Volume Two, TURKEY: Poverty Policy Recommendations December 18, 2004)

World Bank and the Government of Turkey organized the Third International Conference on Conditional Cash Transfers in June 26-30, 2006. In this Conference it was strongly emphasised that due to these transfer programs school attendance rates have increased and considerable help to the poor had been made, between the

years 2003 ve 2005. On the other hand, one point stressed in this conference was the insufficiency of conditional cash transfers to solve the whole poverty problems. A consensus was reached in the Conference about the major aim of these programs "to find the poorest of the poor" and to guarantee that the distribution of aid would be starting from the most in need. In this context it has been pointed to the fact that such aims have not been realized yet. As a result it is argued that "targeting" for studies of poverty has become very important.

The issue of targeting with respect to poverty can be understood as defining the indicators and having a consensus on "who the poor is". Even if this stage is completed, there is a second stage of targeting for interventions which deals with "where the poor is". This considers the usage of geographical targeting as a tool which deals with the spatial dimension of poverty.

The Day 4 - Report (2006) of the conference states that: "Geographical targeting - depending on concentration of poverty can be effective, but is often politically problematic as communities are treated differently in terms of the eligibility for the program".

Even if geographical targeting is mentioned by its political problematic for poverty alleviation process in the conference, there is an important fact that it is accepted as a significant issue. The usage of this method can overcome its problematic issues for poverty alleviation programs. That idea can be confirmed by the evidence on the increase in number of geo-targeting studies of poverty and poverty maps.

2.3. Geographical Targeting for Poverty Alleviation

Geographical Targeting concept increases its popularity for analyzing poverty as the need for efficiency in poverty alleviation programmes increases.

More specifically for the situation of Turkey, geographical targeting or "geo-targeting" for poverty alleviation gains more importance due to the outcome of the

"new poverty" concept. New poverty in Turkey as mentioned above represents that; definition of the poor in the urban areas can not be limited only to new comers any more. In that case, all the efforts to reduce poverty can not be realized efficiently without having a knowledge of the new spatial distribution of the poor in Turkey by the policy makers. When the situation in urban areas are taken into consideration, there is a very major need for understanding the relationship of poverty in its connection to the city and the space. Realization of this need makes "geo-targeting", which is increasingly gaining significance in the world, also an important method for Turkey.

In order to support and discuss the increasing importance of the method of "Geo-targeting", usage of some statistical information about Turkey may be helpful. As Buğra and Keyder (2005, p.3 and 7) point out, "Poverty is closely associated with growth and income distribution. However, the relationship between growth, inequality and poverty significantly varies among different countries. Among 175 countries for which UNDP in 2001 compiles human development indices, Turkey's ranking is 96 while the country ranks the 70th as far as its GDP per capita at purchasing parity is concerned. The difference between the two rankings clearly shows that Turkey is not achieving the human development level which its level of economic development could allow."

In this case, to find the places where the poor live through "geo-targeting" can increase investments and, hence, the welfare and the improvement of the living standards of the poor.

One other issue which should not be neglected is that "new technologies should be used for human development" as pointed out in Human Development Reports 2001 and 2004 for Turkey. In other words, new developments in the computer technologies could be put to use for alleviation of poverty. (Human Development Report for Turkey 2004)

For the understanding of geo-targeting as a poverty alleviation strategy, the point mentioned above in those two reports can be interpreted as usage of new progressive methods in information technologies can be useful for the measurement and identification of poverty.

As the importance of poverty alleviation by the aid of geographical targeting is discussed, the next issue is the implementation of this strategy.

When dealing especially with urban areas, local governments' contribution for poverty alleviation can not be neglected as local governments play an important role at the micro scale of poverty, because they have direct interaction with the poor. Their crucial role for poverty reduction is the service delivery process. (Mokate, 2000)

Far beyond this, urban poverty is an issue in Turkey that generally reveals itself as rehabilitation efforts in squatter settlements occur. In order to develop more effective rehabilitation projects, the socio-economic conditions of the residents must be taken into consideration by local governments. Therefore, investments for urban rehabilitation should target people. The important issue for local governments' interventions to alleviate poverty is to decide; which area/household should get benefits, and which area/household should be excluded? In this situation, geo-targeting for poverty alleviation is required.

The understanding of alleviating poverty by geo-targeting lies under the spatial dimension of poverty. As a multi-dimensional process, the geographic component of poverty is usually analyzed through mapping. The spatial dimension and characteristics of poverty should be emphasized firstly, in order to map poverty and analyze its spatial distribution.

2.4. Spatial Dimension of Poverty

When the word “spatial” is used to define a characteristic of a phenomenon, this means that the data of it can be linked to locations in geographic space, usually via features on a map. (Bailey and Gatrell, 1995)

With respect to this definition, poverty can be called as a spatial phenomenon as it occurs in a geography. This means poverty is presented in some locations and it is not present in other locations as an incidence considering the same measure, or poverty can be measured at a higher degree in some locations than in others.

If the understanding of poverty is based on households, poverty proceeds as highly mobilized in space. This is because, people are mobile and they may change their places. In this situation, mapping incidence of poverty for a region, to represent it as a spatial phenomenon, can be possible by pointing the place of resident of poor people. In this case, scale is an important factor for analysis. The appropriate scale (country, city, neighbourhood, household) to represent poverty as a map is chosen according to geographic units that the analyst needs to compare.

Furthermore, poverty incidence may be more dense in certain areas or the distribution of poverty data in a geography may figure out certain patterns as it is a spatial data. Patterns may be regular, clustered or random. These patterns may result according to different reasons in different places. These reasons may be due to the properties of that land as land values, distance to certain roads, services, workplaces or other urban structures etc. More than that, the pattern recognition may not be completely possible by the human eye on poverty maps. In this case, spatial analyses should be done considering the statistical properties of spatial data.

Another important concept of the spatial characteristics of poverty is the incidence of spatial segregation, usually occuring in urban areas. Marques and Torres (2004, p.3) defines segregation as; “the degree of residential distance among different social groups”. Segregation has become more important as the newer definitions of

poverty widen the concept to human poverty. This situation can be examplified by being less accessible to certain goods and services or social interaction. These may partly be the results of the residential segregation in an area. Marques and Torres (2004, p.4) states that; "social indicators of poor individuals living in poor-peripheral areas are systematically worse when compared to other individuals with similar social characteristics but who live in areas that are mostly inhabited by wealthier groups". However, it may not be possible to visualize it by simply pin-pointing poverty incidents on a map. Instead, more detailed spatial analysis should be done as it is recommended above for the pattern recognition process.

The spatial dimension of poverty that is mentioned above in this part deals with the phonemena as an incidence. On the other hand, the spatial characteristics of poor areas such as low rents may be the results of the decision of poor individuals to settle there, then the poverty of the individuals may itself be a result of the space/geography (Crump, 1997). Jalan and Ravallion (1997) mentioned the term "spatial poverty traps" which is a situation that is observed if a household living in the better endowed area sees its standard of living rising over time, while the other does not. Spatial aspects such as limited access to educational, social and economic opportunities with respect to the geography may cause an increase in poverty according to the term "spatial poverty traps". Moreover, as similar properties of space give the same opportunity to the emergence of similar settlements, poor neighbourhoods may occur in the adjacent places of previous poor areas. Therefore, poor settlements usually tend to cluster together in space and indicate a center of gravity which pulls the poor to that area. Another characteristic of geography which influences poverty is the spatial dependence. This means different factors may cause the emergence of poverty in different places or the same factor may have a different influence on poverty in different places. As a result, the relationship between space and the poverty has to be analyzed in a detailed way in order to discover the reasons of poverty.

Whether the space is reason of poverty or an outcome of it, there is need for developing new methodologies with respect to new technologies to assess the

spatial dimension of poverty. The newly and most popular environment to establish these kind of analysis is the Geographical Information Systems (GIS).

2.5. Importance of GIS for Spatial Data Analysis

Spatial data as mentioned above is the data directly connected to the location of observation. Bailey and Gattrell (1995) state that this situation may have an importance in interpreting the data and the definition of "spatial data analysis" is described by them as; "accurate description of data relating to a process operating in space and the exploration and explanation of patterns and relationships in such data".

During the past years, the spatial data sources (i.e maps, census data, aerial photos) have increased in size and quality as the methods for spatial analyses also increased. As well as simple map measurements, complex procedures are in usage to analyze spatial data. UCGIS(2003) states that this fact has initiated many studies in the geographical sciences. Since, the acquisition techniques and data sources are expanding, different branches of science are involved in geographical analyses. This monitors the reason of increasing implementations of spatial analyses on the data of social sciences (i.e poverty data). The spatial analyzing process of social data is usually a hard task, because mapping a socio-economic variable such as poverty is hard due to its measuring difficulties.

Whether it is socio-spatial or other spatial data, GIS is the latest and most common technology for spatial data analyses with its high capabilities increasing everyday. GIS is used to; "store, manipulate, integrate, analyze and visualize spatial data" (Aronoff, 1993).

A GIS data simply consists of map features whose addresses and locations are geographically coded to map with databases related to them. GIS consists of point, line or polygon features to represent geographical phenomena. This enables the investigator to pinpoint a wide variety of phenomena in geographic space. Once

locations have been established for phenomena, geographically referenced data can be added to the database of a geo-coded feature (Calkins and Eagles, 1995). Furthermore, GIS has a layer based structure, which is an advantage for analysts to extract new information by relating the data in different layers.

GIS also contributes to spatial data analysis by its statistical capabilities. As spatial data analysis is a quantitative approach to geographical analysis, it also includes statistical techniques to analyze why phenomena occur in particular places, and to discover the reasons of it.

An important usage of GIS due to the investigation of the change in statistical measures of data in relation to distance is to perceive an idea of the distribution pattern of data hidden from the direct visual capabilities of the human eye .

Moreover, the socio-economic data mostly relies on statistical analyses. As the demand for the use of statistical techniques for spatial analyses increases, geographical information systems and spatial statistics need to have an interaction. This has to be carried out carefully, in order to figure out better representations of data.

According to the spatial data analysis capabilites of GIS, the spatial dimension of poverty displayed through maps can be generated in a GIS environment. This is the main motivation behind the newly established poverty mapping studies by the help of GIS.

2.6. Previous Poverty Mapping Studies by GIS

Henninger et. al. (2002, p.1) defines the need to use the poverty maps as; “the need of decision-makers for information tools to help them identify areas where development lags and where investments in infrastructure and services could have the greatest impact”.

As a further attempt, Henninger et. al. (2002, p.1) defines “poverty mapping” as; “the spatial representation and analysis of indicators of human wellbeing and poverty which is becoming an increasingly important instrument for investigating and discussing social, economic, and environmental problems”.

Most of the poverty maps are based on small-area estimation techniques or other ones as use of composite indices, including the Human Development Index (HDI) originated by the United Nations Development Programme (UNDP).

Use of poverty maps increased with the availability of mapping technologies, such as Geographical Information Systems (GIS). GIS techniques provide four functions in poverty mapping (Bigman and Deichmann, 2000):

- integration of multiple databases from different sources;
- analysis of spatial association between variables;
- inclusion of spatially generated explanatory variables into the multivariate analysis of the determinants of poverty, including natural capital and infrastructure, and access to public services and product and labour markets; disaggregated poverty measures can serve as an explanatory variable for other outcomes;
- policy comparison and formulation through dynamic mapping or monitoring.

GIS techniques can be used to incorporate spatial analysis into the determinants of poverty or food insecurity. One other most common application is to analyze the causal relationship between poverty and the environment. Lately established poverty maps include regression calculations for ranking indicators of poverty.

Furthermore, Akinyemi (2004 p.3) states that; “the household socio-economic indicators stored in the GIS database enables the intelligent transfer of interventions based on what their needs are, as opposed to what decision makers think the poor need”.

Most of these poverty maps include no more detail than neighbourhood level poverty. These maps are used to figure out an indicator assesment for poverty by small area statistics based on the integration of different datasets to represent poverty (Petrucci, Salvati and Seghieri, 2003). On the contrary, poverty occurs at the household level. The indicators used for creating poverty maps as generalizations for neighborhoods, may not always represent the conditions of poverty at household levels. In order to investigate poverty at household level, where poverty realm occurs, and to identify the reasons behind the clustering of the poor, an alternative study and methodology is needed. This alternative study is infact another method of poverty mapping, as the poverty maps are the outputs of initial objectives and appropriate methodologies.

CHAPTER 3

DESCRIPTION OF THE CASE STUDY AREA AND DATA PROCCESSING PERIOD TO ASSESS POVERTY USING GIS

The efforts to analyse poverty in a spatial context is the last point of the previous chapter. This thesis is an attempt to assess the same issue. In order to achieve this goal, a case study is generated in *Keçiören* district from *Ankara*, Turkey. This chapter summarizes the characteristics of the study area and the steps of data processing which are the initial stages before conceptualizing a methodology based on GIS to assess the spatial dimension of poverty.

3.1. Study Area: Keçiören

As mentioned in the previous chapter, it is possible to view the high rate of urban poverty in Turkey. Therefore, reflection of this situation in geography gains importance. Also, to be able to understand the alternative definition of poverty beyond income distribution is needed. Additionally, there is a need to evaluate the methods of poverty alleviation (eg. social assistance and conditional cash transfers) in terms of their relations to the space. Thus, site selection for the case study has to justify for those needs. Therefore, the poverty data available from *Keçiören* district meets most of the required features for analysis of mentioned aspects of poverty in the thesis. Besides, there are other reasons for the selection of *Keçiören* as a study site from *Ankara* (see 3.1.4.). In order to present the selection criteria of the district, the characteristics of its geographical features, urban development throughout the history and population, is explained firstly.

3.1.1. Geographical Characteristics of Keçiören

Districts neighbouring *Keçiören* are *Altındağ* from the east and southeast, *Yenimahalle* from the South and the West, Kazan from the northeast and *Çubuk* from the North. The distance from *Keçiören* to the *Ankara* city center is approximately 3 km. At present, *Keçiören* has 43 neighbourhoods or "*mahalle*" (quarters of a municipality which is the official name for neighbourhoods in Turkey).

The structure of the centers in *Keçiören* has developed as a linear line through the main roads. In addition, there are also centers which have developed in the fringes of the district within the neighbourhoods.

One important geographical aspect in the district is the topography, which rises towards the north of *Keçiören*. Besides, *Karşıyaka* cemetery and some forest areas exist in the northwest of the district. The main highway surrounding *Ankara* passes through the north of the urban part of the district.

In *Keçiören*, there are 136 public and 27 private elementary / high schools. In terms of higher education within the district, there are institutes affiliated to *Ankara* University Agricultural Faculty and Social Work School of Higher Education affiliated to *Hacettepe* University.

In terms of health, some of the important hospitals are in *Keçiören*. Two most significant ones, as can be seen in the landuse map of *Keçiören*, are Sanatorium Hospital in the North, and *Gülhane* Military Medical Faculty in the South.

Apart from the health and education centers other social service giving units in *Keçiören* are care institutes providing various care facilities. As seen in the Landuse Map (see figure 3.2, p.35) these units are : *Keçiören Çocuk Esirgeme Yurdu* (Child Protection Center), *Keçiören Belediyesi Güçsüzler Yurdu* (The center for the elderly connected to *Keçiören* Municipality), *Adalet Bakanlığı Çocuk Islahevi* (Child Probation Center connected to Ministry of Justice).

Additional important facilities in *Keçiören* are parks and social centers that were constructed recently (see figure 3.1, p.34).

Figure 3.1 A View from Keçiören (Kalaba, Güçlükaya and Çiçekli Neighbourhoods in 2004), (source: Keçiören Belediyesi (2004), "Ankara'nın Parlayan Yıldızı: Keçiören", p.18)

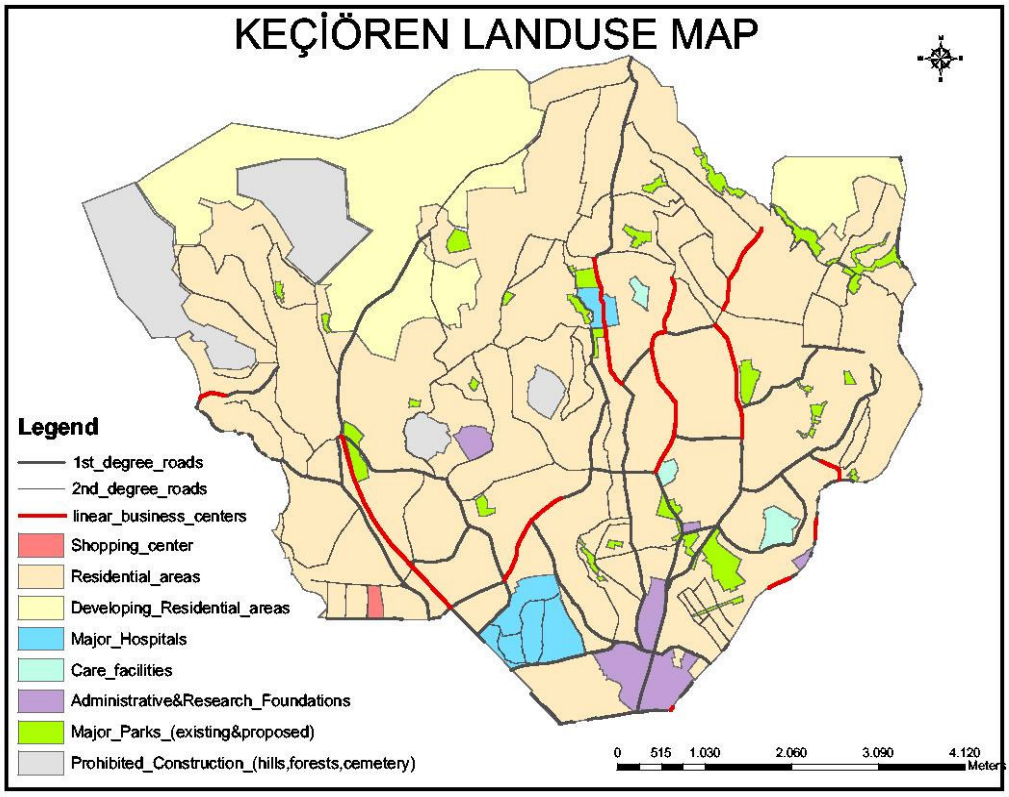

Figure 3.2 Landuse Map of Keçiören (source: Ankara Metropolitan Municipality, digitized in this study)

3.1.2. Urban Development Stages of Keçiören

Keçiören was a recreation place in the North of *Ankara* till 1940s where vineyards and orchards used during summer were found. In the Jansen Plan of 1932 for *Ankara*, it was proposed that this old vineyards and orchards and their typical design should be protected. In 1936, through withdrawing the construction plan to the municipality boundaries, it was suggested that there should be houses with large gardens in the vineyard areas. Between 1940-1950, *Keçiören* and *Etlik* were expanding as two separate areas on the sides of the city, and the transport to the city was provided by public city buses. Gradually the houses in those gardens and vineyards were used both in winter and in summer. *Kalaba* (as a village), *Aktepe, Tepebaşı* and nearby neighbourhoods were within the boundaries of *Keçiören* but *Etlik* was seperate. These neighbourhoods were the core of *Keçiören*. In those years

frequent demands from *Keçiören* for construction were rejected because they did not fit into the Jansen Plan (Şenyapılı, 2004).

In 1940s, although there was an increase in the need for construction, no solutions to the problem of housing were found. Since no houses for the poor were built, the squatter settlements have increased. According to Şenyapılı (2004), those who came to *Ankara* from the rural areas but stayed unemployed, low income groups in the city and those villagers from nearby villages who occasionally came to the city to work, since all of these people could not find suitable houses to live they produced "*gecekondu*"s (squatter settlements) as a solution. In *Ankara*, urban development in places not covered by the plan took place in those *gecekondu* areas. At that time there were only small number of squatter settlements in *Keçiören*, seen near the region called *Etlik* at present. In 1950s, however, there was a serious rise in the number of gecekondus in *Keçiören*. These areas were also the places where the most of poor in the area lived (Şenyapılı, 2004).

In 1950s, besides gecekondu developments, it was possible to see serious urban development in *Keçiören* in the planned areas. As a result of these developments in *Keçiören* and the expansion of the city center and the gecekondu areas around the center, *Keçiören* became a settlement integrated to the city. In those years, seeing the inadequacy of Jansen Plan with regards to population increase in the city, to make a new plan was decided. As a result, a new *Ankara* Plan was prepared in 1957 by Nihat Yücel – Raşit Uybadin, which proposed new settlement areas around *Keçiören* and a dense construction in the order of blocks and parcels in the region. In this plan; the density of net population proposed for *Keçiören* was 100 persons/ hectar; for *Etlik* it was 245 persons/ha. On the other hand, no proposal was made for the increasing number of gecekondu settlements in *Keçiören* and *Etlik* areas.

In the year 1960s, the northern parts of *Keçiören* were full with gecekondu settlements. Especially, *Emrah* and *Aşağı Eğlenc*e neighbourhoods around *Etlik* were fast expanding places (Şenyapılı, 2004).

Table 3.1 Properties of Regions of today's Keçiören District in 1970 according to the 1990 Structural Plan of Ankara

***Etlik* Region**	**Sanatoryum Region**	***Keçiören* Region**	**Aktepe Region**
Middle–Low Income Groups	Low Income Groups	Middle-Low Income Groups	Low Income Groups
Squatter Settlements with Improvement Plans: *Esertepe, Yayla, İncirli*(some parts) neighbourhoods	Squatter settlements: *Kuşcağız, Ufuktepe, Bademlik* neighbourhoods	Squatter settlements: -	Squatter settlements: *Aktepe* (some parts) and nearby neighbourhoods
Legal settlements: *Etlik*, *Aşağı Eğlence, İncirli* neighbourhoods	Legal settlements: *Pınarbaşı* neighbourhood Settlements in prevention zone: the area between *Pınarbaşı* and *Aktepe* neighbourhoods	Legal settlements: *Şenlik, Yakacık, Tepebaşı* neighbourhoods	Settlements in prevention zone: *Aktepe* Neighbourhood
Population (1970): 35195 person	Population (1970): 25283 person	Population (1970): 42284 person	Population (1970): 24121 person

In the 1970s a new plan for *Ankara*, "1990 *Ankara* Structural Plan (1990 Ankara Nazım Planı)" was prepared. In Table 3.1, p.37, proposals of the plan for different quarters of *Keçiören* district today can be seen (Ankara Metropoliten Alan Nazım

Plan Bürosu, 1977). This plan proposed the decentralization of the population living in inner city areas, which also include *Keçiören*, towards a corridor to the West of the city. In the report of the plan, it was pointed out to the fact that around 1970s the legally established areas of *Keçiören* and *Etlik* were mostly inhabited by middle income groups. In those areas (legally established) the population density was measured 203 persons/hectars for *Keçiören* brut and 277 persons/hectars net; for *Etlik* it was 314 persons/hectars brut and 532 persons/hectars net. In the plan there was a proposal for prevention zones in the squatter settlements–gecekondu areas of *Keçiören*. In spite of this, these proposed prevention zones do not cover all of the gecekondu areas in *Keçiören*.

Later with the 1984 law, *Keçiören* was declared as one of the 8 district municipalities connected to the *Ankara* Metropolitan Municipality (see Figure 3.3, p.39). From this year onwards district municipalities started to make 1/1000 scale Construction Improvement Plans (*Islah İmar Planları*) for the gecekondu areas (see Figure 3.4, p.39). These plans were completed for all of *Keçiören* in the year 2004 without any upper-scale plans of the district. In *Keçiören*, with these plans, building density of the settlements have been increased to 4 floor apartment buildings and social infrastructures like education and health facilities were proposed in the periphery where once gecekondu settlements took place. Present physical structure/form of *Keçiören* is related to "Construction" and "Construction Improvement" plans which were made in the last ten years (see Table 3.2, p.40). At this point, it has to be emphasised that there is a need to analyse the impact of such physical rehabilitation process on the social organization and structure. The main question is; as if the squatter housing areas still remain as clusters of poverty in the district, or if there exists a change in the spatial distribution of the poor in the district. Şenyapılı (2005) in her study of *Ankara*, emphasized that, as a result of the decentralization towards a corridor to the west of the city, the well-off groups have left *Keçiören* District, lying in the Center-North of the city. Instead of those who moved out, other households who have improved their conditions and living in other neighbourhoods have moved into *Keçiören*.

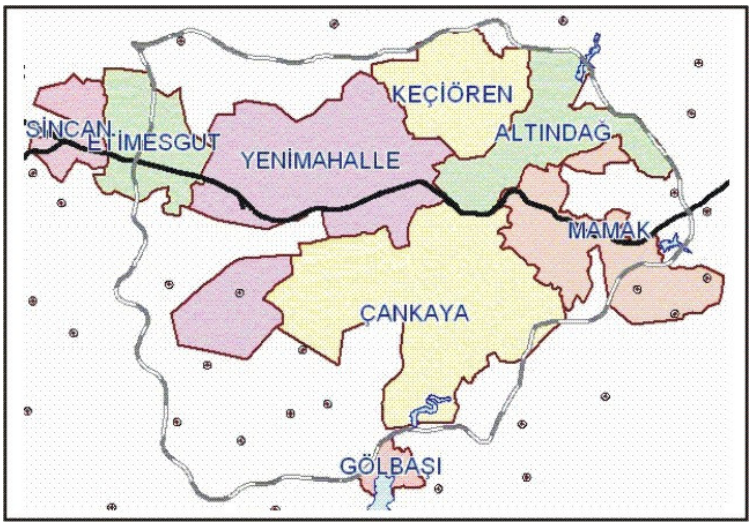

Figure 3.3 The Metropolitan Municipality Districts in Ankara (source: Ankara Metropolitan Municipality Official Website; http://www.ankara.bel.tr)

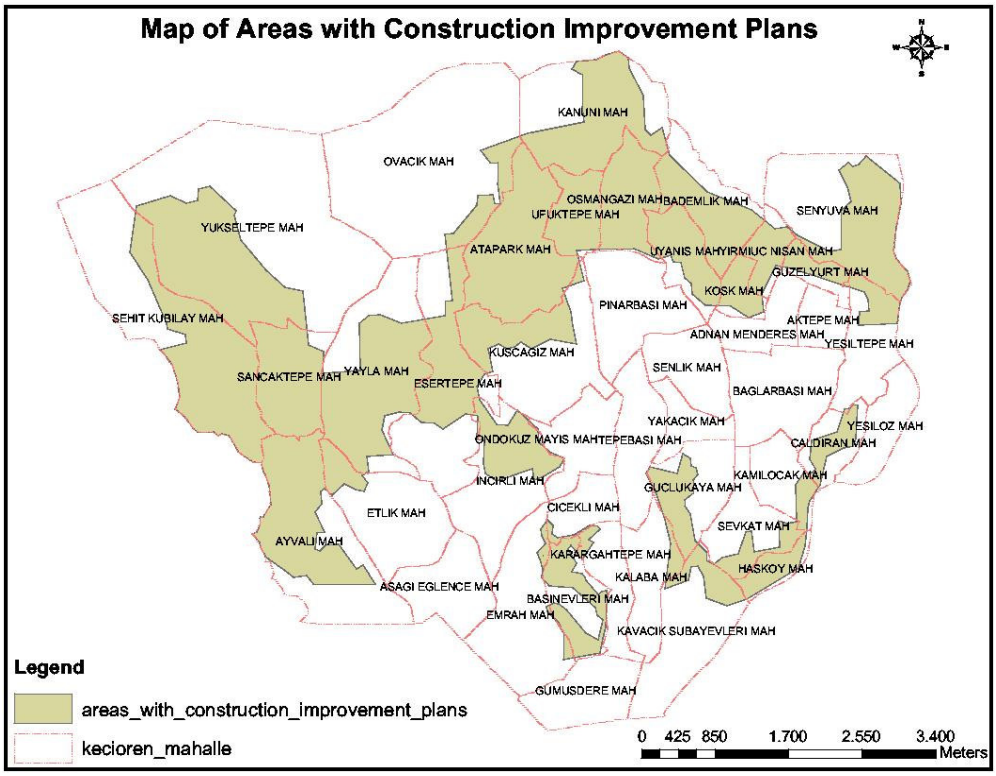

Figure 3.4 Areas with Construction Improvement Plans in Keçiören District

Table 3.2 Neighbourhoods with Construction Plans (1/1000) since 1984 in Keçiören

Construction Improvement Plans (*Islah İmar Planları*)	Construction Plans (*Uygulama İmar Planları*)	Construction Plans that are revisioned (*Revizyon Uygulama İmar Planları*)
*Aktepe **	*Etlik*	*Atapark*
Atapark	*Ovacık*	*Ayvalı*
Ayvalı	-	*Esertepe*
Bademlik	-	*Kalaba*
*Bağlarbaşı **	-	*Yükseltepe*
Basınevleri	-	-
Çaldıran	-	-
Esertepe	-	-
Etlik	-	-
Güçlükaya	-	-
Hasköy	-	-
İncirli	-	-
Kanuni	-	-
Kamil Ocak	-	-
Kuşcağız	-	-
Ondokuz Mayıs	-	-
Osmangazi	-	-
Sancaktepe	-	-
Şehit Kubilay	-	-
Şenyuva	-	-
Ufuktepe	-	-
Uyanış	-	-
Yayla	-	-
*Yeşilöz **	-	-
Yeşiltepe	-	-
Yükseltepe	-	-

* Neighbourhoods that have Improvement Plans, but the boundaries of them are not displayed on figure 3.4, p.39

3.1.3. Population of Keçiören

There is a major rise in the population of *Ankara* after it was announced as the capital of the Republic. During the Independence War the urban population was below 30.000, but in 1927 census it became 74.553. Since that time the population in Turkey has increased 5 times and *Ankara* indicated a 10 times increase. According to the censuses, population increase rate between 1927-1935 is 34,7 % and between 1990-2000 it decreased to 21,4%. Besides, ratio of urban population in the city to the rural population has increased since the city was declared as the capital. Ratio of those whose birth place is not *Ankara* and who came to the city later was 20 % in 1935 but has risen to 47% in 2000. The cities from where most of the migration to *Ankara* takes place are *Çorum, Yozgat, Çankırı* and *Kırşehir*, which are located in the Central Anatolia and nearby cities. This is the general population profile of *Ankara* and this profile reflects *Keçiören* district as well.

