# CREATING 2010 CENSUS GEOGRAPHY OF TURKEY BY USING GEOGRAPHIC INFORMATION SYSTEMS

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*ABSTRACT*

Today, population censuses serve to generate information about not only the number of people living in a specific area, but also many other facts related with them. Therefore, census based statistics are the main data source of many organizations and researchers. These statistics are meaningless without any relation with the real world, so a census geography is needed. In Turkey, administrative boundaries are used for this purpose, but they are far away from meeting the needs of many data users. The main aim of this study is to create a new and only statistical purposed census geography for Turkey.

Keywords: Census Geography, Small Area Statistics, Multi Criteria Decision Making (MCDM), Geographic Information Systems (GIS), Turkey.

## 1. Introduction

The Turkish Republic will conduct its 15th population census in 2010 - a record of taking census since 1927. The purpose of this population census is "…to determine completely and correctly the size, the distribution by the administrative division, and the demographic, social and economic characteristics of the population within the boundaries of the country on the application date of the census." (SIS, 2005)

Today, census results are not only fundamental for population counting but also for providing information to many organizations and people who make decisions about many issues. "These include matters of public relevance such as health and education, transportation planning and community services, and private concerns - such as siting of businesses, housing, consumer marketing, and economic strategies*." (*Edmonston, 1999) From this point of view; is the geographic base of censuses (administrative division) adequate to answer the needs?

The answer is 'No'; because "recent increasing importance of information and knowledge systems in the new process oriented methods adopted in the production, distribution and consumption of goods and services in the societies caused the demand for a new geographical base for statistics." (Backer et al., 2002)

First of all, administrative boundaries are always subject to change because of political or population trends. As a matter of fact, administrative divisions of Turkey have been changed so many times; and these alterations cause serious problems for statistical data users by making time-series comparisons almost impossible. Researchers may not have accurate results from their studies; formulation of regional policies and development plans may cause unsatisfactory results; and goods and services may not be conveyed to the needy areas. Therefore, use of relatively *unchangeable statistical units* is needed to improve the current statistical system of Turkey.

The second drawback of legal boundaries is their non-standardized structure. It is obvious that almost none of the administrative units are comparable to each other in terms of population numbers. For example, the population of a quarter may be 30-40 times larger than another in the same district. This condition prevents making good judgments among administrative units, which are also statistical areas, and makes them incomparable to each other. Therefore, Turkish statistical system needs standardized and comparable statistical units.

The third considerable disadvantage is the possibly misleading effects of the population censuses. Yetik (2003) mentions that "the majority of statistics, being developed, are on the basis of the cities, which are the biggest geographical unit of administrative classifications and very few of them are based on districts." The provinces and districts have relatively big sizes in respect to population; and when statistics are produced for these divisions, the specific characteristics of local inhabitants are ignored. As a result, data users see only the average, not the real. Therefore, Turkish statistical system needs homogeneous statistical units to the possible extent to reduce such kinds of errors.

The number of drawbacks may be increased, but these three reasons are adequate to show the disadvantages of the geographic bases of the current system. It is clear that, administrative areas have been designed for administrative purposes only, not for statistical purposes. Thus, starting out from the drawbacks of the current system, **the main aim of this thesis** is to create a new and only statistical purposed '*Census Geography'* for Turkey. Census Geography is "…a collective term referring to the geographic entities used in data collection and tabulation operations, including their relationships to one another." (US Census Bureau, 2002) This new system will not completely substitute the current statistical constitution and administrative division, rather it must be thought as a complementary to the present system.

## 2. Steps towards compliance with European Union

State Institute of Statistics (SIS) is the only authorized technical and scientific institute which produces publications to fulfill Turkey's information needs on social, economic, and cultural subjects. "The main function of SIS is to comprehensively determine information needs, collect and compile data, and finally, to present information to its users according to the highest international standards" (SIS, 2005). SIS has 26 regional offices and 1 branch office in Turkey. The statistics and products generated by SIS are currently used as a guide by governmental institutions and foundations, universities, private organizations, decision makers and researchers.

However, Demir and Toprak (2004) say that, "As the world entered into a phase, which is commonly described as the process of globalization, statistical offices of many countries come to cope with the challenges of the new demands from decision-makers and researchers." Therefore, the general situation in Turkey has to be examined to see if there are series of problems to be solved to complete the adaptation process or not.

The declaration of Turkey as the formal candidate country to the European Union (EU) in December 1999 caused to think about the adoption process to EU in the area of statistics. European Commission has '*The Accession Partnership*' rules, which declare short and long term priorities to the candidate countries. The priorities about statistics to Turkey include the following:

For the short term;

> *"…adopting a strategy for the further development of statistics, in particular demographic and social statistics, regional statistics, business statistics, external trade and agricultural statistics; bring the business register up to EU standards."*

For the long term,;

> *"…adopting EU compatible statistical methodologies and practices, in particular as regards GDP (Gross Domestic Production) estimation, harmonized consumer price indices, short-term indicators, social statistics, business register and balance of payments; aligning macro-economic statistics further with the statistical acquis; and ensuring adequate training of staff and improve the administrative capacity"* (Demir and Toprak, 2004)

After the Accession Partnership, Turkey began setting itself as a member state of EU; and it was clear that, statistics would play a vital role in attaining the goals. This problem had a major priority among the all others. SIS was aware of that and began the harmonization studies in statistics immediately. Studies about this subject are still underway, and today SIS still has to realize many projects to reach the international standards (mainly European Union), and to reach the aim of improving the statistical system of Turkey. In this framework, a High Level Committee has been established to evaluate the situation and to identify overall and key objectives for the adoption studies of the SIS. Some steps taken on this way are described in the 'Country Paper: Republic Of Turkey', prepared by SIS (2002). There are mainly eight steps defined in this paper, and one of them is the project of 'Upgrading the Turkish Statistical System'.

