CHAPTER 1

Introduction

The purpose of this research report is to use a combination of Geographic Information Systems (GIS) and statistical techniques to investigate questions relating to the socio-economic needs of communities for national and local government planning purposes. This will be needed for the analysis of the forthcoming Ethiopian census data. As no Ethiopian geo-referenced data was available when this work was carried out, the report uses the 10% sample of the South African (SA) Census 2001 data as a hypothetical population for this purpose. For this reason, the weights provided in the 10% sample were not used. It should also be noted that where population sizes are quoted for 'KZN', this refers to the hypothetical population, and not the actual population.

Data for KwaZulu-Natal (KZN) was used, as this provides a setting with urban and rural populations, as well as mountainous and flat areas. The research aims at developing skills in posing and answering questions, and does not include interpretation of the actual results in terms of policy for KZN.

The questions to be asked of the Ethiopian census data are of the form:

- What exists at a specific location or in a specific area? (eg what health facilities are there, what is the population)?
- What access does the population have to facilities in the area? Does the road network need to be improved to resolve the problem of access
- Where are groups of people in greatest need of … (eg where are there clusters of people with disabilities, and are there facilities for them)
- What are the characteristics of ... (eg female headed households – are these related to HIV/AIDS or migrant labour?)

1.1 What is GIS? How does it work?

The Web includes many references for these topics, including material from companies providing GIS software and services, conference proceedings, as well as lecture notes and PhD theses. Brabyn (1996) describes a GIS as:

"GIS is a collective term commonly used for computer systems that manipulate geographic data. These systems are implemented with computer hardware and software functions for the:

- acquisition & verification
- compilation
- storage
- updating and changing
- management and exchange
- retrieval and presentation and
- analysis and combination of geographic data.

Geographical data can be defined as consisting of information on the quality of and the relationships between objects which are uniquely geo-referenced".

However, Bernhardson (1992) states that 'A GIS is not just an information technology. A GIS incorporates technology, people, the data, the organization & skilled personnel to make it an effective aide to management and decision-making."

Gibson (2000) notes that "GIS offers a consistent and cost-effective means for the sharing and analysis of geographic data among government agencies, private industry, non-profit organizations, and the general public".

Data analysis within a GIS involves the integration of data from many different sources. One major GIS strength is that dissimilar data such as data from a census, Demographic and Health Survey (DHS), agricultural survey, industry, cartography, etc can be linked via spatial co-ordinates. Thus in a given area, different socio-

economic problems, and interests of different organizations can be compared and resolved. The only common denominator required is that the various areal differentiations are expressed in compatible reference systems. Stored data can be processed in a GIS for presentation in the form of maps, tables, or special formats. In particular, once can integrate the spatial or map data with the attribute data (information concerning what is found at which location), and query these simultaneously in the spatial database. One can still interrogate the attribute data on a conventional database.

In a GIS, you have a digital map that identifies various boundaries, landmarks, and so on with points or dots. The difference between a standard paper map and a GIS map is that the information you have from the GIS software comes from a database, and can be manipulated to show only the things you want to see. In other words, with a standard map, if you were looking for specific crossroads, you would see hundreds of things that are of no interest or help to you. But with a GIS map, you would see only the crossroads along with anything else you identified to be included, eliminating all the unnecessary things.

This is because the items shown on the GIS map are layered, and the layers can be turned on or off at your discretion. You might have one layer that consists of the roads in an area you are trying to look at while another layer might include lakes and rivers, another layer might include mountains, another layer railroad tracks, or airports, and so on. You then have the option of looking at all of the layers together, giving you the entire view or you can turn off (hide) various layers, getting down to the very basics.

With the layering aspect of GIS, you can choose only the information you want to see in relation to the specific goal that you are trying to achieve. If you were a public worker associated with the water company and needed to identify all of the water sources for a specific city for surveying, then you could choose the layers so that you

retrieve the map using only bodies of water. Then, because you will need to know how to reach each of these bodies of water, you would need to see streets, which would be the second layer built onto the map.

The website http://www.mapcruzin.com/what-is-gis.htm notes the additional advantage that "When a database is updated, the associated map can be updated as well." This allows for the representation of data from different times to be included in the GIS data base, and interrogated as to changes over time.

The information or data is referenced to the object or the events that are geographical features on earth, the information (or data) is said to be geographic information (data). Geo-referenced or spatial data is the data pertaining to the locational aspects of geographical feature together with their spatial dimensions. They are approximated by points, lines and areal extent. Generally, geographic information can be classified as regional or thematic (topical). Regional geographic information includes more than one kind of geographic information in a place or region, while thematic geographic information may shows, one earth feature or human activity as it occurs throughout wide area. Thematic geographic information may include physical and human geographic information. Physical geographic information concerns the locations of such earth features as land, water, and their relation to one another and to human activity, where as human geographic features concern patterns of human activity and their relationships with environments, such as, political, cultural, population, social, historical, and constructed (road, building, utilities & facilities).

It is estimated that approximately 80% of all information has a "spatial" or geographic component. In other words, most information is tied to a place. So when making decisions about siting new facilities, like schools, hospitals, roads, etc or redrawing legislative districts, geography plays a significant role (Gibson and Power, 2000):

Bernhardsen (1992) states that “Nothing answers the questions of where to place government services better than GIS. In fact the predominant use of GIS over the past decade has been around the analysis of the impact public policy has on a specific site. This use of GIS to analyze demographic data has long played an important role in establishing policies, developing long-range plans, and designing infrastructure. Undoubtedly GIS will continue to play a significant role with the increased accessibility of census information and the enhanced usability of GIS technology.”

Banthia (2001) notes that “The goal of using a GIS with census data is the establishment of the most accurate representation possible of our nation's communities. More specifically, the provision for this inclusion of GIS data ensures the most accurate representation of political boundaries, nation's street networks, service giving firms such as schools and hospitals, wells (deep hole in the ground for obtaining water) and other infrastructure”.

This creation of homogeneous socio-economic categories allows researchers to make better assumptions regarding responses to survey questions and may assist in the drawing of samples that are both smaller and geographically representative. GIS is a basic tool which can provide valuable information for decision-makers, planners, and so on. (Schwabe and O’Donovan, 2001)

1.2 Geo-referenced data

Geo-referenced data is usually expressed in terms of a position in a Cartesian coordinate system (such as northing, easting, and elevation) or in longitude and latitude. But other reference systems such as postal code and various area divisions used in map indexes and demographic studies are also employed (Juppenlatz & Tian, 1996)

The Global Positioning System (GPS) is very useful for obtaining qualitative data on locations (x, y, z) in the terrain. It is used in combination with GIS for a wide range of applications, such as the selection of control points for geo-referencing satellite images or air-photos or digitized vector data recorded in digitizer unit, correct orientation in the field and entry of field data into a GIS. (ITC MSc, course notes, 1995).

1.3 Type of data, data model and source of spatial data

Analysis and modeling in GIS requires the input of relevant data. The data consists of two types: spatial data representing geographic features (points, lines, and area) and attribute data (descriptive information). Data input should be done with utmost care, as the results of analysis heavily depend on the quality of the input data. The data can be entered by:

a. digitizing, if you want to use the data from an analog (paper) map
b. keyboard entry, for entering tabular data
c. scanning, if you want to use paper prints of satellite images, aerial photography, maps and pictures
d. importing existing data files from another source, such as satellite imagery obtained in remote sensing.

The most common method of entering (capturing) spatial data for GIS is digitizing. A digitizer records the location of spatial data (features) by means of a digitizer unit which creates the coordinates. To correctly register features in a map, the relationship between map and digitizer coordinates needs to be established. A minimum of four control points and their corresponding map coordinates should be specified by the user in order to calculate the transformation between digitizer and map coordinates. If so, these spatial data is said to be geo-referenced after the projection is carried out. Digitizing converts the spatial features on a map into digital format. There are two

conventional methods to digitizing: with a tabular digitizer and with a bureau scanner (Ilwis 2.1 for windows, 1997).

Digitizing is the transformation of information from an analog format, such as paper, to a digital format that can be stored and displayed with a computer. This data conversion process is also known as geocoding. Digitizing is performed on a digitizing table or tablet but may also be done on a computer screen (heads up digitizing). The digitizing table has a fine grid of wires embedded in it that acts as a Cartesian coordinate system. The coordinate may be in plane or geographic coordinates. The procedure involves tracing map features in the form of points, lines or polygons with a puck which relays the coordinate of each sample point to be stored in the computer. The tablet and puck acting together with the computer can locate the pucks position relative to reference information provided by the operator (3- point/4-point/ etc orientation). (McGowan, 2004)

Points, linear features and areas (or polygons) can all be input by manual digitizing. All features have real world geographic coordinates associated with them as well as topological data that are input as part of the digitizing process (McGowan, 2004)

Scanning is a method for transferring analog (paper) maps into a digital format the computer can read. Scanners use CCDs (charge coupled devices) to read reflectance values from a surface. Specialized electronics then transform the values into a digital format. Reflectance is how the light, consisting of different wave lengths which distinguish different colors, bounces from the object being scanned. (McGowan, 2004).

The result of scanning is an electronic image composed of pixels ("picture elements") that can be viewed on a computer monitor. Each pixel has a number assigned to it that represents the reflectance that was collected by the CCDs. (McGowan, 2004). Scanning is increasingly an effective means of automating spatial data. Traditionally,

all spatial data was digitized manually by using a digitizing tablet or in some cases, keyed in by hand. However, in recent years, developments in hardware and software have made map scanning a viable tool for data automation. There are several different techniques that utilize map scanning as a means of recording spatial data. One method is to scan a map, and then use it as a background image for on-screen digitizing. Another method is to use sophisticated software to convert a scanned raster image into useable GIS data. (Haddock, 2004)

Aerial photography and remotely sensed imagery are important sources of spatial information. If they have to be used in conjunction with other data in GIS operations, they should be geo-referenced, which is the 'absolute orientation' of photogrametry. Common problems presented in aerial photographs of terrains with relief are image displacement, bending lines, and variations in scale in the photograph.

In nearly every GIS project, use can be made of existing digital data. These can be digital vector data, Digital Terrain Models, Digital attribute files, digital air-photos and, often, satellite images, which is another method of obtaining raster data by using satellites aboard on a platform (ITC MSc course notes, 1995).

Spatial data (say in the form of a map) may already be available in digital format, from other sources. They may be generated using different GIS software, or result from scanning maps, or may available as digital satellite images or scanned images. Therefore, in order to use these digital data in a GIS project, importing the file and changing them to the program that you are currently using file format is required (Ilwis 2.1 for windows, 1997).

1.3.1 Spatial data

Spatial features are represented as vector data types in the following way:

1. **Points**: A point is the simplest graphical representation of an object. Points have no dimensions but may be indicated on maps or displayed on a screen by using symbols. Many items can be represented as single points on a map. Points may refer to schools, hospitals, wells, etc.
2. **Lines**: Lines connect at least two points and are used to represent objects which may be defined in one dimension. EA boundaries are typical lines. So are roads, rivers, rail roads, etc.
3. **Area** (polygon): features which occupy a certain area, such as a land use unit, EA, district, province, etc.

Spatial features can also be described as surface-type data. This form is not discussed in this report.

1.3.2 Attribute Data

Attribute data is descriptive data attached to points, lines, locations on a line, or areas. If the point being collected is a school location, the attributes might be its name, type of school, or number of classes, etc. If the line feature is a road, attributes might be pavement type, number of lanes, or speed limit. Area attributes might be soil type, EA code, vegetation cover, or land use.

An attribute is the generic descriptor for the feature, where each feature has a specific value. In the point example above, likely values for the type of school attribute would be governmental and private. It's important to distinguish between attributes and values. Think of attributes as the questions that would be asked and values as the answers. Attributes to be collected would be determined in the planning process, while specific values would be entered in the field. (Schaeffer, 2004)

1.3.3 Data models

The spatial entities (data) can be represented in digital form in two data models: vector or raster data models. Both models store details on the location of entities and their identifiers. The main difference between the two data models is the way they store and represent the location (Ilwis 2.1 for windows, 1997).

1.3.3.1 Vector data model

In vector data models, the position of each spatial feature is defined by (a series of) X and Y coordinates. Besides the location, the meaning of the feature is given by a 'code'. For instance, the location of points is described by a single x-y coordinate pairs and stored in a point map by registering their location in X and Y coordinates and by coding them (e.g. school, hospitals, etc). The line is stored as a series of X & Y coordinates (points) that best reflect its characteristics and stored by registering their location and by coding them (e.g. road, river, etc.). An area is represented by its border or by boundary lines, which are lines enclosing the area (polygon). Such an area defined by its boundary lines and its code is called a polygon. The code represents the content of the polygon (e.g. EA, district, etc.). Vector data are mostly obtained by digitizing. Vector data require less disk storage space and are suitable for creating high quality outputs. They are less suitable for a number of GIS operations, especially those dealing with map overlaying (Ilwis 2.1 for Windows, 1997).

Other forms of vector data models include triangular irregular networks.

1.3.3.2 Raster data model

In a raster model, spatial data are organized in grid cells or pixels (picture element). Pixels are the basic unit for which information is explicitly recorded. Each pixel is assigned only one value. The maps stored according to a raster model are called a

raster map. Pixels in a raster map all have the same dimensions. Thus, it is unnecessary to store all their coordinates as the pixels are arranged in regular pattern. It is enough to determine the pixel size and the parameters to transform between X and Y coordinates of a map and the pixel locations in the raster map (row/lines and column). The process to establish this relationship is called geo-referencing. Through geo-referencing you calculate the parameters used in the equation to transform between a coordinate system and pixel location in the image. A point is described in the raster model by the position of a single pixel (its position is defined by a row and column number). A pixel is assigned one code (label). A line and area (polygon) are described by a set of connected pixels having the same code (label). In the raster model there is no basic difference in how points, lines and areas are stored. Raster models require more disk storage space than that required by a vector model (Ilwis 2.1 for windows, 1997).

1.4 Map scale

Digital or digitized datasets have no unique scale. One can display an output the dataset in any scale. However, the source maps have a scale. Large-scale map are more accurate in depicting real world features than small scale documents. If a 1:10,000 source map is being used for digitizing, and the output is in scale 1:1000, it doesn't imply that the accuracy of the map has been improved.

The data capture processes only exacerbates the errors in the source documents (Map). The error builds up within the database through the various processes of data acquisition and manipulation. Some of the factors that determine the accuracy of the 'table digitizing' and the 'scanning' process are as follows:

- Source data i.e. the accuracy of the source data, the scale of the source data, and the cartographic quality of the source data.
- Staff capability such as eyesight, hand movement and dexterity, carefulness, and knowledge of the system.

- Equipment resolutions i.e. sensitivity of the detector, signal to noise ratio of the detector (Juppenlatz & Tian, 1996).

In the vector data structure, the location of points, lines and polygons are stored with the x and y coordinates, which were calculated using the conversion formula from digitizer coordinates to map coordinates. It is also possible that different input maps have different coordinate systems. In order to bring the vector map to the same coordinate system, use can made of a program to transform the coordinates of a vector map. The raster capture approach involves scanning the maps and data, attaching a reference geo-code and creating a database. This is the quickest of all approaches. (ITC MSc course notes, 1995).

1.5 Map projection and map datum

1.5.1 Map Projection

The correspondence between points on the surface of the earth and a plane map can never be exact. The curved surface cannot be fitted on a plane map without some distortion or deformation. Only a spheroidal map, like a globe, can be used for accurately representing the earth's surface features. Because a spherical representation is not convenient to use, preference is given to a flat representation. A map projection is a mathematical transformation that is used to project the spherical 3 dimensional surface on a flat 2-dimensional surface.

All spatial data stored in a GIS are associated with a map projection, either implicitly (so-called "unprojected" data stored with raw longitude, latitude coordinates) or explicitly (where the data have been transformed into a known map projection). Map projections are a particularly important feature of spatial data because it must be noted that they introduce error and distortion, since a sphere cannot be transformed to

a plane without some stretching and twisting of the sphere's surface. (ITC MSc course notes, 1995)

The selection of a map projection for a GIS project will be influenced by a number of issues :

1. how the results of analysis are best presented in the form of map,
2. in order to match different data layers in a GIS, all maps must be transformed to one common map projection, and
3. in order to make any quantitative measurements (area, length, etc) the degree of accuracy must be examined.

As stated earlier it is not possible to fit a curved surface onto a plane. The assumption that scale is constant for all distances at all places and in all directions is not true. A map projection defines the relationship between the map coordinates and the geographic coordinates, latitude and longitude and vice versa.

The spatial data that you obtain either by importing or digitizing, or scanning, often needs to be changed before you can use them in combination with the rest of your spatial data. One of the most important changes that may have to be done is related to the coordinates of the map. The map may not have coordinates (in the case of scanned, satellite image, aerial photography). In this case you will have to geo-reference and resample them, so that they have equal dimension, pixel size and projection. Also for vector maps, these coordinates may not be the ones that you use for the other maps. In that case you will need to transform the coordinate system. The most important reason that coordinates may be different, (apart from the fact that a local coordinate system may have been used), is that the original maps had different projections (Ilwis 2.1 for windows, 1997).

1.5.2 Datum

For long time the shape of the earth was considered to be a spherical planet. At the end of the 17th century it was found that the concept of truly spherical earth was incorrect. Because the earth is a rotating planet the equatorial axis is longer than the polar axis. In other words the earth is flattened towards the poles (ITC MSc course notes, 1995).

Therefore the earth's shape can be best represented by an ellipsoid of rotation or, as it is sometimes called, a spheroid. The ellipsoid fits the shape of the earth more closely than does a sphere and is therefore the reference surface (datum) employed in surveying. About 15 different ellipsoids (datum) have been defined. Based on an analysis of data from the United Nations' summaries on the status of world topographic mapping, it is estimated that nearly 93% of the earth's land area is mapped using only four of these ellipsoids: International, Krasovsky, Bessel, and Clarke 1880. Clarke 1880 is the one most suitable and most widely used in SA for preparing the digital spatial data base and producing the digital map of SA. To have a standard ellipsoid is important as so much global GIS data is now being prepared, such as the digital map of the SA.

Height above a surface must be measured relative to that surface. For example, most elevations are reported as being some number of feet or meters above mean sea level. Unfortunately, mean sea level is an average that varies locally because of gravity, spinning force, sun-moon-planet orientation, and a dozen other things.

The ellipsoid is a geometric figure fit around the earth that ignores most of the irregularities. Its smooth surface is excellent for determining elevation since it will be consistent from spot to spot. Most GPS receivers allow you to specify the ellipsoid (datum) for calculating relatively correct and consistent elevations over an area.

Many of the ellipsoid models can be translated mathematically from one model to another. Choosing one doesn't mean that another can never be used, but more time and effort is involved. Also, maps and other models using one set of elevations will have to be changed.

GIS's have the same problem with the earth's surface. If your GPS information will be fed to a GIS, you should match the GIS datum, or at least make sure that a transformation to the needed datum is available. (Schaffer, 2004).

The choice of ellipsoid which best fits a given region of the earth's surface to be mapped, depends on the surface curvature and geoid undulation in that region. Hence every country has its own "best" ellipsoid or datum (Ilwis 2.1 for windows, 1997).

1.6 The spatial nature of census data

Demography is the study of human populations with an emphasis on statistical analysis. Data describing a human population (like census) is referred to as demographic data. The demographic (or census) data includes, besides the population count, data describing the socio-economic characteristics of the population. In all, information about the age, ethnicity, gender, income, housing condition, and other socio-economic variables are considered. Virtually any organization that utilizes information about people needs demographic data (Matthews, 2004).

There are further issues in demography beyond the actual data, such as the need for modeling the data in order to get rid of things such as age heaping (people rounding their ages to the nearest 5 or 10, arises particularly when they don't know their date of birth), under-reporting in the lower age group (such as babies). Demography also looks at progression from one census or time to the next, and tries to estimate changes in fertility, mortality, etc.