In the year 2000, according to Total Population, *Keçiören* with its 672.817 residents is the second highly populated district after *Çankaya* district. This makes *Keçiören* a district with a large population, even lager than most of the "small" cities in Turkey. Additionally, due to the density of the population (although between the years 1990 and 2000 the population increase in *Keçiören* was not high) in the year 2000 with 3,5 persons per square meter, the district has the highest population density among the districts of *Ankara* (see Table 3.3, p.42).

In *Keçiören* average household size is approximately 3,9 persons and this gives it the 6th place among other districts. On the whole there are 172.635 households. The number of crowded households with 5-9 persons in *Keçiören* are high. In fact, *Keçiören* is not in the first place when the districts are evaluated within themselves for this criteria, but *Keçiören* is the district where the most crowded households are found.

Table 3.3 Population in the Metropolitan Districts of Ankara (1990 and 2000), (Source: State Institute of Statistics, 2000)

District	1990 Total Pop.	2000 Total Population	1990-2000 period, annual pop. growth rate, (%)	2000 Urban Population	Area (km^2)	Population Density (pop./area)
Altındağ	422.668	407.101	-0,38	400.023	167	2438
Çankaya	714.330	769.331	0,74	758.490	268	2871
Etimesgut	70.800	171.293	8,83	169.615	49	3496
Gölbaşı	43.522	62.602	3,63	35.308	735	85
Keçiören	**536.051**	**672.817**	**2,27**	**625.167**	**190**	**3541**
Mamak	410.359	430.606	0,48	412.771	471	914
Sincan	101.118	289.783	10,53	267.879	344	842
Yenimahalle	351.436	553.344	4,54	534.109	274	2020

In terms of level of education, when the populations of the districts in *Ankara* are compared according to those who are in the age group 6+ and who have graduated from at least one school, *Keçiören* is in the middle ranges among others due to the within district ratios of 8 districts (shown in Table 3.4, p.43). In terms of elementary and secondary level of school education, ratio within population comes first in *Mamak* and *Altındağ*, but in terms of high school and university education *Çankaya* comes first. In can be seen that total number of persons with elementary or secondary school educational attainments, lives mostly in *Keçiören*.

Table 3.4 Percentages (%) of Population (6+) with respect to the each state of education considering only the graduation of the last school (Source: State Institute of Statistics, 2000)

District	Elementary School	Secondary School	High School	Vocational School of Higher Education	University
Altındağ	54,32	16,25	21,64	3,15	4,65
Çankaya	23,57	13,28	33,84	7,13	22,18
Etimesgut	32,22	15,55	32,84	6,69	12,70
Gölbaşı	50,37	15,74	24,41	3,48	6,00
Keçiören	**42,83**	**18,19**	**28,02**	**4,42**	**6,54**
Mamak	50,09	18,63	23,96	3,18	4,13
Sincan	48,10	18,95	26,63	3,20	3,13
Yenimahalle	34,01	15,21	30,94	6,63	13,22

When the distribution of population between age groups is analysed, the age groups below the age of 15 live mostly in *Keçiören*. *Keçiören* comes second after *Çankaya* when we take age groups above this age. On the other hand, to take the age groups in terms of their distribution within the districts is more meaningful. According to this criteria, among 8 districts *Keçiören* is located in the middle level.

In terms of employment; economically active population in *Keçiören* is 194.817 persons which is nearly one third of its population. These people are mostly employed in non-agricultural manufacturing activities (33%). When economically active population of the districts are evaluated within themselves, *Keçiören* has the highest percent for trade and sales employees according to other districts with 14%. Additionally, the most common economic activity which takes place in *Keçiören* is public and private services (36%) within the district. If economic activities are evaluated within each district, the highest percent for transportation, communication and warehousing is in *Keçiören* by 7,5% within the district.

If building conditions of districts are evaluated, differences can be observed for number of rooms and repair need of dwellings. Flats within *Keçiören* usually have 4

rooms and the proportion of flats for other room numbers are similar with the *Çankaya* district. The values of percentage ratios of houses which need serious repairs or which has to be demolished represent *Keçiören* as the second highest place among other districts (shown in Table 3.5, p.44).

Table 3.5 Percentages of buildings for each type of the Repair Need within the Districts of Ankara in year 2000 (%), (source: State Institute of Statistics, 2000)

Municipality (Districts)	**No Repairing Need**	**Some Repairing Need**	**Serious Repairing Need**	**Need to be Demolished**
Altındağ	38,2	38,4	18,8	3,5
Çankaya	52,4	24,6	9,6	12,3
Etimesgut	68,8	20,5	5,3	4,5
Gölbaşı	66,7	19,3	6,8	6,0
Keçiören	**45,1**	**29,3**	**16,9**	**7,4**
Mamak	42,0	42,9	11,2	2,8
Sincan	73,4	21,6	2,5	1,0
Yenimahalle	69,7	21,3	6,6	1,3

As mentioned above, the major aspect which has to be emphasised is that, even if there are districts which have lower values than *Keçiören* for criteria representing low socio-economic status and living standards; individual level of deprivation in *Keçiören* is higher than all the other districts in *Ankara*. This is due to its second place in terms of number of population and first place in population density among others.

3.1.4. Selection of the Study Area as Keçiören

The reasons for selection of *Keçiören* as the study site is based on three reasons:

1. Firstly, it is one of the oldest districts in *Ankara* where the population increase has risen much more than expected and at present it is the district with the highest population density in *Ankara*.

2. Secondly, in terms of its degree of representation, it can be argued that *Keçiören* represents the average for *Ankara*. Hence, with respect to variables which are useful to understand poverty and the poor, like socio-demographic indicators, level of education, household size and branches of economic activities of the employed population, there is great diversity within *Keçiören*. It can be claimed that this characteristic of *Keçiören* makes it a suitable site for a representative study of poverty in *Ankara*.

3. Thirdly, when urban development and its stages in *Keçiören* are considered, it can be said that the district became a residential place mainly for middle income groups. However, poor groups also settled in this district. Although there are districts in *Ankara* where much poorer households than those in *Keçiören* live, it is easier to differentiate the poor from the non-poor in those areas since polarization is higher. On the other hand, in *Keçiören* it is hard to assess who is the poor and where the poor lives, since the polarization between the middle groups and the poor households are hard to distinguish. Additionally, due to the Construction Improvement Plans in the last ten years in *Keçiören*, it becomes difficult to assess poverty from the physical conditions of the settlement areas. Due to these reasons, *Keçiören* carries a priority rather than other districts of *Ankara*, for studies to be made in order to understand the spatial distribution of the poor and poorer places.

3.2. Data Collection and Manipulation

This thesis is an effort to analyze the spatial dimension of poverty through a case study in *Keçiören*. In order to implement the spatial analysis in this study, necessary and appropriate data should be collected, transfered and manipulated in the GIS environment. Thus, GIS consists of databases and maps which are linked to each other. This means that; the data for this study includes both tabular data as databases and graphical data as maps.

The first step is to represent the data which is used in this study. As a matter of fact, the raw data which is collected initially should be useful for the recognition of the poor. Infact, different data from different sources are merged in this study. The tabular data and the maps and their sources are presented in Table 3.6, p.46.

Table 3.6 Data used in the study

Data	Source
Household survey with the applicants of social assistance in *Keçiören*, 2005 (in .xls format)	Social Assistance and Solidarity Encouragement Foundation (SYDV) under *Keçiören* Local Governors' Office
Building census of *Keçiören* with data according to neighbourhoods in year 2000 (in .xls format)	State Institute of Statistics, Center for Population and Demographic Analysis
Population Census of *Keçiören* in year 2000 (only includes total population for neighborhoods in .xls format)	State Institute of Statistics, Center for Population and Demographic Analysis
Keçiören Neighbourhood (Mahalle) Map (with boundaries)	ASKI (*Ankara* Water Management Department), Infrastructure Information System
Keçiören Road Map (2000)	ASKI

Table 3.6 (continued) Data used in the study

Data	Source
Keçiören Building Map (2000)	ASKI
Ankara Education (Primary, High School) and Health Facilities Point Maps (2000)	ASKI
Keçiören Landuse Map (digitized in this study)	*Ankara* Metropolitan Municipality, Construction and Planning Department
Linear Business Centers and Neighbourhood Centers in *Keçiören* District (digitized in this study)	Gokce's (2000) study on "Centers in *Ankara* Metropolitan Area"
Keçiören's Construction Improvement Plans with boundaries (digitized in this study)	*Ankara* Metropolitan Municipality, Construction and Planning Department (1993), "Metropolitan Area Planning Study for *Ankara* 2025"
Bus Lines in *Keçiören*	*Ankara* Public Transportation Map (2000)
Land Values according to roads of *Keçiören* in hardcopy (prices according to square meter as unit of the land in YTL-New Turkish Lira)	Ministry of Finance and *Keçiören* Municipality Department of Estate Taxation (2003)

The most significant tabular data, that is used as a poverty database in this study, is a Household survey with the applicants for social assistance in *Keçiören*. The data consists of "2037" rows as households with their addresses and evaluation of their poverty levels and some additional attributes about household head and his wife (if exists) for not all but some of the rows. Figure 3.5, p.48 is a screenshot that shows a part of the poverty database after transfering to GIS.

ID	ADDRESS	CONDITION	BIRTHPLACE	EDUCATION	EDUCA_WIFE
1	19 MAYIS CAD 62/1	NEUTRAL			
2	19 MAYIS CAD. NO:72	NEUTRAL		SECONDARY SCHOOL	
3	19 MAYIS MAH CAMLIK SOK NO:31/8	POOR	ANKARA	SECONDARY SCHOOL	ELEMENTARY SCHOOL
4	19 MAYIS MAH CAMLIK SOK NO 23/9	NEUTRAL	KIRIKLI		
5	19 MAYIS MAH FOCA SOK NO:20/1	POOR	SORGUN	ELEMENTARY SCHOOL	ELEMENTARY SCHOOL
6	19 MAYIS MAH GONULCUK SOK 11/1	NEUTRAL	SUNGURLU	LITERATE	ILLITERATE
7	19 MAYIS MAH KARA ELMAS SOK NO:57 KD	NEUTRAL	SORGUN		
8	19 MAYIS MAH OZGURLUK SOK NO:33/1	NEUTRAL	SULEYMANLI		
9	19 MAYIS MAH.GONULCUK SOK.NO.3/1	NEUTRAL	ANKARA		
10	ALACALI CAD 3/7	NEUTRAL			
11	ALACALI CAD NO:6/KD	POOR			
12	ALACALI CAD.4/KD	POOR	ERBAA	ELEMENTARY SCHOOL	HIGH SCHOOL
13	ALACALI SOK 13/8	NEUTRAL			
14	ALACALI SOK 8/4	POOR			
15	ALACALI SOK NO 26/2	NEUTRAL			
16	ALACALI SOK NO 7/2	POOR			
17	ALACALI SOK NO:28/1	FAIRLY POOR			
18	ALACALI SOK.10/529	NEUTRAL			
19	ALTINCIK SOK NO.25/1	POOR	KAGIZMAN	ELEMENTARY SCHOOL	ELEMENTARY SCHOOL
20	ARDESEN SOK 6/3	NEUTRAL			
21	BAGDAT SOK NO 4	NEUTRAL			
22	BAGDAT SOK NO.26	NEUTRAL	KARS		
23	BAGDAT SOK.NO:6	POOR	KUMRU	ELEMENTARY SCHOOL	ELEMENTARY SCHOOL
24	BINAY SOK NO:2/1	POOR	ALACA	SECONDARY SCHOOL	
25	BINAY SOK.11/5	POOR	BOLU		
26	CAMLIK SOK 48/16	NEUTRAL			
27	CAMLIK SOK 58/7	NEUTRAL			
28	CAMLIK SOK NO:14/13	POOR			
29	CAMLIK SOK NO:20	POOR	SAMSUN	ELEMENTARY SCHOOL	HIGH SCHOOL
30	CAMLIK SOK NO:37/17	NEUTRAL			

Figure 3.5 A Part of the Poverty Database for Keçiören

In order the understand who is accepted as "poor" according to this data, the emergence of this data must be summarized. As an initial step, *Keçiören* Local Governors' Office collected and registered all the persons who applied for social assistance and conditional cash transfers between the years 2004-5. The social work experts who are working as affiliated to Social Assistance and Solidarity Encouragement Foundation (SYDV) under *Keçiören* Local Governors' Office had evaluated and ranked the applications by using questionnaires (see Appendix A). According to their evaluations, the conditions of the families who applied for social assistance to the Local Governor's Office were ranked at a 5-point scale as "poor", "neutral" etc. The experts have not used only income poverty but also used criteria of human poverty for ranking. The Questionnaire tends to have an idea of income level, education, health, household composition, conditions of dwelling, vulnerability to poverty, and similar quality of life measures. The aim of the SYDV

in *Keçiören*, in compiling a systematic information set, is for assisting and directing the Local Governor's Office for the amount of social assistance implemented in the district. Futhermore, the Office will have a better view of the level of poverty in the District**.** The results of this effort is accepted as truely representing the poor residents in *Keçiören* district, as a major assumption of this thesis.

The second step after collecting the data, is to link the databases with maps and to link different maps with each other. The GIS software packages used in this study are using relational database structure, so the databases were transfered to GIS with respect to this fact. In a GIS, each row of a database represents a unit on a map. Then, the rows of the transfered databases are linked to the map features. The other part of this step, which is relating different maps to each other is generated by defining the projection and the geographical coordinates of the digitalized maps.

An example for the second step is relating the poverty database to the most appropriate map to represent households in the most detailed geographic position. In this case, the centroids of the buildings in the Building Map is predefined firstly to represent the locations of poor households. Next, the data is geo-coded and snapped to these centroids as points (if there exists) with respect to the address field in the database and a point map of *Keçiören* Poverty Data emerged (see figure 3.6, p.50). Then the land value variable is added to the poverty database as a new field that represents the land value of the households' dwelling unit with respect to the name of the road in the address field. The other example for this step, considers the Neigbourhood Map and constituting a database for it. The fields of Neighbourhood Map's database is managed in order to integrate population and building census data for each of the "43" neigbourhoods/mahalle (the neighbourhood map is shown in figure 3.4, p.39).

Figure 3.6 The geo-coded poverty point data (represented by hexagons) according to the centroids of buildings

The third step of data processing is generating new fields for the databases of maps as a result of the beneficaries of GIS and its single-multiple layer operations. These operations may help to establish new attributes for layers as maps. The new values for new fields can be entered easily through querying from a database or visually selecting the items on a map.

A new field to the road map of *Keçiören* is added in this study which includes three types of values according to the degree of the road. The Road Map consists of road segments for all of the road network in *Keçiören* district and every segment is valued as a 1st Degree Road (Main artery), a 2nd Degree Road (Secondary Artery), or a Street. Afterwards, Linear Business Centers' Map is digitized with respect to the Road Map (1st, 2nd Degree Roads, Linear Business Centers are shown in figure 3.2, p.35).

At the end of data processing period, the outcome is a structure which is composed of different but geographically referenced layers which are maps with databases. These layers are infact vector maps in this study. This means each layer represents its corresponding data with only one of the following feature types as: point, line, or polygon (area).

The next chapter in this thesis, also represents further data as new layers (both in vector and in raster format) or new tables or new attributes that emerged in the process of spatial analysis.The database structure of this study, which is constructed initially before generating these spatial analysis, is presented in Tables 3.7, p.51 and in Appendix B.

Table 3.7 The Database Structure (Layers, Records)

Feature Type	**Layer Name**	**Number of Records**	**Layer's Description**
Point	Kecioren_poverty_data.shp	2037	Distribution of applicants to *Keçiören*'s SYDV with their state of poverty and other social variables (mapped with respect to the household's address)
Line	Kecioren_roads.shp	8750	Road/Street Network of *Keçiören* that consists of road segments with their hierarchy
Polygon	Neighbourhoods_of_ Kecioren.shp	43	Neighbourhoods of *Keçiören* (boundaries and positions are predefined) with populations, average building condition values

3.3. Properties of the Poverty Data

The most significant data of the study is a database of households who applied to SYDV (Social Assistance and Solidarity Encouragement Foundation) in *Keçiören* for social assistance. This data is used as a poverty database since it has emerged as a result of a poverty alleviation effort in the district. As the terms "poverty" and "poverty alleviation" and the conditions of Turkey are defined in the previous chapter, the poverty alleviation efforts and the definition of poverty in *Keçiören* will be the main issue in this section.

In order to make an assessment on the properties of the poverty database of SYDV in the district, previous assessments on other implementations have to be considered initially. Since the two widespread efforts of poverty alleviation in Turkey are the "Green Card" and "Conditional Cash Transfer (CCT)" programmes, their evaluation for *Keçiören* is significant. The "Green Card" scheme covering people who are not covered by any social security scheme and health insurance in Turkey, represents the group of population which can be accepted as poor to some extent. With reference to the numbers of the Ministry of Health in Turkey in November-2006, *Ankara* is in the 17th place among the whole 80 cities of Turkey, with nearly 268000 registered users (Ministry of Health, http://www.saglik.gov.tr/yesil). The cities in front of *Ankara* in this ranking are the cities in the east of Turkey and also *İstanbul* due to its high population. On the other hand, within *Ankara* more than 39000 of the registered users live in *Keçiören*. This makes *Keçiören* as one of the three districts in *Ankara* with high number of registered users. Such registered users may also represent the number of the poor or the possible applicants for social assistance in *Keçiören* district. The second important implementation is the "CCT", which is a type of social transfer to the poor. Nearly 16 % of the households are included in the CCT programme in the Central Anatolian region of Turkey, where *Ankara* is located. Additionally, Central Anatolian region has a share of 0.78 % within the total number of beneficiaries in Turkey (World Bank, 2003). If *Keçiören can be accepted* as a representative sample of its region and *Ankara*, one may say that the district does not involve many poor residents in comparasence to other

regions of Turkey. In order to evaluate this assumption and the geographic distribution of the poor in *Keçiören*, the poverty data has to be defined and analysed in detail.

The first step is to define the poverty data and its properties. The poverty database in this thesis includes two important attributes for each household ; "the state of poverty" and "the address". These two attributes make the usage of this database possible as a poverty data for GIS applications and mapping purposes. On the other hand, this poverty data has limitations which directly influence the meaning of what is mapped on the outputs of the study. Therefore, limitations of the data have to be studied firstly in order to conceptualize the methodology of spatial analysis for poverty in line with the aim of the thesis.

One of the limitations of the poverty data is the absence of the time perspective. This means that the changing trends such as increases or decreases in poverty in different parts of the district can not be observed since the data represents only the situation in 2005. Moreover, time perspective is the cause of possible errors of the data. These errors may happen in twofolds. Firstly, as the poverty data is collected in a period of time (2004-2005), there may be changes in the conditions of the applicants which are previously identified as poor in the database before 2005. Secondly, as the data considers the situation of applicants in 2005, there may be differences up to now.

Another limitation of the dataset is the reliability of the determined poverty level for each applicant household. The poverty database denotes poverty levels of applicants with respect to a 5-scale poverty evaluation of households and a questionnaire which is implemented by social work experts to the applicants. The state of poverty based on this evaluation is not used to determine the beneficiaries of any of the social transfers. Instead it is only used for the statistical considerations of the SYDV in the district. According to this 5-scale evaluation, each applicant household is attributed a status of one of the conditions of poverty, namely as; "fairly poor", "poor", "neutral", "well-off" and "fairly well-off" categories. These categories

represent poverty levels of applicants as a final product of the assessment of different components of poverty which are included in the questionnaire. Even if this evaluation can be accepted as a successful effort for the understanding of the "human poverty" concept, there can still be missing factors or wrong interpretations of poverty of the applicants. Then, reliability of the poverty levels in the data corresponds with the reliability of the observations of experts.

The last limitation of the data is the representativeness of the poverty data for *Keçiören*. The data which is used in this thesis consists of the poverty level and address for each of the 2037 households, and is nearly 25 % of the original number of applications for social assistance to SYDV in 2005. This situation is caused by the fact that, there are missing evaluations for the "state of poverty" and "address" attribute for most of the applicants. In that case, if the poverty dataset of 2037 is a truely representative sample of applicants, it may still be a insufficient data to represent the situation in the whole district. The crucial point in here is that, this data does not include all the poor households in the district. This is classified as "Type I error" as one of the general errors in targeting. Furthermore, it is not a sample which is directly selected from all of the households living in the district. Therefore, this data represents the households in *Keçiören*, who accept themselves as "poor" and apply for some assistance. Also those applicants can be assumed as those who have some level of "awareness" of being poor and information about assistance from the Foundation. On the other hand, some poor households may not be aware of the definition of the "poor" of the Foundation or may not be as informed as the others about their social rights for assistance, and that they do not have enough knowledge and motivation to apply for social assistance. In this situation; institutional advertisements, social networks, cultural values and neighbourly relations have a crucial role for informing the poor to apply to SYDV in the district. The second problem, which is classified as "Type II error" signifies the non-poor population who applied to the social assistance. Despite the fact that, the poverty data of *Keçiören* can identify the non-poor ones according to the 5-scale evaluation, there still can be wrong classifications of non-poor as poor.

Other than the first two limitations, the last limitation of the poverty data which is mentioned above as representativeness has to be defined more precisely in order to establish spatial statistical analysis. For this reason, the method of "Expert Interview" is implemented in October 2006 with different actors in the process of evaluation of poverty in *Keçiören*.

The first interview is carried out with *Mr. Fuat Akarsu* who is the director of the SYDV in *Keçiören*. He is one of the most significant persons having knowledge about the recent social structure and level of poverty in the district. The questions directed towards him in the interview tend to have an idea of properties of the poverty data and poverty alleviation issues according to his personal knowledge and experience. His answers to these questions clarify the issue of representativeness of the data. The second interview with the same questions was conducted with the social work expert, *Mr. Oktay Yüce*, who has implemented the poverty evaluation questionnaires to the applicants of social assistance in *Keçiören* many times. The questions and the answers of both experts are summarised below.

Question 1: Who are the applicants of social assistance in *Keçiören*, are they the poor ones? How do you figure out who are the poor and the beneficiaries?

- Answer of Mr. Fuat Akarsu: "The only criteria for applying to the SYDV is; not having social security. The applicants of the SYDV in *Keçiören* do not have to be poor with respect to their income as the social assistance of the foundation covers different types of monetary and non-monetary aid. This means, the beneficiaries are not only related to their social state of being "poor". An extreme case of social assistance to a non-poor applicant may happen if that resident experiences a sudden severe health problem that involves a costly treatment. Therefore, all applicants may be seen as poor households to some extent. The benefits and the state of poverty of each applicant household is determined after implementing a questionnaire at the residence of each applicant by social work experts."

- Answer of Mr. Oktay Yüce: "The households in the database of the Foundation are not always the applicants due to the hesitancy or misinterpretation of social assistance. The experts may implement questionnaires with households which are mentioned as poor by the *"Muhtar"* (local administrator) of each neighbourhood. The benefits are limited to the households which do not involve any person with social security. The type of beneficiary is specified after the implementation of questionnaires. The beneficiaries cover 60 % of the applicants."

Question 2: Do all the non-poor applicants of social assistance, which are in the poverty database of the Foundation, are poor in some extent? Does the applicants of the database of SYDV which are identified as "fairly poor" or "poor" by questionnaires, include all the poor in the district with respect to the definition of the Foundation? Can the results of the evaluation of poverty by questionnaires of SYDV be accepted truely as always?

- Answer of Mr. Fuat Akarsu: "The households evaluated as non-poor among the applicants do not always get the benefits since they are not poor, but some of them may still need assistance. In this case the "neutral" and "well-off" applicants may be evaluated as "less poor". Also the ones evaluated as "poorest" include the "fairly poor" and "poor" applicants. The poorest ones of the database do not include all of the poor in the district which may be in the same condition. There may also be some errors in the evaluation of the state of poverty of applicants as the questionnaires are implemented by experts whose decisions are sufficient for determining the state of poverty for that household rather than using a pre-defined formula. However, these errors are very rare, less than 5%."

- Answer of Mr. Oktay Yüce: "The database does not include all of the poor in *Keçiören*, and there are possible errors in the evaluation of experts. These errors are nearly 5-10 % of the evaluations, which are mostly caused by the informal economy that can not be identified as it is not registered by the

state. Therefore, non-poor or poor as represented in the database are not always the right evaluation. In that case, expert's view gain more importance for determining the poverty level of that applicant. "Fairly poor" and "poor" ones mostly are the beneficiaries and accepted as the "poorest".

Question 3: What is the number of the poor who are in the same condition of "poorest" ones of applicants in the district? Is this poverty data represent a meaningful sample of the poor in *Keçiören* relative to the population of each neighbourhood?

- Answer of Mr. Fuat Akarsu: "As an expert view of the social conditions of *Keçiören*, it can be argued that, 10% of the population is poor in *Keçiören* and most of them are registered to the Foundation. The poverty data as the sample of 2037 households is truely representing the real situation with respect to the ranking of poorer neighbourhoods relative to the population.