SIS has prepared the proposal of this project in November 2001 with the assistance of two EU consultants in order to accomplish the short and long term priorities of Accession Partnership and National Plan. Its total budget is 15.3 million Euro for 36 months period (2002-2004). The project includes many components to upgrade the Turkish statistical system, but one of them, '*Upgrading of the regional statistical system, introduction of NUTS classification, data collection and dissemination system, and a regional indicator database*' is the focus point of this thesis. This component will be examined, and a new geographic statistical system will be proposed to develop the existing NUTS classifications of Turkey, and to make a contribution to the adoption process.

## 2.1. NUTS (Nomenclature Units for Territorial Statistics)

In Turkey, until recently, statistical classifications of regions were made according to administrative divisions. Turkey, consisting of 81 provinces, partly adapted to the European statistical classification in September 2002. Turkey was divided into 12 NUTS-1 units, 26 NUTS-2 units and 81 NUTS-3 units. All regional planning efforts are carried and incentives extended on the basis of these NUTS regions.

These NUTS regions were created and developed according to the following principles of Eurostat (2004):

1. The NUTS must favour institutional breakdowns:

There may be many different criteria to divide a national territory into smaller regions. These criteria are mainly classified into two groups as normative and analytical. *Normative* regions have some political expressions, and they are mainly based on the tasks allocated to the territorial communities. Necessary population size is defined to fulfill these tasks, and then historical, cultural and etc. indicators are evaluated while determining the boundaries. On the other hand, *analytical* regions are based on analytical requirements. Specific regions having similar types of geographical or socio-economic characteristics are grouped together while determining the boundaries of the regions. Member States base their NUTS classifications mainly on normative criteria because of practical reasons of data availability and the implementation of regional policies.

2. The NUTS favours regional units of a general character:

Some areas have the specific characteristics of a certain field of an activity like mining regions, rail traffic regions, farming regions, labour-market regions etc. These areas may also be used to draw the boundaries of NUTS regions.

3. The NUTS is a three-level hierarchical classification:

Since this is a hierarchical classification, the NUTS subdivides each Member State into a whole number of NUTS 1 regions, each of which is in turn subdivided into a whole number of NUTS 2 regions and so on. In addition to these two, it is necessary to establish a third regional level, NUTS 3, which corresponds to a less important administrative structure.

The current boundaries of NUTS 1, NUTS 2, and NUTS 3 levels in Turkey are shown in Figure 1 below;