Before the actual census carried out, as a preparatory phase, the cartographic database must be generated for census mapping (i.e. for the production of EA maps) and representing the geographical observations (can be geometrically symbolized by points such a schools, hospitals, etc.; lines such as roads, rivers, etc.; or polygons such as EA, districts, etc.) and is in place in the GIS. Therefore beside demographic and socioeconomic variables, the census data set includes geographic identifiers that uniquely identify each geographical observation (Enumeration Area (EA), sub-place name, main-place name, etc) through which a tabular demographic (census) data set can be linked to the corresponding geographical objects in a GIS. In fact, in order to fully utilize the census database in a GIS project, some modification of the census data should be applied because census data holds data in tabular form for each household and each person. Therefore the data should be summarized accordingly, say, at district level, so that there could be one record for each district. In doing so, one can link census data with the corresponding spatial data and display the result in the form of a map, since there is only one record for every feature in a spatial dataset.

1.7 Aim of the project

The main aim of this research report is to investigate methods of assessing the socio-economic needs of communities for national and local government planning purposes. In particular, the research report aims to investigate areas and questions such as:

Migrant labour

- The existence of migrant labor in districts of KZN; their work status and occupation.
- Is there any migrant labor in each districts of KZN? How much? Where do they come from? What is their impact on access to different service facilities and what socio-economic problems do they face? In which type of occupation do most of them engage themselves? What is their economic activity? What

work status do they classify themselves as? Are there migrant worker heads of households (HHs) in the area? If so, in what economic activities are they engaged?

Female headed HHs

- What is the implication of HHs headed by females? Headed by children? What is the dominant population group of female HHs? Why? Is there any pattern that shows that particular population groups of female headed HHs are more engaged in one particular economic activity than others? Why?

Sanitation

- What does the distribution of toilet facilities found at dwellings look like? Are there HHs having no toilet facility? What is the possible reason behind this? What measures should be taken to rectify this? What is the distribution of access to water found at dwellings? Are there HHs having access only to water from river/stream? Why is that?

Socio-economic questions

- Are there uneducated persons (never attended in any educational institution at all) in the area? Why are they uneducated? What is the average age of pupils currently attending any educational institution in the area? What are the implications of these?
- Does only their number (i.e. number of educational institutions found in the area) determine that better service could be provided for people living in that area? Why? Are all educational institutions found in the area found at least within 10km of the road network? Railroad network? River course? What is the possible impact of this?

Health questions

- Do the disabled attend any educational institution? If so, where do most of them attend? It is often stated that the older we get the more likely we are to be disabled. Is this true?
- What does the spatial structure of road network already established in the area look like? Is it spatially well distributed? Is new construction needed to improve this facility? What does the landscape of the area look like i.e. is it suitable for road construction? We also need to consider the population density of the area - who is likely to be served by these facilities.

And we also need to,

- Investigate different social and economic aspects of communities and subgroups of the population, such as access to schools, hospitals, water supplies, sanitation, employment, income, etc.
- Display the result in the form of maps
- Using a combination of GIS and statistical techniques, highlight and propose areas that need further or improved services in the light of the number of people likely to be served by these facilities.

As the emphasis of this report is on the investigation of the methods, only the KwaZulu-Natal province (KZN) will be examined, it being a province with a combination of metropolitan and rural areas. The data that will be used is the 10% sample of 2001 SA census data, as the full census data is not accessible in the public domain. The specific data sets considered are:

a. HH records
b. Person records
c. South African spatial data (digital map of SA as a whole)
d. Spatial data for the road network.
e. Spatial data for the rail road network.
f. Spatial data for river courses.

g. Spatial data for educational institutions.
h. Spatial data for health facilities.

Aspects of the GIS relating to merging of the different data sets are also investigated.

1.8 Aspects of GIS

To create a GIS data base, a standardized coordinate system and map projection is required. This is based on a suitable map projection, for example the Mercatore, to represent geographical coordinates (longitude/ latitude or X/Y pairs) on a flat paper medium.

Integration of data from maps at different scales means permanent loss of information in the original sources. Therefore it is important to know or to mention and describe the source of our map (Ilwis 2.1 for windows, 1997).

If two or more spatial data (themes) use different projections, these themes will not align correctly and you will get erroneous results if you perform queries and analysis. Thus to overcome these problems, all spatial data (themes) should use the same projection (i.e. the projections and all the projection parameters are the same). Or if the view contains projected data (image/map), one can add spatial data in decimal degree to the view and set the projection for the view to be the same as the projection used by image or grid or vector.

The order in which themes are drawn on a view is based on the order in which they are listed in the view's table of contents. The theme at the top of the table of contents is drawn on top of those below it, and so on down the list. Themes that usually belong in the foreground of the view, such as themes representing line and point features, should therefore kept at the top of the table of contents. Themes that form the background of the view, such as themes representing polygon features and images, should be at the bottom (Arc view GIS 3.3, 2000).

One of the GIS deficiencies is a lack of precise definition. Whilst general definition of GIS quite valid, in practice the diversity of GIS has spawned various definitions. Firstly, users have contrived working definitions suited to their own specific uses. Thus, they may vary according to whether operators are planners, water supply & sewage engineers, or support service personnel – or perhaps administrators. Secondly, those researchers, software developers, or sales & training staff – may use definitions deviating from the purely practical.

GIS are not yet available off-the-shelf; only their constituent devices, such as computer hardware and basic GIS software can be bought. Their cost is very expensive therefore it is not easily affordable. So a GIS can function only after the requisite expertise is available, the data are compiled, the various routines organized and the program modified. The various devices, and computer hardware & software is vital in GIS, the compilation of data is expensive and time consuming, and the organizational problem are the most vexing. The technologies itself will not prove effective if data needs, human resources management and organization change are not addressed (Bernhardson, 1992).

"In many ways GIS presents a simplified view of the real world. Yet the processes involved are seldom straightforward because realities are irregular and constantly changing, so perception of the real world depends on the observer. Moreover, the real world may be described in terms of countless phenomena, from basic sub-atomic particles up to the dimension of oceans and continents. The complexity and enormity of the real world, combined with a whole spectrum of interpretations of it, imply that the designs of GIS system may vary according to the capability & preference of their creators. This human factor can introduce an element of constraints, as data compiled for particular application may be less useful elsewhere". (Bernhardson, 1992).

"The real world can be described only in terms of models which delineates the concepts and procedures needed to translate real world observations into data that are meaningful in GIS. If this model is not correct, the problem is severe.

Regarding the real world as comprising geometric figures (points, lines, areas) means viewing objects as discreet data model representation. A discrete data model doesn't always suit reality. For instance, exact elevation is seldom observed on the ground because elevation generally varies continuously. Difficulties also arise in depicting phenomena that lack clear physical demarcation, such as soil types, population densities or prevailing temperature. These problems can be solved by defining boundaries and establishing variable or fixed areas in which attribute values are presumed constant" (Juppenlatz & Tian, 1996).

1.9 GIS contribution to census data

Problems arise with any census. An American newspaper commented, in an article titled: "Census 2000: Counting on GIS" that "As the population of the United States has steadily increased, the US Census Bureau has come under fire for its mistakes in the population count. Undercounts and a general overlooking of immigrants, the homeless, low-income families and even children have contributed to the error in census figures. Mistakes were widely noticed in the 1990 census, in which 8.4 million people were not counted, and 4.4 million people were double-counted because of dual residences or census errors."
(http://www.keepmedia.com/pubs/AmericanCityCounty/1998/

Stats SA (2003) lists as possible sources of error:

- EA boundary problems;
- incomplete listing of dwellings with in the EA (failure to identify all dwellings);
- failure to identify all households, where multiple households are found in dwellings;

- failure to complete the questionnaire for all households (refusal, non-return of questionnaire left for self-enumeration, etc);
- failure to include all individuals within households;
- failure to observe the inclusion rule based on a person's presence on census night; in other words, failure to apply the de facto census accurately;
- lost questionnaires or questionnaires that could not be processed."

(Stats SA, 2003)

1.10 Conducting the census

The current method for conducting the census, in many countries in this world, aims at "counting the whole number of persons in the country." To accomplish that, the census bureau relies on its previous computerized or any records and performs numerous rounds of updates to account for new addresses, construction and other geographical changes.

1.10.1 Census Conducted by Stats SA in 2001

1.10.1.1 Initiating the process

"Planning for Census 2001 began in earnest in November 1999, after the necessary funding had been obtained through the parliamentary budget process." (Stats SA, 2003, p5)

"Census 2001 was conceptualized as consisting of the following four phases: Pre-enumeration, Enumeration, Data processing, Analysis and dissemination". (Stats SA, 2003, p6)

1.10.1.2 Pre-enumeration

1.10.1.2.1 Demarcation and map production

"In the Pre-enumeration phase, Statistics South Africa had to demarcate the whole country into small geographic areas, called enumeration area (EAs). The underlying principle is that all parts of EA should be within comfortable reach of an enumerator,

so that enumeration of all households can be completed within the allocated number of days.

To complete this undertaking, three distinct operations were performed: (1) creation of a spatial information data base, (2) demarcation of EAs, and (3) printing of maps for enumerator summary books.

For the first time, Geographic Information Systems (GIS) technology was utilized to demarcate EAs and for map production instead of the traditional method of using analogue and sketch maps. A comprehensive digital spatial information database was created from several data sets acquired from governmental departments and private sector companies." … "In areas where digital data was not sufficient, Global Positioning System (GPS) were used to collect information in the field, which was then incorporated into spatial information database. These data set were all integrated into one common spatial frame." (Stats SA, 2003, p9)

"A geographical hierarchy structure was created to link EAs to administrative boundaries. The EA is the smallest geographical unit and can be aggregated up to municipal, district and provincial level." … "For EAs to be functional, demarcation must adhere to certain specifications regarding administrative and social boundaries, shape, size, population density, and mobility of enumerator at the time of census." (Stats SA, 2003, p9)

"Each EA receives a unique code number, linking it to its geographical entities. All subsequent census process used this number as identifier." (Stats SA, 2003, p10)

"Map production is an important census activities, maps were produced for every EA (81,000 A3 maps)". (Stats SA, 2003, p10)

1.10.1.2.2 The census questionnaire

"The Pre-enumeration phase also involved the development and testing of the questionnaire. The Census '96 questionnaire was used as a base." … "Questions and layout were tested with behind-the-glass interviews towards the end of 2000.

Three different questionnaires were developed – one for households (the A questionnaire), one for individuals in institutions (the B questionnaire), one for institution themselves (the C questionnaire)". (Stats SA, 2003, p10-11)

1.10.1.2.3 Preparation for the post enumeration survey

"For the 2001 PES, Stats SA decided to conduct reconciliation visits for all cases that could not be matched when the census and PES data were compared". (Stats SA, 2003, p11)

1.10.1.2.4 Initial training plan

The training process "involves some form of cascade training, whereby people are trained in the processes and methodology and in turn train further groups of people, and so on down the line". (Stats SA, 2003, p12)

1.10.1.2.5 Listing

"Listing takes place within each mapped EA. It involves making a list of all dwellings with in the EA in the summary book provided, and indicating a suitable route to follow through the EA to ensure that all dwellings are visited". (Stats SA, 2003. p14)

1.10.1.2.6 Enumeration

"In the enumeration phase, field workers called enumerators visited the households in the EA throughout the country and ensured that a questionnaire was completed giving information on persons in the household." (Stats SA, 2003, p21)

1.10.1.2.7 Data processing

"The development of the data processing began in earnest after the pilot census. This fell naturally into four phases – data capture, post-data capture, coding, and product generation". (Stats SA, 2003, p25)

1.10.1.2.8 The post enumeration survey.

"A post enumeration survey (PES) is under taken to determine the degree of under – or over count in a population census, and to evaluate the quality of data collected during the census. In Census 2001, this exercise was undertaken shortly after the enumeration phase of the census." … "The goal is to conduct an exhaustive, independent enumeration on the selected EAs to compare against census data". (Stats SA, 2003, p31)

1.11 Impact of census data

Although the census was created with a distinct political purpose (not party political, but rather an attempt to identify national priorities for upliftment), many organizations have taken advantage of the existing figures for other tasks, such as petitioning for the establishment of branch libraries, schools, hospitals, water supplies, etc. Research groups use the numbers to track migration patterns and changes; and National or provincial or local officials use the data to make decisions about where to build public service giving facilities such as roads, fire hydrants, etc to improve and alleviate the community problem in a given area.

An accurate census will ensure proper governmental representation and fair allocations of regional/provincial grant money, as well as usable data for multiple organizations. Because census data has widespread applications, it is important to have the most reliable figures.

1.12 Geographical location of KZN province in relation to South Africa.

The map in figure 1.1 below shows that KZN is located in the eastern part of South Africa and is bounded by the Mpumalanga province in the North, Eastern Cape in the South, Free State & Lesotho in the West and the Indian Ocean in the East. The province is mainly covered by savanna followed by grassland.

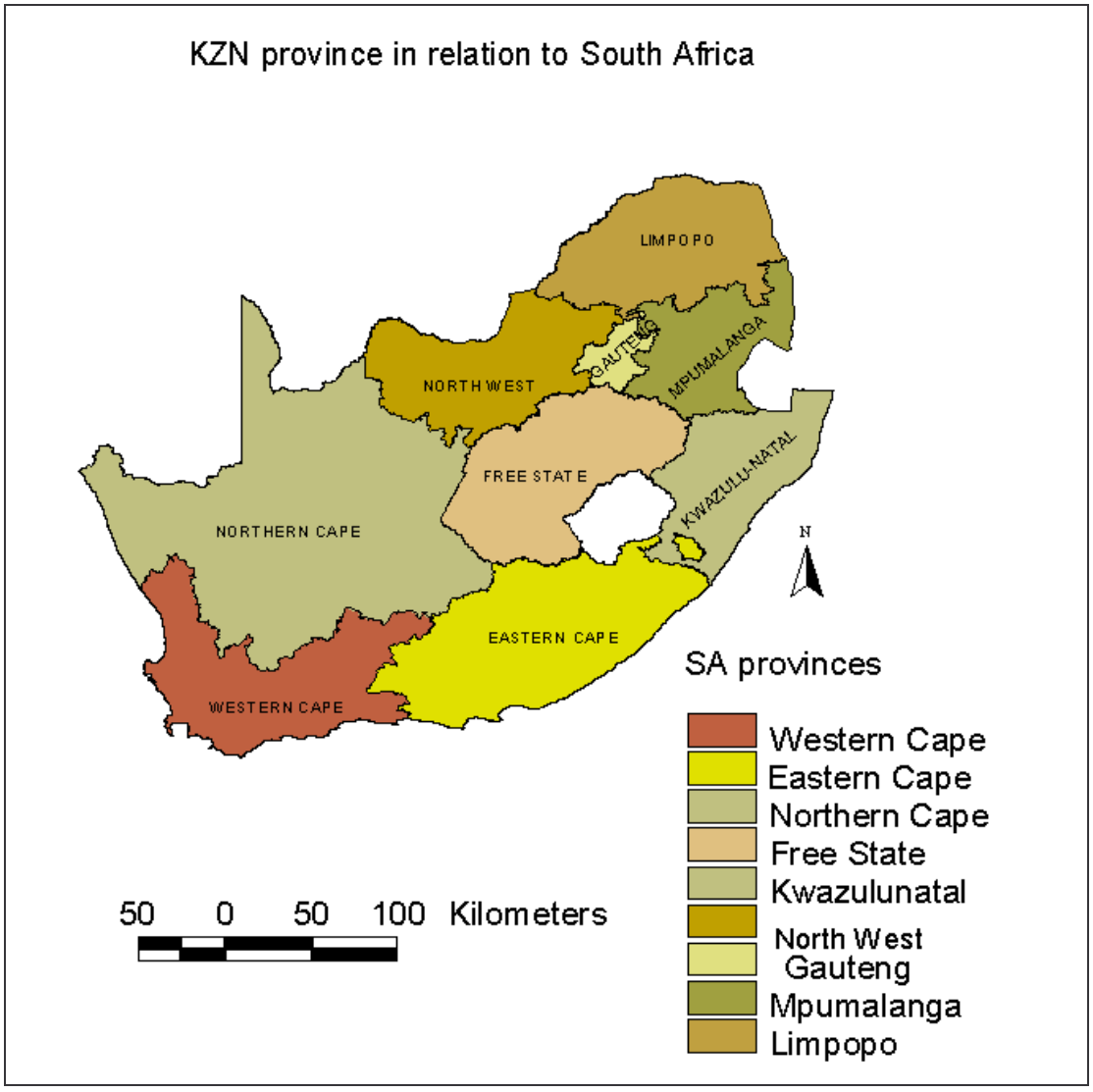

Figure1.1 Kwazulu-Natal province in relation to South Africa, 2001.

The Municipal Demarcation Board defined a new area structure in 2000, by considering settlement type, the rationalization of municipality, manageable size and functionality.

It divided South Africa into 6 metropolitan areas (Cape Town , Durban/ Ethekwini, East Rand/Ekurhuleni , Johannesburg, Port Elizabeth /Nelson Mandela Metropolitan Area and Pretoria/Tshwane) and 256 district council areas. These district councils are sub-divided into local municipalities (231) and district management areas (25). Metropolitan areas are conurbations featuring high population density, intense movement of people, goods & services, extensive development, and multiple business districts & industrial areas. Other features include complex & diverse economy, a single area where integrated development is desirable and strong interdependent social & economic linkages between its constituent units. (Stats SA, 2003).

In KZN there are ten district municipalities and one metro in the province these are: Amajuba, Sisonke, Umgungundlovu, Ugu, Umkhanyakude, Umzinyathi, Uthukela, Uthungulu, Zululand and ILembe Districts and the Ethekwini municipality.

The 2001 Census was conducted by Stats SA after a complete demarcation of the country into defined enumerator areas (EAs). The data from the census have been sampled at EA level (i.e. 10% sample from 2001 census data). The sampled data have been made available for users.

This report presents selected data for each district of KZN compared to the provincial averages in form of maps and tables. Maps are based on the “places” that are defined in the Census data. However, the EA links are not provided in the 10% sample in order to preserve the confidentiality of the respondents. This prevents a merging of the spatial data with census (tabular data) at EA level. For the purposes of this

research report, the data is analyzed at metro / district council level, so as to provide a reasonable ‘population’ size for each area.

CHAPTER 2

Demographic profile

Introduction

Modern societies are now so complex, and their problems so interwoven, that they can't be solved independently. For instance, a new housing development may affect the local school system. Altered age distribution in a village may affect health & social expenditure. The volume of city traffic may put constraints on the maintenance of buried pipe networks, affecting health. The population size may put constraints on the proper distribution of community services such as school, health care facilities, water supply, and etc. Joblessness may well force people from their home and they will go to other places to look for jobs. For instance, Uthukela district shares a common international border with Lesotho, so it is not surprising that this study shows that a number of migrant workers are observed who come from Lesotho and work in Uthukela. The same is true in the Amajuba district since it shares provincial boundaries with the Free State and Mpumalanga provinces. Hence due to this reason, there might be a problem to access proper service facilities because too many (around 8000) migrant people are found in the area. In other areas, such as Umzinyathi, Zululand and Ugu, the majority of households (HHs) are headed by females. The reason might be her partner went to another place to do his job or to look for a job. In KZN, regardless of population group, more than two-thirds of female HHs have work Status: paid employee. Very few are self-employed or are employers. However, more employer white female HHs are found in the area than the rest of other three-population groups.

The decisions regarding actions needed to solve such problems are best taken on the basis of standardized information, which can be combined in many ways to serve many users. GIS has this capability. This report investigates the use of the 10% sample in providing some of this information for KZN.

Populations are now more mobile than ever and increasing in size. Changing jobs, looking for jobs & moving house have become common place. When key personnel leave, they take their expertise with them. If that expertise involves specific knowledge of, say, the water supply and sewage network of a community, the loss can be serious if the information is inadequately documented. Here too, GIS has an advantage in that it can act as an effective filing system for dissimilar sectors of a complex society.

In modern societies, decisions should be made quickly and on a reliable basis even though there may be many differing viewpoints to consider and a large amount of information to process. Today, the impact of decisions is ever greater, often because they involve conflicts between society & individual interests, or between development & preservation. Information should therefore be readily available to decision–makers. It is known that about 50% to 70% of the activities of all public administrations involve some form of geographic information.

A GIS integrates data sets that were previously difficult to merge or overlay, allowing for the establishment of a more complete picture of the problem at hand.

2.1 Population size (Population density)

In the 10% sample 2001, KZN province had a total population of 738 430. The KZN population is comprised of 341 405 males (46.23%) and 397 025 females (53.77%).