- Answer of Mr. Oktay Yüce: "10% of *Keçiören* can be accepted as poor and the sample of 2037 represents the poverty level ranking of neighbourhoods based on the population. The neighbourhoods; Kanuni/Yükseltepe are high, Şenlik/Pınarbaşı are medium and *Etlik*/Bağlarbaşı are low in the ranking of poverty level which is similar to the case within these 2037 households."

Question 4: What are the sources of information and motivation of households who applied for social assistance?

- Answer of Mr. Fuat Akarsu: "The 40 % of applicants of the Foundation are aware of the type of benefits that they can receive. Others are informed by the SYDV when they apply. The applicants usually learn about the social assistance activities of SYDV from their neighbours and sometimes from the announcements of the Foundation. There is no difference in the awareness of applicants with respect to their cultural values which is related with their social origins. Neighbouring relations have a crucial role as most

of the households apply after figuring out that some of their neighbours receive benefits."

- Answer of Mr. Oktay Yüce: "Neighbourly relations of households and informations supplied by "muhtar" of each neighbourhood are the most important sources of information for the applicants."

Question 5: What is the difference in between the evaluation of the condition of poverty as "fairly poor" or "poor"? What are the main criteria to be accepted poor in *Keçiören* without implementing a questionnaire?

- Answer of Mr. Fuat Akarsu: "In the process of evaluation of the questionnaires, the Foundation has informed the experts who implement the questionnaires to identify the "poor" applicants who need urgent social assistance. Therefore, these ones are accepted as "fairly poor". In fact, the main criteria to be accepted as poor without implementing a questionnaire or to be evaluated as a "fairly poor" applicant after implementing a questionnaire are the same.. These conditions are; a household which includes disabled/chronically ill person, single parent woman household who is divorced/widow with low level of education, and some other conditions which are observed by the experts during the process of implementing a questionnaire."

- Answer of Mr. Oktay Yüce: "The "fairly poor" and "poor" categories are differentiated by the urgent conditions of the "fairly poor" ones as; a household which includes disabled/chronically ill person, single parent woman household who is divorced/widow with low level of education and the applicant may be in the absolute level of poverty based on lack of income. There may be also other important conditions which are observed by the expert during the process of implementing the questionnaire in the residential place of the applicant. The SYDV has developed another scheme

recently to evaluate the poverty of applicants which will be based on a new questionnaire, (see Appendix A)."

Question 6: What is the difference between the method of evaluation of poverty by Conditional Cash Transfer (CCT) questionnaires and the evaluation of poverty which is in the database of the SYDV in *Keçiören*?

- Answer of Mr. Fuat Akarsu: "The CCT programme has its own questionnaires and own evaluation method based on a previously defined formula, which is only known by the General Directorate of Social Assistance and Solidarity. The most important difference is that the evaluations of the questionnaires of SYDV mainly rely on the expert's view. On the other hand, the questionnaire of CCT does not consider the differences between urban and rural places and the specific conditions of Turkey/*Keçiören*. In this case, it does not reach its main goal, which is to involve the poorest 6 % of the population as beneficiaries."

- Answer of Mr. Oktay Yüce: "Expert's view has an important advantage in the stage of evaluation of questionnaires which are used in SYDV. The questionnaires can not guarantee the evaluation of informal relations such as the solidarity between the neighbours and the family. Furthermore, there are different questions in the questionnaires of SYDV in *Keçiören* considering the local conditions of the district and Turkey."

Question 7: Which places of *Keçiören* are poorer and is there any difference in this picture during the recent years after the implementation of Construction Improvement Plans? Does the average building conditions or the landuse of an area display the amount of "poorest" applicants in that area?

- Answer of Mr. Fuat Akarsu: "The neighbourhoods in the north of the district are poorer than the others but this trend is changing day by day. Some of the poor in improved areas are not poor any more as they have become property

owners, and the others migrate to other places in the city which are still *"gecekondu"*. These result in the decrease of the poverty level difference between the places in the north and the remaining parts of the district. Therefore, it is harder than before to recognize the poverty of an applicant based on the building type and landuse of his/her neighbourhood."

- Answer of Mr. Oktay Yüce: "Kanuni/Yükseltepe etc. neighbourhoods that are in the north of the district are poorer, but the number of poor living in those neighbourhoods are decreasing in improved areas. The building conditions on the other hand, does not represent the poverty of an applicant, even if it is a *"gecekondu"*. These squatter houses display a low level of infrastructure or their residents live in a unhealthy environment, but this does not represent their income based poverty level. The ones living in those houses pay less for the rent and get free coal etc. Moreover, most of the poor living in those buildings do not feel that these conditions are unhealthy. Therefore, living in unhealthy conditions may be a preference and the poor applicants living in apartment buildings may be poorer to some extent."

The most important result of these interviews for the analysis part of this study is the indication of the need for the assesment of local poverty conditions in *Keçiören*. The experts could not identify the poverty conditions with respect to the local geography in details even the address of applicants exist in the database. This clearly displays that, the spatial component of poverty is not analysed in a detailed perspective for *Keçiören* before. If this kind of an analysis is established, it can be beneficial for determining the prior areas of intervention.

The other significant results of these interviews for the conceptualization of the methodology of the thesis are:

- For a better representation of the spatial distribution of poor, "fairly poor" and "poor" ones in the applicant data are classified as "poorest" households and the others as "less poor", as mentioned by the experts. Furthermore, the

"fairly poor" category is not analysed distinctly from the "poor", as the only difference in the definition is the urgency. Therefore, even there exists a difference in the spatial statistical properties of their distribution, this does not represent a confident result with respect to the definition of the experts.

- The total number of poor in *Keçiören* in 2005 can be estimated as 10% of the population in accordance with the experts views. Firstly, the total population of *Keçiören* in 2005 is calculated as 741200 with reference to difference in the population between 1990 and 2000. This means 74120 people and 19000 households are poor according to the average number of households in the district. As the "poorest" ones in the poverty data is 1401, it represents 7 % of the total poor in *Keçiören* in 2005.

- The data is representative for neighbourhoods according to the experts. In this case, comparison of the poverty level of neighbourhoods is possible.

- Statistically correlating poverty with the average building conditions of neighbourhoods is not suitable and meaningful according to the experts' view.

Next chapter of the thesis describes the methodology of the study and implementations of spatial analysis based on the poverty data for *Keçiören* with respect to the data properties which are mentioned above.

CHAPTER 4

ASSESSMENT OF THE SPATIAL DIMENSION OF POVERTY IN KEÇİÖREN USING GIS

This chapter deals with the main issue of this thesis, which is the assessment of the spatial dimension of poverty, as a case study in *Keçiören* District. In this respect, the methodology of the study is conceptualized as a first step. Afterwards, the spatial analyses which are mentioned in the methodology are carried out by the help of GIS and the results are obtained. Lastly, these results are discussed in order to generate information on the geography of the poor in the district.

4.1. Methodology

The aim in this thesis is to investigate the spatial characteristics of poor residents in an urban area in order to increase the efficiency of poverty alleviation efforts. This general term is conceptualized by two major approaches in this study, which are;
1) The identification of more vulnerable spaces of poverty which is the detection of "poorest of the poor",
2) The identification of similar settlement properties of poor residents.

The proposed methods to achieve these two approaches accordingly, are;
1) Geographical targeting of poorer areas, which is investigated in terms of the "spatial densities", "clustering" and "locational quotients",
2) Relation between poor residents and urban landuse features, which is explored in terms of "buffer analysis" according to map distances, "density analysis" by overlaying poorer areas and landuse and "hypothesis testing" on tabular data values.

1) The first proposed method is realized in two dimensions, in this study, according to the scale of analysis; as macro and micro levels of poverty analysis for *Keçiören*.

Afterwards, a third scale is introduced, namely as the mezzo level of poverty analysis.

- Macro level represents a global view to the district which consists of two type of analyses. First analysis is the *"Density Analysis of the Poorest households"* which is carried out in order to display the compact areas of the poorest applicants according to their residential locations. "Poorest" applicants of the poverty data are defined in the previous chapter according to the experts' view, as the "Fairly Poor" and "Poor" applicants of social assistance in the district according to a 5-scaled evaluation of the state of poverty by the social work experts. A further step in this analysis is the investigation of this situation in relation to the population of neighbourhoods. Hypothetically; the denser areas of these households maybe due to the high population in those areas. The second analysis considers a comparison of neighbourhoods (*mahalle*) which is carried out as a *"Location Quotient (LQ) Analysis of Poverty for Neighbourhoods"*. Poverty level of neighbourhoods are assumed to be represented by the ratio between the total number of poorest applicants located in each neighbourhood and the neighbourhood's population. In order to perform local scale analyses on poverty data, the tendency of the spatial pattern of the poorest residents have to be known for different regions of the study area based on their poverty levels. This is fulfilled by *"Pattern Analysis of the Poorest households"*, which can be accepted as an analysis that figures out the interaction between macro and micro level. This spatial pattern may be regular, clustered or random.

- Micro level analysis of this study indicates the exploration of local scale spatial patterns of poverty rather than a generalization for the overall area or neighbourhoods. The analyses of this scale helps to identify the local clusters of poorest households indicating the places of residential isolation of that social group in *Keçiören*. *"Cluster Analysis of Poorest Residents"* is

analysed according to the geographical locations of the poorest applicants for each region as a subgroup of poverty level in the district.

- Mezzo level of poverty analysis in this study represents an alternative scale of analysis of poverty which is in between the macro and the micro levels. It is developed as a result of the need to monitor the poorer areas, which are the prior areas of interventions, in more detailed perspective. The macro level of poverty as neighbourhoods is coarse for interventions due to the broad administrative borders, and the micro level as a single household which points out only to a building is too small for an area of intervention. For the case of Turkey, as there is no smaller administrative quarter of a district than neighbourhoods exists, a new and smaller partitioning (segmentation) is needed to be established in order to represent the poverty in the mezzo level of *Keçiören*. Other than monitoring the prior areas of intervention of poverty alleviation, this new scale also displays the spatial interaction between poorest and less poor households with respect their local adjacencies. The appropriate segments of this new level accepted for this study are based on the *thiessen polygons* of the poverty data. Then the poverty condition of each applicant is assigned to the overlapping thiessen polygon. The *"Spatial Analysis of the Poverty by Thiessen Polygons"* is carried out by two types of analyses that are established for this level, which are; local mean calculation in order to represent the isolation of the poorest households and local outliers calculation in order to represent the spatial integration of poorest and less poor households.

2) The second proposed method consists of three kinds of analysis:

- First analysis considers the calculation of road density in relation with the results of analyses that are mentioned above in the first proposed method. Therefore, the *"Road Density Analysis of Poorer Areas in the District"* is implemented for clusters of the poorest households, densely populated places of poorest households and isolated / integrated thiessen polygons of

the poor respectively. The ratio between the total road length in the overlapping polygon and the area of each polygon represents the road density.

- Second one is an effort to discover the possible relation between the state of poverty of applicants and the land value of the dwelling unit of the corresponding household for each record of the poverty database table. This analysis considers only a statistical *"Comparison of Poverty and Land Value by a Hypothesis Test"* on tabular data without using the associated map distances between records. Hypothetically, the poor people tend to settle mostly on the land with lower monetary values. Moreover, the poverty data layer of applicants can be mapped according to the land value attribute in order to visualize the land values on a map and to compare with the results of spatial analyses of this study.

- Third one includes *"Buffer Analysis of Main Roads, Bus Lines, Education Facilities, Health Facilities, Linear Business Centers and Neighbourhood Business Centers"*. These service facilities which are analysed by buffers are the selected urban landscape features for this study. The buffers are generated for every unit of each feature for 100 – 150 – 200 – 300 – 500 meters of distances. The selected distances are the most appropriate ones in order to indicate pedestrian accessibility to the services with respect to the neighbourhood scale of residential locations other than the city scale where the network analysis of distances are the main issue of accessibility. Ratios of applicants for each category of condition of poverty to the total number of applicants located in each buffer is calculated and compared to the ratio of the overall poverty database with 2037 applicants in *Keçiören*. In this respect; if the ratio for each category to the total number in the buffers is generated for a feature, it has an increasing tendency for decreasing distances to that feature; this situation can be emphasized as a spatial characteristic of poor residents in *Keçiören* district.

The results of the most of these spatial analyses are displayed in figures as overlapping with neighbourhoods which are labeled with the “Id” field. The name and id of neighbourhoods are given in Table 4.1, p.67.

After completing the spatial analyses associated with the two proposed methods mentioned above, the following stage of the study includes the discussion of the results of the spatial analyses in relation to each other and according to the characteristics of the study area. Furthermore, the characteristics of the study area as properties associated with the buildings are displayed in the discussion part.

As the methodology of the study is formed by explorative spatial data analyses, the general characteristics of these analyses have to be highlighted initially before explaining each analysis in detail.

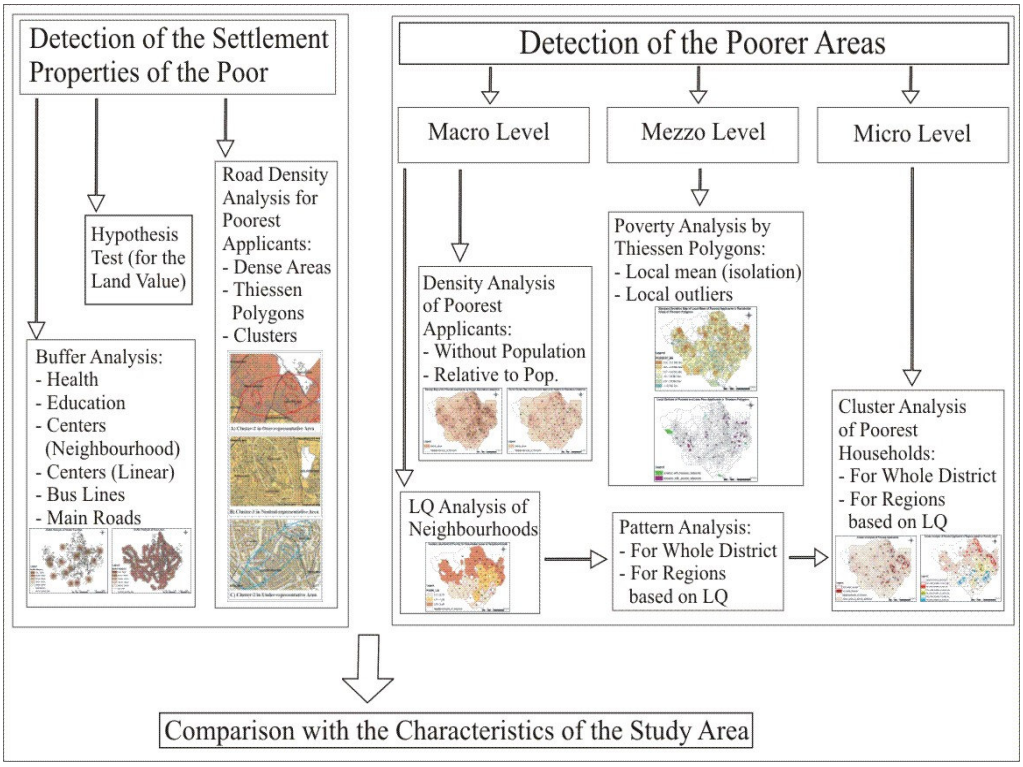

Figure 4.1 The Flowchart of the Methodology of the Study

Table 4.1 Name and Id Number of the Neighbourhoods in Keçiören

ID	**Mahalle / Neighbourhood**
1	*Adnan Menderes*
2	*Aktepe*
3	*Atapark*
4	*Ayvalı*
5	*Aşağı Eğlence*
6	*Bademlik*
7	*Basınevleri*
8	*Bağlarbaşı*
9	*Emrah*
10	*Esertepe*
11	*Etlik*
12	*Gümüşdere*
13	*Güzelyurt*
14	*Güçlükaya*
15	*Hasköy*
16	*Kalaba*
17	*Kamil Ocak*
18	*Kanuni*
19	*Karargahtepe*
20	*Kavacık Subayevleri*
21	*Kuşcağız*
22	*Köşk*
23	*Ondokuz Mayıs*
24	*Osmangazi*
25	*Ovacık*
26	*Pınarbaşı*
27	*Tepebaşı*
28	*Ufuktepe*
29	*Uyanış*
30	*Yakacık*
31	*Yayla*
32	*Yeşiltepe*
33	*Yeşilöz*
34	*Yirmiüç Nisan*
35	*Yükseltepe*
36	*Çaldıran*
37	*Çiçekli*
38	*İncirli*
39	*Şehit Kubilay*
40	*Şenlik*
41	*Şenyuva*
42	*Şevkat*
43	*Sancaktepe*

4.2. Explorative Spatial Data Analysis

Spatial analysis are used to measure properties and relationships of geographical phenomena. If a spatial analysis method indicates an exploration of the data, it is called an Explorative Spatial Analysis. Anselin (1994, p.45) defined exploratory spatial data analysis (ESDA) as "techniques to describe and visualize spatial distributions, identify spatial outliers, discover patterns of spatial association (spatial clusters) etc". One of the most important characteristic of ESDA is that, this type of spatial analyses do not generally depend on assumptions of the distribution of data, instead they stay close to the original data. Most of the ESDA techniques can be realized easily in GIS environment by recent developments in spatial analyses capabilites of GIS softwares.

Carvalho (2003, p.1) states that; "..a Gis, besides the visual perception of the spatial distribution of the phenomenon, is very useful to translate the existing patterns into objective and measurable considerations". This is a crucial point which is in the center of the methodology of this study which is based on GIS.

Haining and Wise (1997) classifies ESDA methods into two groups as;

- Global or whole map statistics which process all the cases for one (or more) attributes,

- Focused or local statistics which process subsets of the data one at time and which may involve a sweep through the data looking for evidence of smooth and rough elements of the mapped data.

Poverty data which is a type of social data is the main issue of spatial analysis in this study. The spatial analyses for social data are usually practiced for two cases. First one deals with analyzing area data such as neighbourhoods which has boundaries and neighbours. Second one is the analysis of point data such as residential addresses of survey respondents for possible patterns.

The spatial analyses for point data of poverty which are used in this thesis can be classified into two groups according to the property of data that is analysed. The mentioned properties of spatial data are first and second order properties of spatial data.

Bailey and Gattrell (1995) defines them as; the first-order properties to include the intensity of the process, which is the mean number of events per unit area and the second-order properties or spatial dependence of a spatial point process which involves the relationship between numbers of events in pairs of subregions within total area.

Density and pattern analyses in this study clearly reflect the effects of these two properties on spatial analyses. The density analyses in this thesis which are generated according to the Kernel Estimation Method are concerned with the first order effects, and the pattern analysis in this thesis which is based on Nearest Neighbour Distance Method is concerned with the second order effect.

Next, these explorative spatial analysis and all the others that are mentioned in the methodology are explained in detail.

4.3. Density Analyses of the Poorest Households

One of the explorative analysis in this study is the density analysis. Density maps are usually used in the analysis of point and line data, displaying concentrated areas of features. The analysis create a continuous surface, using the features as input. The values of the output surface is calculated according to the features of the input map with respect to a pre-defined search area .

Kernel Estimation is the selected method for analyzing densities of the locations of households, which are the poorest applicants of social assistance in *Keçiören*. Kernel density function does an interpolation as a generalization of incident

locations to entire area, not as estimating values for locations with no event. It is advantagous for generating smoother surfaces according to the other density analysis techniques.

A kernel or k( ) is a suitably chosen bivariate probability density function which is symmetric about the origin. Distance of each incident, that falls within a predefined region according to bandwidth ($\tau > 0$), to the grid cell's center is measured by this method. Each observation contributes to the density value of that grid cell based on its distance from the center. Nearby observations are given more weight in the density calculation than those farther away. Moreover, there may be edge effects according to the study area in the calculation of densities. In that case, edge correction factor is used which is the volume under the scaled kernel centered on a location (s) that lies inside the area (R). The formulation of the kernel density for a general location as "s" in a study region where "s_1, ..., s_n" are the "n" observed locations, and k( )=kernel, is given in Formula 4.1:

$$\hat{\lambda}_{\tau}(s) = \frac{1}{\delta_{\tau}(s)} \sum_{i=1\tau}^{n} \frac{1}{2} k\left(\frac{(s - s_i)}{\tau} \right) \tag{4.1}$$

τ = Bandwidth

$\delta\tau(s)$ = Edge correction factor

By the improvements in the spatial analyses capabilites of GIS softwares, Kernel Density analysis has become easier. The analysis in this section are carried out by the help of Crimestat, Surfer and ArcGIS softwares. The crucial point for generating this analysis in a GIS software is the selection of appropriate bandwidth.

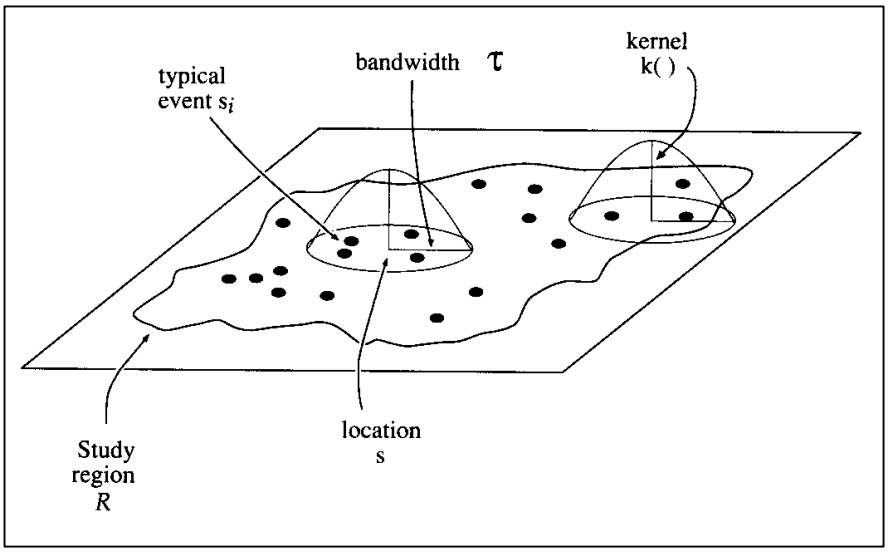

Figure 4.2 Kernel estimation of a point pattern (source: Bailey and Gatrell, 1995, p.86)

The bandwidth determines the amount of smoothing of the point pattern. The bandwidth defines the radius of the circle centered on each grid cell, containing the points that contribute to the density calculation. In general, a large bandwidth will result in a large amount of smoothing and low density values, producing a map that is generalized in appearance. In contrast, a small bandwidth will result in less smoothing, producing a map that depicts local variations in point densities. Using a very small bandwidth, the map approximates the original point pattern and is spiky in appearance. (Bailey and Gatrell, 1995)

In this study, "adaptive bandwidth" is used for kernel estimation rather than deciding on a fixed bandwidth distance. This type of bandwidth increases the precision of the output estimates as mentioned by Bailey and Gattrell (1995). An adaptive bandwidth automatically adjusts the bandwidth distance according to the sample size. The minimum sample size from the poverty dataset is selected as 5, in order to get a finer resolution of the spatial distribution. The kernel density analysis is established for two cases in the thesis. First one only considers dense areas with

respect to the geographical distribution of the poorest households. The second one is a dual kernel density function of the location of poorest households relative to population. This second analysis uses a secondary file which is the centroids of neighbourhoods including the population attribute. Furthermore, density analysis maps are overlapped with the neighbourhood map which is labeled by "id" in order to assess the denser ones.

4.3.1. Density Analysis of the Poorest Households

The poorest applicants to social assistance in *Keçiören* can be assumed as a meaningful sample with a similar spatial distribution in the district as the whole poor residents as mentioned by the experts. Then, the kernel density analysis of 1401 households which are the poorest (both poor and fairly poor ones) of 2037 applicant households can be interpreted as the compact areas of poverty in the district. As all applicants are somehow poor, at least they accept themselves as poor, density analysis is initially carried out for both poorest applicants and for all applicants. The results were interestingly similar in these analyses, infact more similar than the visual interpretation of human eye as the values correspond to each other. With reference to this situation, analyses in this part include only the case of poorest applicants representing the density of the poor in the district shown in Figure 4.3, p.73.

It is clearly seen from the adaptive kernel density map that; most of the dense settlements are in the neighbourhoods namely as; *Yükseltepe, Sancaktepe, Adnan Menderes, Güzelyurt, Yirmiüç Nisan, Yeşiltepe, Kalaba, Güçlükaya, Şevkat, Kanuni, Bademlik*, and the core group which consists of *Uyanış, Pınarbaşı, Ondokuz Mayıs, Tepebaşı, Yakacık, Şenlik.* The secondary dense areas are in *Şehit Kubilay, Yayla, Köşk, Bağlarbaşı, Çaldıran, Aşağı Eğlence, Atapark, Kuşcağız, Osmangazi, Aktepe* neighbourhoods (see Table 4.1 for Name and Id of Neighbourhoods, p.67). More brief discussion on the results of these analyses are given in the last part of this chapter.

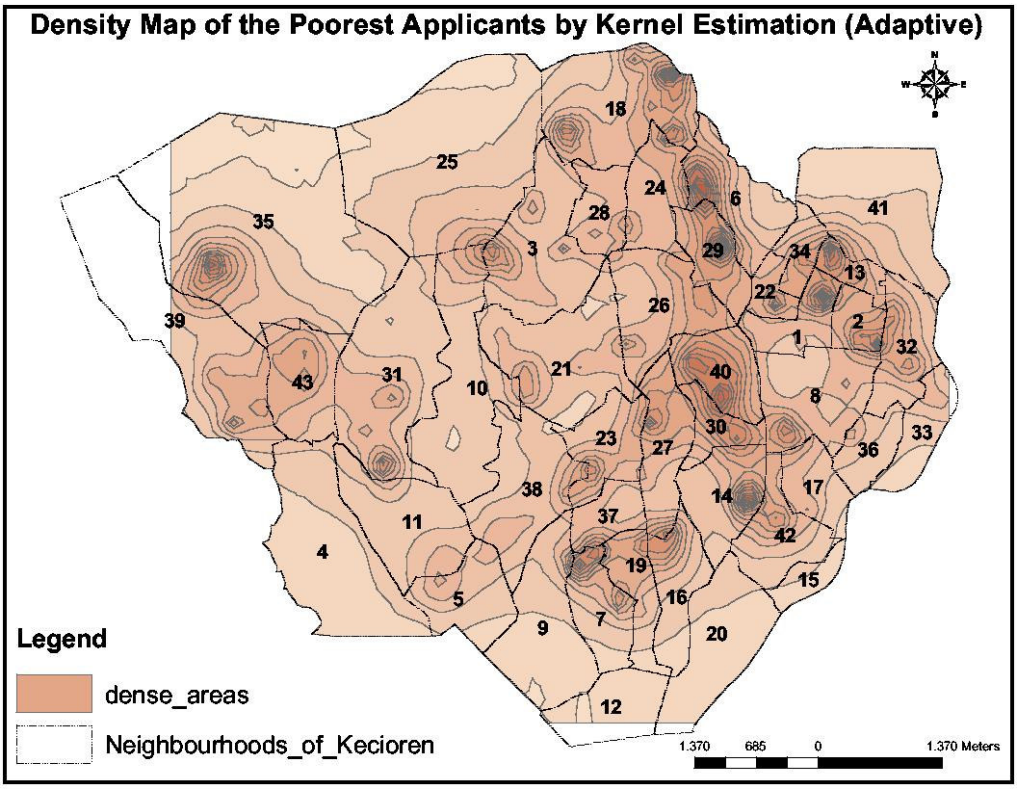

Figure 4.3 Density Analysis of Poorest Applicants by Kernel Estimation Method (Adaptive with minimum sample size = 5)

4.3.2. Density Analysis of the Poorest Households Relative to Population

The second kernel density analysis in this thesis involves ratio of the density of poorest household locations with respect to the underlying population which is assigned to each of the centroids of neighbourhoods in *Keçiören*. The reason for the creation of this density map is to assess the real distribution of poorer areas in the district and for further investigation of landuse in those areas. The kernel density map of this analysis is an important evidence on the spatial characteristics of the poor in the district (shown in Figure 4.4, p.74).