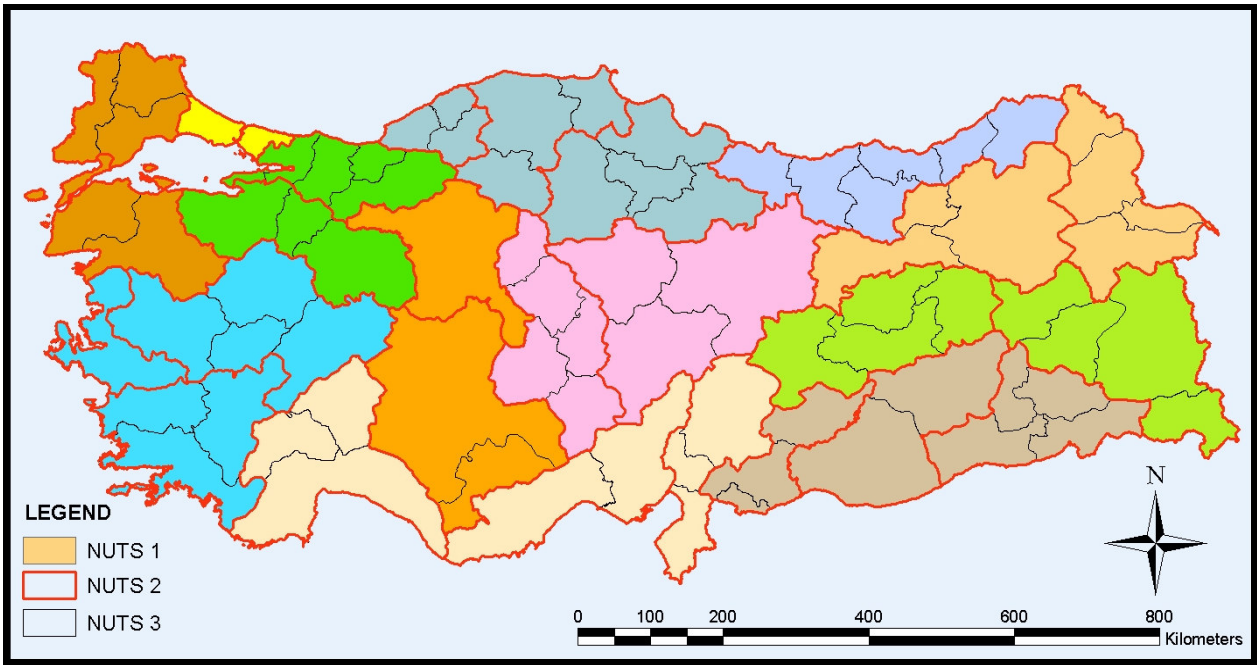

Figure 1. Current NUTS 1, NUTS 2, and NUTS 3 regions of Turkey

At a more detailed level, there are 'Local Administrative Units' (LAU). Determining the boundaries of LAUs and creating a new census geography are the main concerns of this thesis; and they will be created based on the concept of 'small statistical areas'.

## 3. Small Statistical Areas

Backer et al. (2002) defend that improving the general quality of the classical systems of official statistics is not the only reason to create a new geographical base for statistics in Europe. The main reason is to answer the existing and potential importance of information and knowledge systems in production, distribution and consumption of goods and services in our societies. These activities are the main concerns of almost all institutions and organizations taking part through hierarchies of especially public projects. According to them, "…projects contributing to the development of societies are no longer limited to the development of infrastructures within administrative borders, but have been forced to shift their focus to the development of networks whose output patterns are not satisfactorily captured by crude systems of 'large area statistics'." Turkey strongly needs a new system of 'small area statistics', too. This system should not completely substitute the current statistical constitution, rather it must be thought as a complementary to the present system.

There are standards, guidelines, and criteria for defining, identifying, and delineating the small areas to be used in a population census. Small statistical areas must specify precise criteria for establishing the new component entities. After examining the international applications, basically seven fundamental requirements have been formulated for small statistical areas (SSA); (1) Homogeneity, (2) Functional Integrity, (3) Compactness, (4) Continuity and Consistency, (5) Population equity with same level of statistical areas, (6) Easy Identification, and (7) Historical Comparability. The explanations of these requirements are below;

1. SSA should be as homogeneous as possible both socially and economically;

"The homogeneity principle involves combining a group of people, housing units, or business establishments with similar characteristics into a single geographic area (US Census Bureau, 1994). This principle is the most important criterion among the others because it minimizes the Ecological Fallacy problem occurring in the current census system. Ecological fallacy is described by Ratcliffe (1999) as a situation that can occur when a researcher or analyst makes an inference about an individual based on aggregate data for a group.

2. SSA must have functional integrity;

Functional integration principle is also one of the most important priorities while constituting a new census geography unit. "The principle involves the grouping together, into a single statistical area, the people, housing, or business establishments that share a central nucleus along with the surrounding, functionally related entities, such as a large city and its suburbs." (US Census Bureau, 1994) Such areas tend to be a whole by both of their geography and functions. The integration inside the statistical unit will be supplied by communication, movement, and interaction of persons, goods, and services. For instance, in practice, a specific urban pattern may fit all the necessary criteria like homogeneity etc. to be named as a small area; but if there is a highway intersecting this area, it also intersects the functional integrity. The life going on there is not a whole and people are not integrated with each other; thus that area should not be defined as a small statistical area.

3. SSA should be as compact as possible;

Compactness of shape is a desirable quality in a statistical entity, particularly for functionally defined ones; and small areas should be as similar by shape as possible to each other. It makes sense in a statistical unit for their peripheries to be approximately equidistant from the centers. Too irregularly shaped areas have less chance to stay invariant about their statistical characteristics than the others. If irregularity is inevitable, it should reflect geographic properties related to the population, housing units or establishments that the area contains. Irregularities may also cause some difficulties for cartographic presentation and may present problems in data analysis as well. Sometimes these irregularities are unavoidable, but the important point is to make the evaluation of all the other criteria carefully and judiciously before final decision making.

4. SSA should eventually have a complete and consistent coverage across the country;

It is important to create a continuous pattern of statistical areas and to define all the areas across the nation without any undefined or empty space. It is also important not to define the same area more than once or not to overlap with another statistical entity. Moreover, a uniform approach should be used to control the identification and delineation of those geographic areas that are numerous and widespread consisting a national consistency.

5. SSA should be comparable in terms of population;

Size of the statistical entities is also an important consideration while creating or changing their boundaries. US Census Bureau (1994) say that "…to many data users, *size* refers to the number of people, housing units, or economic establishments within an area rather than the geographic extent of the area." In the context of this thesis, population size guidelines are used as criteria for most types of statistical entities. The size criterion generally determines the optimum and minimum-maximum number of such entities that can be established within a given region. The observation of minimum population size guidelines for statistical entities also helps to ensure confidentiality; while maximum population size helps to prevent excessive population differences between the same types of statistical entities.