Table 2.1 shows the distribution of the population according to districts, from the 10% sample, and reveals that the highest population is found in the Ethekwini municipality, with a total of 240 340 (32.55%) which is more than double that of other districts. The second largest district, in terms of population size, is Umgungundlovu with 70 952 (9.60%), followed by Uthungulu with 70 838 (9.59%) and Zululand with 62 422 (8.45%). Sisonke is the smallest, in terms of population

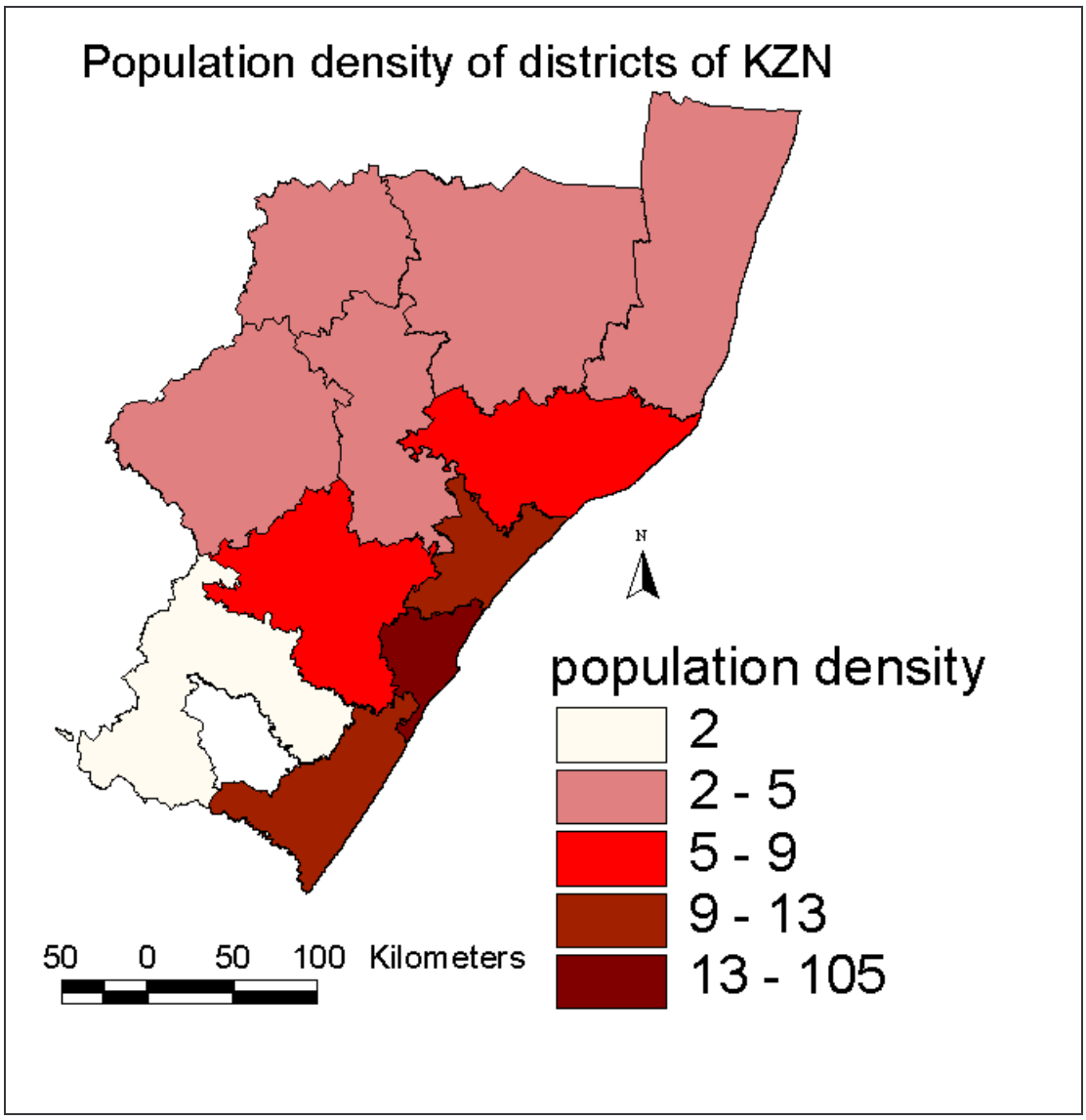

Figure 2.1 Districts of KZN: map of Population density, 2001.

size with only 23 011 (6.08%). The map in figure 2.1 shows the population density of each district of KZN and reveals that the Ethekwini municipality is a more densely populated area than other districts, followed by Ugu & ILembe. Sisonke is the least populated area.

The province is predominately rural with 49.06% of the population living in tribal settlements, 34.06% in formal urban areas, 6.69% on commercial farmland and

9.86% in informal settlements. In general, in KZN, 44.70% of the total population live in urban areas and 55.30% live in rural areas.

Table 2.1. Population size by gender for each district, 2001.

Geographic area	Total	male	Female
Amajuba	36698	46.49	53.51
Ethekwini	240340	47.84	52.16
Sisonke	23011	44.89	55.11
Umgungundlovu	70952	46.84	53.16
Ugu District	56201	45.14	54.86
Umkhanyakude	46183	44.99	55.01
Umzinyathi	36276	43.06	56.94
Uthukela	51860	45.42	54.58
Uthungulu	70838	45.49	54.51
Zululand	62422	45.34	54.66
Ilembe	43649	45.71	54.29

2.2 Person's place of enumeration and his usual residence.

If a person usually lives in the HH for at least four nights a week, or lives in another HH but in the same EA then he/she is considered as being enumerated at the same place as his place of usual residence. But if he lives in another province or country or even within the same province lives in another main place/sub place then he is considered as being enumerated at a different place to his place of usual residence.

The person's place of enumeration and his usual residence for each district within the KZN province are shown in Figure 2.2 and table 2.2. It is clear that almost all people in every district are enumerated at their place of usual residence. Therefore it indicates that there is a very small proportion of migrant workers who came from other areas for work and go back their usual residence say once a week, once a month and so on, for each district and for the province as a whole.

In Uthukela, there is relatively high proportion of persons enumerated whose usual residence is foreign i.e. 0.04%. However, this translates into 21 people, which is a

very small population. This might be an indication of migrant labor coming from Lesotho to find a job, because Lesotho and Uthukela share a common international border. A high proportion of persons whose usual residence is in a different province is observed in the Amajuba & Uthukela districts i.e. 0.24% (88 people) and 0.23% (119 people) respectively. Here again, since these two districts share a common border with Free State and Mpumalanga provinces, some people might be crossing the provincial border to look for jobs (or already be employed in KZN). These comments are pure speculation, given the small numbers of the 'population'.

Table2.2 Person's place of enumeration, 2001.

Geographic area	Undetermined	Sameplace	Diff place	Diff.prov.	Usual foreign res.
Amajuba	0.07	99.19	0.49	0.24	0.02
Ethekwini	0.09	99.30	0.46	0.13	0.02
Sisonke	0.14	99.47	0.27	012	0.00
Umgungundlovu	0.09	99.32	0.51	0.06	0.01
Ugu	0.13	99.33	0.42	0.12	0.01
Umkhanyakude	0.33	98.85	0.71	0.11	0.00
Umzinyathi	0.23	99.46	0.24	0.07	0.00
Uthukela	0.10	99.41	0.22	0.23	0.04
Uthungulu	0.22	98.90	0.74	0.14	0.01
Zululand	0.28	99.30	0.33	0.09	0.00
Ilembe	0.11	99.12	0.66	0.11	0.01

2.2.1 Person's place of enumeration and their occupation

Employed persons with usual place of residence a different province or foreign, might be a migrant worker. Therefore based on this assumption, it can be seen that of the migrant workers in the Amajuba district who came from another province: 17.24% are elementary workers, 5.75% are in crafts, and 5.75% of them are service workers. Of the migrant workers who came from another country and work in the Amajuba district, 16.67% of them are skilled agricultural workers.

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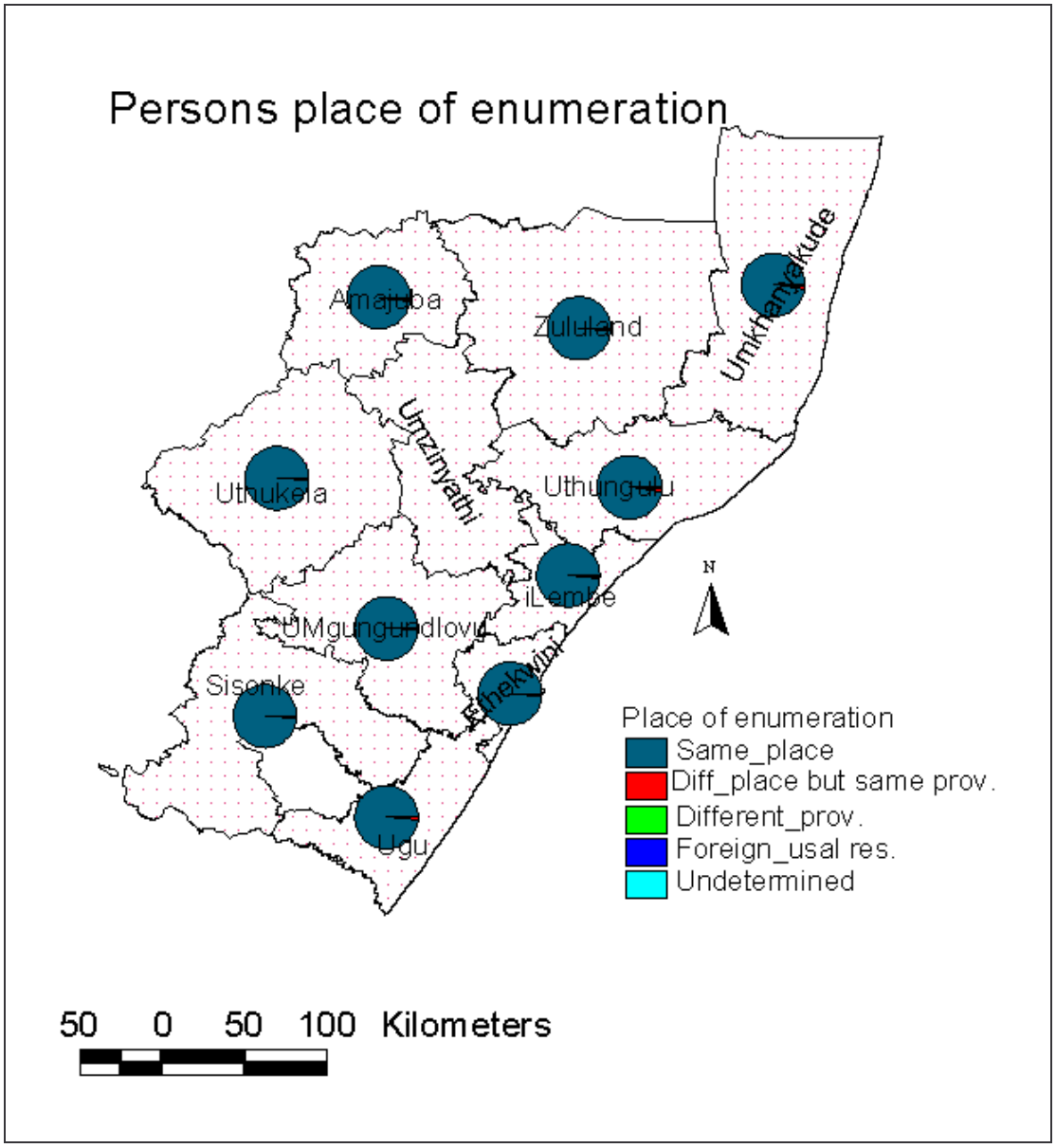


Figure 2.2. Districts of KZN: person's place of enumeration, 2001.

The description of the value of occupation is:

1. Legislators, senior officials and managers
2. Professionals
3. Technicians & associate professionals
4. Clerks
5. Service workers, shop and market sales workers

6. Skilled agricultural & fishery workers.
7. Crafts & related trades workers
8. Plant & machine operators and assemblers.
9. Elementary occupations.
10. NEC (Not Economically Classified) or Unspecified

Of all migrant workers who came from another province and are working in the Ethekwini district, 11.04% are professional workers, 7.57% are legislators, and 5.68% are elementary workers. While among migrant workers who came from another country and are working in the Ethekwini district, 10.64% are service workers, and 8.51% are from each of the categories legislators, professional workers & elementary workers.

Of all migrant workers who came from another province and are working in the Sisonke district, 7.41% are technicians, Clarks and crafts. There are no migrant workers from another countries in the Sisonke district.

Of all migrant workers who came from another province and are working in the Umgungundlovu district, 7.14% are crafts, 4.76% are elementary workers, and 4.14% are service workers. While migrant workers who came from another country and are working in this district, 22.22% are service workers & legislators, 11.11% are professional workers.

Of all migrant workers who came from another province and are working in the Ugu district, 9.23% are crafts, 6.15% are technician & elementary workers, and 4.62% are professionals. While for migrant workers who came from another country and are working in the Ugu district, 66.67% are skilled agricultural workers, and 16.67% are professional workers.

Of all migrant workers who came from another province and are working in the Umkhanyakude district, 28% are professionals, 10% are crafts, and 8% are service workers. While all migrant workers who came from another country and are working in the Umkhanyakude district are Clerks.

Of all migrant workers who came from another province and are working in the Umzinyathi district, 20.83% are crafts, 12.50% are elementary workers, and 8.33% are plant & machine operators. There are no migrant workers from another country in the Umzinyathi district.

Of all migrant workers who came from another province and are working in the Uthukela district, 16.67% are elementary workers, 5.83% are service workers, and 5% are plant & machine operators. While for migrant workers who came from another country and are working in the Uthukela district, 85% are elementary workers, and 5% are legislators, professional and service workers.

Of all migrant workers who came from another province and are working in the Uthungulu district, 12.87% are elementary workers & in crafts, 3.96% are professionals and plant & machine operators. While among migrant workers who came from another country and are working in the Uthungulu district, 20% are elementary workers & Clarks.

Of all migrant workers who came from another province and are working in the Zululand district, 16.07% are elementary workers, 8.93% are in crafts, and 7.14% are service workers. There are no migrant workers from another country in the Zululand district.

Of all migrant workers who came from another province and are working in the ILembe district, 19.15% are elementary workers, 8.51% technicians, and 6.38% are professionals. While for migrant workers who came from another country and are

working in the ILembe district, 25% are Clerks & service workers. For details see table 2.2.1.

Table 2.2.1 person's place of enumeration and their occupation

Geographic area	Place of enumeration	NEC	Legislator	professional	Technicia	Clerk	Service workers	Skill agr.	crafts	Plant &mach	Elem Occu
Amajuba	Undeterm.	65.38	7.69	3.85	0.00	0.00	3.85	0.00	0.00	3.85	15.38
	Same place	85.30	0.59	0.70	1.61	1.81	1.30	0.37	2.12	1.91	4.91
	Diff. place	69.27	1.68	1.12	4.47	1.68	1.68	0.56	1.68	3.35	14.53
	Diff. Prov.	58.62	4.60	1.15	1.15	0.00	5.75	1.15	5.75	4.60	17.24
	Forgn Res.	83.33	0.00	0.00	0.00	0.00	0.00	16.67	0.00	0.00	0
Ethek-wini	Undeterm.	66.82	1.90	2.84	1.42	6.16	3.79	0.00	2.37	1.90	12.80
	Same place	74.66	1.56	1.97	2.78	3.50	2.73	0.15	3.06	2.52	7.05
	Diff. place	60.38	1.80	4.49	6.02	4.31	4.31	0.27	3.50	3.59	11.32
	Diff. Prov	57.10	7.57	11.04	4.42	4.10	3.79	0.32	2.52	2.47	5.68
	Forgn Res.	57.45	8.51	8.51	2.13	2.13	10.64	0.00	2.13	0.00	8.51
Sisonke	Undeterm.	90.63	0	0	0	0	6.25	0	0	3.13	0
	Same place	87.46	0.47	0.48	1.13	1.04	1.28	0.90	0.88	0.94	5.43
	Diff. place	55.56	3.17	1.59	3.17	4.76	7.94	4.76	3.17	3.17	12.70
	Diff. Prov	74.07	0	0	7.41	7.41	0	0	7.41	0	3.70
	Forgn Res.	100	0	0	0	0	0	0	0	0	0
Umgungundlovu	Undeterm.	69.84	1.59	0	1.59	3.17	3.17	0	3.17	3.17	14.29
	Same place	79.41	0.89	1.28	2.03	1.91	2.00	1.02	1.99	1.88	7.59
	Diff. place	65.75	0.55	1.37	3.84	2.74	3.56	0.27	6.03	4.11	11.78
	Diff. Prov	76.19	0	0	2.38	0	4.14	0	7.14	2.38	4.76
	Forgn Res.	44.44	22.22	11.11	0	0	22.22	0	0	0	0
Ugu	Undeterm.	81.08	0	2.70	1.35	1.35	1.35	0	2.70	2.70	6.76
	Same place	88.10	0.48	0.49	1.18	0.87	1.16	0.50	1.09	0.98	5.16
	Diff. place	72.22	0.85	1.71	1.71	1.28	4.27	0.43	5.13	2.14	10.26
	Diff. Prov	64.62	3.08	4.62	6.15	3.08	3.08	0	9.23	0	6.15
	Forgn Res.	16.67	0	16.67	0	0	0	66.67	0	0	0
Umkhanyakude	Undeterm.	87.01	0	0.65	0.65	0	1.30	0	0.65	1.30	8.44
	Same place	93.55	0.25	0.35	1.01	0.51	0.80	0.34	0.44	0.43	2.32
	Diff. place	77.13	0.91	0.610	4.27	1.22	2.13	0	3.35	3.05	7.32
	Diff. Prov	34.00	0	28.00	6.00	2.00	8.00	0	10.00	6.00	6.00
	Forgn Res.	0	0	0	0	100.	0	0	0	0	0
Umzinyathi	Undeterm.	85.71	0	0	0	0	1.19	1.19	4.76	1.19	5.95
	Same place	92.62	0.29	0.35	0.98	0.48	0.70	0.40	0.52	0.49	3.17
	Diff. Place	67.82	1.15	0	2.30	2.30	4.60	1.15	5.75	2.30	12.64
	Diff. Prov	54.17	0	0	4.17	0	0	0	20.83	8.33	12.50
	Forgn. Res.	-	-	-	-	-	-	-	-	-	-

Uthukela	Undeterm.	80.00	0	0	0	0	0	0	2.00	2.00	16.00
	Same place	88.86	0.42	0.47	1.22	0.94	1.04	0.27	1.52	1.74	3.53
	Diff. place	57.39	3.48	2.61	6.96	4.35	2.61	0.87	5.22	5.22	11.30
	Diff. Prov	59.17	1.67	2.50	4.17	4.17	5.83	0	0.83	5.00	6.67
	Forgn. Res.	0	5.00	5.00	0	0	5.00	0	0	0	85.00
Uthungulu	Undeterm.	79.08	1.96	0.65	0.65	1.31	1.96	0.65	1.31	1.31	11.11
	Same place	86.93	0.49	0.65	1.31	1.25	1.16	0.52	1.35	1.16	5.18
	Diff. Place	64.49	0.96	1.73	2.11	2.69	3.45	2.11	4.61	4.41	13.44
	Diff. Prov.	53.47	1.98	3.96	2.97	2.97	1.98	2.97	12.87	3.96	12.87
	Forgn. Res.	60	0	0	0	20.0	0	0	0	0	20.00
Zululand	Undeterm.	80.95	0	0	2.33	0	1.16	0.58	1.16	1.74	4.07
	Same place	92.00	0.27	0.41	1.02	0.76	0.80	0.40	0.66	0.55	3.13
	Diff. Place	82.13	0.48	1.45	3.38	2.42	1.45	0	1.93	0.97	5.80
	Diff. Prov	62.50	0	0	1.79	1.79	7.14	0	8.93	1.79	16.07
	Forgn. Res.	100.0	0	0	0	0	0	0	0	0	0
ILembe	Undetermi.	84.78	0	0	0	4.35	0	0	0	2.17	8.70
	Same place	85.72	0.54	0.51	1.14	1.09	1.08	0.57	1.91	1.77	5.67
	Diff. place	63.41	0.35	1.05	3.48	2.44	5.92	1.39	5.23	3.48	13.24
	Diff. Prov	53.19	2.13	6.38	8.51	0	4.26	2.13	2.13	2.13	19.15
	Forgn. Res.	50.00	0	0	0	25.0	25.00	0	0	0	0

2.2.2 Work Status (economic activities) of employed people of KZN

The work status of (economic activities) employed people aged 15-64 years living in KZN is given as: 88.79% paid employees, 1.30% paid family workers, 7.58% self employed, 1.61% employers and 0.73% unpaid family workers. The specification of their work status is:

Paid employee: a person who works for someone else or a company for wage or salary, or for commission from sales or bonuses, or for payment in kind such as food, housing or training.