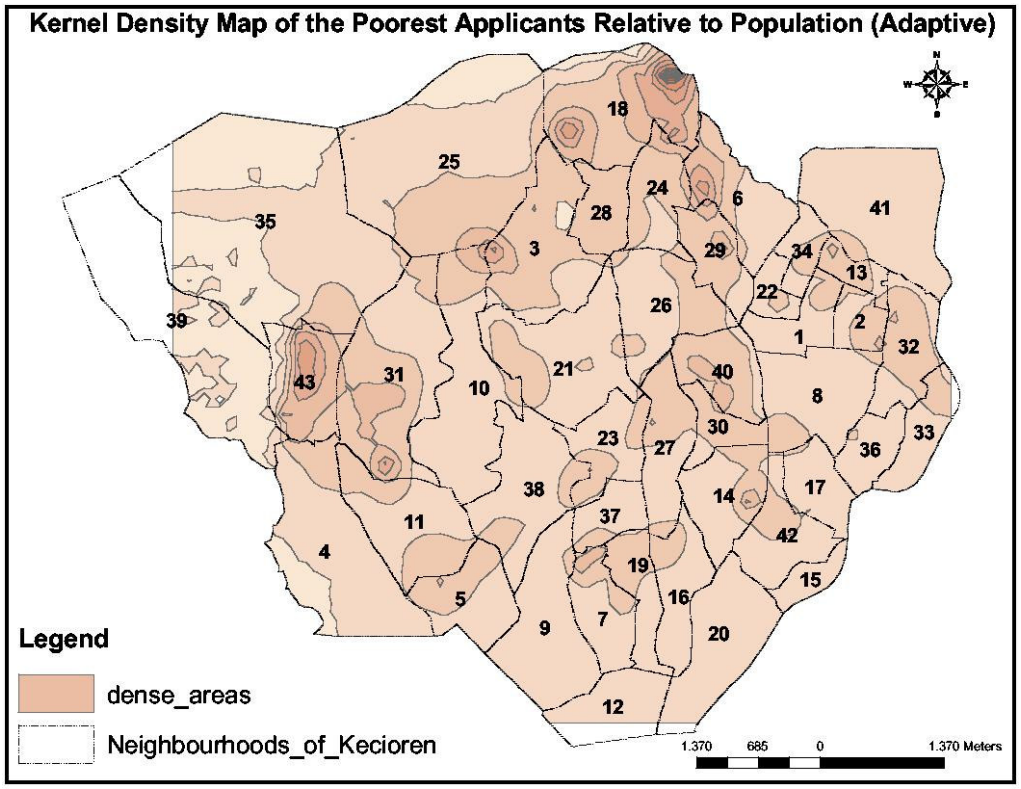

Figure 4.4 Density Map of Poorest Applicants Relative to Neighbourhoods's Population by Kernel Estimation Method (Adaptive with minimum sample size = 5)

This new kernel density map is slightly different from the previous one. Denser areas in this map are mostly in the north of the district. These neighbourhoods are; *Kanuni, Bademlik, Yayla and Sancaktepe*. The less dense neighbourhoods are; *Ovacık, Atapark, Osmangazi, Ufuktepe, Uyanış, Yakacık, Şenlik, Güzelyurt, Aktepe, Yeşiltepe, Basınevleri, Karargahtepe*. Moreover, if the dense areas of this map is compared with the population of the neighbourhoods overlapping them, the neighbourhoods with higher population are not displayed as dense as the previous density map of poorest locations.

4.4. Location Quotient Analysis of Poverty for Neighbourhoods

Location Quotient Analysis is a method that is generally used to calculate the ratio between the local economy and economy of some reference unit data. This definition is translated into a general method in spatial statistics for measuring the differentiation of areal entities according to a reference. Location Quotient (LQ) calculates the ratio of a category to the total number of all categories within each area and for whole study region in its first step. Then calculates the proportion of the ratio in each area to the ratio of the study region. This can be formulated as:

$$LQ = \frac{\left(\frac{X_i}{X}\right)}{\left(\frac{Y_i}{Y}\right)} \tag{4.2}$$

X_i: The number of items in an area categorized as i
X: Total number of items within that area
Y_i: The number of items in the whole area categorized as i
Y: Total number of items in the whole area.

LQ analysis in this study is generated for neighbourhoods / *mahalle* as the selected areal division of the study region. In general, LQ>1 shows poorer areas and LQ<1 shows less poor areas according to the average poverty in the district.

Brown and Chung (2006), used LQ to analyse ethnic segregation. With respect to their study; LQ values less than "0.85" indicate under-representation and LQ values greater than "1,2" indicate over-representation as a significant concentration of the analysed ethnic group and LQ in between 0,85 and 1,2 represents a neutral situation. If the LQ values of areal units consider too many outliers, these thresholds are not the best choices to represent the differentiation.

In this study, LQ values of poverty are evaluated similarly with the approach of Brown and Chung (2006). On the other hand, the threshold levels are re-assigned

for a better representation of data as; LQ<0,7 represent less poverty, LQ>1,3 represent more poverty and 0,7<LQ<1,3 represent average poverty with respect to the district, which corresponds with experts' view as displaying three different sub-groups of poverty level in the district.

In this analysis, LQ of poverty for each neighbourhood is calculated according to the LQ formula above by defining the areal units as neighbourhoods and whole area as the district total.

Firstly, the number of poor households (poor, fairly poor) according to the applicants in poverty data is counted for each neighbourhood and the ratio of these poorest households to the total households in each neighbourhood is calculated. Total household number for each neighbourhood is computed by dividing the population of each neighbourhood to the average household size in *Keçiören*. The population is the most important factor for this calculation.

Second step of this analysis is to find out the norm, which will be the comparison of poor ratio of different neighbourhoods. This norm is the ratio of the poorest applicants in the data which is 1401 households to the total number of households living in *Keçiören*.

Finally, the poor ratio of each neighbourhood is divided by the poor ratio of the district and a spatial index is formed for the neighbourhood level poverty in *Keçiören*. The results are visualized in Figure 4.5, p.77 according to under-representation, over-representation and neutral situation of poverty with respect to LQ values on the residential areas of neighbourhoods. The poorer neighbourhoods with LQ values above "1" are usually located in the north part of the district as the darker tones shows more poverty for neighbourhoods. These neighbourhoods are: *Şehit Kubilay, Yükseltepe, Sancaktepe, Yayla, Ovacık, Kanuni, Atapark, Kuşcağız, Ufuktepe, Osmangazi, Bademlik, Uyanış, Yirmiüç Nisan, Şenyuva, Güzelyurt, Aktepe, Yeşiltepe, Yeşilöz*. Moreover, the LQ analysis is generated not only for the

poor applicants but also for total number applicants in each mahalle. The results are very similar diplaying the same neighbourhoods for higher and lower LQ values.

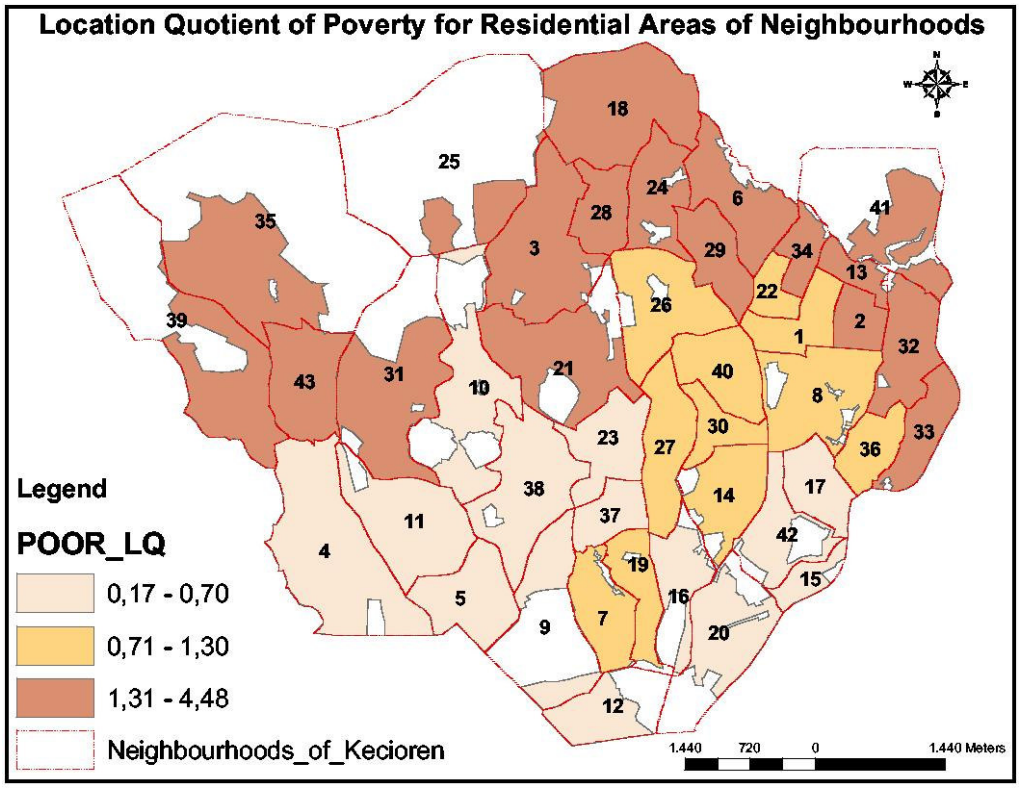

Figure 4.5 Residential areas of Sub-regions based on the LQ values of Poorest Households in Neighbourhoods of Keçiören

As the data is based on the applicants, the poor according to the data does not indicate the true number of poor residents in neighbourhoods and the district. The values are only a sample of the total population of poor residents. Furthermore, the poor ratio according to the population in each neighbourhood does not represent the true values. However, the calculated LQ values of poverty are beneficial to compare the different neighbourhood's concentration of poverty representing more poor or less poor ones according to district average.

4.5. Pattern Analysis of Poorest Households

Patterns represent the spatial distribution of a variable across a study area. This geographical variable may be represented as a point pattern according to the scale of the study. Point pattern can be recognized to some extent by the human-eye as an initial expression, but it has to be identified according to spatial statistics in order to get a better understanding of the situation.

In the case of this study, point pattern analysis is established in order to determine the spatial characteristics of the distribution of the poorest households of the Poverty Data Layer of *Keçiören*, before investigating local scale clustering. Infact, this layer is represented as a poverty dot map with a database displaying the residential locations of the poorest applicants of social assistance in *Keçiören*, who are assumed to be the poor households in the district (see in Figure 4.6, p.79). The points of the data on map are not arbitrary locations, instead they are the events of poverty occurence. The pattern in this respect can be detected by the help of GIS.

GIS has advantages and limitations for point pattern analysis which differentiates according to the selection of the method of analysis. Nearest Neighbour Analysis is the appropriate method which is implemented in this study for the analysis of the poverty pattern in *Keçiören*. This analysis is generated by manual statistical calculations with the help of the ESRI GIS software for measuring nearest neighbour distances.

Nearest Neighbour is one of the explorative spatial analysis techniques which is defined by Bailey and Gatrell (1995, p.88), as “an explorative analysis investigating the second order properties using distances between observed events in the study area”.

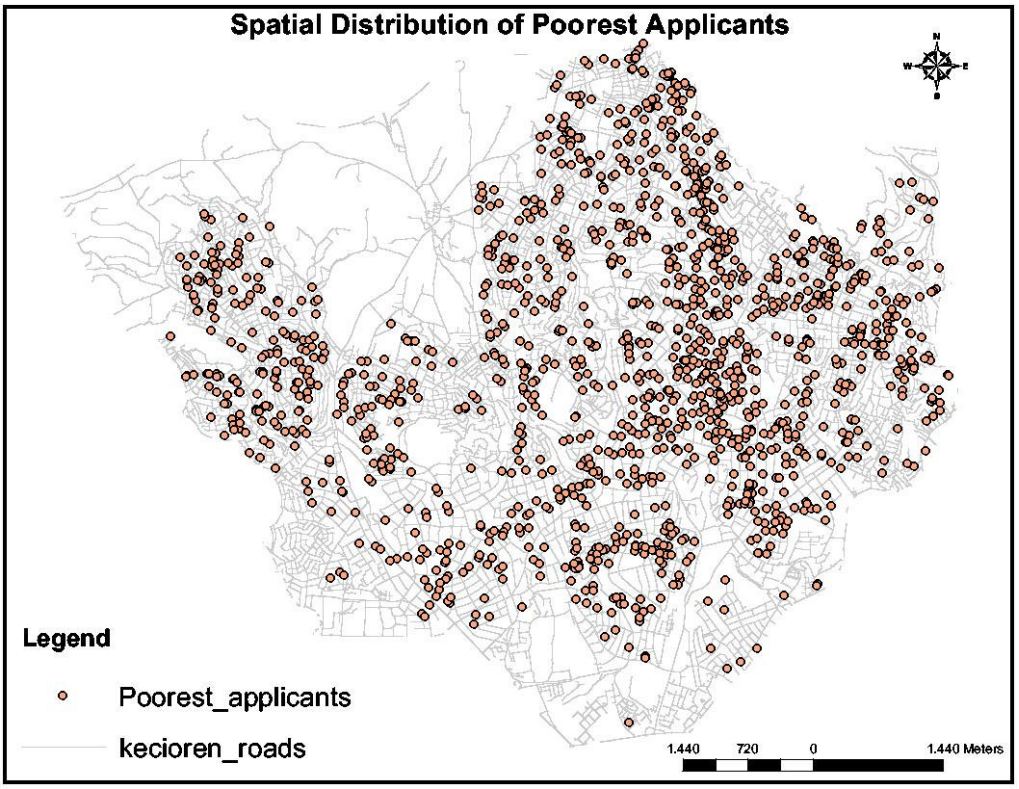

Figure 4.6 Map of the Distribution of Poorest Applicants of Social Assistance in Keçiören

This study deals with the nearest neighbour (NN) event-event distances "W". The result of this analysis represent one of the three possible patterns. These patterns are: regular, clustered and random (see Figure 4.7, p.80).

- A random pattern, which is a non-systematic pattern consists of the events that have the equal chance of occurrence.
- A pattern is called clustered or agglomerated when all points are grouped together.
- Regularity (a dispersed pattern) indicates a uniform distribution across the study area.

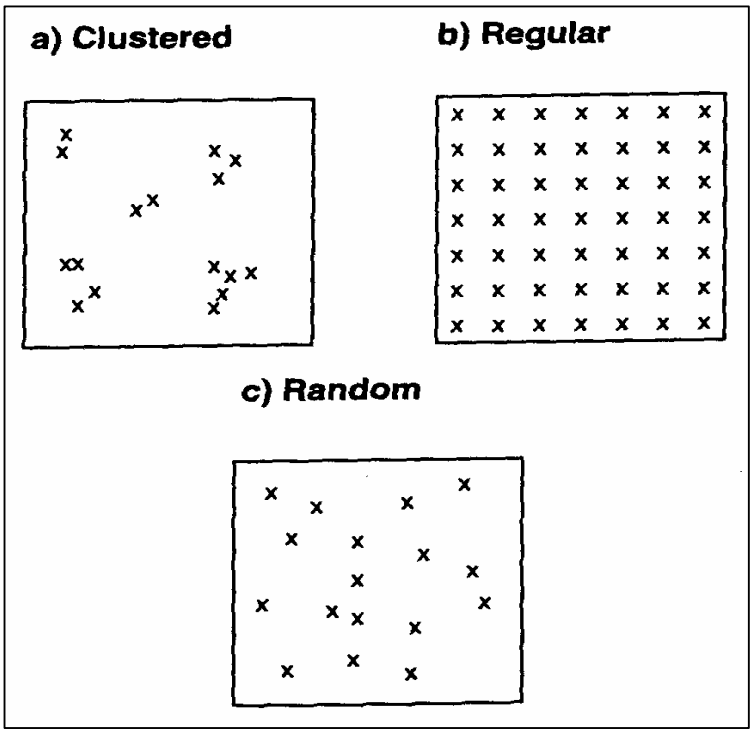

Figure 4.7 Possible Point Patterns

The first step of the analysis in this study is the determination of the nearest neighbour (only the closest point in straight line distance) of each event location of the poorest applicants. Next, the distance of each point to its nearest neighbor is measured (some of them are shown in Table 4.2, p.81 for the whole district). Next, the mean minimal distance for the analyzed pattern, r_o, is calculated. Second step is the calculation of the mean distance for the random pattern, r_e, which is the half of the square root of the ratio between the size of study area (A) and the number of points (N). The study area is defined as the total residential area of the study region. Thirdly, observed empirical mean distance and the expected theoretical mean distance for the random pattern are compared. Afterwards, the pattern is identified according to z statistic. The steps of these calculations are shown in Appendix C according to four cases; first one is based on the whole district and the other three are for the regions of the district which can be defined as sub-groups according to poverty levels that are calculated in the Location Quotient Analysis.

Table 4.2 Nearest Neighbour (NN) and Distance to NN of each event in poverty data of Keçiören

ID of each poorest hh	ID of the Nearest Neighbour	Distance (m) to the nearest neighbour
3	5	92,2675
5	48	73,7534
11	14	19,7349
12	11	20,1172
14	11	19,7349
16	11	50,0153
17	50	116,1639
19	75	69,0389
23	1059	134,5227
24	25	101,2320
25	24	101,2320
28	29	63,2785
29	28	63,2785
31	56	53,0051
36	1594	79,3324
. . .	. . .	. . .
2027	2028	44,2226
2028	2027	44,2226
2029	2028	113,4403
2030	2035	40,3241
2031	2030	67,6145
2032	2020	115,9489
2033	1964	33,2556
2034	1989	144,1804
2035	2030	40,3241
2036	1976	60,8964
2037	1984	37,8714

The results of the NN Analysis are similar for each of the cases representing clustering in the preliminary calculations. However, these results are not statistically significant and all of the cases reflect a random pattern according to z statistic and 95% confidence limit.

Another important issue which can be deduced from the calculations of NN Analysis, is the spatial integration level of the poorest households in each region based on their NN distances. This can be achieved by comparing the mean minimal distance of each region with the mean of whole district. In order to establish a more precise comparison, mean minimal distances are recalculated for each case by excluding the outlier distances. In general, an outlier is an observation that is far from the rest of the data.

The outliers and the calculations to reach the new mean minimal distances of each case as subsets of the poorest data are given below.

Mean minimal distance of poorest applicants in whole district:

Mean (Initial) = 68,05

Quartile-1 = 33,82

Quartile-3 = 88,04

Outlier < Q1-1,5 (Q3-Q1) = -47,51

Outlier > Q3+1,5 (Q3-Q1) = 169,370

Mean (after excluding outliers)= 61,838

Mean minimal distance of poorest applicants in Neutral Representative areas:

Mean (Initial) = 63,02

Quartile-1 = 33,13

Quartile-3 = 82,10

Outlier < Q1-1,5 (Q3-Q1) = -40,325

Outlier > Q3+1,5 (Q3-Q1) = 155,555

Mean (after excluding outliers) = 59,31

Mean minimal distance of poorest applicants in Over Representative areas:

Mean (Initial) = 65,15

Quartile-1 = 31,49

Quartile-3 = 85,20

Outlier < Q1-1,5 (Q3-Q1) = -49,075

Outlier > Q3+1,5 (Q3-Q1) = 165,765

Mean (after excluding outliers) = 59,45

Mean minimal distance of poorest applicants in Under Representative areas:

Mean (Initial) = 96,68

Quartile-1 = 44,62

Quartile-3 = 114,22

Outlier < Q1-1,5 (Q3-Q1) = -59,78

Outlier > Q3+1,5 (Q3-Q1) = 218,62

Mean (after excluding outliers) = 76,07

The final mean minimum distance, after outlier detection, for the whole district is "61.838", which is above the mean minimum distance of neutral and over representative regions and below the mean minimum distance in under representative region. This means poorest household live in closer distances in neutral and over representative regions of poverty in *Keçiören*, which figures out more spatial integration.

4.6. Cluster Analysis of Poorest Households

This part of the chapter reflects the micro level analysis of poverty in this thesis, which is based on the investigation of poorest clusters. Cluster analysis is an effort to create groups from the data that contain observations with similar properties. These properties can be the local characteristics of the spatial distribution of the data. In spite of the variability of techniques for this kind of analysis, the most appropriate method of cluster analysis for this study is Hierarchical Clustering. In general, hierarchical clustering is defined by Bailey and Gatrell (1995, p.232) as; "... a technique that starts with all observations and at each step join the most similar ones according to a optimisation rule".

A minimum spanning tree diagram is conceptualized for this process; that groups some number of incidents from the data in the first stage as clusters and then continues to group the data which are the clusters of the first stage for the second stage and then the second-order clusters are grouped into third-order clusters and same method of grouping continues for other stages until no further grouping is possible according to the optimisation criteria (e.g. nearest neighbour). This technique is examplified as a non-spatial representation up to the fourth level in Figure 4.8, p.84. Analyses according to this technique are carried out more easily by the CrimeStat, which is a spatial statistics program that is used in this thesis.

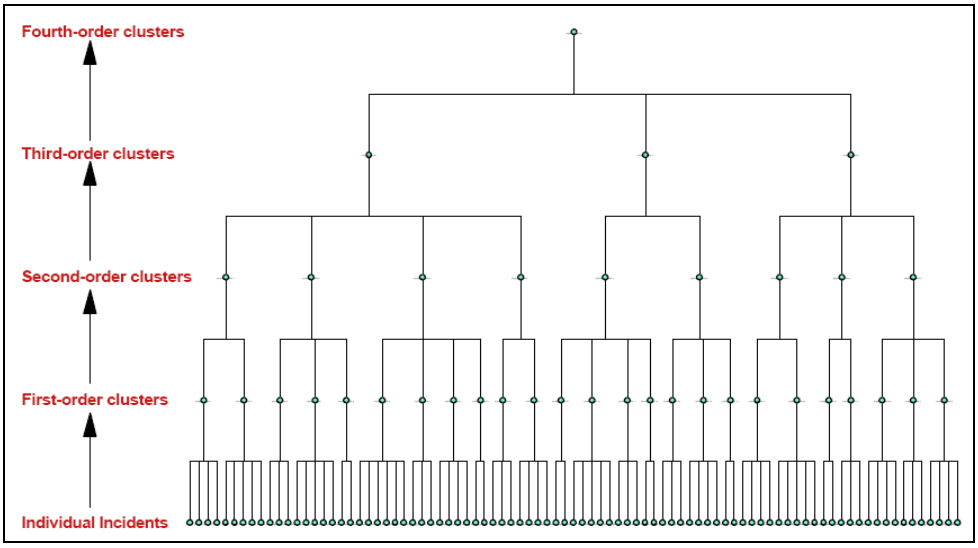

Figure 4.8 Hierarchical Clustering Technique (source: CrimeStat 3.0 (2004), User Guide)

More specifically; the selected method of analysis in this part is the Nearest Neighbor Random Hierarchical Clustering. This analysis does not create clusters based on the high intensities of data; instead its aim is to detect different local groupings of data based on a minimum number of incidents with respect to the similar event-event distances. As mentioned by this definition, the method involves two important steps:

- A threshold distance should be defined firstly. Next, the points that are closer to one or more points than the threshold distance are selected for clustering. Random threshold distance is the average nearest neighbour distance in the study area, which is calculated as:

  Mean Random Distance = $d(ran) = 0.5\sqrt{\left(\frac{A}{N}\right)}$ (4.3)

  A; Area

  N; Number of events

- Secondly, the minimum size of clusters should be defined. For this study, "5" is the ideal minimum size of clusters according to the data which resulted due to the deficiency in the number of clusters containing more than five incidents.

After completing these steps, clusters are generated by the software. According to the logic of the hierarchical clustering higher order clusters are also formed in the routine. The visualization of these clusters are displayed as standart deviational ellipses. This ellipse is an abstraction from the points in the cluster that may be arranged in an irregular manner. 1X standard deviational ellipses are created since 1.5X and 2X standard deviations can create an exaggerated view of the underlying cluster as mentioned in the CrimeStat 3.0 User Guide (Levine, 2004). The second order ellipses that are extracted from the first order ones indicate a better understanding of clusters, as some of the first order ones may happen by chance due to small size of clusters. The second order ellipses use the center of first order ones as the data should be in the type of point locations for cluster analysis.

In this study, the cluster analyses of poverty reflects the possible local interaction between closely located poverty incidents that are at the same state of poverty. This analysis is generated for two cases. First case considers the geographical distribution of poorest applicants in the whole district, and the second case deals

with the clusters of three different regions which are previously defined in macro scale analyses as over / neutral / under representative areas of poverty in *Keçiören*.

4.6.1. Cluster Analysis of the Poorest Households in the District

The first cluster analysis is generated for the poorest households of poverty data layer which is based on the applicant data as point locations for the whole district. Initially, "fairly-poor" and "poor" sub-groups of 5-scaled poverty data are classified as the "poorest" households in this study. Then, the analysis is performed for all *Keçiören* without considering any administrative divisions in the district. The results of this analysis displays first-order and second-order clusters with respect to the sample size of "5" events as minimum number. These clusters are shown in Figure 4.9, p.86 on the Density Map of Poorest Households in *Keçiören*.

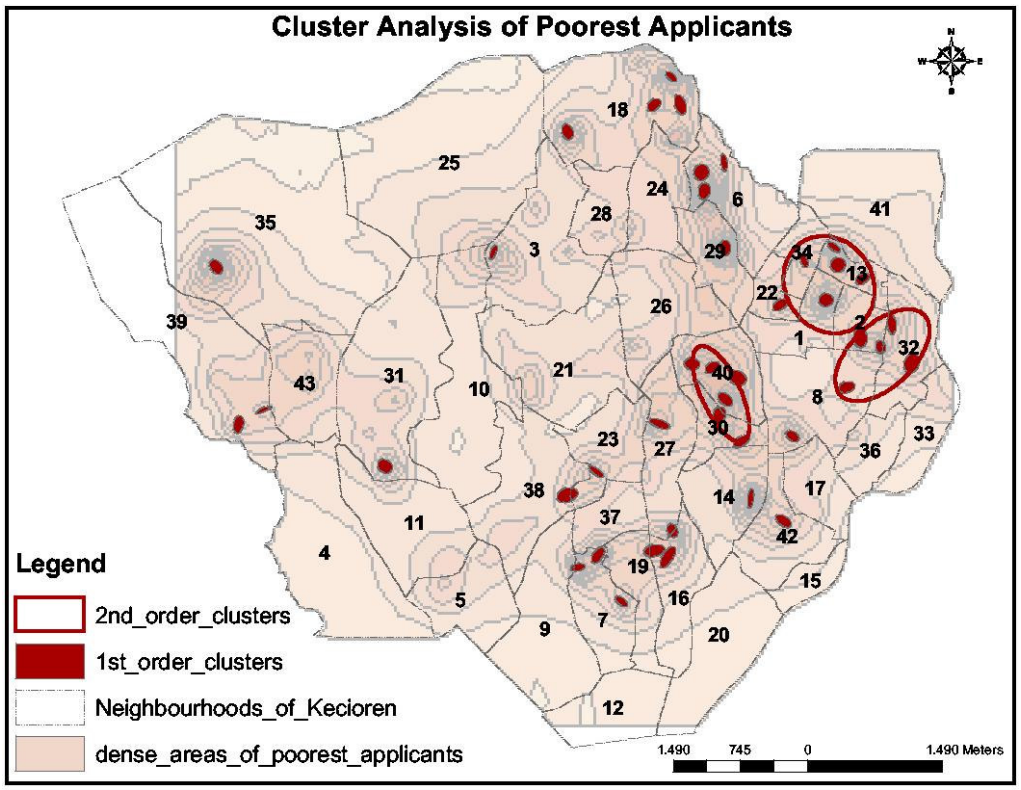

Figure 4.9 Cluster Analysis of Poorest Applicants of Social Assistance in Keçiören

Second order local clusters are detected in the area between the middle and north-east part of the district, specifically on *Şenlik, Yakacık, Aktepe, Yeşiltepe, Adnan Menderes, Bağlarbaşı, Köşk, Güzelyurt* and *Yirmiüç Nisan* neighbourhoods. Consequently, poorest clusters are mostly overlapping with the dense areas of poorest applicants in relation to the density map, except some dense areas in the south-west of the district.