6. SSA should be easily identifiable;

While creating a new statistical unit, it is important to make it as simple as possible. US Census Bureau (1994) states that "…easy identification and recognition should be key aspects in the wide acceptance of any geographic entity for which the Census Bureau presents data in its tabulations and publications." The identification of most administrative areas are good examples about this criterion, because boundaries of almost all of them follow easily definable features. Although the boundaries are invisible, local data users are aware of them; but the data users unfamiliar with the territory may need appropriate maps which show the names and locations of most governmental units, and display their boundaries. There are some rules that define the conditions to meet to accept a feature as the boundary of a statistical entity. This is also important for a consistent statistical wholeness, therefore SIS have to use same types of map features as boundaries throughout the Nation. The map features may be visible or non-visible features.

7. SSA should have historical comparability;

It is desirable to maintain comparability of geographic entities from one census or sample survey to the next. Therefore, the boundaries of statistical areas must remain as stable as possible. Cities are living organisms and, of course, numbers and characteristics of the people, homes, and institutions located there change through time. The point here is to reflect this change to the boundaries of small statistical areas as minimum as possible to preserve the historical comparability of that urban part.

## 4. Standard Census Geography Proposal

As mentioned before, SIS should tabulate its data in terms of a geographic entity that does not correspond with combinations of administrative entities; and they must offer a variety of statistical entities in their standard data products. In Figure 2, a new hierarchical census geography is proposed to be used in the 2010 Population Census.

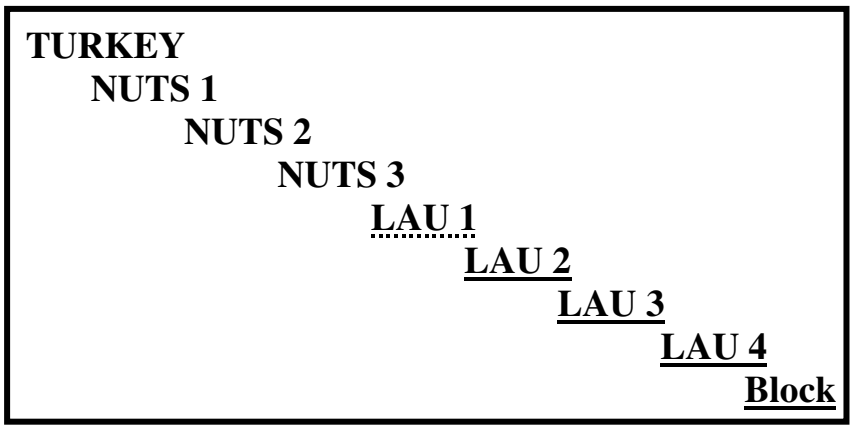


Figure 2. Standard Census Geography Hierarchy proposal for Turkey

The existing NUTS statistical regions of Turkey were formed according to the European Union criteria, but the lower levels of the statistical hierarchy will be mainly formed according to the United States (US) criteria in the context of this thesis while United Kingdom (UK) criteria are also included in some parts. The higher levels of US could not be used because of two reasons. First, Turkey has already defined the higher level statistical regions, and the second, the administrative hierarchy of US is very different from Turkey. On the other hand, the applications of US for the lower levels of the hierarchy are very suitable to Turkey while UK's lower levels are based on their postcode system, which is very different from the postcode system of Turkey. As result, a new census geography has been proposed for Turkey with the statistical units below, which have been mainly formed by adapting the related definitions of the US Census Bureau and the UK Office for National Statistics. The smallest and basic statistical entities of the hierarchy are blocks.

**Blocks** → Blocks will be the smallest geographic unit for which SIS will collect and tabulate decennial population census data, like in the US system. Boundaries of blocks are formed by streets, roads, railroads, streams and other bodies of water, other visible and invisible physical and cultural features, and the legal boundaries shown on census maps. Census data for these areas serve as a valuable source for small-area geographic studies, because all the other parts of the hierarchy are mainly based on blocks.

**LAU 4** → LAU 4s are the next level above census blocks in the geographic hierarchy. A LAU 4 is a combination of census blocks that is a subdivision of a LAU 3. The LAU 4 is proposed as the smallest geographic entity for which SIS will tabulate and publish sample data. There are some population requirements for LAU 4s, which allow some flexibility, to make them meaningful to produce statistics and to provide standardization between different LAU 4s. Their population thresholds change between 600 and 3,000 inhabitants, with an optimum population of 1,500 inhabitants.

Population of defined statistical areas may change through time, so some combining or subdividing operations may be necessary. It is necessary to subdivide LAU 4s having population of 3000 or greater. These operations, of course, must retain original LAU 4 boundary. This will help data users to aggregate data for the newly created LAU 4s and to compare it with the

original single LAU 4 area. It is also required to combine a LAU 4 into an adjacent LAU 4 when the population of a LAU 4 is below 600.

**LAU 3** → A LAU 3 is a small statistical area, which is relatively permanent subdivision of a quarter to present decennial population census data. LAU 3 boundaries have to follow visible and invisible features, too wherever possible; because it is important for LAU 3s to be easily identifiable in the area by data users. LAU 3s are always sub-parts of quarters and their boundaries are quarter boundaries at the same time.