Paid family worker: a person working in a business such as shop or a farm belonging to the family, and receiving a salary or wage.

Self employed: a person who has his/her own business or enterprise but doesn't regularly employ other persons except for unpaid family workers.

Employer: a person who works for him/herself and employs others in the business.

Unpaid family worker: a person who works in a family business or a family farm without receiving a monetary payment.

Table 2.2.2 highlights the fact that the Umkhanyakude (81.26%), Umzinyathi (83.94%) and Zululand (85.19%) have a lower proportion than the provincial average of paid employees (81.26%, 83.94% and 85.19% respectively, versus the average of 88.79). Indeed, Umzinyathi (10.64%) and Umkhanyakude (9.98%) have a higher proportion than the provincial average regarding self employed.

Concerning employers, Ethekwini (1.14%) & UMgungundlovu (1.23%) have a lower proportion than provincial average (1.61%)

Table 2.2.2 Work Status of each district [employed people]

	Paid emp.	Paid f. worker	Self emp.	employer	Unpaid f.worker
Amajuba	89.42	0.99	6.73	2.11	0.75
Ethekwini	89.41	0.99	8.04	1.14	0.41
Sisonke	87.42	1.48	7.63	2.23	1.24
Umgungundlovu	90.62	1.30	6.37	1.23	0.48
Ugu	87.81	1.73	7.35	2.03	1.08
Umkhanyakude	81.26	2.47	9.89	4.30	2.08
Umzinyathi	83.94	2.21	10.64	1.47	1.73
Uthukela	89.05	1.21	7.14	2.04	0.56
Uthungulu	88.12	1.85	6.54	2.20	1.30
Zululand	85.19	2.24	7.37	3.14	2.06
Ilembe	88.96	1.50	6.62	2.08	0.84

2.2.3 Person's place of enumeration and their work Status

From table 2.2.3 below, we can see that there are no employed people with foreign residence in Sisonke, Umzinyathi, and Zululand districts. This means that there are no migrant workers listed as coming from other countries in these areas (in the 10% sample).

Among those employed people with foreign residence who live in Amajuba, Umgungundlovu, Uthungulu, & Umkhanyakude, all (100%) are in the categories paid family worker, paid employee, paid employee, and employer respectively. In Ugu, 40% are paid employees, and 60% are self employed; in Ilembe the split is 50: 50; in Uthukela, 65% are paid employees, and 35% are employers; while in Ethekwini, 85% are paid employees, 10% are self employed, and 5% are employers.

More than ¾ of employed people from different places in Sisonke & Umkhanyakude, are working as paid employees. In Sisonke, 57.14% of people from different provinces are paid employees, 14.29% are paid family workers, and 28.57% are employers. In Umkhanyakude, 57.58% are working as paid employees, 6.06% are working as paid family workers, 30.30% are working as self employed, and 6.06% are working as employers. Moreover there are no self employed people from different provinces in Sisonke, Umgungundlovu, Umzinyathi, and Zululand. And there are no employers from different provinces in Ugu, Umzinyathi, Zululand and ILembe.

Table 2.2.3 Person's place of enumeration and their work Status.

Geographic area	Place of enum.	Paid emp.	Paid f. w.	Self emp.	Employer	Unpaid f. w.
Amajuba	Undeterm.	44.44	0	44.44	11.11	0
	Same plce	89.50	0.99	6.67	2.11	0.73
	Diff. place	90.91	0	5.45	0	3.64
	Diff. prov.	88.89	0	8.33	2.78	0
	Frign Res.	0	100.	0	0	0
Ethekwini	Undeterm.	75.71	5.71	12.86	5.71	0
	Same plce	89.46	0.98	8.02	1.13	0.40
	Diff. place	87.53	1.36	7.94	1.13	2.04
	Diff. prov	82.35	1.47	12.50	2.94	0.74
	Frign. Res.	85.00	0	10.00	5.00	0
Sisonke	Undeterm.	100.00	0	0	0	0
	Same plce	87.60	1.46	7.63	2.06	1.25
	Diff. place	75.00	0	10.71	14.29	0
	Diff. prov	57.14	14.29	0	28.57	0
	Frign. Res.	-	-	-	-	-
Umgun-	Undeterm.	84.21	0	10.53	5.26	0

gundlovu	Same pace	90.59	1.32	6.40	1.21	0.48
	Diff. place	95.20	0	3.20	1.60	0
	Diff. prov	90.00	0	0	10.00	0
	Frign. Res.	100.00	0	0	0	0
Ugu	Undeterm.	78.57	0	7.14	0	14.29
	Same plce	87.80	1.73	7.36	2.05	1.07
	Diff. place	98.46	0	0	1.54	0
	Diff. prov	78.26	8.70	13.04	0	0
	Frign. Res.	40.00	0	60.00	0	0
Umkhanyakude	Undeterm.	75.00	0	0	5.00	20.00
	Same plce	81.45	2.48	9.78	4.31	1.97
	Diff. place	86.67	1.33	8.00	1.33	2.67
	Diff. prov	57.58	6.06	30.30	6.06	0
	Frign. Res.	0	0	0	100.00	0
Umzinyathi	Undeterm.	58.33	0	25.00	8.33	8.33
	Same plce	84.08	2.21	10.59	1.46	1.65
	Diff. place	78.57	3.57	14.29	0	3.57
	Diff. prov	90.91	0	0	0	9.09
	Frign. Res.	-	-	-	-	-
Uthukela	Undeterm.	90.00	0	10.00	0	0
	Same plce	89.29	1.24	7.07	1.83	0.57
	Diff. place	81.63	0	10.20	8.16	0
	Diff. prov	77.55	0	14.29	8.16	0
	Frign. Res.	65.00	0	0	35.00	0
Uthungulu	Undeterm.	87.50	6.25	3.13	3.13	0
	Same plce	88.07	1.84	6.53	2.23	1.33
	Diff. place	90.81	1.62	7.03	0.54	0
	Diff. prov	87.23	2.13	8.51	2.13	0
	Frign. Res.	100.00	0	0	0	0
Zululand	Undeterm.	94.74	0	5.26	0	0
	Same plce	85.18	2.26	7.40	3.06	2.10
	Diff. place	75.68	0	8.11	16.22	0
	Diff. prov	95.24	4.76	0	0	0
	Frign. Res.	-	-	-	-	-
Ilembe	Undeterm.	85.71	0	14.29	0	0
	Same plce	88.96	1.44	6.65	2.10	0.84
	Diff. place	92.38	2.86	2.86	0.95	0.95
	Diff. prov	77.27	13.64	9.09	0	0
	Frign. Res.	50.00	0	50.00	0	0

To sum up, we have seen from the above discussion that Amajuba & Uthukela districts have higher proportions regarding “not place of usual residence” than the rest

of the districts. This implies that there are a number of migrant workers in the area. From results obtained in sections 2.2.1 & 2.2.3 we can say that most migrant workers are involved in elementary occupations i.e. working as street vendors, messengers, shoe cleaners, etc while more non-migrants are involved in professional job. However, when we take in to account their work status, most of them are paid employees, which is comparable with the non-migrants. However a higher number of migrant workers are involved as self employed and employers than non-migrant worker. The reason behind this might be that they might came to the areas to invest or to run their own business. This analysis of occupation has not taken into account the high proportion that fall into the NEC category.

2.2.4 HHs place of enumeration and their work Status

If the person who acts as HH has a different province or foreign country as a place of usual residence, he/she likely to be migrant worker who came from other province or other country outside of SA. From table 2.2.4, we can see that, there are no HHs with a foreign country as a place of usual residence in the Amajuba, Sisonke, Ugu, Umzinyathi, Uthukela and Zululand districts. That means there are no migrant worker HHs who came from another country in these areas.

From those HHs from foreign countries in the Ethekwini municipality, 80% are paid employees and 20% are self employed. Of those that live in Umgungundlovu, Umkhanyakude, Uthungulu, and ILembe, all (100%) are paid employees, employers, and self employed respectively.

There are HHs from other provinces in all districts of KZN. Of these; more than two-thirds are paid employees in all districts except in Sisonke. Indeed, in Sisonke, 50% are paid employees, and 50% are employers. In Umzinyathi, 20% of the HHs are unpaid family workers. Again, the number of respondents is too small to draw firm conclusions.

Further more there are no self-employed HHs from other provinces in the Sisonke, Umgungundlovu, Umzinyathi, and Zululand. And there are no employer HHs from different provinces in the Ethekwini, Ugu, Umzinyathi, Uthukela, Zululand and Ilembe districts.

Table 2.2.4 HHs place of enumeration and their work Status.

Geographic area	Place of enum.	Paid emp.	Paid f. w.	Self emp.	Employer	Unpaid f. w.
Amajuba	Undeterm.	40.00	0	40.00	20.00	0
	Same plce	88.15	0.65	8.47	2.51	0.23
	Diff. place	95.24	0	0	0	4.76
	Diff. prov.	81.82	0	13.64	4.55	0
	Frign Res.	-	-	-	-	-
Ethekwini	Undeterm.	68.00	4.00	20.00	8.00	0
	Same plce	88.02	0.74	9.63	1.35	0.25
	Diff. place	82.99	1.36	10.88	2.04	2.72
	Diff. prov	82.76	6.90	10.34	0	0
	Frign. Res.	80.00	0	20.00	0	0
Sisonke	Undeterm.	10.00	0	0	0	0
	Same plce	87.75	1.10	8.27	2.14	0.75
	Diff. place	87.50	0	12.50	0	0
	Diff. prov	50.00	0	0	50.00	0
	Frign. Res.	-	-	-	-	-
Umgungundlovu	Undeterm.	87.50	0	0	12.50	0
	Same pace	89.23	1.01	7.97	1.39	0.41
	Diff. place	95.08	0	4.92	0	0
	Diff. prov	83.33	0	0	16.67	0
	Frign. Res.	100.00	0	0	0	0
Ugu	Undeterm.	87.50	0	0	0	12.50
	Same plce	87.70	1.46	8.00	2.41	0.43
	Diff. place	100.00	0	0	0	0
	Diff. prov	77.78	11.11	11.11	0	0
	Frign. Res.	-	-	-	-	-
Umkhanyakude	Undeterm.	81.82	0	0	9.09	9.09
	Same plce	82.11	1.84	10.41	4.55	1.08
	Diff. place	92.16	0	5.88	0	1.96
	Diff. Prov	75.00	0	12.50	12.50	0
	Frign. Res.	0	0	0	100.00	0

Umzinyathi	Undeterm.	40.00	0	40.00	0	20.00
	Same plce	83.69	1.42	12.40	1.68	0.81
	Diff. Place	80.00	10.00	10.00	0.00	0.00
	Diff. Prov	80.00	0.00	0	0	20.00
	Frign. Res.	-	-	-	-	-
Uthukela	Undeterm.	100.00	0	0	0	0
	Same plce	88.28	1.10	8.77	1.55	0.29
	Diff. Place	92.00	0	4.00	4.00	0
	Diff. Prov	85.00	0	15.00	0	0
	Frign. Res.	-	-	-	-	-
Uthungulu	Undeterm.	81.25	12.50	0	6.25	0
	Same plce	88.49	1.43	7.12	2.39	0.57
	Diff. Place	88.89	2.47	7.41	1.23	0
	Diff. Prov	84.00	0	12.00	4.00	0
	Frign. Res.	100.00	0	0	0	0
Zululand	Undeterm.	80.00	0	20.00	0	0
	Same plce	85.09	2.04	8.53	3.01	1.33
	Diff. Place	72.73	0	9.09	18.18	0
	Diff. Prov	87.50	12.50	0	0	0
	Frign. Res.	-	-	-	-	-
Ilembe	Undeterm.	100.00	0	0	0	0
	Same plce	87.83	1.21	8.27	2.07	0.62
	Diff. Place	94.23	0	5.77	0	0
	Diff. Prov	80.00	10.00	10.00	0	0
	Frign. Res.	0	0	100.00	0	0

2.3 Household composition

2.3.1 Number of persons per household & gender of HHS

The average number of people per household in KZN province is 4.5. The Ethekwini municipality & Umgungundlovu district have lower numbers of people per household than the provincial average. Uthukela has nearly the same proportion as the provincial average. But the Umkhanyakude & Zululand districts have higher numbers of people per household than the provincial average. Moreover, the results obtained in section 2.3.5 indicate that in both (Umkhanyakude & Zululand) districts there is a possibility that HIV/AIDS affects the area more than other districts, so that some HHs might be grannies looking after AIDS orphans.

For KZN province as a whole, nearly half of the HHs (45.96%) are women. About two-thirds (61.22%) of HHs in Umzinyathi, 54.67% in Zululand, 53.46% in Ugu, and 52.16% in Uthukela are females, which is a higher proportion than the provincial average, see (Table 2.3.1). Only the Ethekwini municipality has a lower proportion of female HHs than the provincial average. The variations are displayed in Figure 2.3.

Table 2.3.1 HH size and proportion of gender of HH, 2001.

Geographic area	Average # of persons Per HH	Proportion of HH Headed by female	Proportion of HH Headed by male
Amajuba	4.20	45.90	54.10
Ethekwini	3.04	37.84	62.16
Sisonke	4.02	46.65	53.35
Umgungundlovu	3.88	45.60	54.40
Ugu	4.36	53.46	46.54
Umkhanyakude	5.25	50.34	49.66
Umzinyathi	4.71	61.22	38.78
Uthukela	4.57	52.16	47.84
Uthungulu	4.43	47.74	52.26
Zululand	5.18	54.67	45.33
Ilembe	4.39	48.39	51.61

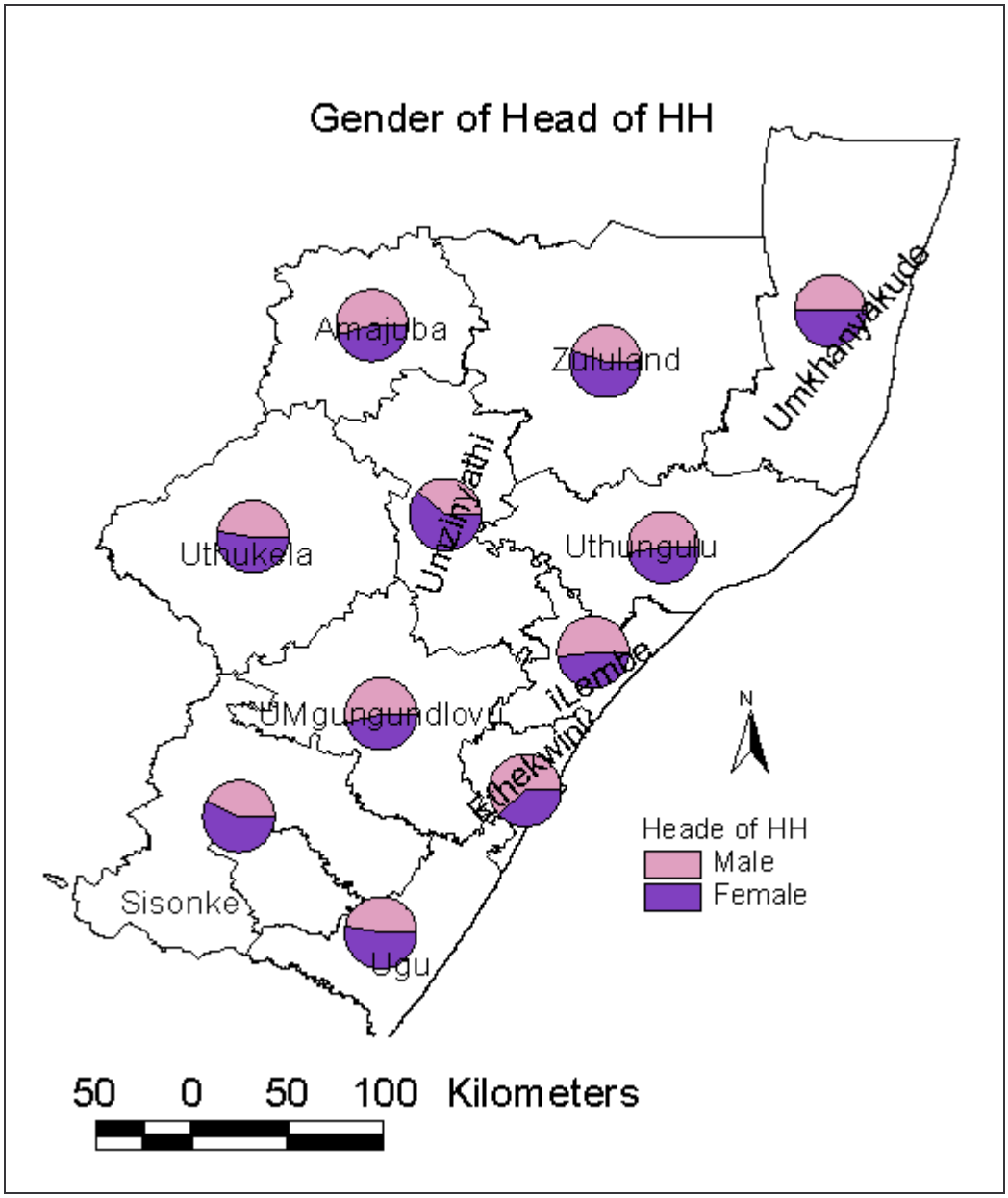


Figure 2.3 District of KZN: proportion of HHs by gender, 2001

The graph shows that as the household size goes up, so does the proportion of female headed HHs.

2.3.2 Population group by Work Status

Of black employed people living in KZN, 91.35% are paid employees, 4.74% are self-employed and 1.69% are employers. Among colored employed people, 91.39% are involved as paid employees, 6.40% are self-employed and 1.14 % are employers. Of all Indian/Asian employed people, 87.90% are involved as paid employees, 9.91% are self-employed and 0.88 % are employers. Of the white employed people KZN, 75.59% are involved as paid employees, 19.89% are self-employed, and 2.33 % are employers. For details see table 2.3.2.

To sum up among four population groups, whites are more involved as self-employed and employers than others.

Table 2.3.2 Population group by Work Status

Pop. Group	Paid emp.	Paid f. worker	Self emp.	employer	Unpaid f. w
Black	91.35	1.39	4.74	1.69	0.83
Colored	91.39	0.67	6.40	1.14	0.40
Indian/Asian	87.90	0.95	9.91	0.88	0.36
White	75.59	1.43	19.89	2.33	0.77

2.3.3 Gender and population group of HHs & their work Status.

Table 2.3.3 highlights the fact that, of all black employed female HHs, 92.32% are paid employees, 4.44% are self employed, and 1.33% are employers; among coloureds , 94.47% are paid employees, 3.52% are self employed, and 1.01% are employers; among Indians/Asians , 91.15% are paid employees, 6.79% are self employed, and 0.99% are employers; while among whites, 83.73% are paid employees, 13.39% are self employed, and 1.40% are employers;

For employed male HHs living in KZN, the situation is that among blacks, 90.51% are paid employees, 5.94% are self employed, and 2.04% are employers; among coloreds, 84.99% are paid employees, 12.63% are self employed, and 1.30% are employers; among Indians/Asians, 82.93% are paid employees, 15.24% are self

employed and, 1.17% are employers; while among whites, 69.15% are paid employee, 26.43% are self employed, and 3.20% are employers.

Comparing this provincial figure with each district of KZN, in all districts except Ethekwini, Ugu, and Umzinyathi, all colored employed female HHs are paid employees; in fact, in Ugu, they do have a much higher proportion than provincial average (3.52%) regarding self employed colored female HHs. In Umzinyathi, the proportions of colored employer female HHs are higher than provincial average.

In Umzinyathi (84.49%), Umkhanyakude (85.15%) and Zululand (87.84%), the proportion of black paid employee female HHs is lower than provincial average, with higher proportions than the provincial average regarding black self employed female HHs in Umkhanyakude (11.85%).