4.6.2. Cluster Analysis of Poorest Households for Over-Neutral-Under Representative Regions of Poverty in the District

The second case is the exploration of clustering of poorest households in three different regions of *Keçiören* separately (see Figure 4.10, p.88). These regions are determined with respect to three groupings of values of the "Poor_LQ" attribute which are calculated in the LQ analysis of poverty for the neighbourhoods.

First region consists of the locations of poorest households who are the residents of the neighbourhoods which have high LQ values of poverty that are over-representative. Clustering, that is observed for this group, is not much different from the results of the previous cluster analysis on the same area of the district, except the occurence of second order clusters in the north, overlapping with *Kanuni* and *Bademlik* neighbourhoods.

The clusters in the second region, which indicates the neutral-representative LQ values of poverty, are overlapping with the clusters of the same area of the whole district's cluster map of poorest households.

Third region is composed of neigbourhoods that are under-representative of poverty in the district. Clusters of poorest applicants in this region, especially the second order ones, are not observed in the previous cluster map based on the spatial distribution in the whole district. The two second-order clusters detected for this region are overlapping with *Etlik, Aşağı Eğlence, İncirli* and *Şevkat, Kamil Ocak* neighbourhoods.

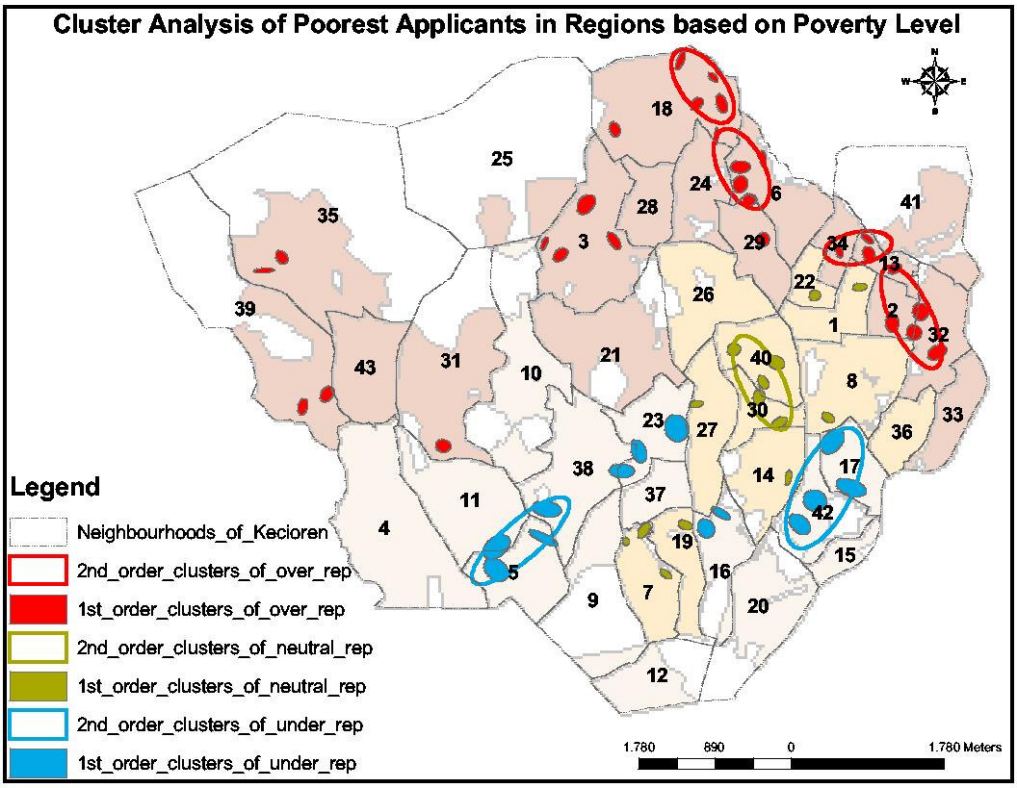

Figure 4.10 Cluster Analysis of Poorest Applicants in Regions of Keçiören based on Poverty Levels

4.7. Spatial Analysis of Poverty in the District by Thiessen Polygons (Voronoi Mapping)

In this thesis, analysis in the mezzo level are carried out by creating a new areal division, which is continous over the district, by establishing a Voronoi map (Thiessen polygons) using the poverty data. The "Thiessen polygons are created around a dataset o points, such that all point locations within a polygon are closer to the point object used to define that polygon than to any other such point object" as mentioned by Bailey and Gatrell (1995, pg. 20). This new map consists of 2037 polygons, which represents one of the two sub-grouping of the dataset as "poorest" and "less poor" households. This means the intensity of all polygons are same representing only one event, even if these polygons are different in size and shape.

Figure 4.11, p.89 displays the Voronoi map of *Keçiören*'s poverty data with respect to the district boundaries, where the smaller partitioning in the map means more amount of data is located there. Therefore, the visualization of the larger thiessen polygons should not be recognized as continuous areas of the same poverty level. Infact, this situation is caused by less amount of point data in those places.

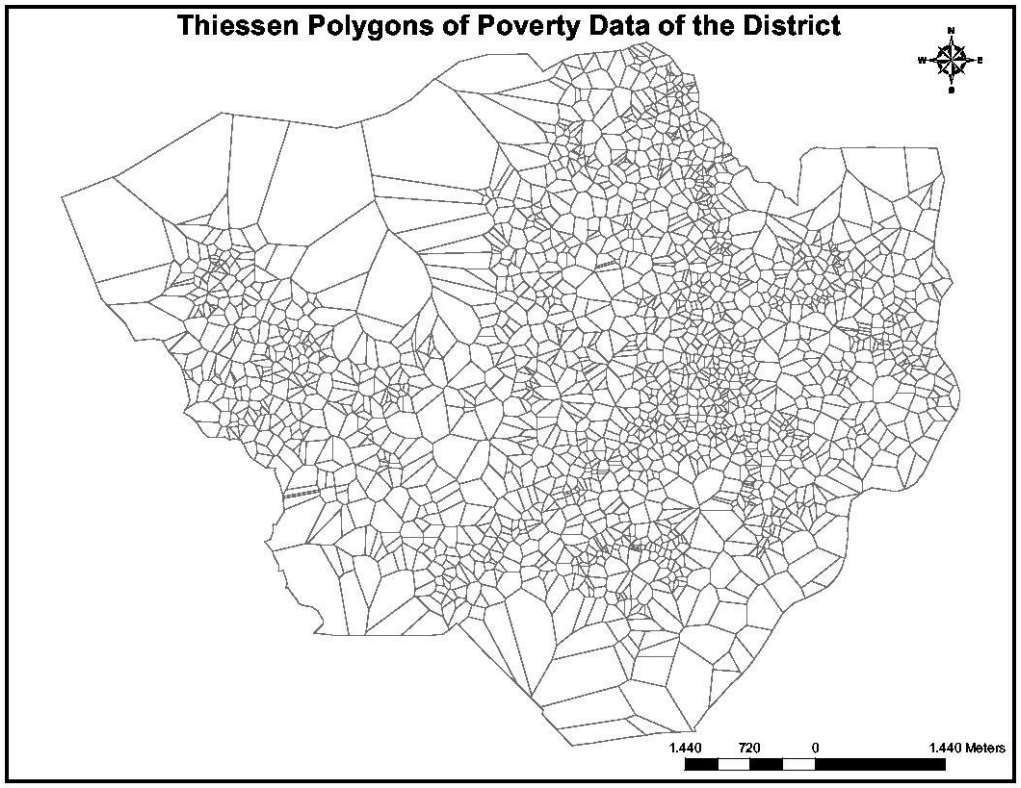

Figure 4.11 Thiessen Polygons (Voronoi Map) of Poverty Data of the District

An important advantage of using a Voronoi map is that it clearly defines the neighbourhoods of each sample data (which is a polygon after establishing the map) based on the boundaries of that polygon. Each Thiessen polygon involves a convex region sharing common boundaries with other Thiessen polygons, which are identified as its neighbours. The calculations with respect to a Voronoi map are usually based on these local neighbours of each polygon. There are different

methods of local statistical calculations using the neighbours of thiessen polygons for different purposes. Two of them are implemented for the poverty analysis in this thesis. These are the "local mean" calculation for each polygon and the identification of "local outliers". Both of them can be accepted as a spatial segregation measure of the poorest households from the less poor ones in a residential area using the exact locations of residents rather than using aggregated totals in administrative units. The details of each local statistic method of Voronoi mapping and their usage in this study are described in details below.

4.7.1. Spatial Analysis of Poverty in the District by Local Mean Calculation of Thiessen Polygons

Local mean calculation is performed in order to get an idea of the isolated locations of poorest households in the district. Isolation, in this sense, means the case of a thiessen polygon representing an applicant of social assistance and its neigbouring polygons are mostly composed of poorest ones not the less poor ones with respect to the proportion in the whole study area. The local mean is computed by taking the average of the number of poorest households of a thiessen polygon with its neighbours and then re-assigning this local average value to that polygon again in a new field named "Poorest_Mn". This is repeated for all polygons and their neighbours. If there is a poorest sample point with all of its neighbours are poorest, its local mean value represents "100%" of isolation of the poorest applicants in that area. On contrary, if a less poor household whose neigbours are all less poor is considered, the local mean of the poorest in that area is "0". As the proportion of poorest households to the less poor households in the poverty data of *Keçiören* is "0.69". Local mean values that are at least "+0.5" standard deviation above "0.69" are accepted as isolated areas of poorest residents. The Standard Deviation Map of the local mean of Thiessen polygons displaying the isolation of the poorest applicants is shown in Figure 4.12, p.91 which is only highlighted for the residential areas. This poverty map mostly indicates the areas in the north of the district as isolated residential places of the poorest households, that are previously mentioned in this study as over-representative neighbourhoods of poverty in *Keçiören*.

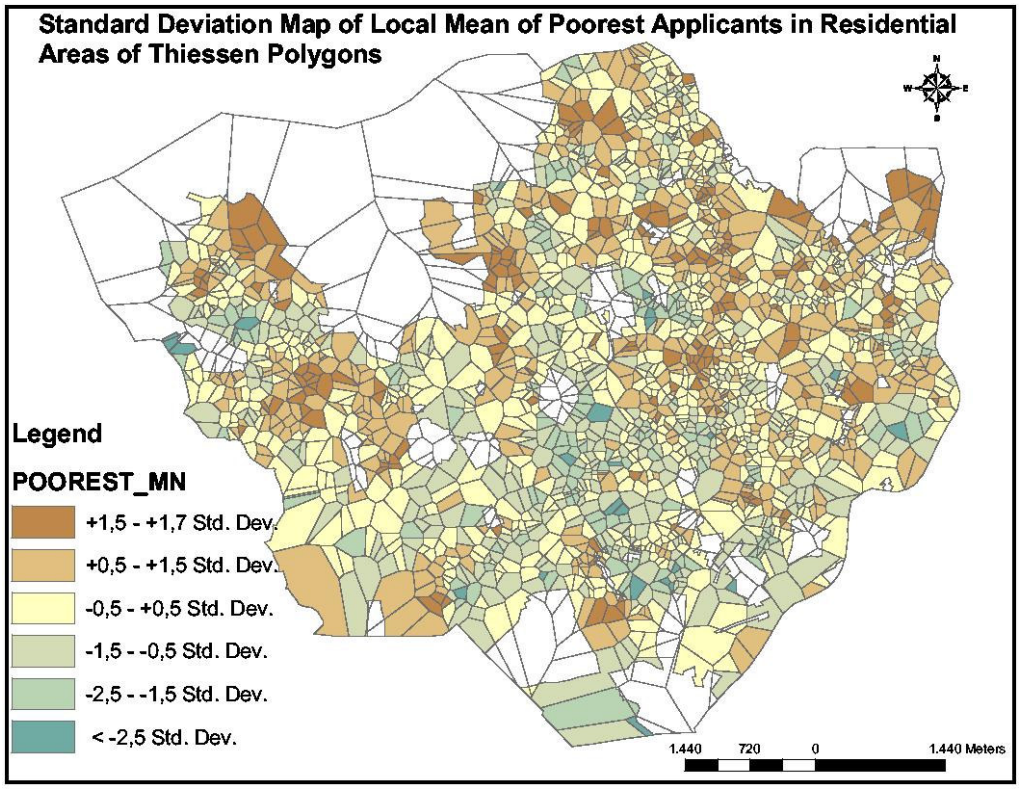

Figure 4.12 Standard Deviation Map of Local Mean of Poorest Applicants in Residential Areas of Thiessen Polygons based on Keçiören's Poverty Data

4.7.2. Spatial Analysis of Poverty in the District by Local Outlier Calculation of Thiessen Polygons

If the state of poverty of a sample point associated to the overlapping thiessen polygon is different from each of its neighbours, then this polygon is identified as a local outlier. This means, a less poor polygon is completely surrounded by poorest neighbours, or all adjacent neighbouring polygons of a poorest polygon are less poor ones. These local outliers of thiessen polygons represent the highly spatially integrated areas of poorest and less poor applicants. The basic assumption behind this idea is the ability of a sample household of a social group to persist its living in a different environment of another social group. In this case, the sample household living in an area of another poverty based social group is well adapted to its

environment. Therefore, the existence of a social integration for that household may be understood from the existence of a spatial integration based on the local outliers calculation. The local outliers of poorest and less poor applicants in Thiessen polygons of poverty data of *Keçiören* are identified and visualized in Figure 4.13, p.92. The results of this analysis mention that, there are not much local outliers of poorest households that are surrounded by less poor ones. On the other hand, there are more local outliers of less poor households surrounded by neighbours which are only poorest households. This situation may caused by the higher number of poorest households than the less poor ones in the applicant data. The Figure 4.13 displays that the distribution of the outliers in the district is highly dispersed whether it is poorest or less poor. Despite, there are less number of local outliers in the south of the study area.

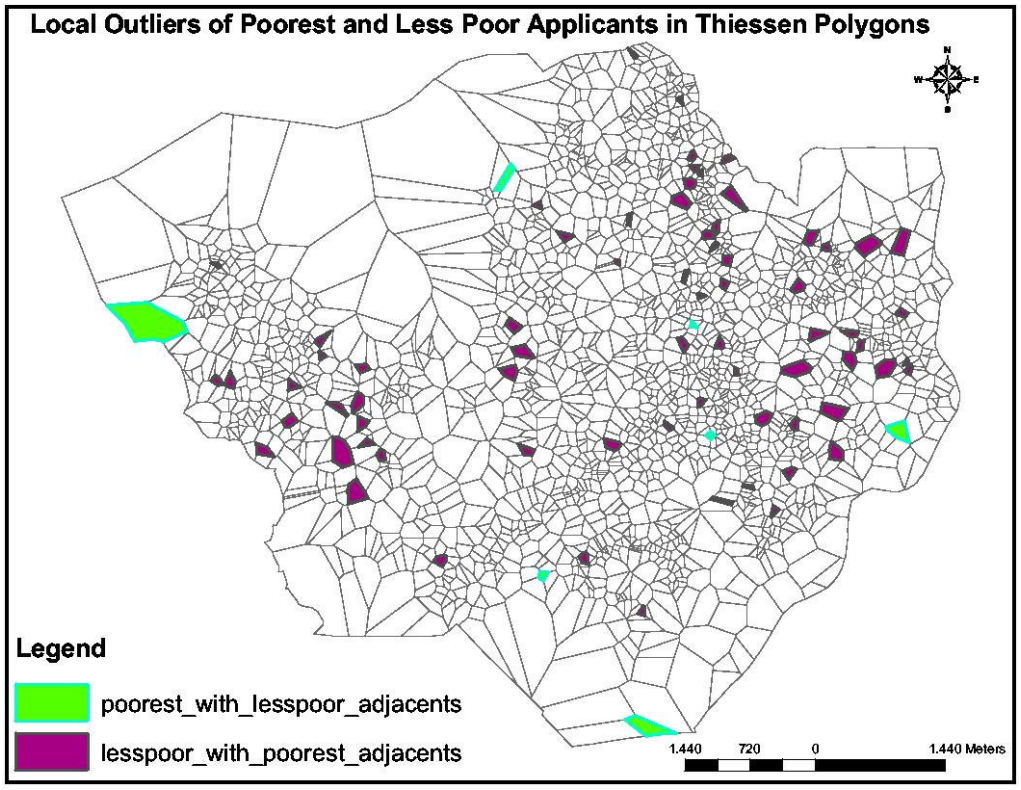

Figure 4.13 Local Outliers of Poorest and Less Poor Applicants in Thiessen Polygons of Poverty Data of Keçiören

4.8. Road Density Analysis of Poorer Areas in the District

The previous analyses in the study deal with the detection of the poorer areas in the district. The road density analysis and further analysis, which are the land value-poverty comparison and buffer analyses, consider the detection of the settlement properties of poor residents. Moreover, the results of these analyses may help the estimation of poor areas for other places where there is no poverty map.

The road density is calculated for the selected zones from the results of previous analyses, which are mostly the poorer areas. Road density is simply the proportion of the total road length in the selected zone and the area of that zone. The analysis is implemented for the clusters of the poorest households, densely populated places of poorest households and isolated/integrated thiessen polygons of the poor respectively and the results are shown in Table 4.3, p.94.

Initial step of this analysis is the calculation of the average road density in the whole residential areas of the district. This resulted with a density value of "0,019". Then the first zone is selected for the road density calculation, which specifies the dense areas of the poorest applicants of the poverty data. The total road length and area in this zone and in other ones are calculated easily and precisely by the usage of GIS softwares after overlay operations on different layers. The results denotes that the road density of the dense areas of poorest residents is the same with the district's average value. On contrary, if the dense areas of the poorest ones relative to population is the selected zone, then the road density is higher.

Another density analysis is established for the poorest clusters in three different regions of the district that represent poverty levels. The second order clusters of each region are the selected zones to calculate road density within them. Road density values of the clusters of over-representative region are mostly higher than the average road density in the district. On the other hand, road density values of clusters of the neutral and under representative regions are below the district's average and similarly below the value of clusters in over-representative region.

Table 4.3 Road Density of the selected zones from the Poverty Maps of *Keçiören* that are established in this study

Name of the zone	**Total road length inside the zone (m)**	**Total area of the zone (m^2)**	**Road density**
Over-representative Cluster-1	10539,17	488119,38	**0,022**
Over-representative Cluster-2	4966,54	231057,26	**0,022**
Over-representative Cluster-3	7628,89	416077,83	**0,018**
Over-representative Cluster-4	9095,22	397829,76	**0,023**
Neutral-representative Cluster-1	7002,65	464529,03	**0,015**
Under-representative Cluster-1	12567,52	788203,04	**0,016**
Under-representative Cluster-2	8545,60	511397,90	**0,017**
Dense areas of poorest ones of dataset	114103,67	5960197,80	**0,019**
Dense areas of poorest relative to population	58068,70	2838312,89	**0,020**
Residential areas of isolated thiessen polygons	234661,62	12162396,98	**0,019**
Outlier thiessen polygons	18789,32	1237823,34	**0,015**
Residential Areas of the district	681067,50	35367896,43	**0,019**

This finding can be accepted as a reflection of the landuse pattern in over-representative areas of poverty, which is examined in details in the Discussion of the Results part of this chapter.

The last road density calculation deals with the zones which are defined by the thiessen polygons of the poverty data in *Keçiören*. This is generated for two cases of local statistics. First zone includes the residential areas of the polygons with local mean values of poorest households which are at least "0.5" standard deviation higher than the proportion of poorest in the applicant data. The road density in this zone is similar to the district's average value. The second case considers the local outlier zones of thiessen polygons. This time, road density of the district is higher than the value of this zone. Even if this situation may be a result of the smaller partitioning of the outlier polygons, it may also points out that these areas are not spatially integrated as the road network is not dense. More specifically, as the spatial integration is based on closer distances, which is accepted as neighbouring polygons for the Voronoi Map, the real situation of adjacency should be based on the road network. Therefore, the integrated areas of poorest and less poor households that are detected by the local outliers may be considered random occurences.

The most important deficiency of the road density calculations of the selected zones is the exclusion of the degree of the road. In the previous calculations, the roads are not weighted by their importance or any other factor such as quality. The thematic map in Figure 4.14, p.96 which is created by the visualisation capabilities of GIS, displays the road network in *Keçiören* by overlapping with the regions of different poverty level in the district. The thematic map clearly represents the situation of the arrangement of 1st degree roads in the district, without conceptualizing any spatial statistical analyses for them. As a result, 1st degree roads are usually in the under-representative region of poverty, which is infact the well-off part of the district. Only two of these main roads, that are infact the main arterials connecting the district to other places, have road segments in the over-representative region. These roads are "*Etlik* Main Street" and "*Sanatoryum* Main Street".

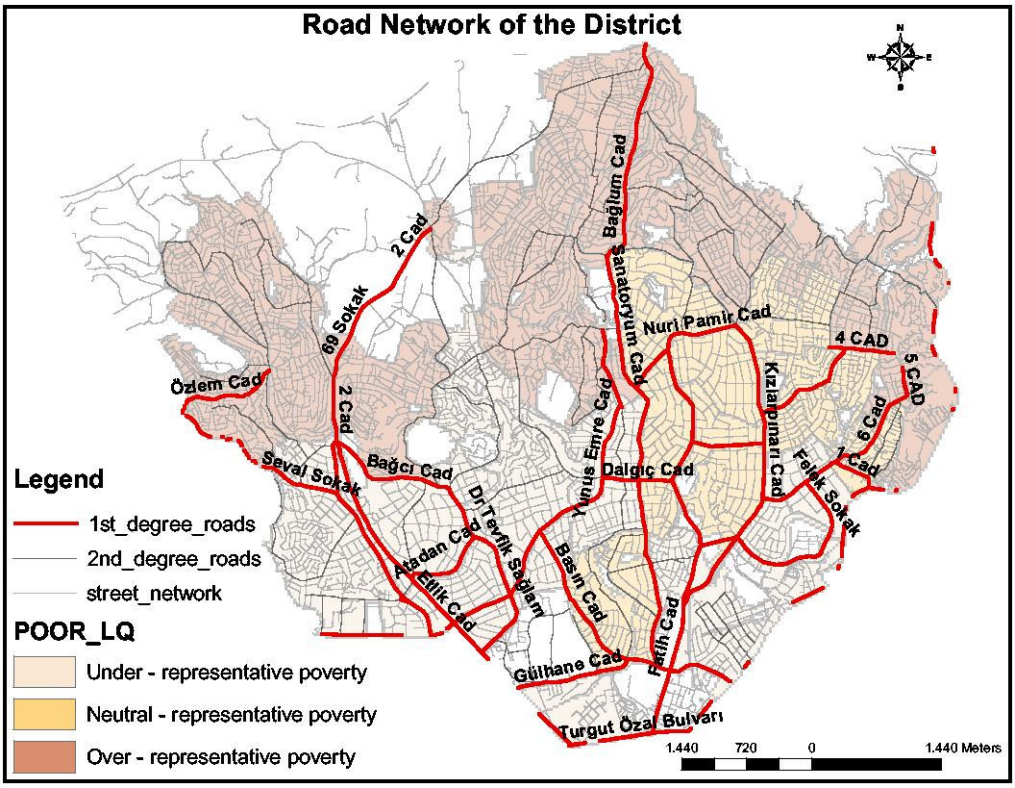

Figure 4.14 Road Network in Keçiören

4.9. Comparison of Poverty and Land Value by Hypothesis Test

This analysis is an effort to compare two distinct variables that are; “poverty” and “land value”, with respect to some statistical analysis on tabular data. Apparently, the analysis is based on testing whether there is a relationship betwen the condition of poverty of people and the land value of their residential places, or not. As the poverty data of applicants does not represent numeric poverty values, hypothesis tests are generated according to the categories of condition of poverty field. Furthermore, land value is expected to increase as the poverty decreases. Poverty decreases according to the categories in the order of “Fairly Well-off”, “Well-off”, “Neutral”, “Poor”, “Fairly Poor”. In order to test the hypothesis; fairly well-off and well-off ones are grouped together as an initial step, because of the lack of data in these two categories.

Table 4.4 Statistics of each Sub-group according to the Condition of Poverty in Data of Applicants with respect to the Land Value of Residence of each Applicant

Statistics	**Fairly Poor**	**Poor**	**Neutral**	**Well-off and Fairly Well-off**
Number of Households in Applicant Data	216	1185	616	20
Mean Land Value	70,713	71,863	73,396	112,35
Median Land Value	60	60	60	60
Range of Land Values	525	655	435	426
Minimum Land Value	15	15	15	24
Maximum Land Value	540	670	450	450

Table 4.4, p.97 indicates that the median value is same for each category and the mean values do not represent a major increasing tendency towards less poor conditions other than the well-off ones. These statistics are important of course, but to test whether the difference among the subgroups is significant or not, appropriate hypothesis tests should be used.

The selection of the method of testing the hypothesis is a crucial point in this analysis. The method must be an appropriate one which considers the characteristics of the data. The poverty data according to land values does not involve a normal distribution, as there are many outliers. The normality of the data is tested by Kolmogorov-Smirnov Normality test, at 0.95 confidence level, in Minitab. The hypothesis are;

H_0 : The land values are distributed as normal

H_A: The land values are not distributed as normal

Calculated p-value is less than 0.05 according to the Minitab output. Therefore, the null hypothesis is rejected which means that the land value data is not distributed as normal.

As the data is not distributed normally, the parametric conditions are not satisfied. Therefore, the selected hypothesis testing methods must be the non-parametric ones;

- First one is the Kruskal-Wallis Test which is used to identify the differences between poverty levels with respect to the land values. The hypotheses are ;

H_0 : the land value is the same for all poverty conditions (groups)
H_A: the land value is not the same for different poverty conditions (groups)

This test is carried out in Minitab program at 0,95 confidence level, which resulted with the p-value = 0,021. The null hypothesis (H_0) is rejected since p-value = 0,021 < 0,05. There exists a significant difference between groups.