The population thresholds for LAU 3s are proposed to be between 2.000 and 8.000 inhabitants, with an optimum population of 5.000 inhabitants for Turkey. Many areas may be out of the necessary criteria in the following years, and population change over time may create LAU 3s that are either below the minimum size or above the maximum size. LAU 3s with lower population than the minimum threshold must be combined with the closest LAU 3; and LAU 3s with higher population than the maximum threshold must be divided to be meaningful and comparable with other LAU 3 regions.

**LAU 2** (Quarters) → A quarter is the smallest administrative unit whose inhabitants need same services, have the same priorities, and neighbor to each other in Turkey. The administrator of a quarter is a headman (called muhtar in Turkey) and a council. Headman determines the necessities, improves the quality of life of the quarter by participation of the local people. Furthermore, he/she executes the relationships with municipality and the other public organizations; and notifies information about the quarter.

The quarters (LAU 2) will be generated by combining the lower level LAU 3 statistical areas. As it has been mentioned, each LAU 3 optimally includes three LAU 4 regions, so each LAU 2 will be generated by combining three LAU 3 regions. According to the proposal of this thesis, the quarters will be redefined, their boundaries will be redrawn according to the already defined criteria, and some of them will be combined while some are divided; but the quarter system will work as it is now, and quarters will again be the sub-administrative units of district municipalities. Of course, all quarter boundaries will be LAU 3 boundaries at the same time.

Quarters, differently from the other statistical entities defined, will serve statistical and administrative purposes. A quarter must meet the population and boundary feature criteria and comprise a reasonably compact, contiguous land area internally accessible to all points by road; each quarter must contain a minimum of one LAU 3 and may have a maximum of nine LAU 3s. The population criteria for the quarters change between 10,000 and 20,000 inhabitants, with an optimum population of 15,000 inhabitants. The boundaries of quarters must be defined according to the criteria defined for LAU 3s.

**LAU 1** (Districts) → Actually, determination of the boundaries of LAU 1 regions is out of purpose of this thesis; because more criteria like political, geographical, historical etc. properties have to be taken into consideration to draw the boundaries. Nevertheless, the districts are assumed as LAU 1 regions to preserve the completeness of the census geography hierarchy,

which has 'Turkey' at top and 'block' at the bottom. The districts are the sub-divisions of provinces and generated by combining the quarters.

## 5. Case Study

With a population of 758.490 in 2000, **Çankaya**, the case study area of this study, is the most populated district of Turkey and located in Ankara, the capital city. This figure is greater than the populations of 54 provinces of Turkey. The de-facto population of the district reaches 2 million people during daytime. Çankaya has a nation-wide importance because it is the administrative center of the country. It also includes Kizilay (the central business district), national assembly, prime ministry, presidential palace, ministry buildings and foreign embassies.

There are 104 quarters in Çankaya and the total area covered by these quarters is approximately 22,000 hectares. In addition, there are 70,000 commercial offices, 350,000 dwelling units, 9 public hospitals, 166 primary schools, 35 high schools, and 8 universities in the district. 17 percent of the inhabitants live in unauthorized squatter settlements (gecekondu). (Çankaya Municipality, 2005)

Çankaya district has been selected as the case study area mainly because of the diversity it offers in terms of housing, land-use pattern, and socio-economic profile; ease of obtaining data; and its proximity to METU.

### 5.1. Data

The data that will be used through the further steps are; District Boundaries of Ankara, Quarter Boundaries of Çankaya, Land Use, Transportation Network, Buildings, Public Service Locations (Fire Brigades, Hospitals, Police Stations), Landmarks, Locations of Housing Complexes, Sample Elevation Points (23757 units), Population of Çankaya Quarters, Number of housing units in Quarters, Literacy Ratios of the Quarters, University and Primary School Graduate Ratios (%),Unemployment Ratios, Young Age Employment Ratios, Population Density, Average Household Size, 1-3-5-8-10 minute drive zones of the public services, Kriging Interpolation Map, Slope Map and 3-D Representation of Çankaya. The basic data sources of this study are The Municipality of Greater Ankara and the State Institute of Statistics. In addition, some data have been generated from the raw data by the author.

After data collection period, ArcGIS 8.3 software has been chosen as the main software package; ArcView 3.2, MapInfo 7.5, MapBasic 5.5, and Visual Basic 6.0 have been used as complementary software packages for additional purposes. After the necessary conversion, editing etc. data manipulation operations, all data have become ready to use in geodatabase format in ArcGIS. Now it is time to create, LAU 1-2-3 and LAU 4 regions.

Here, the districts of Ankara are accepted as the LAU 1 (Local Administrative Units) regions. Figure 3. shows the boundaries of these 8 LAU 1 regions.