There are no Indian/Asian employed female HHs in Umkhanyakude and Zululand districts at all.

Regarding self employed female HHs, Indian/Asian in Amajuba; colored, Indian/Asian, white in Ugu; white in Umkhanyakude and ILembe have a much higher proportion than provincial average.

Regarding employer female HHs, coloreds in Umzinyathi, Indian/Asian in Uthukela and Uthungulu, blacks in Umkhanyakude, and whites in Ugu, Umkhanyakude and Amajuba, have a higher proportion than provincial average.

Comparing the proportions of paid employee black male HHs living in each districts of KZN with provincial average, the proportions in Umkhanyakude (81.65%), Umzinyathi (86.10%), and Zululand (86.39%) are lower than the provincial average (90.51%); as are the proportions of colored paid employee HHs in Umkhanyakude (72.22%), Ilembe (73.33%), and Sisonke (79.37%); the proportions of Indian/Asian

paid employees HHs in Umkhanyakude (62.50%), Zululand (66.67%) , Umzinyathi (73.02%), and ILembe (75..87%); and the proportions of white paid employee HHs in Sisonke (39.13%), Ugu (56.18%), and Zululand (58.47%) are lower than provincial average.

Comparing the proportion of self employed black male HHs, the proportions in Umkhanyakude (10.74%), & Umzinyathi (10.21%) are higher than provincial average (5.94%); as are the proportions of colored self employed HHs in Umzinyathi (22.22%), Sisonke (19.05%), and Uthukela (18.75%); the proportion of Indian/Asian self employed HHs in Umkhanyakude (37.50%), Zululand (33.33%), Sisonke (23.53%), and ILembe (20.65%); and the proportions of white self employed HHs in Sisonke (53.26%), Ugu (36.65%) and Zululand (34.97%).

Comparing the proportions of employer black male HHs, the proportions in Umkhanyakude (4.38%), Amajuba (3.32%), Ugu (3.00%), and Zululand (3.00%) are higher than provincial average (2.04%); as are the proportions of colored male employer HHs in ILembe (13.33%) & Ugu (3.57%); the proportion of Indian/Asian male employer HHs in ILembe (2.49%), & Ugu (1.83%); the proportion of white male employer HHs in Sisonke(6.52%) & Uthukela(5.88%).

Moreover, there are no colored male employer HHs in Amajuba, Umgungundlovu, Umzinyathi & Uthukela districts in the 10% sample while there are no Indian/Asian & colored male employer HHs in the Umkhanyakude, Uthukela, and Zululand districts, and no Indian/Asian male employer HHs in Sisonke.

Table 2.3.3 Gender & population group of HHs and their work Status.

Geographic area	Population group	Female					Male				
		Paid emp.	Paid f.w.	Self emp.	employer	Unpaid f. w.	Paid emp.	Paid f.w.	Self emp.	employer	Unpaid f. w.
Amajuba	Black	93.46	0.85	4.12	1.57	0	87.75	0.66	7.82	3.32	0.44
	Colored	100	0	0	0	0	93.75	0	6.25	0	0
	Indian/Asian	76.92	0	23.08	0	0	80.88	0	17.65	1.47	0
	White	79.41	0	14.71	5.88	0	78.64	0.34	18.64	2.03	0.34
Ethekwini	Black	93.68	1.15	4.14	0.73	0.30	92.38	0.78	5.14	1.42	0.28
	Colored	93.84	1.09	3.62	1.09	0.36	85.57	0.70	12.17	1.39	0.17
	Indian/Asian	92.54	0.48	5.84	0.77	0.38	83.61	0.40	14.68	1.17	0.14
	White	84.29	0.61	13.47	1.02	0.61	70.50	0.71	25.66	2.91	0.23
Sisonke	Black	90.63	1.34	5.36	1.79	0.89	91.38	1.05	4.55	2.33	0.70
	Colored	100	0	0	0	0	79.37	0	19.05	1.59	0
	Indian/Asian	100	0	0	0	0	76.47	0	23.53	0	0
	White	76.19	4.76	19.05	0	0	39.13	0	53.26	6.52	1.09
Umgungundlovu	Black	95.04	0.83	2.97	0.51	0.65	93.15	1.05	3.80	1.68	0.32
	Colored	100	0	0	0	0	88.89	0.74	10.37	0	0
	Indian/Asian	87.10	2.42	8.87	1.61	0	81.77	1.04	16.54	0.65	0
	White	86.22	0.44	10.67	1.78	0.89	65.23	1.23	29.61	3.44	0.49
Ugu	Black	93.74	1.63	2.57	1.29	0.77	89.64	1.36	5.72	3.00	0.28
	Colored	75.00	0	25.00	0	0	82.14	0	10.71	3.57	3.57
	Indian/Asian	82.14	0	17.86	0	0	83.56	0.46	13.70	1.83	0.46
	White	72.88	0	25.42	1.69	0	56.18	3.19	36.65	3.98	0
Umkhanyakude	Black	85.15	0.95	6.95	5.37	1.58	81.65	2.23	10.74	4.38	0.99
	Colored	100	0	0	0	0	83.33	0	16.67	0	0
	Indian/Asian	-	-	-	-	-	62.50	0	37.50	0	0
	White	76.92	0	23.08	0	0	65.38	1.92	30.77	1.92	0
Umzinyathi	Black	84.49	1.22	11.85	1.05	1.39	86.10	1.56	10.21	1.56	0.57
	Colored	87.50	0	0	12.50	0	72.22	5.56	22.22	0	0
	Indian/Asian	100.00	0	0	0	0	73.02	3.17	22.22	1.59	0
	White	84.21	0	0	5.26	10.53	66.67	0.95	27.62	4.76	0
Uthukela	Black	92.62	1.03	4.95	1.12	0.28	89.43	1.08	7.78	1.39	0.32
	Colored	100.00	0	0	0	0	81.25	0	18.75	0	0
	Indian/Asian	80.00	0	10.00	10.00	0	79.71	0.97	18.84	0	0.48
	White	86.36	4.55	4.55	4.55	0	67.65	1.47	25.00	5.88	0
Uthungulu	Black	89.96	2.16	4.85	2.16	0.88	89.40	1.24	6.35	2.54	0.48
	Colored	100.00	0	0	0	0	83.87	3.23	9.68	0	3.23
	Indian/Asian	84.21	0	10.53	5.26	0	90.63	1.25	7.50	0.63	0
	White	86.30	0	12.33	1.37	0	78.06	1.19	17.59	2.96	0.20

Zululand	Black	87.84	2.13	4.86	3.04	2.13	86.39	2.00	7.62	3.00	1.00
	Colored	100.00	0	0	0	0	85.71	0	14.29	0	0
	Indian/Asian	-	-	-	-	-	66.67	0	33.33	0	0
	White	81.82	6.06	9.09	3.03	0	58.47	1.64	34.97	4.92	0
Ilembe	Black	92.98	1.20	3.91	1.40	0.50	89.71	1.21	6.05	2.26	0.77
	Colored	100.00	0	0	0	0	73.33	0	13.33	13.33	0
	Indian/Asian	85.71	4.08	10.20	0	0	75.87	1.00	20.65	2.49	0
	White	72.73	0	22.73	0	4.55	68.03	1.36	27.89	2.04	0.68

2.3.4 Population group of HHs

The majority of HHs in KZN are headed by the black population group (81.12%), followed by Indian/ Asian (9.90), white (7.58%), and colored [1.4%] population groups.

The proportion of black headed HHs in all districts of KZN is higher than the provincial average (81.12%) except for Ethekwini & Umgungundlovu. Furthermore, the proportion of HHs headed by Indian/Asian population group in Ethekwini is higher (almost double) the provincial average. Details are given in table 2.3.4 & fig 2.4 below.

Table 2.3.4 HHs according to population group of HHs, 2001.

Geographic area	black	Colored	Indian/Asian	White
Amajuba	89.19	0.54	3.27	7.00
Ethekwini	65.38	2.38	20.33	11.89
Sisonke	94.00	2.83	0.39	2.77
Umgungundlovu	78.86	1.89	8.95	10.31
Ugu	88.31	0.64	3.82	7.23
Umkhanyakude	98.76	0.17	0.12	0.95
Umzinyathi	95.15	0.58	1.85	2.42
Uthukela	92.82	0.51	3.52	3.51
Uthungulu	92.87	0.44	1.70	4.99
Zululand	96.91	0.20	0.11	2.79
Ilembe	89.22	0.38	7.78	2.61

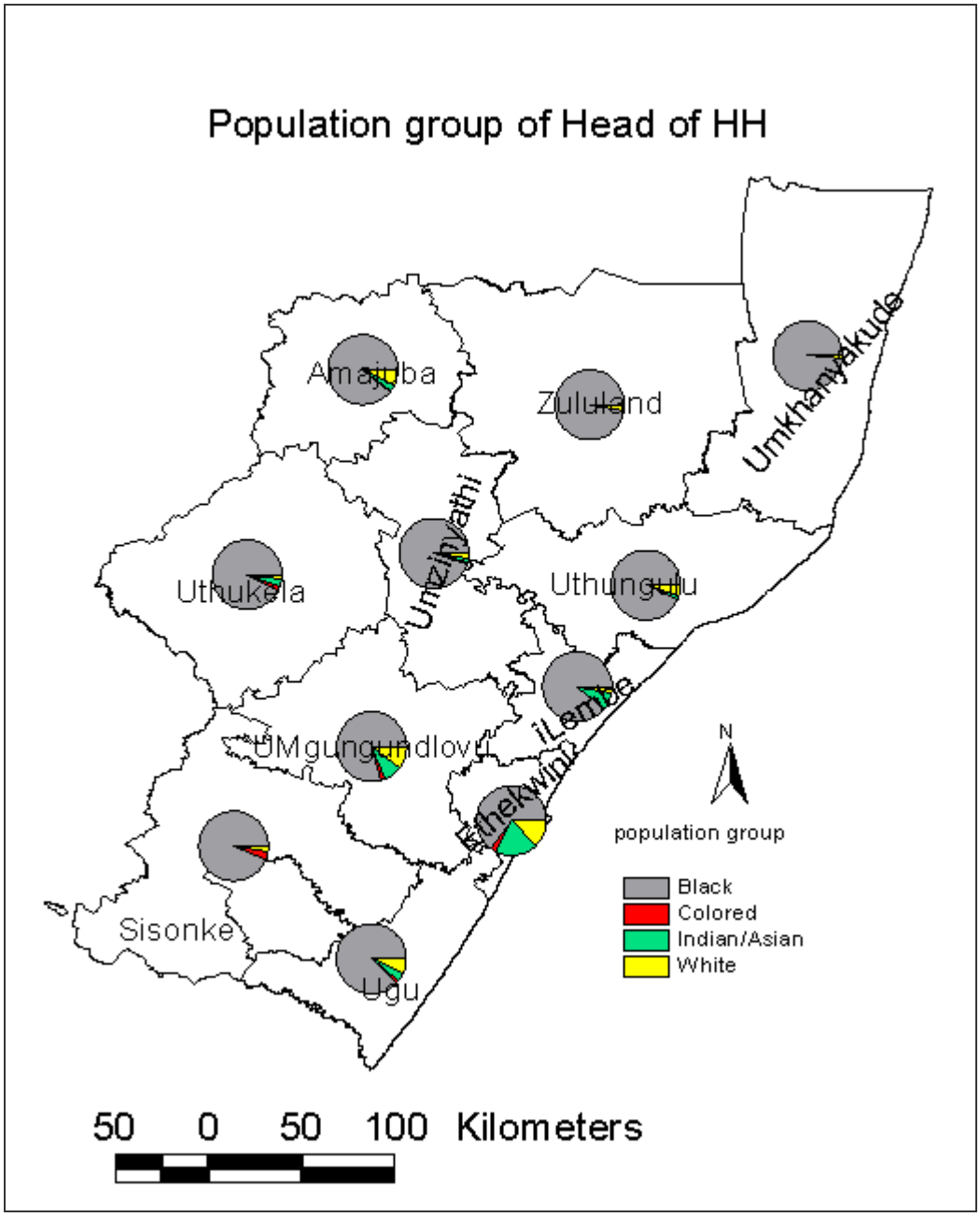


Figure2.4 district of KZN: population group of HHs, 2001

2.3.5 Age group and Gender of HHS

Of all male HHs in KZN, 89.27% are aged 15 to 64 years old, with 0.16% headed by children (under 15 years old). For the female HHs, 80.65% are aged 15 to 64 with 0.21% headed by children.

Comparing to these figures over the districts, all districts except Ethekwini have the proportion of male HHs aged 15 to 64 close to the provincial average. The proportion of female HHs headed aged 15 to 64 year is higher than the provincial average in Ethekwini but lower than provincial average in Ugu, Umzinyathi, and Zululand.

Moreover, in Umzinyathi, Umkhanyakude & Zululand, there is a higher proportion of child HHs (regardless of sex) than provincial average. This might be an indication of the effects of HIV/AIDS in the area. Meaning that the effect of HIV/AIDS is worse in these areas compared to provincial level. For details see table 2.3.5.

Table 2.3.5. HH according to age group and sex, 2001.

Geographic area	Male			Female		
	< 15 years	15 to 64 yr	65+	< 15 years	15 to 64 yr	65+
Amajuba	0.14	88.39	11.50	0.21	79.28	20.51
Ethekwini	0.03	91.87	8.10	0.11	84.90	14.99
Sisonke	0.30	88.69	11.01	0.13	82.20	17.67
Umgungundlovu	0.15	89.04	10.81	0.16	80.62	19.22
Ugu	0.20	84.35	15.45	0.28	76.93	22.79
Umkhanyakude	0.29	85.34	14.37	0.34	80.09	19.57
Umzinyathi	0.53	84.93	14.54	0.33	76.34	23.33
Uthukela	0.18	88.07	11.74	0.26	79.36	20.38
Uthungulu	0.16	89.04	10.80	0.22	79.01	20.77
Zululand	0.53	84.34	15.13	0.48	76.63	22.89
Ilembe	0.29	88.34	11.37	0.15	78.44	21.41

CHAPTER 3

Environmental factors

3.1 Sanitation (Toilet facility)

Figure 3.1 shows the distribution of the type of toilet facility (sanitation) found at dwellings in "places" within each district of the province.

It shows that the "places" with the highest proportions of access to flush toilets are found in Ethekwini (65.71%) which is much higher proportion than the provincial average, followed by Amajuba (47.89%), Umgungundlovu (47.74%) with these districts having no toilet for 3.96%, 5.56% & 5.69% respectively of the households. Table 3.1 highlights the fact that Umkhanyakude is the worst off district in terms of access to toilet facility (sanitation), because 55.91% of the dwellings have no toilets, 25.60% make use of pit & bucket latrines and only 11.66% have a flush toilet, followed by Umzinyathi, Zululand, and Uthungulu with 42.97%, 38.69%, & 30.02% respectively having no toilets.

For the province as a whole, 16.14% have no toilets, while 36.09% use pit & bucket latrines and 42.55% use flush toilets.

Table 3.1. Households, according to type of toilet facility (sanitation), 2001.

Geographic area	Flush toilet	Chemical toilet	Pit latrine	Bucket latrine	No toilet
Amajuba	47.89	3.95	42.02	0.57	5.56
Ethekwini	65.71	5.03	24.22	1.08	3.96
Sisonke	27.56	5.53	54.42	1.54	10.98
Umgungundlovu	47.74	3.24	42.31	1.02	5.69
Ugu	22.59	7.39	51.96	0.97	17.09
Umkhanyakude	11.66	6.82	24.15	1.45	55.91
Umzinyathi	22.08	4.04	31.76	1.15	42.97
Uthukela	26.66	2.35	52.12	1.05	17.81
Uthungulu	27.30	6.75	34.54	1.39	30.02
Zululand	19.34	5.63	35.60	0.74	38.69
Ilembe	24.80	7.94	47.10	1.42	18.74

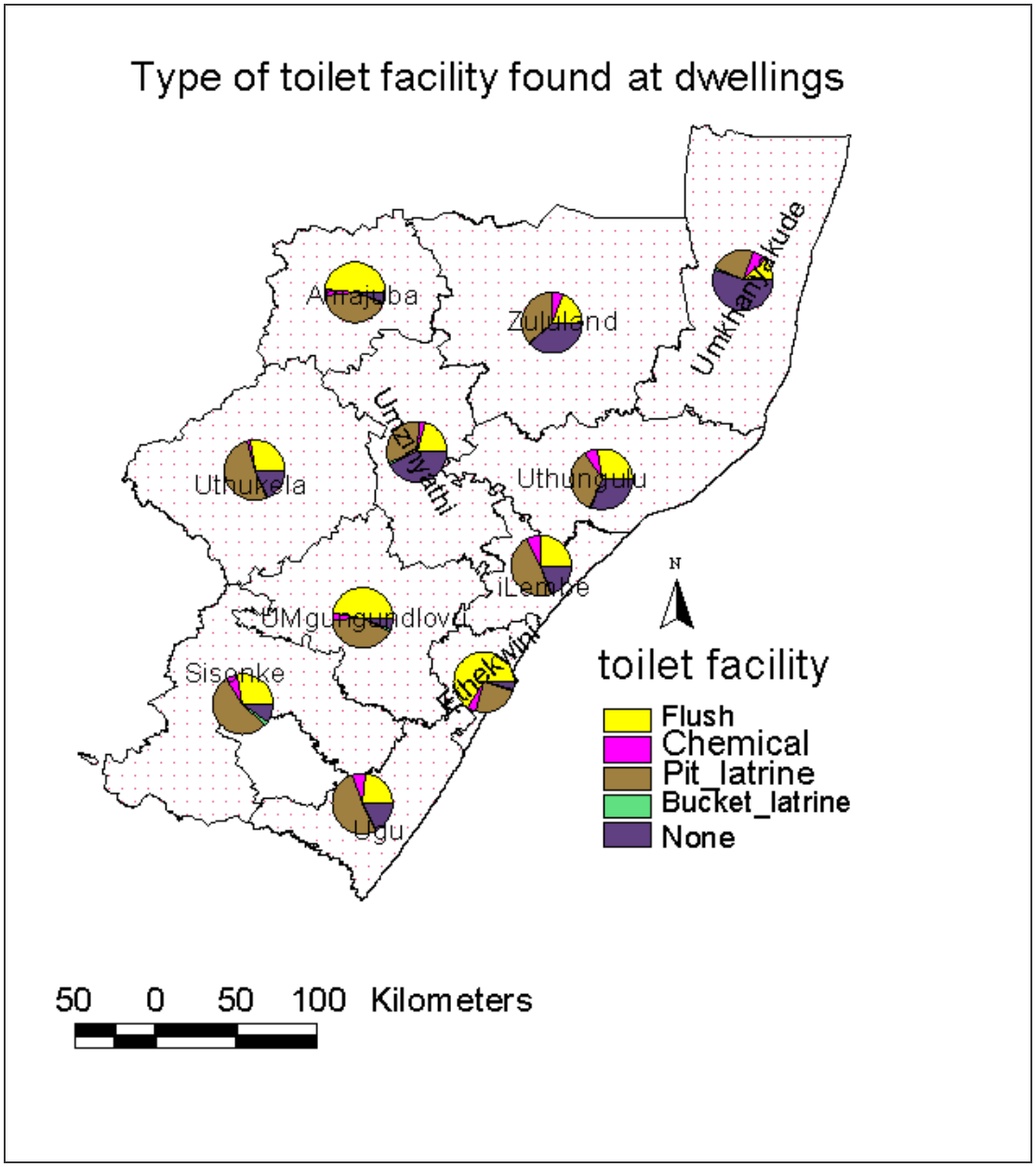


Figure 3.1. District of KZN: Proportion of households according to type of toilet facility (sanitation) , 2001.

3.2 Access to Water

Figure 3.2 shows the distribution of the type of water supply found at dwellings in "places" within each district of KZN. About 50.27% of the households in KZN obtain water from piped water inside the dwelling and another 22.92% have piped water

from a public tap. Around 26% of households in the province obtain water from river/stream and other/borehole/spring… source.

For this particular research report, households obtaining piped water for their domestic use are recoded as follows:

- Piped water inside dwellings & inside yard recoded as piped water inside dwellings.
- Piped water on community stand: distance greater than 200m & less than 200m from dwellings recoded as public tap.