- With respect to the result of the previous test, a second test is generated to identify the sub-group/s that are different from the others by pairwise comparisons. The selected test in this case, is the Mann-Whitney U Test which is carried out by Minitab program at 0,95 confidence level, under the hypotheses;

$H_{0\text{-}1}$: the land value is same for fairly poor and poor households
$H_{A\text{-}1}$: the land value of fairly poor households is less than the land value of poor ones

$H_{0\text{-}2}$: the land value is same for fairly poor and neutral households
$H_{A\text{-}2}$: the land value of fairly poor households is less than the land value of neutral ones

$H_{0\text{-}3}$: the land value is same for fairly poor and well-off households

$H_{A\text{-}3}$: the land value of fairly poor households is less than the land value of welloff ones

$H_{0\text{-}4}$: the land value is same for poor and neutral households

$H_{A\text{-}4}$: the land value of poor households is less than the land value of neutral ones

$H_{0\text{-}5}$: the land value is same for poor and well-off households

$H_{A\text{-}5}$: the land value of poor households is less than the land value of well-off ones

$H_{0\text{-}6}$: the land value is same for neutral and well-off households

$H_{A\text{-}6}$: the land value of neutral households is less than the land value of well-off ones

The hypotheses; Ho2 and Ho4 are rejected at 0,95 confidence level, where p-value of $H_{0\text{-}2}$ is 0,0052 and p-value of $H_{0\text{-}4}$ is 0,052 are both less than 0,05. As a result; "Fairly Poor"-"Neutral" and "Poor"-"Neutral" are pairs of sub-groups which represent a difference with respect to the land values that they involve. According to the alternative hypothesis it can be interpreted as; "the land value of the residence of fairly poor and poor households are significantly less than the neutral ones". Interestingly, no difference is identified between "Well-off" households and other groups. This is due to insufficent number of applicants in the data who are "Well-off".

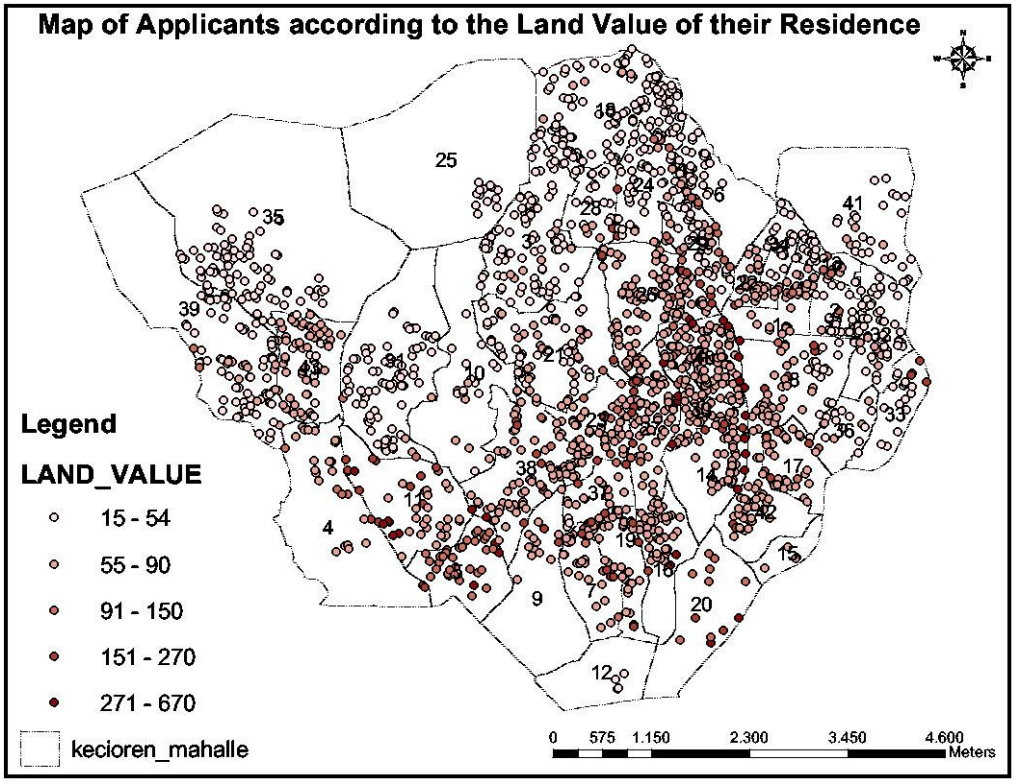

Figure 4.15 Map of the Distribution of Applicants for Social Assistance according to the Land Value of their Residence, in Keçiören

Furthermore, the visualization of *Keçiören* Poverty Data layer by 5 natural breaks of the land value attribute is given above in Figure 4.15, p.100. Interestingly, the cheaper land values are mostly in the north of the district which corresponds with the situation in the map of location quotients of poverty of neighbourhoods.

4.10. Buffer Analyses of Poverty

The buffer analysis is the most appropriate method for the identification of the settlement properties of the poor with respect to distance to the selected urban landscape features. ESRI Software defines a “buffer” as a zone of specified distance around features. In addition, the buffer analysis is a distance analysis measuring the accessibility. In general, accessibility to education / health facilities etc. are

calculated by both buffer analysis and network analysis. In this study, the accessibility represents human walking distances which do not involve network calculations on the road map. Furthermore, it is assumed that these facilities serve to the nearby population as a neigbourhood service. In this case, establishing buffer analyses is necessary.

ESRI ArcMap software is used to generate buffers in this study. Buffers are generated for 5 distances with equal interval as 100m-200m-300m-400m-500m for Health Facilities, Education Facilities, Neighbourhood Business Centers, Linear Business Centers and 50m-100m-150m-200m-250m for Bus Lines, Main Roads. Afterwards number of each sub-group of the poverty data falling into each buffer zone is counted and their proportions are calculated. Then these ratios are compared with the ratio of the whole data.

Health Facilities involve many differences in ratios of each category. The most significant ones are; the high ratio of non-poor households in 100m buffer zone and the high ratio of poor households in 300m buffers (see Figure 4.16, p.102 and Table 4.5, p.101).

Table 4.5 Proportion of categories according to the Condition of Poverty that falls into the Buffers of Health Facilities

Condition of Poverty	**Ratio of the Category in Whole Data**	**Ratio of the Category in buffers of Health Facilities**				
		500m	**400m**	**300m**	**200m**	**100m**
Fairly Poor	0,106	0,097	0,111	0,117	0,108	0,000
Poor	0,582	0,603	0,597	0,626	0,595	0,375
Neutral or Well-off	0,312	0,300	0,292	0,257	0,297	0,625

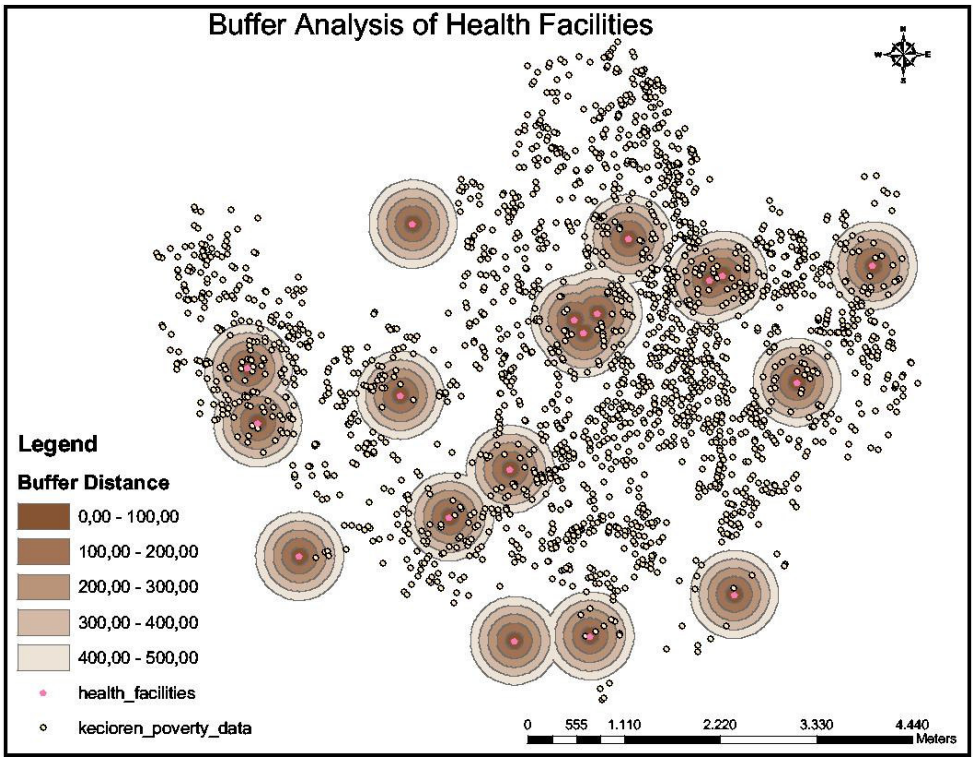

Figure 4.16 Buffer Analysis of Health Facilities (Buffer Distance in meters)

The buffers of Education facilities cover most of the study area. This resulted with similar ratios of categories to the ratio in the whole data. The most different ratios are in 100m and 200m buffer zones. The 100m buffer zone involves a higher ratio of the "neutral, well-off" where as the 200m buffer involves a higher ratio of the category of "poor" (see Figure 4.17, p.103 and Table 4.6, p.103).

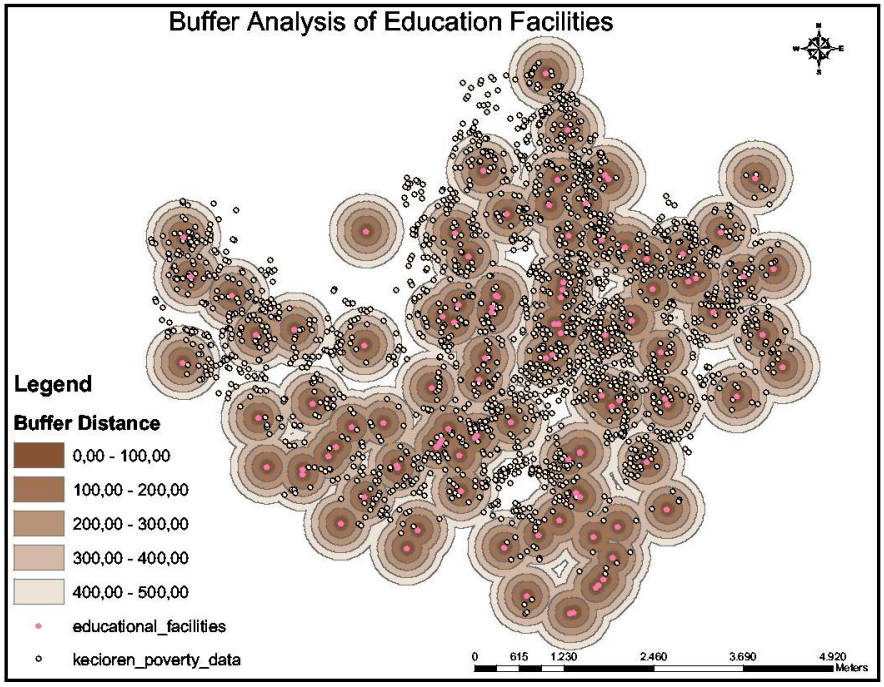

Figure 4.17 Buffer Analysis of Education Facilities (Buffer Distance in meters)

Table 4.6 Proportion of categories according to the Condition of Poverty that falls into the Buffers of Education Facilities

Condition of Poverty	**Ratio of the Category in Whole Data**	**Ratio of the Category in buffers of Education F.**				
		500m	**400m**	**300m**	**200m**	**100m**
Fairly Poor	0,106	0,104	0,108	0,110	0,107	0,092
Poor	0,582	0,581	0,576	0,575	0,588	0,575
Neutral or Well-off	0,312	0,314	0,317	0,316	0,305	0,333

The buffers that are generated for Neighbourhood Business Centers displays a significant result of the ratio change in buffers. The proportion of "Fairly Poor" category of the data increases in adjacent locations to the neighbourhood business

centers. This can be interpreted as one of the settlement properties of fairly poor households. On contrary, this may not be true as the ratios may be happened by chance. In order to achieve a scientific judgement, more detailed analysis with more data should be established (see Figure 4.18, p.104 and Table 4.7, p.105).

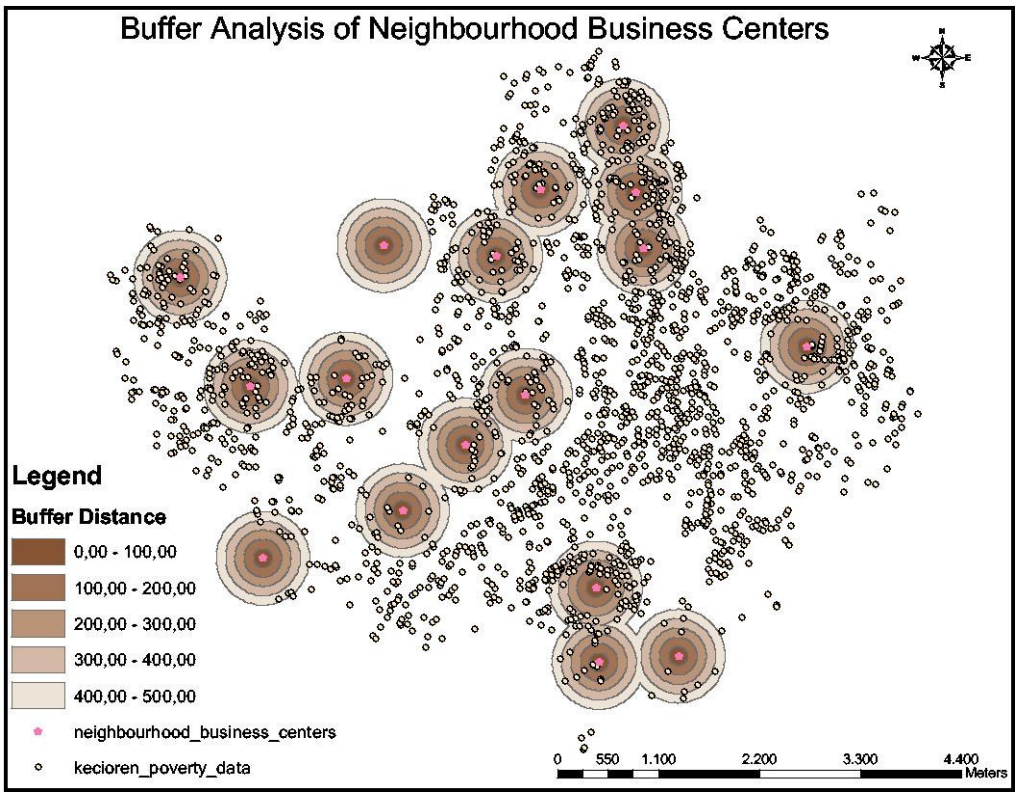

Figure 4.18 Buffer Analysis of Neighbourhood Business Centers (Buffer Distance in meters)

Table 4.7 Proportion of categories according to the Condition of Poverty that falls into the Buffers of Neighbourhood Business Centers

Condition of Poverty	**Ratio of the Category in Whole Data**	**Ratio of the Category in buffers of Neigh. Centers**				
		500m	**400m**	**300m**	**200m**	**100m**
Fairly Poor	0,106	0,110	0,119	0,147	0,183	0,207
Poor	0,582	0,587	0,573	0,524	0,522	0,483
Neutral or Well-off	0,312	0,302	0,308	0,329	0,296	0,310

Linear business centers in *Keçiören* coincide with some of the segments of the main roads. The buffers of these centers cover most of the dense areas of poverty data. The 100m and 200m buffers represent an important difference between categories with respect to the ratio in the whole data. The 100m buffers indicates an higher ratio for the category of "poor". On the other hand, the 200m buffers denotes a higher ratio of the "neutral, well-off" (see Figure 4.19, p.106 and Table 4.8, p.106).

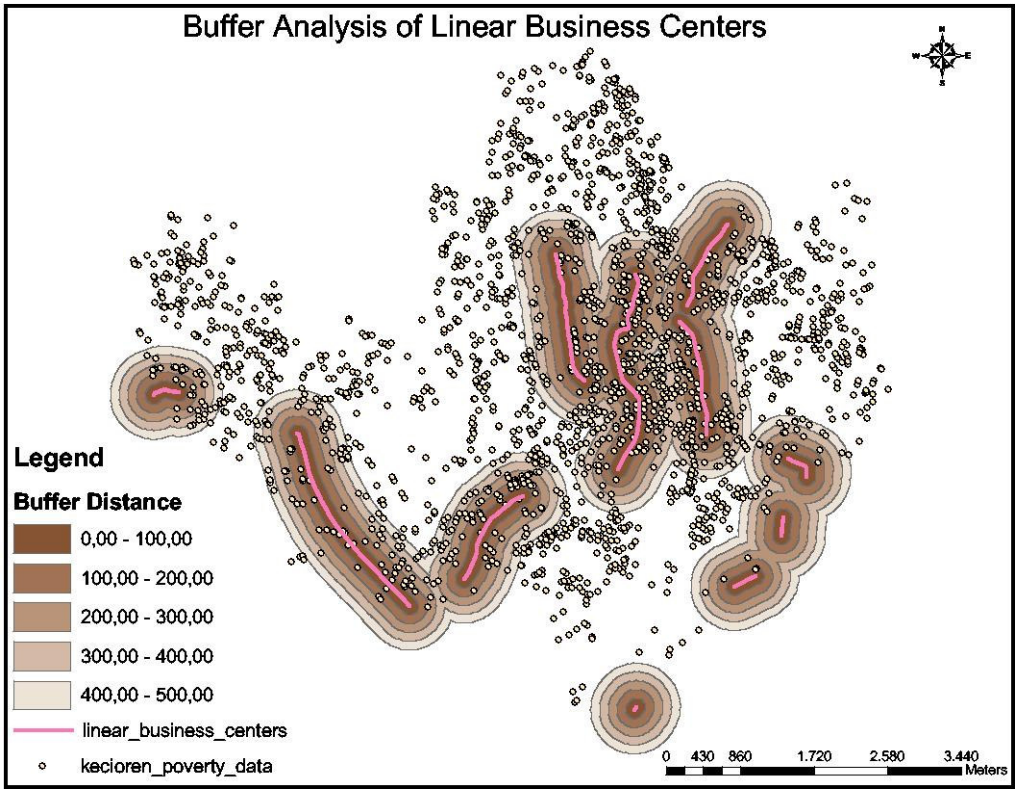

Figure 4.19 Buffer Analysis of Linear Business Centers (Buffer Distance in meters)

Table 4.8 Proportion of categories according to the Condition of Poverty that falls into the Buffers of Linear Business Centers

Condition of Poverty	**Ratio of the Category in Whole Data**	**Ratio of the Category in buffers of Linear Centers**				
		500m	**400m**	**300m**	**200m**	**100m**
Fairly Poor	0,106	0,105	0,107	0,100	0,101	0,068
Poor	0,582	0,578	0,582	0,579	0,564	0,632
Neutral or Well-off	0,312	0,316	0,311	0,321	0,336	0,299

As seen in Table 4.9, p.108, the ratios of the less-poor households in buffers of bus lines are higher than the ratio in the whole area. This may be due to the adjacency of the residences of less-poor applicants to the bus lines in the district. Moreover, the highest proportion of less-poor households is observed in 150m buffer region even if the change in values does not happen in great extent (see Figure 4.20, p.107).

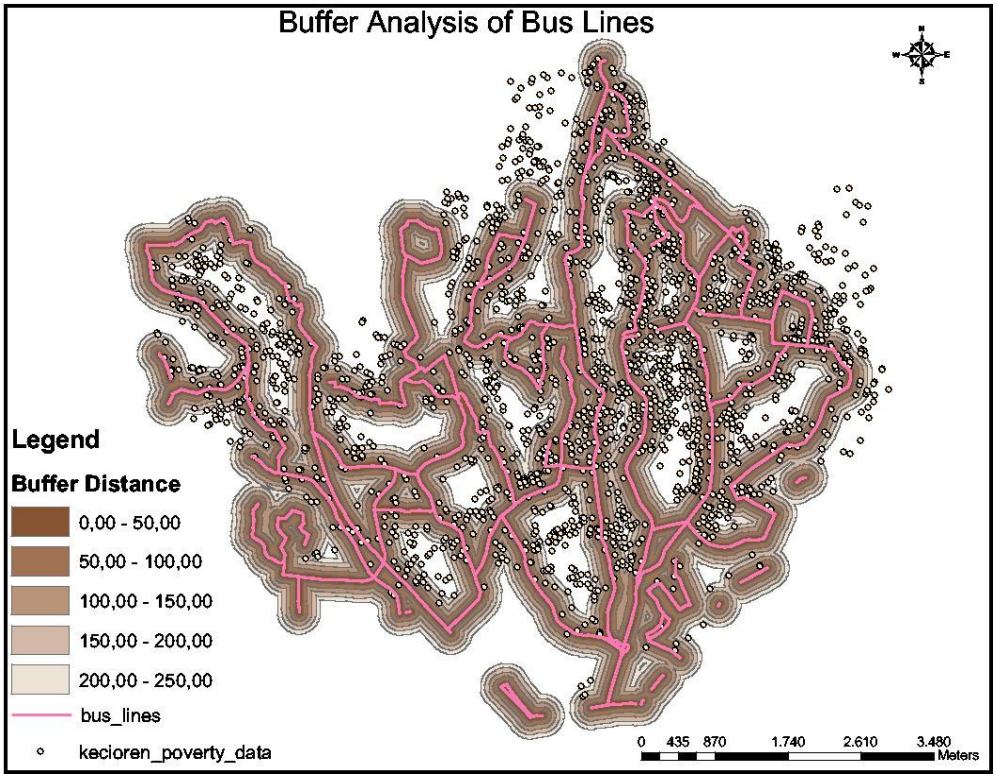

Figure 4.20 Buffer Analysis of "EGO" Bus Lines (Buffer Distance in meters)

Table 4.9 Proportion of categories according to the Condition of Poverty that falls into the Buffers of Bus Lines

Condition of Poverty	**Ratio of the Category in Whole Data**	**Ratio of the Category in buffers of Bus Lines**				
		250m	**200m**	**150m**	**100m**	**50m**
Fairly Poor	0,106	0,104	0,103	0,109	0,103	0,101
Poor	0,582	0,578	0,574	0,563	0,573	0,572
Neutral or Well-off	0,312	0,318	0,324	0,329	0,324	0,327

The proportion of each category is nearly the same in all the buffers of main roads and the values are closer to the ratio in whole data (see Figure 4.21, p.109 and Table 4.10, p.108). This means that the spatial distribution of the main roads in the district is similar with the distribution of poverty data. This situation may be resulted as the main road pattern changes with respect to developments in the district. Moreover, the highest proportion of less-poor households is observed in 150m buffer region which is similar to the situation in buffer analysis of the bus lines.

Table 4.10 Proportion of categories according to the Condition of Poverty that falls into the Buffers of Main Roads

Condition of Poverty	**Ratio of the Category in Whole Data**	**Ratio of the Category in buffers of Main Roads**				
		250m	**200m**	**150m**	**100m**	**50m**
Fairly Poor	0,106	0,109	0,109	0,107	0,109	0,105
Poor	0,582	0,577	0,574	0,575	0,579	0,583
Neutral/Welloff	0,312	0,313	0,317	0,318	0,312	0,311

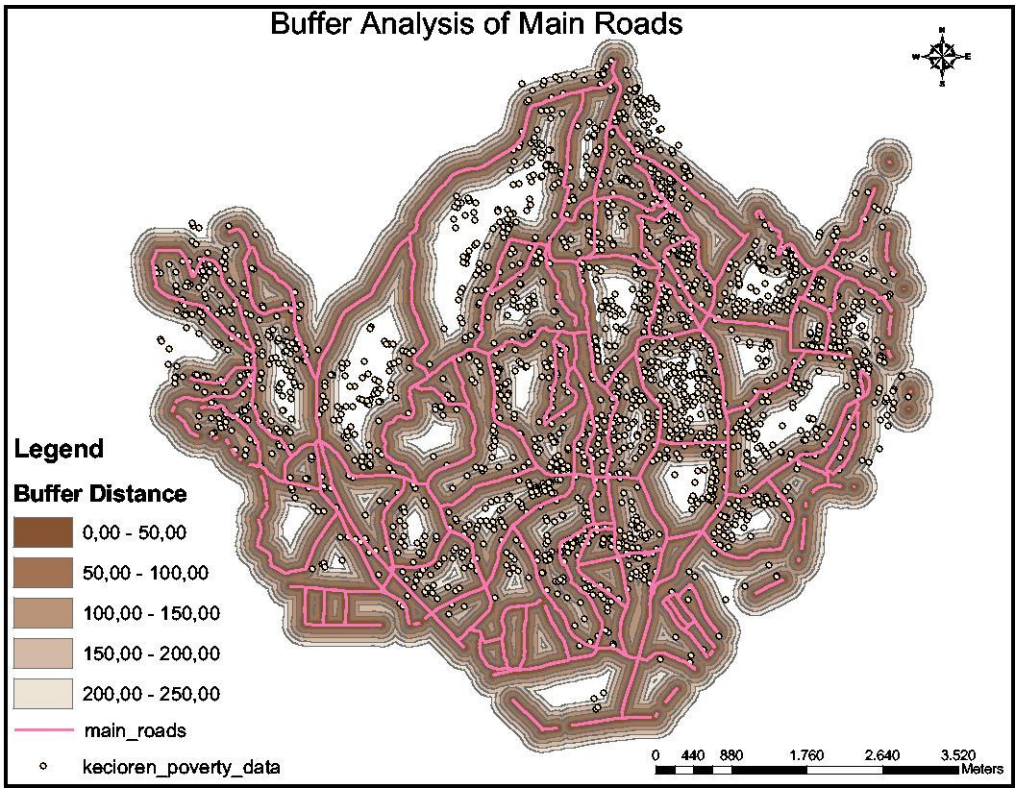

Figure 4.21 Buffer Analysis of Main Roads (Buffer Distance in meters)

4.11. Discussion of the Results

This part of the chapter deals with the results of the case study. The discussions are based on the investigation of the similarities between results of different spatial analyses of poverty and the comparison of them with the characteristics of the study area.

If the exploration of the pattern of the urban poor in *Keçiören* is discussed as a starting point, The Nearest Neighbour (NN) Analysis indicates that the "poorest" applicants of social assistance in *Keçiören* has a random pattern. This may be questionable as if it represents the local conditions. There may be different sub-regions of residential localisations which are not defined by administrative borders. This case is considered in this thesis by introducing a new areal partitioning for

Keçiören. The district is divided into three regions based on the Location Quotient (LQ) values of neighbourhoods which is also accepted by the experts. Then the NN analysis is carried out in each of these regions. Even if the results display randomness for the second time, there may be further partitioning in the district. On the other hand, the "poorest" households are located more in the core settlements (*Tepebaşı, Pınarbaşı, Şenlik, Yakacık* neighbourhoods etc.) of the district with respect to the Density Map. Actually, these neighbourhoods are the first legally established places in *Keçiören* which have been mentioned as the settlements of middle income groups since 1960's. According to the Location Quotient (LQ) Map, these core settlements do not coincide with the over-representative neighbourhoods, but with the neutral ones. In this respect, the LQ analysis reveals that, dense areas of the "poorest applicants" are due to high population in those places. Therefore, the usage of the Density Map of the Poorest Applicants Relative to Population is preferable as most part of dense areas of this map overlap with over-representative region which is the poorest region in the district.

As one of the objectives of this thesis is the geographical targeting of the "poorest of the poor", with reference to the aim of the Conditional Cash Transfers and other social assistance schemes, different spatial analyses are generated. The most relevant results are observed in the clusters at the micro level and the isolation of the poor at the mezzo level for the case of *Keçiören* district. The clusters and isolated areas of the "poorest" applicants can be accepted as the poorer areas, because there may exists a "neighbourhood effect" (Wilson, 1987) and "culture of poverty" (which is a term mentioned by Lewis, 1961) in those places. These clusters and isolation signify an area in which the poor households tend to live close to each other. This may be a result of the physical conditions in that area as small parcels and buildings that are located adjacently. Even if this situation is the cause of clustering in an area, the poverty may also become a culture in that area with respect to segregation of the poor from the non-poor. On contrary, if a poor household lives in a less poor neighbourhood, the better local conditions may be beneficial for that household to struggle against poverty. These can be examplified such as more employment opportunities, opportunities of monetary or non-

monetary help from the well-off residents, increase in motivation to struggle against poverty.