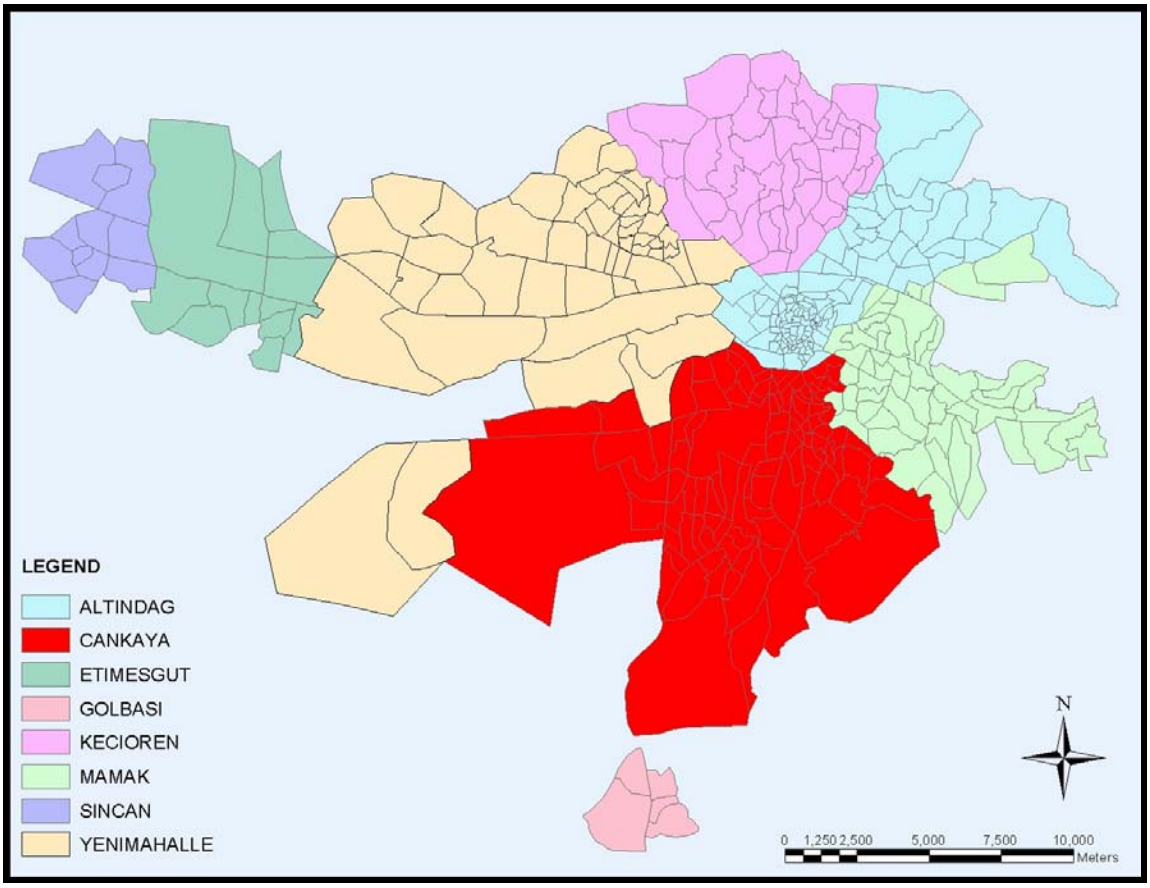


Figure 3. Districts (LAU 1) of the Municipality of Greater Ankara and the location of Çankaya

### 5.2 Creating LAU 2, LAU 3 and LAU 4 regions

Some general rules have already been defined about what conditions are needed to be fulfilled in order to define an area as a statistical census unit. Two of them are the most important ones. First, census units must have similar population characteristics, living conditions and housing characteristics to the possible extent. Second, the census units must be roughly equal in terms of population. That means, an optimum population criterion will be defined for each census unit and the total population of each unit should be as close as possible to these determined numbers.

Now the first step is to draw the boundaries of relatively homogeneous areas, which will be defined according to some criteria. Firstly quality of life degrees of the inhabitants will be determined, and then people in the same degree will be gathered in the same classes. Quality of life is described by Sactaqc (2005) as; “Those aspects of the economic, social and physical environment that make a community a desirable place in which to live.” Quality of life is a relative term and its definition may change according to the perspective of different people, who have different professions, cultures, stages of life etc. Therefore, deciding what makes a good life and what makes a better one is very difficult. Nevertheless, the United Nations Development Programme tries to determine the indicators of a high quality of life in their Human Development Report 2004. These human development indicators include 33 entries and sub-entries of them.

In this study, only ten of these indicators will be used because some of them are not suitable for such a district scale study, and some of them need unavailable data. These ten indicators of quality of life are Literacy Ratio, University and Primary School Graduate Ratios (included in Education caption); Unemployment Ratio and Young Age Employment Ratio (included in Labor Force caption); Proximity to Police Stations, Hospitals, and Fire Stations (included in Proximity to Public Safety Services caption); Average Household Size, and Population Density.