Households obtaining water from boreholes, springs, dams/pools/stagnant water, rain water tanks, water vendor & 'other' are recoded as other while households obtaining water from river/stream are recoded as it is (i.e. river/stream).

Of all districts of KZN, Umkhanyakude is the worst district in terms of access to water (sanitation), because only 16.34% of the dwellings have piped water inside dwellings, and 57.40% make use of river/stream & other sources as their source of water. This is followed by Umzinyathi, Ugu and Zululand, with 23.34%, 24.06% & 28.92% respectively, having piped water inside dwellings, which is much less than the provincial average (50.27). However in Umzinyathi (55.00%), Ugu (51.51%) & Zululand (49.35%) of households make use of river/stream and other as their source of water, which is much higher proportion than provincial average (26%).

However, one reason for Umkhanyakude having so many households that obtain water from river/stream & other sources might be there are a larger number of rivers in the area (i.e.265) than other districts.

In contrast, Ethekwini is the best of all in terms of access to water (sanitation), because 71.43% of the dwellings have piped water inside dwellings, and only 4.95% make use of river/stream & other/borehole/spring as their source of water. [Ethekwini

is the largest and most densely populated area, and is only one classified as a municipality], followed by Umgungundlovu with 64.93% having piped water inside dwellings & 14.98% making use of river/stream and other/borehole/spring as their source of water. For details, see table 3.2 & fig. 3.2. Indeed, there are far fewer rivers in Ethekwini than other districts.

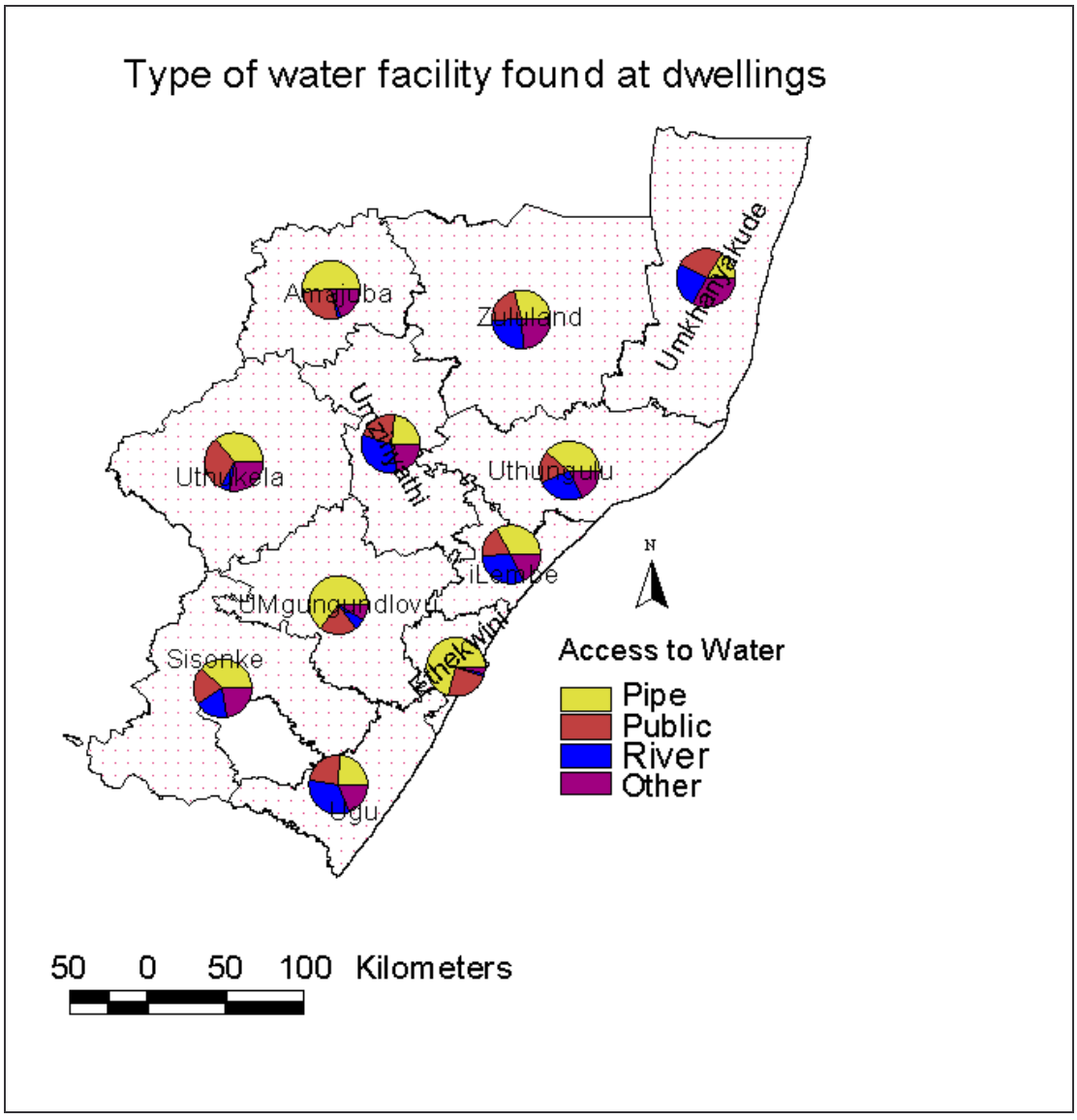


Figure 3.2. District of KZN: Proportion of households according to access to water, 2001.

Table 3.2. HHs according to access to water, 2001

Geographic area	Piped water inside/yard	public tap	River/stream	Other/borehole /spring….	Number of rivers
Amajuba	51.24	27.69	2.17	18.89	42
Ethekwini	71.43	23.62	1.33	3.62	16
Sisonke	38.10	21.17	18.09	22.63	56
Umgungundlovu	64.93	20.10	6.34	8.64	65
Ugu	24.06	24.44	32.70	18.81	23
Umkhanyakude	16.34	26.26	24.64	32.76	265
Umzinyathi	23.34	21.66	33.76	21.24	39
Uthukela	36.47	31.26	6.30	25.97	73
Uthungulu	39.43	16.79	25.85	17.93	52
Zululand	28.92	21.73	24.79	24.56	85
Ilembe	33.30	18.16	30.95	17.58	36

CHAPTER 4

Socio-economic profile

4.1 Education

4.1.1 The highest level of education that persons (>7 years old) have completed

The education data are investigated specifically for the population aged 7-14 years old and for the population aged 7 years & above, these groups being chosen to investigate whether children aged 7-14 years currently attend any educational institution or not, and the highest level of education completed for persons who are aged 7 years and above. In KZN, the proportion of total population (7 year & above) with respect to highest level of education completed is given as: 18.53% not educated at all; 26.95% left school with some secondary but before finishing grade 12, and 16.95% attaining grade 12 and higher educational qualification than grade 12.

The map in Figure 4.1 shows the percentage of the population aged 7 year & above with a matric or higher qualification and highlights a situation of concern with regards to education.

Table 4.1.1 highlights the fact that four districts have between 0 and 10% of the population with a matric or higher qualification. These are found in Zululand (9.56%), Sisonke (9.65%), Umkhanyakude (8.35%), and Umzinyathi (7.66%) districts, which is much lower proportion than provincial average (16.95%), and having high proportion of no schooling (not educated at all) i.e.19.37%, 31.34%, 31.90%, & 26.06% respectively than provincial average.

Table 4.1.1. Population, according to highest level of education (7 year & above) 2001.

Geographic area	No schooling	Some & com. Primary	Some secondary	Grade 12	Higher
Amajuba	14.79	38.99	29.04	13.09	4.09
Ethekwini	10.37	30.89	32.36	19.58	6.81
Sisonke	19.37	47.69	23.30	6.81	2.84
Umgungundlovu	14.91	37.92	28.78	13.67	4.72
Ugu	21.22	45.05	23.36	7.83	2.55
Umkhanyakude	31.34	41.85	18.46	6.56	1.79
Umzinyathi	31.90	41.62	18.82	5.92	1.74
Uthukela	20.93	42.17	25.09	9.22	2.59
Uthungulu	24.42	39.94	22.23	10.20	3.21
Zululand	26.06	42.32	22.07	7.30	2.26
Ilembe	23.07	40.99	24.03	9.85	2.07

4.1.2 Present attendance of any educational institutions by persons aged 7 years and above.

About two-thirds (64.57%) of the people over 7 years old living in KZN are not currently attending in any educational institutions, with 31.75% attending school, and 0.17%. attending other institutions.

Comparing these provincial figures to every district of KZN, the Ethekwini and Umgungundlovu districts have a higher proportion than provincial average regarding not currently attending any educational institutions and a lower proportion for attending school. This might be an indication of a lack of high schools in these areas, so that, to fill the gap, there is a need for constructing some more schools for these districts or enhance their capacity, say, by increasing number of classes.

In contrast, better results are observed in the Umkhanyakude & Zululand districts, which have low proportion of not attending any educational institutions than provincial average and a higher proportion attending school.

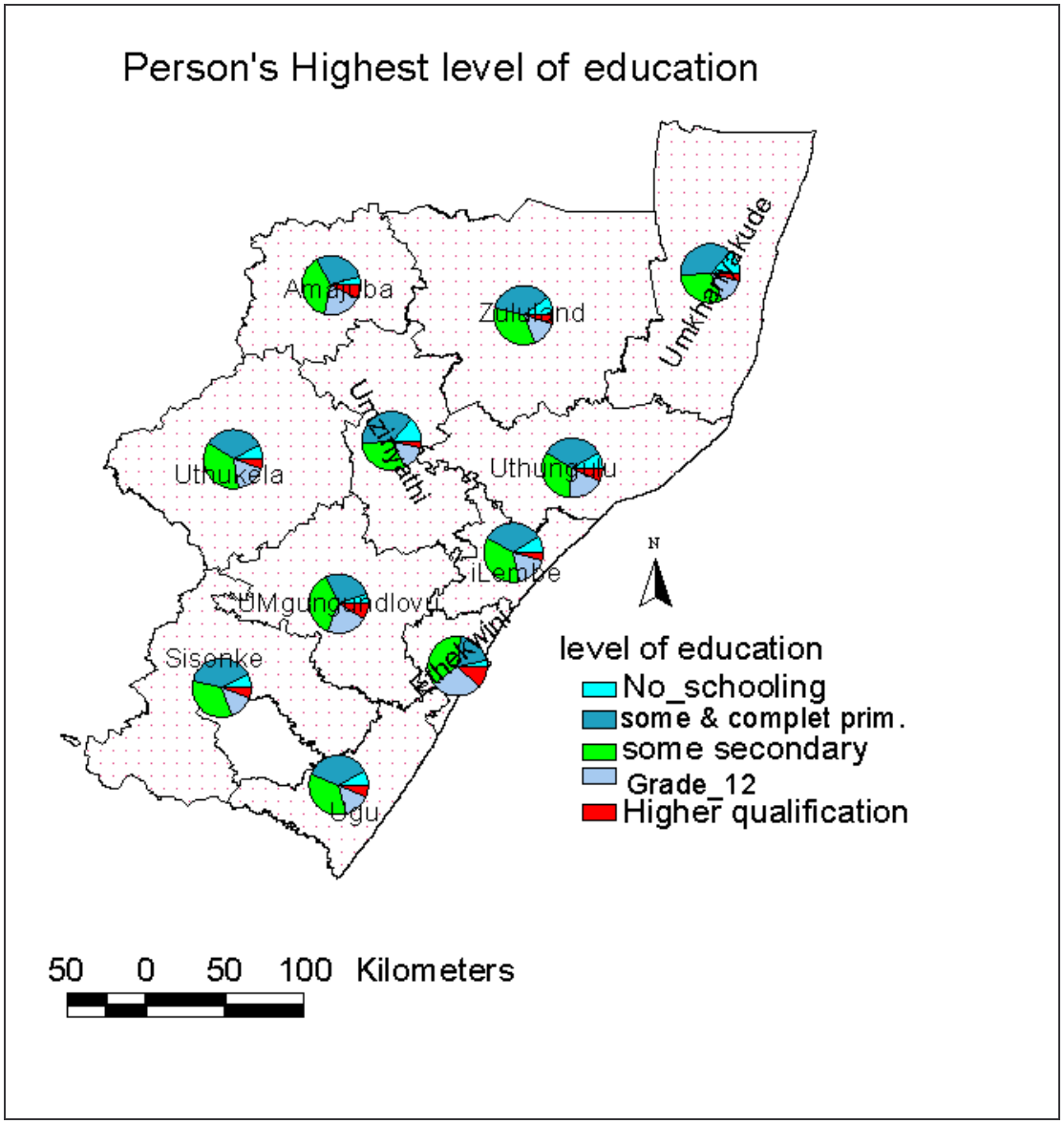


Figure 4.1. District of KZN: Education levels of population aged 7yr & above, 2001.

Concerning attending higher education the Ethekwini is the best of all. See table 4.1.2 and fig.4.2 below.

Table 4.1.2. Persons (> 7 year) Present attendance in any educational institutions, 2001.

Geographic area	Not attending	Pre-school	School	other
Amajuba	63.14	2.17	33.36	1.32
Ethekwini	70.39	1.95	24.60	3.07
Sisonke	62.30	1.94	34.99	0.76
Umgungundlovu	66.86	2.16	29.00	1.99
Ugu	62.40	1.51	35.31	0.78
Umkhanyakude	57.23	2.02	40.05	0.70
Umzinyathi	61.64	1.86	35.91	0.60
Uthukela	62.11	1.93	35.25	0.72
Uthungulu	61.37	2.11	35.03	1.37
Zululand	56.94	2.05	40.13	0.88
Ilembe	63.22	1.72	34.26	0.80

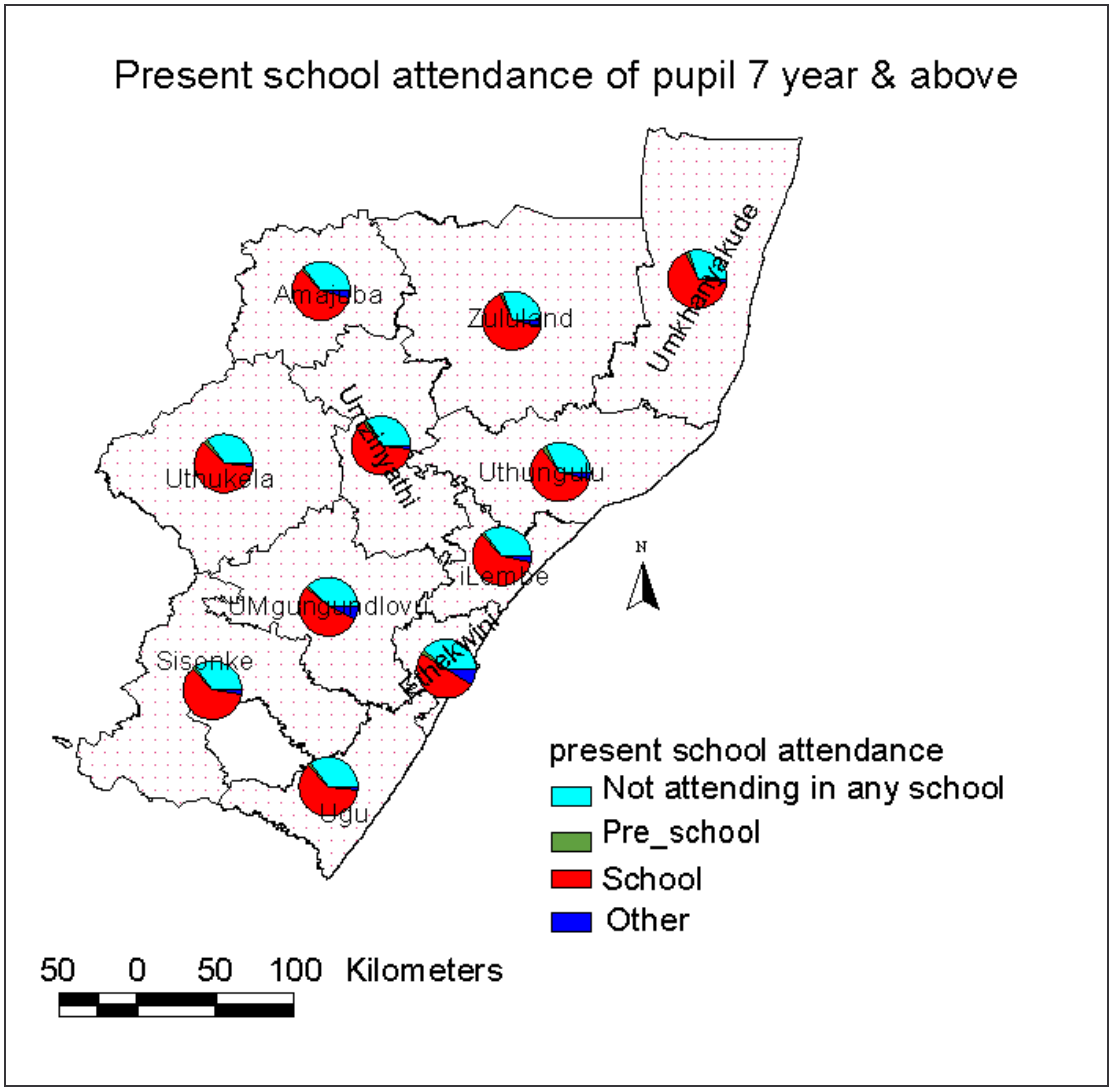


Figure. 4.2 Districts of KZN: present attendance in any educational institutions of people aged 7 yr & above,2001.

4.1.3 Present attendance of any educational institutions of children aged 7 to 14 years old, 2001.

In KZN, the proportion of total children (aged 7 to 14 year) regarding present attendance on any educational institutions is: 14.92% no longer attending any educational institution, 4.02% attending pre-school, 80.89% attending school, and 0.17% attending other institutions.

Among the districts of KZN, Umzinyathi is the worst district regarding children's not attending any educational institutions at all & attending school as well, because 20.08% are not attending at all & 76.70% are attending school, followed by Umkhanyakude. See table 4.1.3.

Table 4.1.3 Children (7 to 14 years) present attendance in any educational institution, 2001.

Geographic area	Not attending	Pre-school	School	other
Amajuba	13.73	5.00	81.14	0.12
Ethekwini	12.36	5.10	82.32	0.22
Sisonke	16.77	3.65	79.38	0.20
Umgungundlovu	12.25	4.36	83.17	0.21
Ugu	16.49	3.07	80.33	0.11
Umkhanyakude	18.19	3.09	78.63	0.10
Umzinyathi	20.08	3.01	76.70	0.21
Uthukela	14.82	3.91	81.16	0.11
Uthungulu	16.80	3.90	79.11	0.19
Zululand	13.96	3.45	82.42	0.17
Ilembe	16.50	3.23	80.14	0.13

4.1.4 Average age of pupils (7 year & above) currently attending any educational institution.

The average age of pupils currently attending any educational institution for the KZN province as a whole is: 32.04 years not attending at all, 4.34 years attending in pre-school, 13.84 years for attending school, 25.15 years for attending college, 23.78 for attending Technikon, 27.06 for attending university, 32.70 years for attending adult education, and 21.51 years for attending others.

Comparing these provincial figures to each district of KZN, shown in table 4.1.4, the average age of attending pre-school, observed in each and every district is comparable with the provincial average. However, when we consider average age of pupils currently attending in school, the Ethekwini (13.36 years) is the best of all, followed by Umgungundlovu (13.44 years), & Umzinyathi (13.65 years) while Uthungulu (14.36 years) and Ilembe (14.31 years) are the worst of all.

Regarding the average age of pupil currently attending college, the Umkhanyakude (31.07 years), Umzinyathi (29.94 years), Uthukela (28.34 years), and Zululand (28.12 years) are the worst of all since they have a higher proportion than the provincial average (25.15 years).

Regarding the average age of pupils currently attending Technikons, the Umzinyathi (29.56 years), Umkhanyakude (29.52 years), and Uthukela (28.56 years) are the worst of all since they have a higher proportion than provincial average (23.78 years)

Regarding the average age of pupils currently attending in University, the Umkhanyakude (34.80 years), Umzinyathi (34.68 years), Zululand (34.43 years), and Sisonke (33.90 years) are the worst of all since they have a higher average than provincial average (23.78 years).