The other objective of this thesis, which is previously mentioned, is the detection of the similarities of the landuse properties of the poor areas. As most of the Poverty Mapping studies with GIS are based on an indicator assessment of poverty, some components of the urban landscape in *Keçiören* are analysed in relation to poverty in this study.

The Land Value Analysis of the district represents a relation with road densities, as the higher road densities generally reflect the areas with lower land values in *Keçiören*. As the lower land values are statistically significant for representing "poorest" households in the district, these lower values are generally cumulated in the north of the district. This area can be accepted as a poorer place which is also highlighted as the region of over-representative poverty in the LQ Map (see Figure 4.5 on p.77).

When the similar settlement properties of the poor as living closer to some urban landscape features, is investigated in the district by Buffer Analysis, no significant characteristic or pattern is observed. However, the most crucial result is obtained from the Buffer Analysis for the condition of settling closer to the Neighbourhood Business Centers (see Figure 4.18, p.104). The proportion of the "fairly poor" households increase with respect to decrease in distance to these centers. This can be interpreted as a result of the location of these centers which is mostly in the periphery of the district, which were once squatter settlements. Even if the squatter settlements are not the only areas of poor residentials, ratio of poor living in those neighbourhoods is higher according to the results of the LQ analyses in this study. Buffer Analysis for other landscape features do not involve a trend like this, but it does not mean there is no existence of other significant spatial trends. If detailed buffer analysis are done with respect to the possible combinations of these landscape features or some other features are also included in the analyses, more settlement properties of the poor may be observed. In that case, the effect of the

conditions of the space for the emergence of poverty can be assessed, which is a broader perspective than the conceptualization of poverty only as an incidence.

An important component of the urban landscape is the road network. In this thesis the residential locations of the poor households are compared to the road density without weighting the roads by their quality etc. The Road Density calculations are implemented on the selected zones from the resultant maps of other analyses. Firstly, the road density within the 2nd order clusters of "poorest" households in different regions of the district is calculated. Figure 4.22, p.113 represents these clusters together with the roads and buildings. The figure clearly displays that clusters in the over-representative region overlap with a landuse which consists of smaller parcels and irregular road network. This landuse pattern is due to the presence of squatter housing in that region which is still not upgraded or limited efforts in neighbourhood planning after the improvement of the buildings. The results indicate that the clusters of over-representative region of poverty coincide with a dense road network with respect to district's average value and the roads in other regions are less dense than the district's average. The important outcome of this situation is the availability of a new information for the geographical distribution of poverty in an urban district of a metropolitan city of Turkey. The case of *Keçiören* in *Ankara* mention that the road density in each cluster of poor residents may represent the poverty level of that place with respect to the district's average.

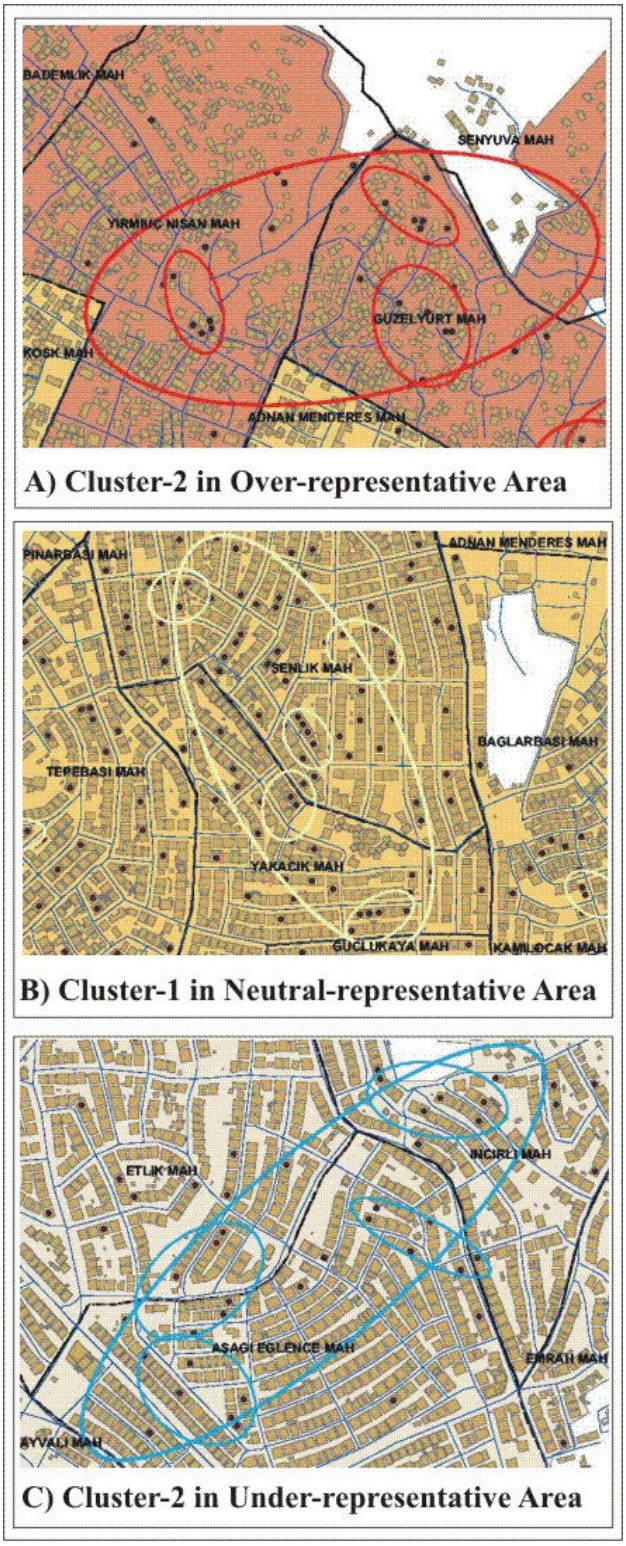

Figure 4.22 Landuse in some of the "Poorest" Clusters of Over, Neutral and Under Representative Regions of the Poverty in Keçiören

The second road density calculation involves dense areas of "poorest" households in the whole district. As a result, the dense areas of the poorest applicants relative to population have a more dense road network than the district's average. This area mostly overlaps with the over-representative region of LQ values. Therefore, the result is similar to the situation in cluster zones of that region. The third calculation is generated for the selected areas from the thiessen polygons of the poverty data. According to the neighbourly relations of these thiessen polygons, road density of the isolated places of poverty in *Keçiören* is similar to the average. This accounts for the precision of the isolation analysis as the occurence of isolated places are not due to the insufficient road network. The other case in this analysis is the computation of the road density in outlier thiessen polygons of household locations. These polygons are previously accepted as the integrated places of "poorest" and "less poor" in the district, but the road density within them is lower than the average. This means that they are not integrated by the road network, which illustrates a random occurence.

A further effort for analysing similar settlement properties of the poor, is the comparison of poverty with the dwelling/building conditions. The building conditions are not used in any spatial statistical analysis as the experts mention that, this can mislead wrong interpretations of poverty. Instead, the average building conditions of neighbourhoods are only visualized according to 5 classes by the "Natural Breaks – Jenks" classification method. This method determines the best arrangement of values into classes by comparing the sum of squared differences of values from the means of their classes. If the poverty maps that are created in this study are evaluated with respect to the average building condition maps of neighbourhoods, the following are observed in Figure 4.23, p.116:

- The map of Repair Need of Buildings does not have much similarity with the poverty maps in this study. Only the north-east of *Keçiören* and the Kanuni Neighbourhood more specifically is a place where the value of the repair need and the LQ of poverty are both high. The repair need map can be used for further calculations of poverty in the district.

- As one of the most important indicators of poverty is the access to water, the Piped Water Installation ratios of *Keçiören* are mapped in Figure 4.23, p.116. The values mention that all of the neigbourhoods have a decent benefit from this infrastructure even if some neighbourhoods have a better situation.

- Coal-Firewood Usage and Natural Gas Installation maps are completely the opposite of each other. The neighbourhoods with higher ratios of coal-firewood usage are the ones with lower ratios of natural gas usage. This is not an unexpected condition as people tend to use other heating methods where there is no opportunity of natural gas. The higher ratios with dark tones of the Coal-Firewood Usage map is a good representation of neighbourhoods with over-representative LQ of poverty. This is the most important outcome of the comparison of dwelling properties of *Keçiören* with the results of spatial analyses of poverty of this study.

- Hot water that is installed to buildings are rare in the district. The neighbourhoods which benefit more from this infrastructure are mostly the ones in the neutral or under representative region of poverty.

- The higher ratios of Elevator and Fire Escape installation to buildings are in the under-representative neighbourhoods of poverty. In addition, these neighbourhoods are mostly the well-off ones such as *Etlik* and *Aşağı Eğlence* which are in the south-west of the district.

- Buildings with car park according to map, generally overlap with the less poor neighbourhoods which are under or neutral representative. The highest ratios are in the highly populated ones which are infact the first legally established and planned settlements of the district.

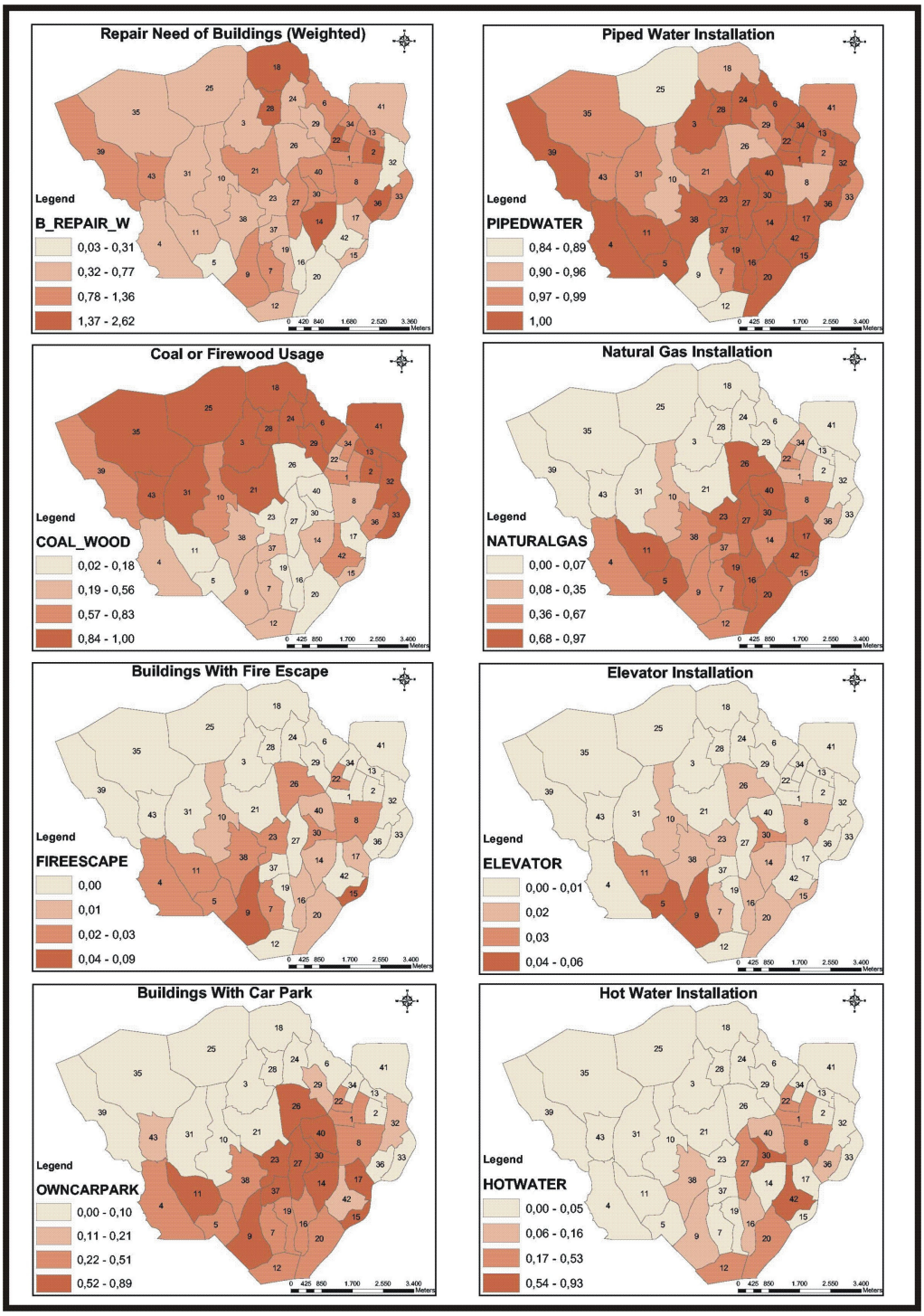

Figure 4.23 Maps of the Average Building Conditions of Neighbourhoods in Keçiören according to natural breaks classification with four breaks

As mentioned above, the spatial analyses that are performed in this study are mostly evaluated according to the regions that are determined by the Location Quotient Analysis of the poorest households. In order to display the differences between over, neutral and under representative regions of poverty of the district, the socio-economic characteristics of applicant households that are settled in those places have to be checked. This comparison can be made according to Tables 4.11-12-13-14 (p.118-119), for education of the household head, education of the wife of the household head, ownership of the dwelling, and number of children with respect to the percentages of each category for each variable based on the total applicants in each region respectively. The households with no data for these variables are omitted in the calculation of percentages.

According to the state of education variable of applicants, the breaking point is the percentage of high school graduates in each region, as higher education level than the high school is rare in the data. Table 4.11, p.118, indicates that the over-representative region has a lower percentage of high school graduates than the whole data for the household heads. On the other hand, both the over and neutral representative regions have lower percentages for high school graduate household wifes. Interestingly, the applicants in the over-representative region of poverty own their dwellings more than the others. This may be as a result of the historical background of the development of the study area indicating the fact that the residents of the previous illegally established settlements have owned their title deeds from the state authorities afterwards. In addition, the applicants who live in the doorkeeper's dwelling are more in the over and neutral representative regions due to the fact that the higher numbers of apartment buildings exist in those areas. The last variable which is investigated is the number of children, but it does not display a significant difference between the regions.

Table 4.11 Percentages of Households for each Category of Education Level of Household Head

Education of the household head	**Applicants in the District (%)**	**Applicants in the under rep. region(%)**	**Applicants in the over rep. region(%)**	**Applicants in the neutral rep. region(%)**
Illiterate	16,3	12,1	17,18	17,35
Only Literate	6,07	6,45	7,32	3,57
Elementary School	61,93	61,29	62,54	61,22
Secondary School	10,22	11,29	10,14	9,69
High School	4,74	7,26	2,54	7,14
Vocational School of Higher Education	0,59	1,61	0	1,02
University	0,15	0	0,28	0

Table 4.12 Percentages of Households for each Category of Education Level of Household Head's Wife

Education of the wife of the household head	**Applicants in the District (%)**	**Applicants in the under rep. region(%)**	**Applicants in the over rep. region(%)**	**Applicants in the neutral rep. region(%)**
Illiterate	16,24	10,45	17,22	17,86
Only Literate	6,7	5,97	7,66	5,36
Elementary School	64,18	61,19	64,59	65,18
Secondary School	7,22	8,95	6,7	7,14
High School	4,9	10,45	3,35	4,46
Vocational School of Higher Education	0,77	2,99	0,48	0
University	0	0	0	0

Table 4.13 Percentages of Households for each Category of Dwelling's Ownership

Ownership of the Dwelling	**Applicants in the District (%)**	**Applicants in the under rep. region(%)**	**Applicants in the over rep. region(%)**	**Applicants in the neutral rep. region(%)**
Owner	23,12	13,77	28,34	19,08
Tenant	65,91	71,86	62,88	67,94
Doorkeeper's Dwelling	2,37	4,79	0,2	4,96
Relative's Property	5,27	5,99	5,59	4,2
Other	3,33	3,59	2,99	3,82

Table 4.14 Percentages of Households according to the Number of Children

Number of Children	**Applicants in the District (% of the ones who have children)**	**Applicants in the under rep. region(%)**	**Applicants in the over rep. region(%)**	**Applicants in the neutral rep. region(%)**
1	17,16	17,31	17,27	16,87
2	34,85	44,23	31,23	35,54
3	22,94	18,27	23,26	25,3
4	10,16	7,69	10,96	10,24
5	6,48	4,81	8,31	4,22
6	3,5	3,85	2,66	4,82
7	2,98	2,88	3,32	2,41
8+	1,93	0,96	2,99	0,6

CHAPTER 5

CONCLUSION

The spatial dimension of "poverty" is analyzed in this thesis with a case study in *Keçiören* district, *Ankara* by using Geographical Information Systems (GIS). This study is undertaken fulfilled with the understanding that in poverty alleviation policies and practices there is a need to deal with the spatial aspects of poverty, especially in *Turkey,* where such practices are mostly performed through apriori measures. Such a study can also be helpful to understand whether the physical upgrading applications are effective in changing the spatial distribution of poverty. Additionally, such an analysis can be beneficial for the policy makers to learn about the criteria of the poor selecting their settlements. This study aims at making contributions in different aspects to spatial analysis of poverty and therefore the conclusion part deals with each of these different aspects respectively. These aspects include; the spatial distribution of the poor in *Keçiören,* GIS usage with social data, methodology for the analysis of spatial dimension of poverty and poverty alleviation, and recommendations for future studies.

The selection of the study area as *Keçiören* district is the first important aspect of this thesis. As the district is mostly inhabited by middle income groups who live in the nearby poor residents since the past, it is hard to distinguish between the poor and non-poor areas. In this case, *Keçiören* carries a priority compared to other districts of *Ankara*, for geo-targeting studies in order to understand the spatial distribution of the poorer places. Furthermore, the selection of *Keçiören* as a site is a result of its transitionary characteristics representing the average of *Ankara* with respect to socio-demographic indicators.

The spatial distribution of poverty in *Keçiören* has two major results. The most significant result of this case study in *Keçiören* is that the northern parts of the

district which cover the areas under construction improvement plans (see Figure 3.4, p.39) and higher percentage of coal and firewood usage, are poorer. This means that not all but a significant portion of the applicants from this region are poor and the poor do not only reside in *"gecekondus"*. The experts interviewed in this study mentioned that "as the squatter settlements are clustered in the northern part of the district, the poor in the district usually settled there in the past. However, after the implementation of construction improvement plans, the poverty in those places have decreased as the squatter owners gained new property from apartment buildings and the tenants in the previous squatter settlements have moved to other places in the city." Even though there has been a decrease in the poverty of those places as mentioned by the experts, they are still the poorer areas in the district with respect to the results of this study. This may be due to the fact that implementation process of plans has not yet come to an end. Moreover, those who have improved their conditions may have moved to other places and the poor who are newcomers to the district may still tend to settle in those places as tenants which were once squatter areas. This may result in a continuous state of poverty in those areas. Thus, the newcomers after construction improvement plans do not possibly benefit from the ownership of the dwellings such as renting the dwellings to the later coming migrants. In this way, the finding claiming that the north of the district is still a poor area testifies the decrease in the possibilities of migrants for overcoming poverty by transferring it to the later coming migrants (which is also claimed by Işık and Pınarcıoğlu in 2001 for Turkey).

The other major result of the case study is that the poor residents are scattered in all of the neighbourhoods of the district, even the well-off neighbourhoods involve a poor population. Although this may be a result of the high population density in the legally established areas, it is also an important evidence for the increase of poverty in different groups of society as an outcome of the term "new poverty" which is the new form of poverty (mentioned by Buğra and Keyder, 2003). Besides, all neighbourhoods include a population of doorkeepers, or *"kapıcı"*, of buildings who are poor and residing in the place of employment. Moreover, according to expert interviews for the definition of the "poorest" among the applicants the evaluation

process of the applicants is important. This process indicates that the age, sex, education, household size and many other factors may influence the poverty level of applicants. Therefore, if the household composition includes old aged people, disabled/chronically ill people or widow/divorced woman or the household is crowded with many dependent persons, then these applicants are more probably recorded as "poorest". Such households may live in every neighbourhood, as they were once not poor, but then they have lived a downward mobility. There may be other possibilities of a downward mobility such that a single earner household in the informal sector may experience a decrease in his earnings if he loses his job. The construction improvement plans also contributed to this situation as some of the "*gecekondu*" inhabitants that pay very little money for the rent have to pay more for rents of the apartment buildings if they do not migrate to other places in the city.

Another aspect of this study includes the technical contribution to GIS usage for social data, which is realized in twofold. Firstly, some spatial statistical techniques which are practiced in this thesis are not covered by GIS software packages, therefore they are carried out in other packages or manually and then transferred to GIS. Secondly, qualitative techniques such as the expert interviews in this thesis are integrated with the quantitative techniques of GIS. In this way, the interview clarifies the properties and limitations of the dataset, which is an initial condition to establish more accurate spatial analysis on the social data by GIS. In addition, the in-depth interviews are necessary for the verification of the results of the spatial analyses on poverty.

The most important issue of this thesis is its methodological difference from other poverty mapping techniques. This situation can be explained by the four different contributions of this new methodology. Firstly, the household data which represents poverty is directly mapped as exact locations and used for spatial analyses. Despite some examples, most of the initial studies do not display a detailed view of poverty considering the household level. Instead, poverty maps generally represent well-being as an average within the legally established boundaries. If the situation in *Turkey* is concerned, there is much more deficiency of poverty studies. This is

partly a result of the inaccessibility of the necessary data for such studies. In this case, the database of applicants of Conditional Cash Transfer programs and Social Assistance Foundations are beneficial to address the poor because a considerable amount of data is collected for those efforts. Hence, this is the raw data which is used in this thesis for spatial analyses. An important aspect of this data is that the state of poverty of households is previously calculated considering not only income but also various socio-economic indicators such as health and education. However, the poverty of households which represents a social state has to be mentioned with respect to geography in order to generate this study. Therefore, the data is gathered from its source with the corresponding addresses which makes geo-coding possible to display poverty as a spatial data.

The second difference of the methodology is the exploration of the spatial characteristics of the poor in three different regions in the district which are based on location quotient levels. This is due to the fact that different poverty levels may represent different local conditions. A result which must be emphasized in the indicator assessment efforts for poverty of this study is that the higher road densities and the lower land values overlap with the clusters of the "poorest" applicants of social assistance in the poorer region of the district but not with the clusters of the "poorest" ones in the less poor regions. Moreover, the mean minimum distance between "poorest" applicants in the under-representative region of poverty is lower than that in other regions. These results account for the validity of the partitioning of the district into three regions by poverty levels as each region displays different spatial properties.

The major contribution of the methodology to poverty studies, which is also mentioned above as a contribution to GIS, is the integration of qualitative and quantitative techniques. Therefore, the benefits of each approach for the spatial analysis of poverty have become available in this thesis.

The fourth part of the methodological contribution deals with the use of GIS as in this study which is advantageous for poverty analysis. The GIS is a useful tool to

deal with spatial data due to its precise geographical localization and measurement and high spatial analysis and visualization capabilities. Furthermore, scientific disciplines like City Planning or Sociology have discussions on poverty in urban areas, which are generally based on qualitative discussions. However, if the methodology of a poverty study involves the evaluation of a survey or similar data by GIS and spatial statistics, quantitative results may be obtained to strengthen the qualitative discussions. Furthermore, the difference of the GIS usage for poverty analysis according to the methodology of this study is the integration of the point and areal data for the geo-targeting of poverty based on macro (neighbourhood), mezzo (thiessen polygons) and micro (clusters) levels. This is accomplished by the layer based structure of GIS. The areal entities in the thesis are of two types; the ones that are defined by administrative borders such as neighbourhoods or other areal partitioning which is not legally defined such as the regions based on poverty level and thiessen polygons. The poverty point data is used to define the characteristics of these areal entities by the use of GIS and spatial statistical techniques. Additionally, the location quotient analysis, the density analysis and the cluster analysis methods in spatial statistics are used as major tools of poverty analysis according to this study to detect the poorer areas by the help of the GIS. Moreover, there is an attempt to minimize the modifiable areal unit problem in the thesis with the aid of GIS. This is realized by the mezzo level of poverty analysis in this study, which meets a new areal division as thiessen polygons which is in between the household level of poverty and neighbourhood level of poverty. As a result, different local poverty conditions can be observed beyond the boundaries of neighbourhoods, such as the isolation of poor residents.

As the study is mainly generated to assist the efforts of poverty alleviation, which is another aspect of the thesis, spatial analyses of the gathered data are carried out to achieve this goal. Therefore, all of the decision makers in the process of poverty alleviation and related professions may possibly make use of the results of this study. First of all, the social assistance foundations such as the Social Assistance and Solidarity Encouragement Fund (SYDTF), Ministry of Health, Social Services and Child Protection Institution, Non-Governmental Organizations may reconstruct

their poverty evaluation efforts based on the local conditions. For instance, the questionnaires of SYDTF for poverty evaluation may be integrated with the local conditions of poverty in each regional partition in *Keçiören* with respect to the results of this case study. In addition, the social assistance is not only based on the evaluation of poor applications anymore, but also direct determination of who is the poor may become easier by knowing where they are located. Secondly, if the local governments request a prioritization for the allocation of the resources to poor areas and consider the social upgrading in the physical upgrading process, then the exploration of the poverty in more detailed localizations than neighbourhoods as in this thesis may be useful.

Poverty analysis as in this thesis may also contribute to other professionals who may not necessarily participate in the process of poverty alleviation. One such profession is the city planners, who definitely need knowledge about the spatial distribution of important phenomena such as poverty even if they are not in the position of the alleviation of it. One other profession or institution, which may need to know the poverty levels in different areas, is the police. The police may develop situational crime prevention schemes with respect to social structure in an area by considering the potential of different problems which may occur in poor or well-off areas distinctively.

Finally, recommendations for future studies have to be considered after the establishment of this study. These recommendations are based on the data, study area, and the methodology of this thesis. As the dataset has significant limitations, future poverty studies by using this kind of data should consider these limitations. First, the database used in this thesis only includes final evaluation of the state of poverty for each applicant based on a questionnaire but it does include the full components of poverty evaluation. Hence, some major indicators were missing. Next, the dataset is not a random sample of the poor in *Keçiören* as the poor ones are recorded only after they applied for social assistance. Applicants are the ones whose information networks and motivations are higher than the others as confirmed by the interviewed experts. Therefore, a field survey can be made for the

poorer areas with respect to the results of the spatial analyses in order to evaluate the different characteristics of poor households in those places. The questionnaire of this survey should be designed to reflect the information networks of applicants and the effects of relative poverty and social exclusion of these households. Moreover, the questionnaire should include more questions about the dwelling conditions, ownership and details of the location changes of each household such as the dates of migration to the present residential location.

Another recommendation may be the implementation of the methodology of this study in other sites. In order to develop a better methodology for the assessment of the spatial dimension of poverty, the analysis should be made in different districts. In this way, the eligibility of geo-targeting and indicator assessment efforts in this study may rise. If the spatial analyses reflect the same results in other districts, then this study may have important implications for policy-making process. Besides, using GIS for poverty mapping may gain significance in that case, as the comparison of the results of spatial analyses in different districts would be easier by GIS.