A Multi Attribute Decision Making (MADM) method will be used to combine all of these indicators and to find the quality of life degrees of living areas. The first step is to find the most qualified blocks and then produce a rank in a descending order beginning from the most qualified to the least. Firstly, the preferences have to be defined because they will be very effective when deciding on which and how characteristics would be more effective through the decision process. The MADM method will be performed from urban planning perspective and the conditions below will be accepted as the indicators of a high level of quality of life;

- Maximum literacy ratio
- Maximum university graduate ratio
- Minimum primary school graduate ratio
- Minimum unemployment ratio
- Minimum young age employment ratio
- Minimum population density
- Minimum average household size
- Maximum proximity to fire stations
- Maximum proximity to hospitals
- Maximum proximity to police stations

Analytic Hierarchy Process (AHP), a multi attribute decision making method, will be used to evaluate these ten indicators and to assign their relative importance to each other. The steps of AHP procedure need some type of complex arithmetic calculations; and it is also necessary to make the analysis for several times. Therefore, a program is necessary to perform the necessary complex procedures. Finally, an application program including approximately 950 lines of code was written by using MapInfo 7.5, MapBasic 5.5 and Visual Basic 6.0 software packages. The program is an Integrated Mapping application, running on Visual Basic platform, and including MapBasic and MapInfo commands. Through the program, firstly user enter the intensity of importances of each indicator, and then the necessary calculations such as finding relative weights and normalizations, a homogeneity map showing the boundaries of same quality of life degrees. (see Figure 4)

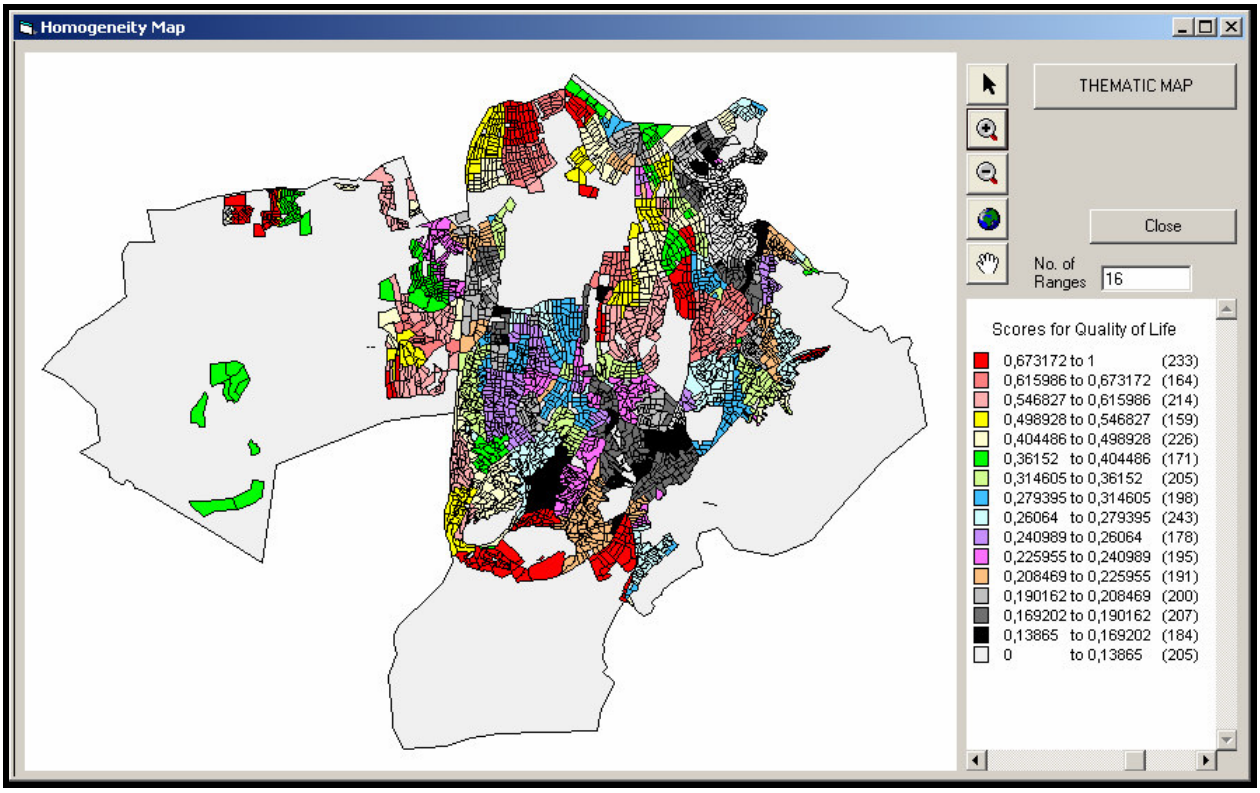


Figure 4. Homogeneity Map according to quality of life degrees

Now, the boundaries of relatively homogeneous areas have been determined. The next step is to divide these areas according to previously defined population criteria of LAU 2-3-4 regions. The LAU regulation will lay down the following optimum, minimum and maximum population thresholds;

Table 1. Proposed population sizes of new LAU regions

| CLASS | Optimum | Minimum | Maximum |
|---|---|---|---|
| **LAU 2** | 15,000 | 10,000 | 20,000 |
| **LAU 3** | 5,000 | 3,000 | 7,500 |
| **LAU 4** | 1,500 | 800 | 2,500 |

The software, which was used to create the boundaries of census geography units, is the "Districting" module of ArcGIS 8.3. Classification procedure with Districting Add-on included some specific steps, which will not be explained detailed here. Then, finally, 461 units of LAU 4, 159 units of LAU 2, and 54 units of LAU 2 regions have been created. Figure 5 shows these statistical units, and the Figure 6 represents an Overall Diagrammatic Approach to the proposed census geography from top to down.