Table 4.1.4 Average age of attending any educational institution

	No schooling	Pre-school	school	college	Technikon	University	Adult education	Others
Amajuba	31.69	4.59	14.01	24.66	23.19	29.81	34.69	19.75
Ethekwini	33.65	4.35	13.36	23.70	23.13	25.76	31.56	21.05
Sisonke	30.64	4.40	14.08	27.26	27.19	33.90	38.54	14.22
Umgungundlovu	33.54	4.22	13.44	25.29	23.94	25.80	25.34	21.61
Ugu	32.46	4.45	14.21	27.63	24.66	30.99	36.32	21.55
Umkhanyakude	28.77	4.21	14.16	31.07	29.52	34.80	34.86	21.67
Umzinyathi	30.01	4.39	13.65	29.94	29.56	34.68	33.79	14.60
Uthukela	30.77	4.52	13.71	28.34	28.56	29.87	31.16	23.66
Uthungulu	30.45	4.26	14.36	27.75	26.71	27.41	29.89	25.35
Zululand	29.98	4.26	13.97	28.12	26.78	34.43	30.99	24.90
Ilembe	31.58	4.28	14.31	27.36	24.31	31.28	36.51	16.74

4.1.5 Type of educational institution people currently attend.

Table 4.1.5. Type of educational institution, 2001.

Geographic area	Public	Private
Amajuba	97.00	3.00
Ethekwini	92.07	7.93
Sisonke	95.70	4.30
Umgungundlovu	93.64	6.36
Ugu	97.06	2.94
Umkhanyakude	96.78	3.22
Umzinyathi	97.71	2.29
Uthukela	97.04	2.96
Uthungulu	96.67	3.33
Zululand	97.12	2.88
Ilembe	95.73	4.27

For KZN province as a whole, the majority of people who currently attend any educational institution, attend Governmental (public) institutions, with a proportion of 95.24%.

Comparing to these provincial figures, in all districts of KZN, the proportion of people who currently attend public (governmental) institution is higher than the provincial average (95.24%) except in the Ethekwini & the Umgungundlovu. For details see table above (table 4.1.5).

Regarding private educational institutions, the Ethekwini municipality is the best of all, because it has larger proportion 7.93% (almost double the provincial average of 4.76%), followed by Umgungundlovu with 6.36%. The Umzinyathi district is the worst of all because it has much a lower proportion (almost half the provincial average), followed Zululand (2.88%), Ugu (2.94%), and Uthukela (2.96%). See fig 4.3.

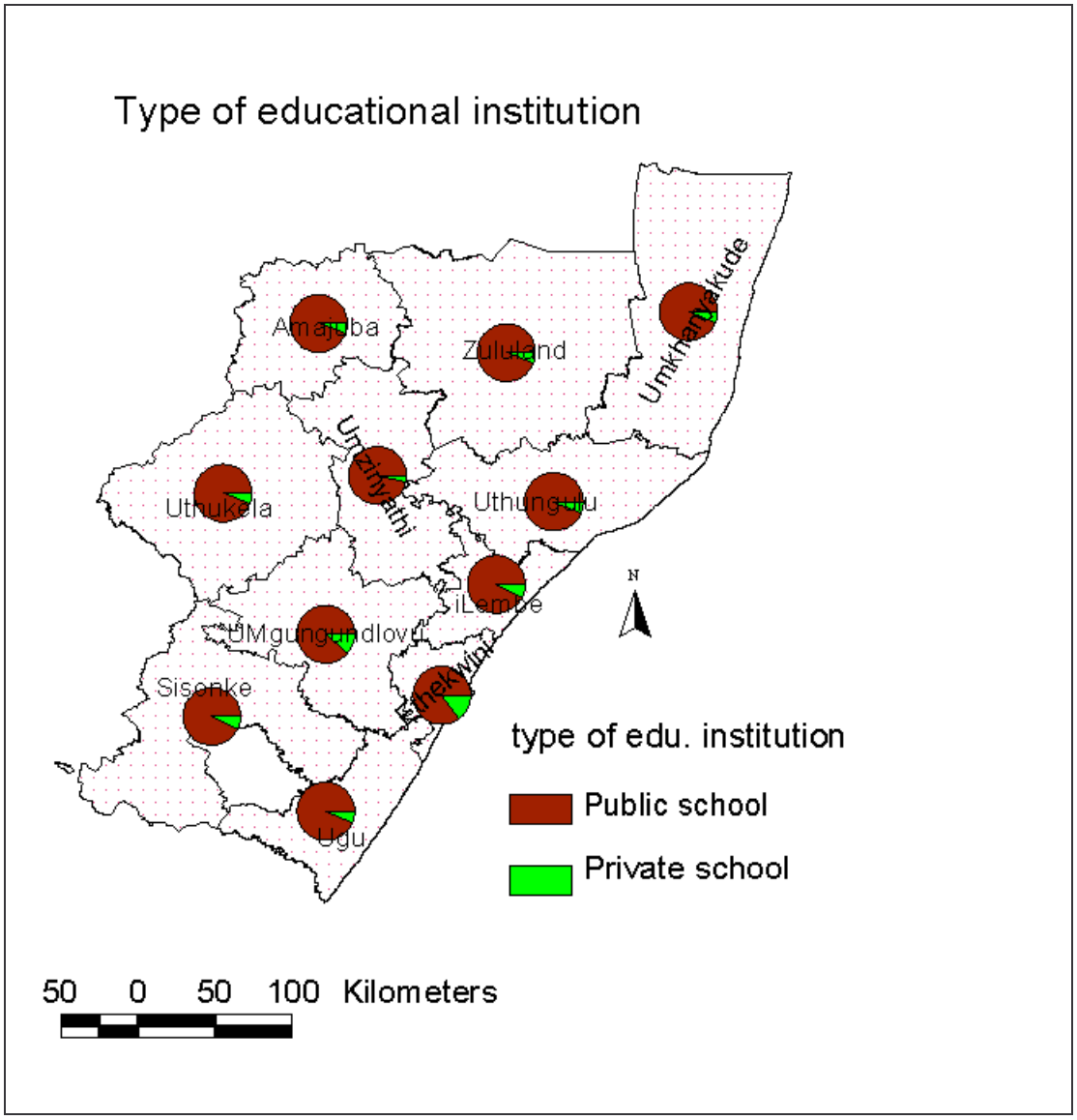


Figure 4.3. District of KZN: type of Educational institution, 2001.

Factor affecting access to school.

4.1.6 Numbers of Educational institutions found in each district Vs number of people served by these facility.

Table 4.1.6 highlights the fact that, among the districts of KZN, Amajuba is the worst district in terms of number of Educational institutions found in the area, because there are only 227 educational institutions, followed by Sisonke (306), Umzinyathi (381) & Uthukela (392). While Ethekwini is the best municipality in terms of number of

Educational institutions found in the area, because there are 1003 educational institutions, which is almost double the total number of Educational institution found in each of the other districts, followed by Zululand (676) & Umgungundlovu (603).

Table 4.1.6. Number of Educational institutions found in each district

Geographic area	Number of Educational institution	Total population	Number of people served
Amajuba	227	36698	162
Ethekwini	1003	240340	240
Sisonke	306	23011	75
Umgungundlovu	603	70952	118
Ugu	460	56201	122
Umkhanyakude	423	46183	109
Umzinyathi	381	36276	95
Uthukela	392	51860	132
Uthungulu	565	70838	125
Zululand	676	62422	92
Ilembe	406	43649	108

But when we consider total number of people served by these educational institutions found in each district, the Sisonke district become the best of all, because one educational institution serves 75 persons, followed by Zululand (1 for 92), & Umzinyathi (1 for 95) persons.

The Ethekwini municipality is the worst of all in terms of total number of people served by these facilities, because one educational institution serves 240 persons, which is much more (almost double the provincial average 129), followed by Amajuba (1 for 162), & Uthukela (1 for 132) persons.

However, one reason for Ethekwini serving so many people is that the schools are bigger. It is more densely populated, and being an urban area, it has a reasonable bus service. Schools there often have up to 10 classes for each grade, as opposed to some of the rural schools, which will have only 1 class for, say, grades 3-5.

4.1.7 Educational institutions of each district in relation to natural & man made Features

Educational institutions are reclassified as

Institutions teaching pupils 3 to 7 grade ------- >primary school

Institutions teaching pupils 8 to 12 grade ------ >secondary school

Institutions teaching pupils other than these---->other.

In KZN, there are around 5444 educational institutions, of these, 3223(59.20%) are primary schools, they teach pupils from grades 3 to 7, 1160(21.31%) are secondary schools, they teach grades 8 to 12, 259(4.76%) teach pupils from grades 3 to 12, and 802 (14.73%) are other institutions that include pre-school, college, university, Technikon and adult education.

Table 4.1.7a highlights the fact that, of all districts of KZN, Amajuba is the worst district in terms of the number of primary (132) and secondary (44) schools found in the area, followed by Sisonke, Umzinyathi & Uthukela. While Ethekwini is the best municipality in terms of number of primary (556) and secondary (244) schools found in the area, followed by Zululand & Umgungundlovu.

Among those educational institutions found in KZN province, 3673 (67.46%) are found within 5 km of the road network, 2145 (39.40%) are found within 5 km of the rail road network, and 4629(85.03%) are found within 5 km of the river course. While 4540 (83.40%) are found within 10 km of the road network, 2950 (54.20%) are found within 10 km of the rail road network, and 5367(98.54%) are found within 10 km of the river course.

Table 4.1.7a Number of primary and secondary school found in each district

Geographic area	primary	Secondary
Amajuba	132	44
Ethekwini	556	244
Sisonke	197	42
Umgungundlovu	341	117
Ugu	274	95
Umkhanyakude	265	92
Umzinyathi	235	73
Uthukela	241	84
Uthungulu	333	139
Zululand	400	149
Ilembe	248	81

Furthermore, out of the 1160 secondary schools found in KZN province, 765 (65.95%) are found within 5 km of the road network, 460 (39.66%) are found within 5 km of the rail road network, and 985 (84.91%) are found within 5 km of the river course. While 958 (82.59%) are found within 10 km of the road network, 632 (54.48%) are found within 10 km of the rail road network, and 1145 (98.71%) are found within 10 km of the river course. The map in fig. 4.4 shows secondary schools found within the KZN province. The rest can be found in appendix 1.

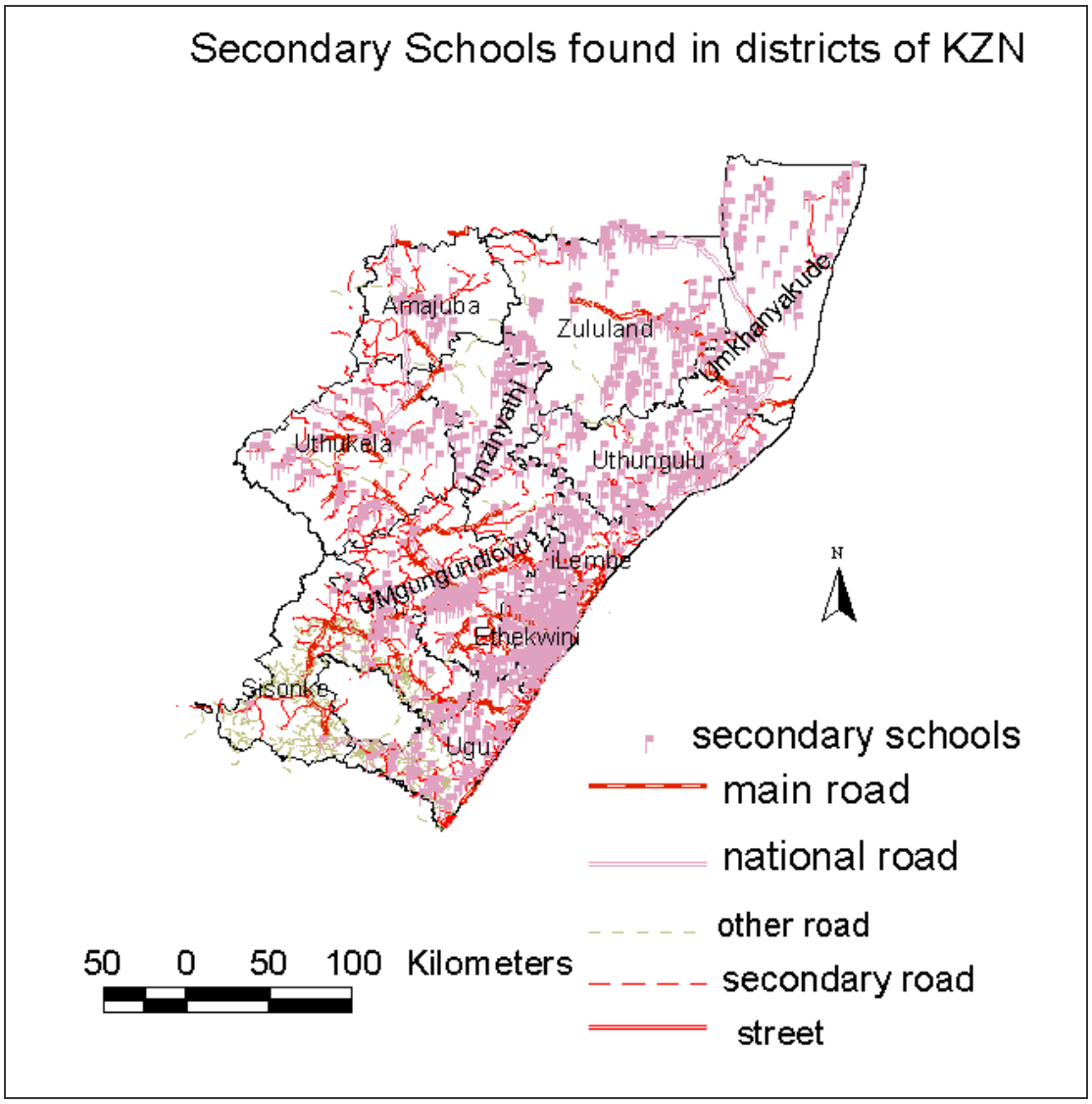


Figure. 4.4: Districts of KZN: Secondary schools found in districts of KZN, 2001.

Table 4.1.7b below highlights the fact that among those educational institutions found in Umzinyathi only one-third (31.23%); nearly half in the Zululand (41.12%), Umkhanyakude (42.08%), and Uthungulu (49.03%) are found within 5 km of the road network, that is a much lower proportion than provincial average (67.46%). While among those educational institutions found in Ethekwini (94.22%), Sisonke (89.22%), Umgungundlovu (87.89%), and Ugu (82.61%), more than two-third of

them are found within 5 km of the road network which is a higher proportion than provincial average.

It also highlights the fact that Umkhanyakude (9.69%), Umzinyathi (15.22%), Zululand (15.38%), and Uthukela (20.41%) have a much lower proportion than the provincial average (39.40%) regarding educational institutions found within 5km of the rail road network. The map in fig. 4.5 shows educational institutions (secondary schools) found within 5km of the road network for districts of KZN.

In general, among those educational institutions found in each districts, more than two–thirds of them found are within 5 km of the river course therefore, it might have an impact towards access to school depending on the water volume of the river, especially for those areas most pupil travel to school on foot.

Table 4.1.7b Educational institutions according to their proximity to road, rail road & river.

Geographic area	Road network		Rail road		River		Total # of school
	With in 5km	With in 10km	With in 5km	With in 10km	With in 5km	With in 10km	
Amajuba	56.83	83.70	56.83	69.16	75.33	100	227
Ethekwini	94.22	98.50	82.15	93.52	94.02	100	1003
Sisonke	89.22	99.35	44.83	65.69	88.89	100	306
Umgungundlovu	87.89	99.34	55.72	73.30	89.88	100	603
Ugu	82.61	96.30	30.22	56.74	87.17	100	460
Umkhanyakude	42.08	61.94	9.69	21.04	65.96	89.36	423
Umzinyathi	31.23	53.81	15.22	21.78	75.85	91.86	381
Uthukela	58.42	88.01	20.41	41.58	91.07	100	392
Uthungulu	49.03	76.64	35.58	55.58	83.36	99.82	565
Zululand	41.12	59.02	15.38	23.08	79.59	100	676
Ilembe	66.75	91.13	25.62	37.93	89.66	100	406

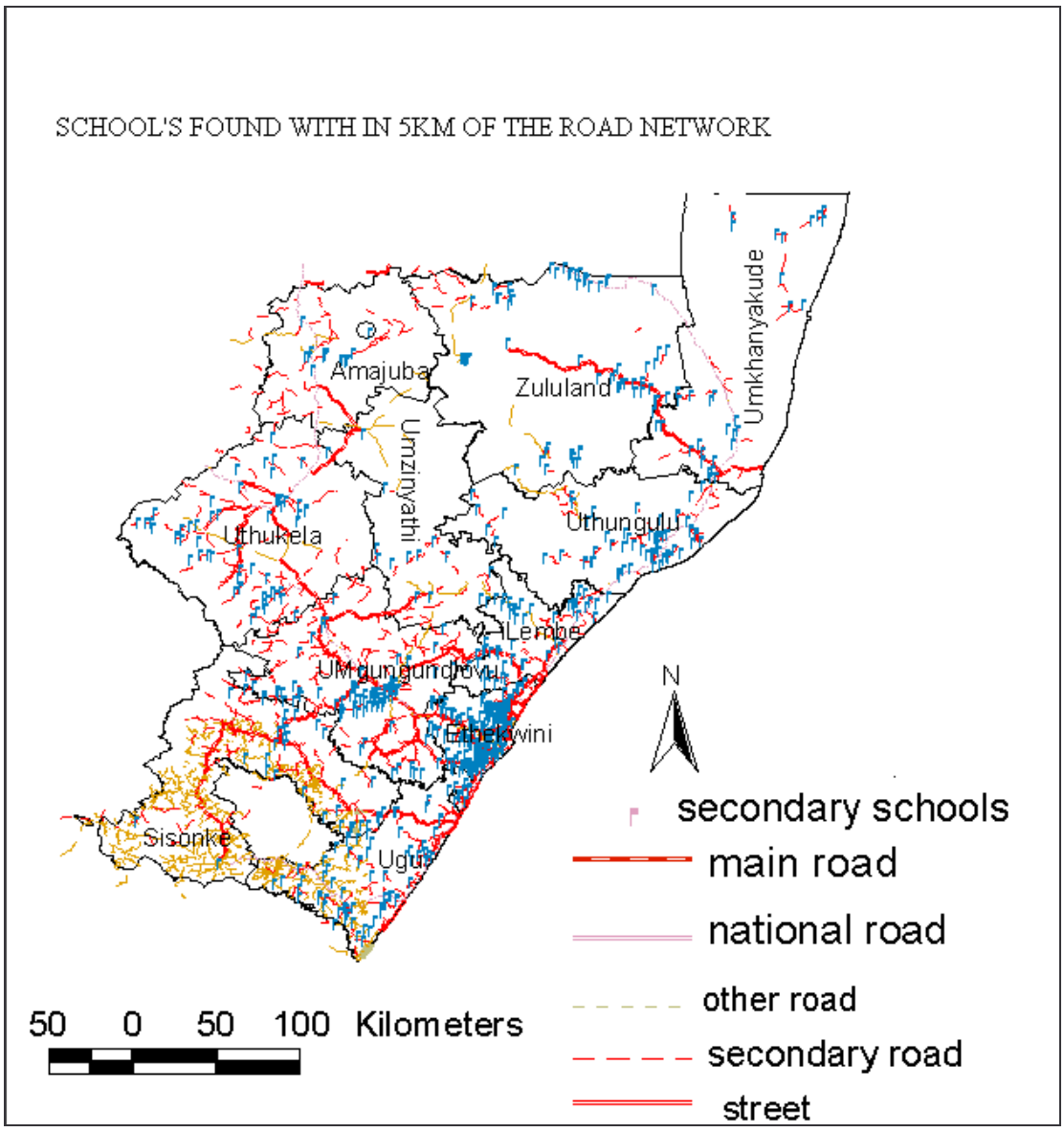


Figure. 4.5 Districts of KZN: educational institutions (secondary school) found within 5km of the road network, 2001.

4.1.8 Person's usual mode of transport to school, 2001.

For KZN province as a whole, 30.81% travel to school on foot, 0.48% travel by cycle, 7.80% travel by car, 8.56% travel by bus, 0.70% travel by train, and 0.34 travel to school by other means of transportation.