Lastly, the methodology of this thesis can be modified in further studies in order to get a better representation of the spatial distribution of poverty. These modifications may be using other spatial analysis techniques based on GIS and including much more urban landscape features for the exploration of them in relation to poverty distribution. For example, network analysis can be used to explore bus lines and main roads. Additionally, for a better representation of the spatial dimension of poverty, the grouping of data with respect to a specific number of nearest neighbours may be used in further studies because neighbourhoods and thiessen polygons do not display the natural boundaries of data. Apparently, some modifications can be made on the qualitative techniques that are used in this thesis such as asking other questions in the interview or making interviews with other significant experts. The other experts who may possibly have knowledge about the spatial distribution of poverty in the district are the decision-makers in the local government

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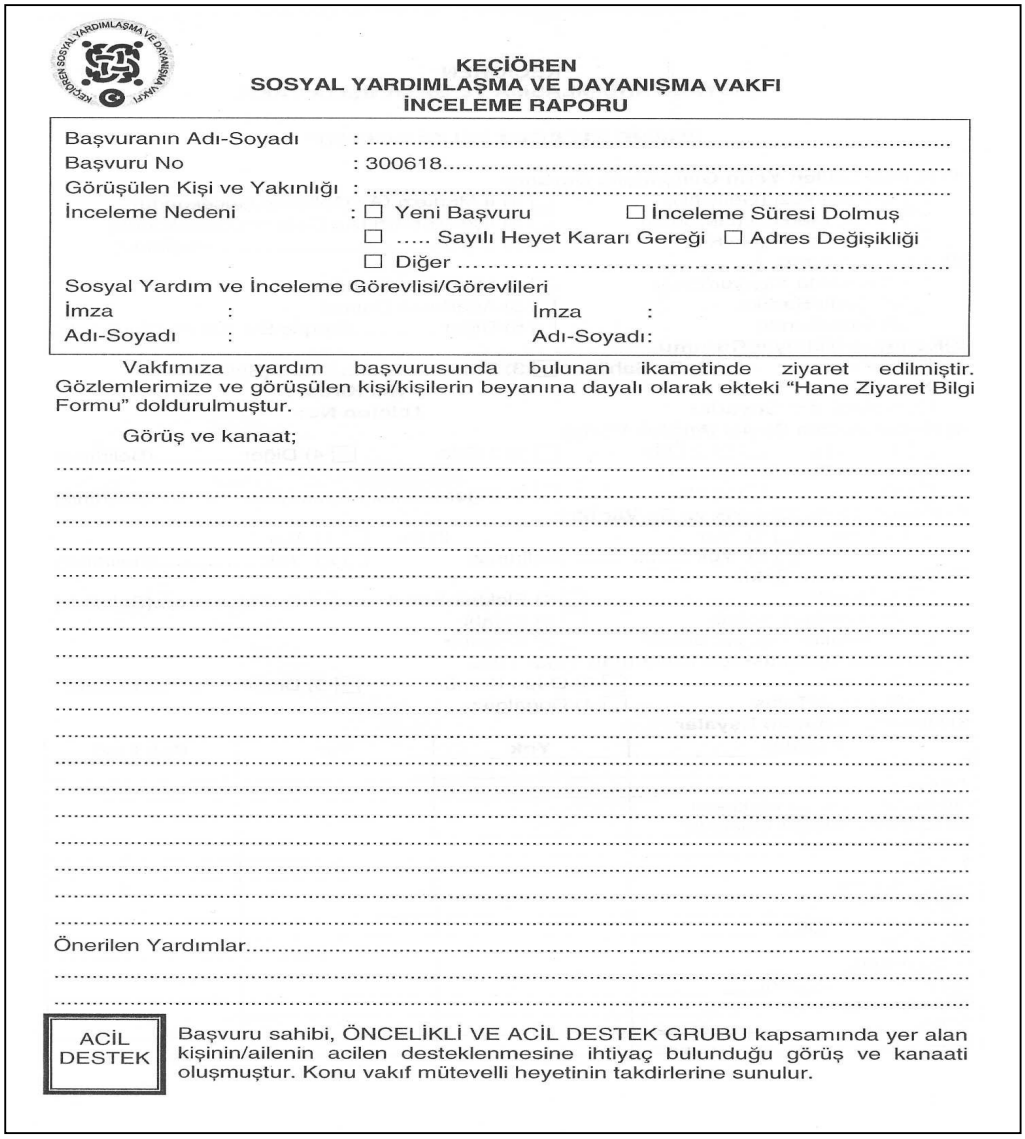
APPENDIX A

NEWLY ESTABLISHED QUESTIONNAIRE OF SOCIAL ASSISTANCE OF SYDV USED IN KEÇİÖREN



KEÇİÖREN
SOSYAL YARDIMLAŞMA VE DAYANIŞMA VAKFI
İNCELEME RAPORU

Başvuranın Adı-Soyadı : .....
Başvuru No : 300618.....
Görüşülen Kişi ve Yakınlığı : .....
İnceleme Nedeni : ☐ Yeni Başvuru ☐ İnceleme Süresi Dolmuş
☐ ..... Sayılı Heyet Kararı Gereği ☐ Adres Değişikliği
☐ Diğer .....

Sosyal Yardım ve İnceleme Görevlisi/Görevlileri

İmza : İmza :
Adı-Soyadı : Adı-Soyadı:

Vakfımıza yardım başvurusunda bulunan ikametinde ziyaret edilmiştir. Gözlemlerimize ve görüşülen kişi/kişilerin beyanına dayalı olarak ekteki "Hane Ziyaret Bilgi Formu" doldurulmuştur.

Görüş ve kanaat;

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Önerilen Yardımlar.....
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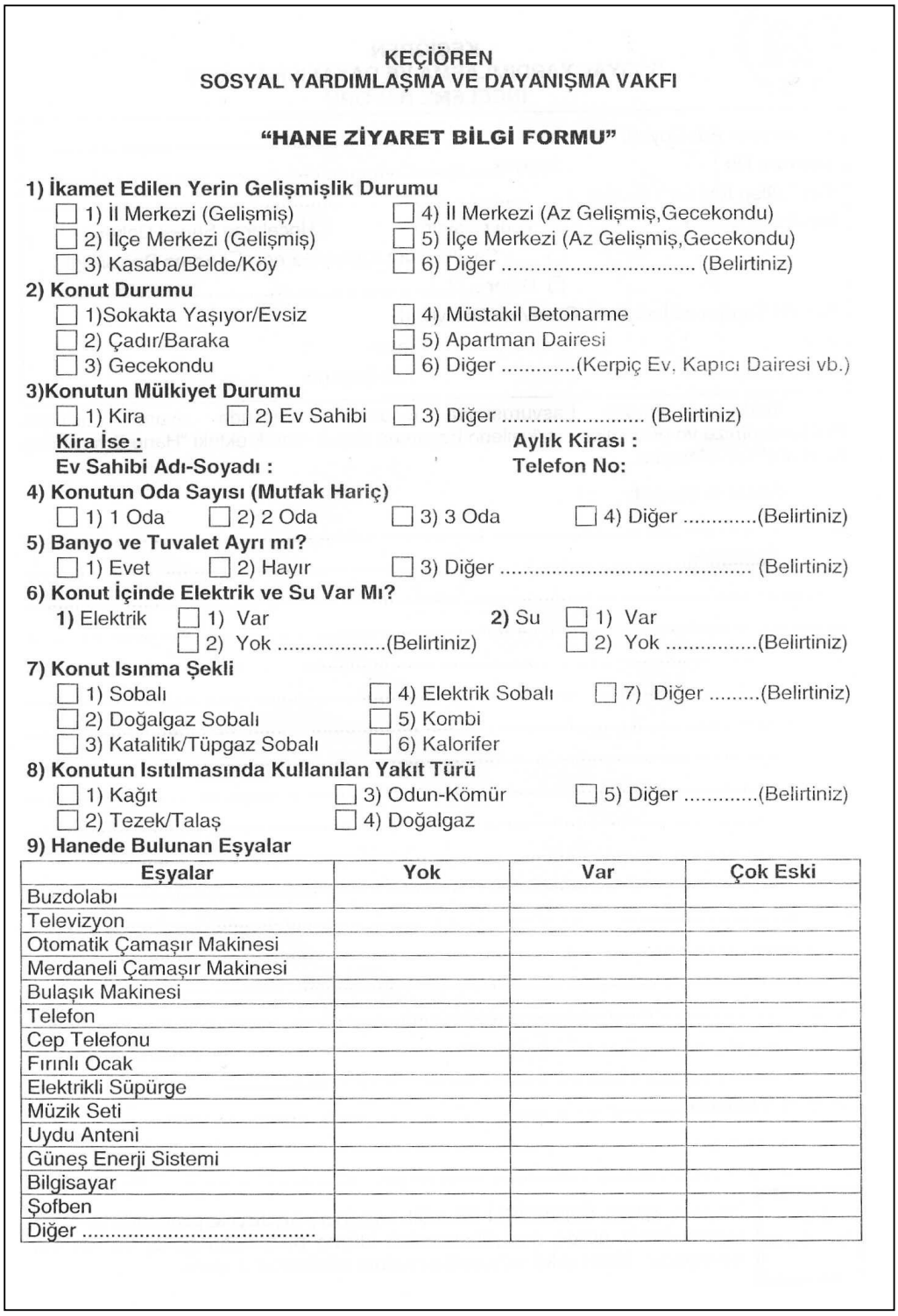
ACİL DESTEK

Başvuru sahibi, ÖNCELİKLİ VE ACİL DESTEK GRUBU kapsamında yer alan kişinin/ailenin acilen desteklenmesine ihtiyaç bulunduğu görüş ve kanaati oluşmuştur. Konu vakıf mütevelli heyetinin takdirlerine sunulur.

Figure A.1 First Page of the Newly Established Questionnaire of Social Assistance of SYDV



KEÇİÖREN
SOSYAL YARDIMLAŞMA VE DAYANIŞMA VAKFI

"HANE ZİYARET BİLGİ FORMU"

1) İkamet Edilen Yerin Gelişmişlik Durumu

☐ 1) İl Merkezi (Gelişmiş) ☐ 4) İl Merkezi (Az Gelişmiş,Gecekondu)
☐ 2) İlçe Merkezi (Gelişmiş) ☐ 5) İlçe Merkezi (Az Gelişmiş,Gecekondu)
☐ 3) Kasaba/Belde/Köy ☐ 6) Diğer ..... (Belirtiniz)

2) Konut Durumu

☐ 1)Sokakta Yaşıyor/Evsiz ☐ 4) Müstakil Betonarme
☐ 2) Çadır/Baraka ☐ 5) Apartman Dairesi
☐ 3) Gecekondu ☐ 6) Diğer .....(Kerpiç Ev, Kapıcı Dairesi vb.)

3)Konutun Mülkiyet Durumu

☐ 1) Kira ☐ 2) Ev Sahibi ☐ 3) Diğer ..... (Belirtiniz)

Kira İse : **Aylık Kirası :**

Ev Sahibi Adı-Soyadı : **Telefon No:**

4) Konutun Oda Sayısı (Mutfak Hariç)

☐ 1) 1 Oda ☐ 2) 2 Oda ☐ 3) 3 Oda ☐ 4) Diğer .....(Belirtiniz)

5) Banyo ve Tuvalet Ayrı mı?

☐ 1) Evet ☐ 2) Hayır ☐ 3) Diğer ..... (Belirtiniz)

6) Konut İçinde Elektrik ve Su Var Mı?

1) Elektrik ☐ 1) Var **2)** Su ☐ 1) Var
☐ 2) Yok .....(Belirtiniz) ☐ 2) Yok .....(Belirtiniz)

7) Konut Isınma Şekli

☐ 1) Sobalı ☐ 4) Elektrik Sobalı ☐ 7) Diğer .....(Belirtiniz)
☐ 2) Doğalgaz Sobalı ☐ 5) Kombi
☐ 3) Katalitik/Tüpgaz Sobalı ☐ 6) Kalorifer

8) Konutun Isıtılmasında Kullanılan Yakıt Türü

☐ 1) Kağıt ☐ 3) Odun-Kömür ☐ 5) Diğer .....(Belirtiniz)
☐ 2) Tezek/Talaş ☐ 4) Doğalgaz

9) Hanede Bulunan Eşyalar

Eşyalar	Yok	Var	Çok Eski
Buzdolabı			
Televizyon			
Otomatik Çamaşır Makinesi			
Merdaneli Çamaşır Makinesi			
Bulaşık Makinesi			
Telefon			
Cep Telefonu			
Fırınlı Ocak			
Elektrikli Süpürge			
Müzik Seti			
Uydu Anteni			
Güneş Enerji Sistemi			
Bilgisayar			
Şofben			
Diğer			

Figure A.2 Second Page of the Newly Established Questionnaire of Social Assistance of SYDV

10) Taşıt Durumu

☐ **1)** Yok

☐ **2)** Var ☐ 1) Binek Oto ☐ 2) Ticari Araç ☐ 3) Traktör ☐ 4) Diğer.....(Belirtiniz)

Markası..... Modeli .....

11) Hane Halkı Sahip Olduğu Gayrimenkul Durumu

Gayrimenkul Tipi	Var / Miktarı	Yok
Ev		
Dükkan		
Bağ/Bahçe		
Arazi/Tarla		

12) Hane Halkına Ait Hayvan Cinsi Ve Miktarı

☐ **1)** Yok ☐ **2)** Var ☐ 1) Küçükbaş Miktarı .....

☐ 2) Büyükbaş Miktarı .....

13) Hane Halkı Tipi

☐ 1) Tek Kişi ☐ 3) Çekirdek Aile

☐ 2) Tek Ebeveynli Aile ☐ 4) Geniş Aile ☐ 5) Diğer ..... (Belirtiniz)

14) Başvuru Sahibinin Medeni Durumu

☐ 1) Eşi Ölmüş ☐ 4) Evli (Nikahsız) ☐ 7) Evli (Nikahlı)

☐ 2) Evli (Terk Edilmiş) ☐ 5) Boşanmış (Kanunen) ☐ 8) Diğer.....

☐ 3) Nikahlı (Ayrı Yaşıyor) ☐ 6) Bekar

15) Yeşil Kartınız Var Mı?

☐ 1) Var Kişi Kodu ..... ☐ 2) Yok ..... (Nedenini Belirtiniz)

16) Son 1 Yıl İçerisinde Herhangi Bir Yardım Kuruluşundan Yardım Aldınız Mı?

☐ **1)** Hayır

☐ **2)** Evet

Alınan Yardım Türü

1) Belediye .....
2) SHÇEK .....
3) SYDV .....
4) Sivil Top.Örg. .....
5) Diğer .....

17) Hanede 2022 Sayılı Kanundan Faydalanan Var Mı?

☐ **1)** Yok

☐ **2)** Var

3 Aylık Gelir Miktarı

1) Kendisi ..... YTL
2) Eşi ..... YTL
3) Çocuğu ..... YTL
4) Anne-Baba ..... YTL
5) Diğer .....(Belirtiniz) ..... YTL

18) Sosyal Yardımlaşma ve Dayanışma Vakfının Hangi Yardım Türünden Faydalanmak İstiyorsunuz?

☐ 1) Gıda ☐ 2) Yakacak ☐ 3) Nakit ☐ 4) Sağlık ☐ 5) Özel Eğitim

☐ 6) Diğer ..... (Belirtiniz)

Figure A.3 Third Page of the Newly Established Questionnaire of Social Assistance of SYDV

19) Aile Bilgi Şeması

YAKINLIĞI	CİNSİYET	YAŞ	EĞİTİM	İŞ	AYLIK GELİR	MESLEĞİ	MESLEĞİ EDİNME ŞEKLİ	KRONİK HASTALIK *	ÖZÜR DURUMU *	RAPOR DERECESİ
								1) VAR ☐ 2) YOK ☐	1) VAR ☐ 2) YOK ☐	1) VAR ☐ %.... 2) YOK ☐
								1) VAR ☐ 2) YOK ☐	1) VAR ☐ 2) YOK ☐	1) VAR ☐ %.... 2) YOK ☐
								1) VAR ☐ 2) YOK ☐	1) VAR ☐ 2) YOK ☐	1) VAR ☐ %.... 2) YOK ☐
								1) VAR ☐ 2) YOK ☐	1) VAR ☐ 2) YOK ☐	1) VAR ☐ %.... 2) YOK ☐
								1) VAR ☐ 2) YOK ☐	1) VAR ☐ 2) YOK ☐	1) VAR ☐ %.... 2) YOK ☐
								1) VAR ☐ 2) YOK ☐	1) VAR ☐ 2) YOK ☐	1) VAR ☐ %.... 2) YOK ☐
								1) VAR ☐ 2) YOK ☐	1) VAR ☐ 2) YOK ☐	1) VAR ☐ %.... 2) YOK ☐
								1) VAR ☐ 2) YOK ☐	1) VAR ☐ 2) YOK ☐	1) VAR ☐ %.... 2) YOK ☐
								1) VAR ☐ 2) YOK ☐	1) VAR ☐ 2) YOK ☐	1) VAR ☐ %.... 2) YOK ☐

Kronik Hastalık Durumu	Kodu		Kodu
Kanser	1	Şeker	7
Böbrek Yetmezliği	2	Hemofili	8
Kalp Rahatsızlıkları	3	Hepatit (b,c,d)	9
Akciğer Rahatsızlıkları (Astım, bronşit, tüberküloz)	4	Epilepsi, Sara	10
Karaciğer Rahatsızlıkları (Siroz vb.)	5	AIDS	11
Yüksek Tansiyon	6	Diğer	12

Özür Durumu	Kodu
Ortopedik	1
Görme	2
Konuşma	3
İşitme	4
Zihinsel	5
Ruhsal	6
Diğer	7

(*) Kronik Hastalık ve Özür Durumu bölümleri; hanede yaşayanlar tarafından vakıf personeline "RAPOR" ibraz edilmesi halinde doldurulacak ve ☐ kutusuna kodlarda yer alan rakamlar yazılacaktır.

İkametimde vakıf personeli tarafından yapılan ziyarette vermiş olduğum yukarıda yazılı bilgilerin doğruluğunu kabul ediyorum.

Görüşülen Kişinin
Adı-Soyadı :
Başvuru Sahibine Yakınlığı :
İmzası :

Bilgi Formunu Dolduran
İnceleme Görevlisinin Adı-Soyadı :
İmzası :

Figure A.4 Fourth Page of the Newly Established Questionnaire of Social Assistance of SYDV

APPENDIX B

DATABASE STRUCTURE OF THE STUDY

Table B.1 The Database Structure (Fields/Variables)

Layer Name	**Field Name**	**Field's Description**	**Field Values and their Explanations**
Kecioren_ Poverty_data	Id	Id number of each household in the data	Integers
	Mahalle	Name of the neighbourbood where household is settled	Text
	Address	Address of each household	Text
	Condition	State of poverty for each household	"Fairly Poor" "Poor" "Neutral" "Welloff" "Fairly Welloff"
	Dwelling	The ownership of the dwelling of Households	"Tenant" "Owner" "Relative's Property" "Doorkeeper's Dwelling" "Other"

Table B.1 (continued) The Database Structure (Fields/Variables)

Layer Name	Field Name	Field's Description	Field Values and their Explanations
Kecioren_ Poverty_data	Education	State of education for each household head	"Illiterate": no literacy "Literate": only literate "Elementary School": Elementary School graduate "Secondary School": Secondary School graduate "High School": High School graduate "Vocational Higher": Vocational School of Higher Education graduate "University": University Graduate
	Marital_St	Marital Status of the household head	"Single" "Divorced" "Widow" "Married"
	Birthplace	Name of the place where hh head was born	Text
	Children	Number of children in household (if there exists any)	Integers
	Land_Value	Land value of dwelling of each household	Integers

Table B.1 (continued) The Database Structure (Fields/Variables)

Layer Name	**Field Name**	**Field's Description**	**Field Values and their Explanations**
Kecioren_ Poverty_data	Educa_Wife	State of education for the wife of the household head (if there exists)	"Illiterate": no literacy "Literate": only literate "Elementary School": Elementary School graduate "Secondary School": Secondary School graduate "High School": High School graduate "Vocational Higher": Vocational School of Higher Education graduate "University": University Graduate
Kecioren_ Roads	Id	Id number of each road segment	Integers
	Mahalle	Name of the neighbourhood where segment is located	Text
	Name	Name of each road	Text
	Imp_Road	Importance of the road for each segment	"1": Street "2": 2nd Degree Road "3": 1st Degree Road

Table B.1 (continued) The Database Structure (Fields/Variables)

Layer Name	**Field Name**	**Field's Description**	**Field Values and their Explanations**
Neighbourhoods_ Of_Kecioren	Id	Id number of each neighbourhood	Integers
	Mahalle	Name of each neighbourhood	Text
	Population	The population for each neighbourhood	Integers
	Building	Number of buildings for each neigbourhood	Integers
	Num_Dwell	Number of dwelling units for each neighbourhood	Integers
	B_Repair_W	Repair need of buildings *	Decimals
	Coal_Wood	The ratio of the buildings that are using coal and firewood to total number of buildings in each neighbourhood	Decimals
	Naturalgas	The ratio of natural gas installed buildings to total number of buildings in each neighbourhood	Decimals

Table B.1 (continued) The Database Structure (Fields/Variables)

Layer Name	Field Name	Field's Description	Field Values and their Explanations
Neighbourhoods_ Of_Kecioren	Pipedwater	The ratio of piped water installed buildings to total number of buildings in each neighbourhood	Decimals
	Hotwater	The ratio of hot water installed buildings to total number of buildings in each neighbourhood	Decimals
	Elevator	The ratio of elevator installed buildings to total number of buildings in each neighbourhood	Decimals
	Fireescape	The ratio of buildings with a fire escape to total number of buildings in each neighbourhood	Decimals
	Owncarpark	The ratio of buildings with a car park to total number of buildings in each neighbourhood	Decimals

* “Repair need of buildings” is calculated in two steps:

Firstly; “no repairing need”, “some repairing need”, “serious repairing need”, “need to be demolished” are calculated separately as ratios of the buildings which suffer from these needs to the total number of buildings in each neighbourhood.

Secondly; total building need for repairing for each neigbourhood is calculated by assigning simple weights as 0-3 to the four-scaled repairing needs evaluation of the first step. The values in each row is finally calculated according to a formula which is:

Building’s Need For Reparing = [(No Repairing_Need * 0) + (Some_Repairing_Need * 1) + (Serious_Repairing_Need * 2) + (Need_To_Be_Demolished* 3)]

APPENDIX C

NEAREST NEIGHBOUR ANALYSIS OF THE STUDY AREA

- Nearest Neighbour Analysis of the Poorest Applicants in *Keçiören*:

Total Residential Area (A) = 35367896,4342 m^2

Total number of events (N) = 1401

Total NN distance = 95344,9969

$r_e = 0,5 (A / N)^{1/2} = 0,5 (35367896,4342 / 1401)^{1/2} = 0,5 (25244,7512)^{1/2}$

$= 0,5 (158,886) = 79,443$

Mean (r_o) = Total NN distance / N = 95344,9969 / 1401 = 68,055

$R = r_o / r_e = 68,055 / 79,443 = 0,87$

This shows a clustered pattern, as 0,87 is between 0 and 1, where R=1 represents a perfect random pattern (0<R<2,1491).

$s_d = 0,26136 / [N (N / A)]^{1/2} = 0,26136 / [1401 (1401 / 35367896,4342)]^{1/2}$

$= 0,26136 / (0,0555)^{1/2} = 0,26136 / 0,2356= 1,1094$

$z = | r_o - r_e | / s_d = | 68,055 – 79,443 | / 1,1094= 11,388 / 1,1094= 10,26$

According to 95% confidence limit, z value of 0,05 is 1,96. H_0 is rejected as 10,26 > 1,96. The points have a random pattern.

- Nearest Neighbour Analysis of the Poorest Applicants in Neutral-Representative Areas of Poverty in *Keçiören*:

Total Residential Area (A) = 7390196,7540 m^2

Total number of events (N) = 405

Total NN distance = 25522,0634

$r_e = 0,5 (A / N)^{1/2} = 0,5 (7390196,7540 / 405)^{1/2} = 0,5 (18247,3994)^{1/2}$

$= 0,5 (135,0829) = 67,541$

Mean (r_o) = Total NN distance / N = 25522,0634 / 405 = 63,017

$R = r_o / r_e = 63,017 / 67,541 = 0,93$

This shows a clustered pattern, as 0,93 is between 0 and 1, where R=1 represents a perfect random pattern (0<R<2,1491).

$s_d = 0,26136 / [N (N / A)]^{1/2} = 0,26136 / [405 (405 / 7390196,7540)]^{1/2}$

$= 0,26136 / (0,0222)^{1/2} = 0,26136 / 0,1490 = 1,7543$

$z = | r_o - r_e | / s_d = | 63,017 – 67,541 | / 1,7543 = 4,52 / 1,7543 = 2,58$

According to 95% confidence limit, z value of 0,05 is 1,96. H_0 is rejected as 2,58 > 1,96. The points have a random pattern.

- Nearest Neighbour Analysis of the Poorest Applicants in Over-Representative Areas of Poverty in *Keçiören*:

Total Residential Area (A) = 16272700,3479 m^2

Total number of events (N) = 745

Total NN distance = 48534,5472

$r_e = 0{,}5\ (\ A / N\ )^{1/2} = 0{,}5\ (16272700{,}3479 / 745\ )^{1/2} = 0{,}5\ (21842{,}5508)^{1/2}$
$= 0{,}5\ (147{,}792) = 73{,}896$

Mean (r_o) = Total NN distance / N = 48534,5472 / 745 = 65,147

$R = r_o / r_e = 65{,}147 / 73{,}896 = 0.88$
This shows a clustered pattern, as 0,88 is between 0 and 1, where R=1 represents a perfect random pattern (0<R<2,1491).

$s_d = 0{,}26136 / [\ N\ (\ N / A\ )\ ]^{1/2} = 0{,}26136 / [745\ (745 / 16272700{,}3479)]^{1/2}$
$= 0{,}26136 / (0{,}0341)^{1/2} = 0{,}26136 / 0{,}1847 = 1{,}4152$

$z = |\ r_o - r_e\ | / s_d = |\ 65{,}147 - 73{,}896\ | / 1{,}4152 = 8{,}74 / 1{,}4152 = 6{,}17$
According to 95% confidence limit, z value of 0,05 is 1,96. H_0 is rejected as 6,17 > 1,96. The points have a random pattern.

- Nearest Neighbour Analysis of the Poorest Applicants in Under-Representative Areas of Poverty in *Keçiören*:

Total Residential Area (A) = 11705259,0064 m^2
Total number of events (N) = 251
Total NN distance = 24267,0902

$r_e = 0{,}5\ (\ A / N\ )^{1/2} = 0{,}5\ (11705259{,}0064 / 251\ )^{1/2} = 0{,}5\ (46634{,}4980)^{1/2}$
$= 0{,}5\ (215{,}950) = 107{,}975$

Mean (r_o) = Total NN distance / N = 24267,0902 / 251 = 96,682

$R = r_o / r_e = 96{,}682 / 107{,}975 = 0.89$
This shows a clustered pattern, as 0,89 is between 0 and 1, where R=1 represents a perfect random pattern (0<R<2,1491).

$s_d = 0{,}26136 / [\ N\ (\ N / A\ )\ ]^{1/2} = 0{,}26136 / [251\ (251 / 11705259{,}0064)]^{1/2}$

$= 0{,}26136 / (0{,}0054)^{1/2} = 0{,}26136 / 0{,}0734 = 3{,}5625$

$z = |\ r_o - r_e\ | / s_d = |\ 96{,}682 - 107{,}975| / 3{,}5625 = 11{,}29 / 3{,}5625 = 3{,}16$

According to 95% confidence limit, z value of 0,05 is 1,96. H_0 is rejected as $3{,}16 > 1{,}96$. The points have a random pattern.