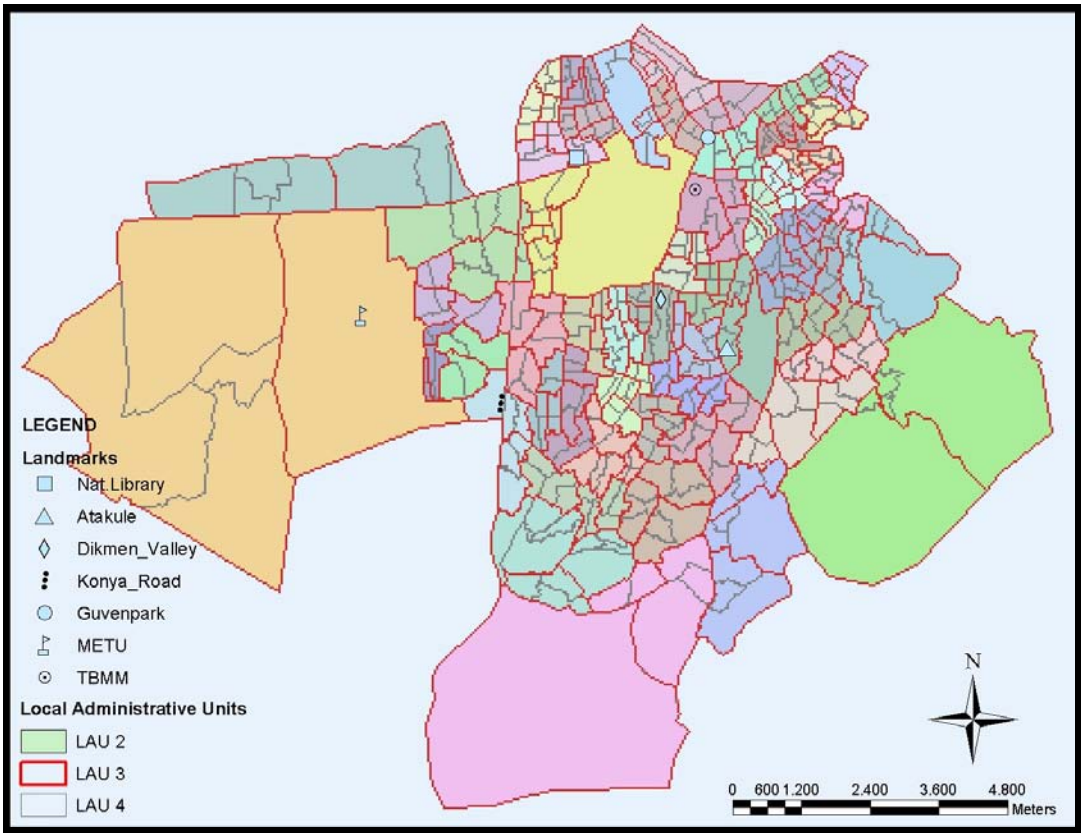

Figure 5 LAU 2, LAU 3 and LAU 4 hierarchy

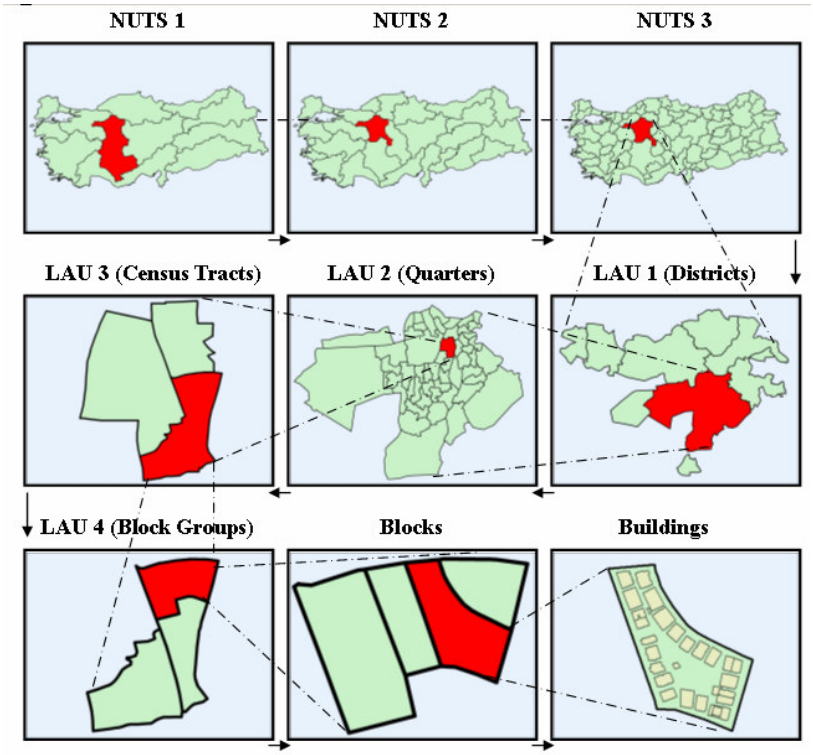

Figure 6. Standard Census Geography Hierarchy – An Overall Diagrammatic Approach

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