Nearly half of the pupils living in Zululand (46.16%), Umkhanyakude (45.89%), Sisonke (43.29%), and Umzinyathi (41.16%) travel to school on foot, that is a higher proportion than provincial average (30.81%), with 3.23%, 1.69%, 2.63%, & 2.31%, respectively travelling to school by bus and 0.28%, 0.31%, 0.28% & 0.44% respectively travelling to school by train & other means of transportation, which is a lower proportion than provincial average.

In contrast, of those pupils living in Ethekwini & Umgungundlovu, 15.91% & 10.59% respectively travel to school by bus, that is a higher proportion than provincial average, and 2.28% & 0.74% respectively travel to school by train and other means of transportation, with 20.39% & 30.96% respectively travelling to school on foot. One reason might be there is a well-structured road and railroad network in these areas which is suitable for bus and train routes. Furthermore, relatively more households are financially stable than other districts.

In general in all districts, except Ethekwini and Umgungundlovu, more than one–third of pupils living in the area travel to school on foot and about 12% travel by car & bus. See table 4.1.8 & fig 4.6.

Table 4.1.8 Person's usual mode of transport to school, 2001.

Geographic area	Not applicable	On foot	Cycle	Car	Bus	Train	Other
Amajuba	47.27	35.95	0.60	3.15	9.65	0.12	0.25
Ethekwini	46.53	20.39	0.47	14.42	15.91	1.84	0.44
Sisonke	48.43	43.29	0.34	5.03	2.63	0.09	0.19
Umgungundlovu	46.97	30.96	0.61	10.13	10.59	0.23	0.51
Ugu	50.31	38.22	0.46	5.15	5.24	0.19	0.44
Umkhanyakude	48.79	45.89	0.51	2.82	1.69	0.15	0.16
Umzinyathi	52.12	41.16	0.48	3.58	2.31	0.12	0.32
Uthukela	49.61	37.98	0.41	4.59	7.18	0.13	0.10
Uthungulu	47.39	38.20	0.53	5.68	7.55	0.15	0.50
Zululand	46.72	46.16	0.53	3.08	3.23	0.14	014
Ilembe	48.46	37.01	0.34	6.17	6.74	0.75	0.54

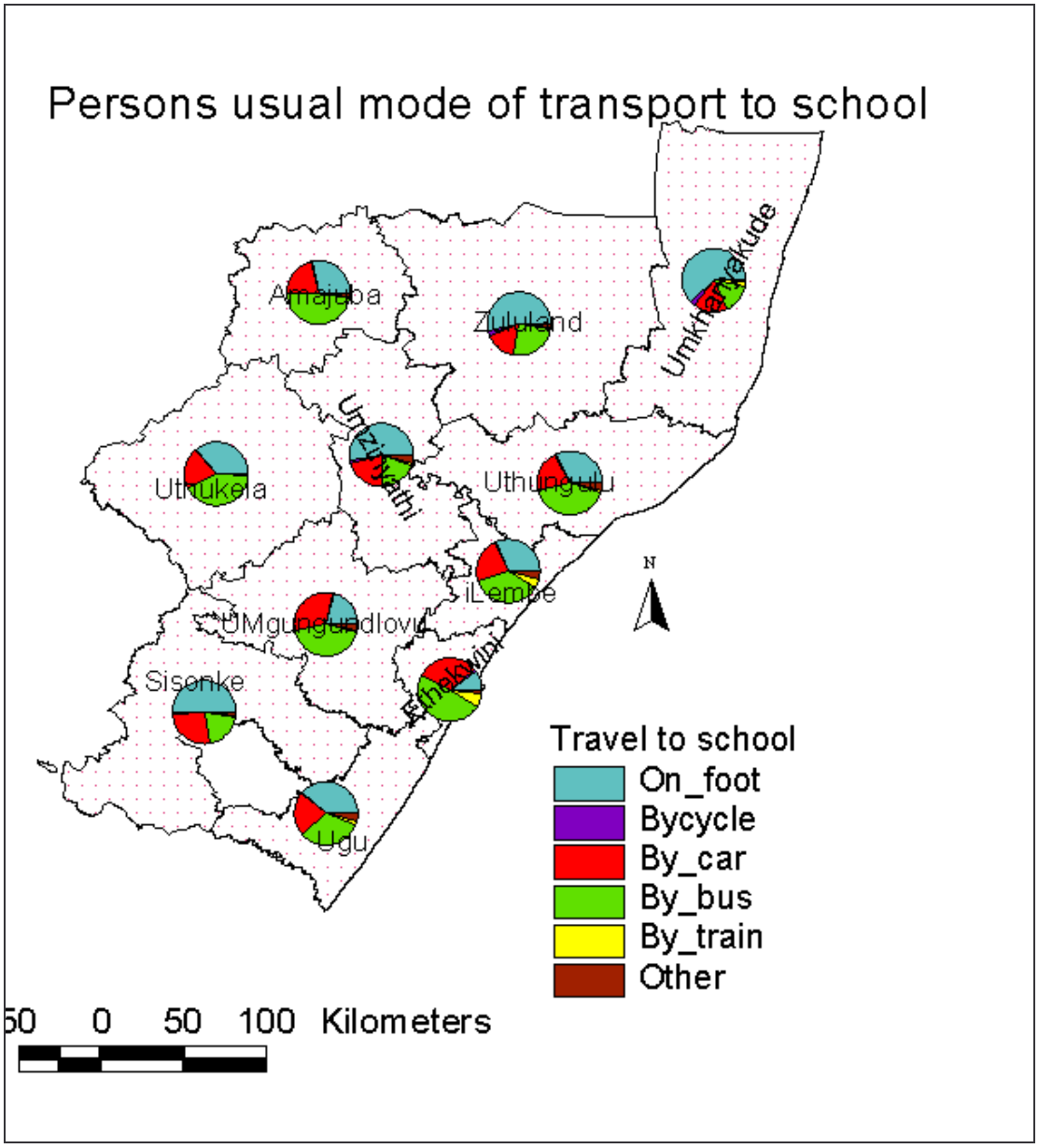


Figure. 4.6 Districts of KZN: Person's usual mode of transport to school, 2001.

4.2 Employment Status

The employment data are specifically for the population aged 15-64 years old and therefore consider the potential economically active population as the total. The definition of unemployment is the one used by Stats SA and is considered the "expanded definition". This definition uses the category, 'unemployed and looking for work' as unemployed [this is the ILO definition].

The map in Figure 4.7 shows the population aged 15-64 years according to their employment status. The highest unemployment is found in the Amajuba (36.08%) & the Uthukela (35.35%) districts, which is a higher proportion than the provincial average (31.92%). One reason might be that, since they do share international and provincial boundaries with another country and province, there might be a number of migrant workers in the area. So that some job opportunity may already occupied by these people, resulting in a high unemployment rate.

Nearly one-third (31.92%) of the economically active age group are unemployed, 40.78% are not economically active, & 27.30% are employed in KZN province.

Compared to these provincial figures, Umkhanyakude is the worst district in terms of people aged 15-64 who are not economically active, because 55.66% are not economically active, followed by the Umzinyathi (53.13%) & Zululand (52.03%). The same holds true for these three districts regarding employed people aged 15-64, because only 12.55%, 14.18%, & 15.03% respectively are employed, which is much more lower proportion than the provincial average (27.30%)

In contrast, Ethekwini is the best of all in terms of people aged 15-64 years who are not economically active, because only 31.93% are not economically active, followed by Umgungundlovu with 35.77% The same holds true for these two districts regarding employed people aged 15-64 years, because 37.00% & 31.99% respectively

are employed, which is a higher proportion than the provincial average (27.30%). See table 4.2.

Table 4.2. Employment Status of adults aged 15-64, 2001.

Geographic area	Employed	Unemployed	Not econ. active
Amajuba	24.63	36.08	39.29
Ethekwini	37.00	31.07	31.93
Sisonke	22.37	31.72	45.91
Umgungundlovu	31.96	32.27	35.77
Ugu	20.79	30.00	49.21
Umkhanyakude	12.55	31.79	55.66
Umzinyathi	14.18	32.69	53.13
Uthukela	19.80	35.35	44.85
Uthungulu	22.92	31.56	45.52
Zululand	15.03	32.94	52.03
Ilembe	24.56	30.52	44.92

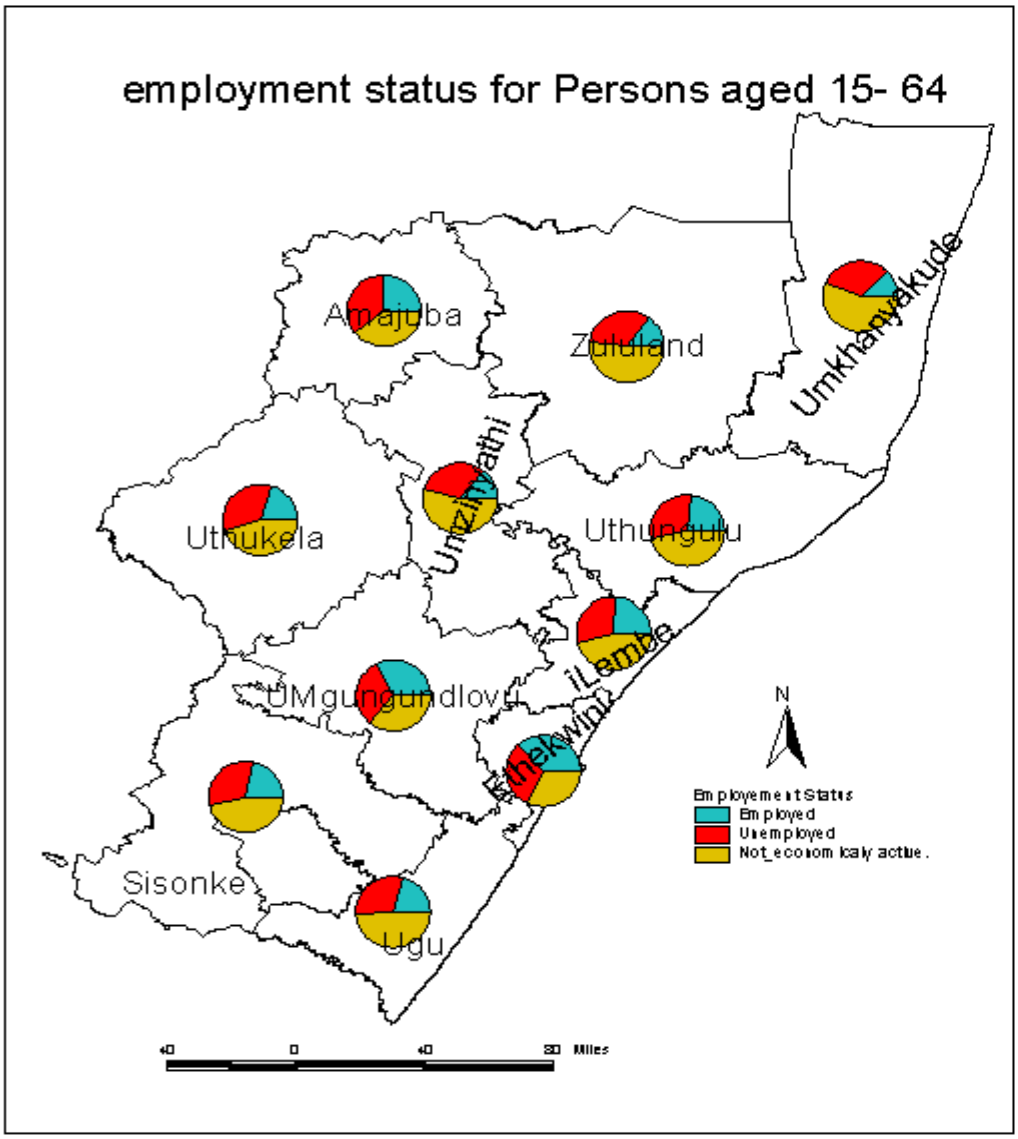


Figure 4.7. Districts of KZN: Employment Status of adults aged 15-64 years, 2001.

4.3 Income distributions

Annual household income is derived from question p-22 (income category) found in the census 2001 questionnaire, which gives the income of each individual. The annual income for each household is calculated by adding together the individual incomes of all members of the household. The result for each household is then reallocated into the relevant income category.

Because individual income was recorded in intervals rather than exact amounts, a fixed amount had to be allocated to each range in order to do the calculation. These amounts were arrived at are as follows:

- Persons claiming that they had no income were not adjusted
- For the first class among those with income, the amount is R 3,200 (i.e. two-third of the top cut-off points of the brackets)
- For the second class, the amount is the mid point of the class interval.
- For the last class, the amount is R 4,915,200.
- For all other classes, the amount is calculated as the logarithmic mean of the top & bottom of the given interval.

This resulted in the following values being allocated to each class for the purpose of calculating the household income.

Income range code	Income range (annual)	proxy values
01	no income	0
02	R1 – R4, 800	3,200
03	R4, 801 – R9, 600	7,200
04	R9, 601 – R19, 200	13,571
05	R19, 201 – R38, 400	27,153
06	R38, 401 – R76, 800	54,306
07	R76, 801 – R153, 600	108,612
08	R153, 601 – R307, 200	217,223
09	R307, 201 – R614, 400	434,446
10	R614, 401 – R1, 228, 800	868,893
11	R1, 228, 801– R2, 457, 600	737,786
12	R2, 457, 601 or more	737,786

Census 2001 collected income information from one question on individual income, without probing about informal income, enterprise profit or income in kind. As a result, the census income is underestimated for most of the population. Further direct comparisons with other data sets can't be made. Therefore, since household annual income is derived from personal income collected in range its result is tentative. Household income doesn't provide a measure of total income and its accuracy in representing relative income is unknown. This variable released in this data set for only to show patterns & trends, rather than precise estimates. However the income & expenditure survey (2000) carried out by Stats SA uses a face-to-face interview method, during which probing questions are asked. And the questionnaire contains questions about all sources of household income. They also cover the purchase of a wide variety of products & services. And also, the 2000 questionnaire investigated additional aspects of spending, for example gambling.

Furthermore this survey provides the quintile for annual household income as:

Quintile 5 ….…… < 7, 992 rand per annum

Quintile 4 ……..7, 992 - 13, 242 rand per annum

Quintile 3 ……..13, 243 - 22, 509 rand per annum

Quintile 2 ……..22, 510 - 46, 221 rand per annum

Quintile 1 ……..46, 222 and above rand per annum

Based on this information I recode the annual household income group as follows

No income ----------1

Very low ---------- (2 & 3)……. Quintile 5

Low ---------- 4..…….. ……Quintile 4

Medium ----------5…… ……Quintile 3

High ---------- 6……..….. Quintile 2

Very high ----------7+..…… Quintile 1

In KZN, 26.31% of households had no income, 42.34% had low and very low income, 12.03% had medium income, and 19.32% had high & very high income.

It can be seen from Table 4.3 that Sisonke is the poorest area in the province because 85.19% household had no income, low, & very low income followed by Umzinyathi (85.14%), Umkhanyakude (82.44%), and Zululand (81.99%). This level of poverty is higher than the average for the province (68.34%).

From the map in Figure 4.8, it can be seen that the Ethekwini municipality (29.97%) & Umgungundlovu (20.48%) have the highest income levels and that is a higher proportion than the provincial average (19.32%).

In general, among those household in each districts of KZN (except Ethekwini), more than two-thirds of them had no income, low, & very low income. Even in Ethekwini, more than half of them had no income, low, & very low income.

Umkhanyakude is the worst district in terms of no income, because 36.03% household had no income, followed by the Umzinyathi (33.84%), Zululand (33.39%), Uthukela (33.25%) & Sisonke (33.13%), that is a higher proportion than the provincial average (26.31%).

ILembe district is the worst district of all in terms of low & very low income, because 53.48% household had low & very low income, followed by the Sisonke (52.06%), Ugu (51.79%), & Umzinyathi (51.30%), which is a higher proportion than the provincial average (42.30%).

In contrast the Ethekwini municipality is the best of all in terms of no income, because 21.63% had no income, followed by the Umgungundlovu with 22.84%. The same holds true regarding low & very low income, because 32.99% & 43.56% respectively had low & very low income.

Table 4.3. Proportion of households according to income group, 2001.

Geographic area	No income	V.low income	low	medium	high	V.high
Amajuba	28.36	30.16	14.52	10.89	7.64	8.43
Ethekwini	21.63	17.83	15.16	15.41	12.78	17.19
Sisonke	33.13	39.15	12.91	6.18	4.22	4.40
Umgungundlovu	22.84	28.19	15.37	13.10	8.96	11.53
Ugu	26.95	36.15	15.64	9.59	5.85	5.82
Umkhanyakude	36.03	33.03	13.38	9.11	4.99	3.44
Umzinyathi	33.84	38.02	13.28	7.06	4.19	3.61
Uthukela	33.25	33.10	13.18	9.68	5.47	5.31
Uthungulu	26.60	31.06	15.35	11.28	6.79	8.92
Zululand	33.39	34.90	13.70	8.19	5.13	4.69
Ilembe	25.75	36.06	17.42	9.99	5.44	5.32

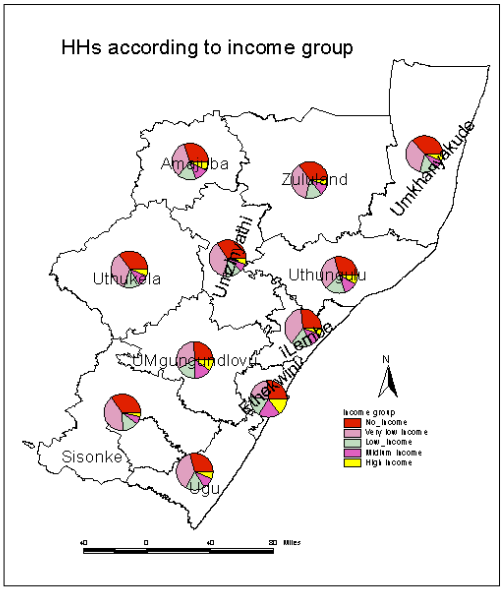


Figure 4.8. Districts of KZN: Income categories of households, 2001.

CHAPTER 5

Health

5.1 Self reported disability

KZN province has 5.09% levels of self reported disability. Of these, 1.19% are sight (blind/sever visual limitation), 0.76% are hearing (deaf, profoundly hard of hearing), 0.20% are communications (speech impairment), 1.33% are physical (e.g. needs wheelchair, crutches or prostheses; limb or hand usage limitation), 0.48% are intellectual (serious difficulties in learning), 0.59% are emotional (behavioral, psychological), and 0.54% are multiple (combination of two or more of the above). The Zululand, Amajuba, and Uthukela had higher levels of disabilities of 7.47%, 6.82%, and 6.47% respectively than provincial average (5.09%). See table 5.1 for detail. Figure 5.1 shows distribution of disable & not disable people found in districts of KZN as a whole (not by type).

Table 5.1. Self-reported disability, 2001.

Geographic area	Not disable	Sight	hearing	Commun.	physical	intellectual	emotional	multiple	Disable total
Amajuba	93.18	1.94	0.86	0.20	1.95	0.51	0.80	0.57	6.82
Ethekwini	96.24	0.74	0.52	0.13	1.10	0.39	0.45	0.43	3.76
Sisonke	94.22	1.37	0.90	0.27	1.57	0.58	0.62	0.47	5.78
Umgungundlovu	95.41	0.89	0.64	0.20	1.36	0.45	0.58	0.48	4.59
Ugu	94.35	1.19	0.91	0.26	1.57	0.56	0.64	0.51	5.65
Umkhanyakude	94.40	1.55	1.04	0.18	1.13	0.54	0.59	0.56	5.60
Umzinyathi	94.66	1.36	0.90	0.24	1.23	0.44	0.70	0.49	5.34
Uthukela	93.53	1.72	0.98	0.25	1.48	0.68	0.66	0.69	6.47
Uthungulu	95.40	1.15	0.60	0.20	1.16	0.47	0.55	0.45	4.60
Zululand	92.53	1.92	1.29	0.29	1.65	0.60	0.84	0.89	7.47
Ilembe	94.36	1.29	0.77	0.18	1.48	0.51	0.73	0.68	5.64

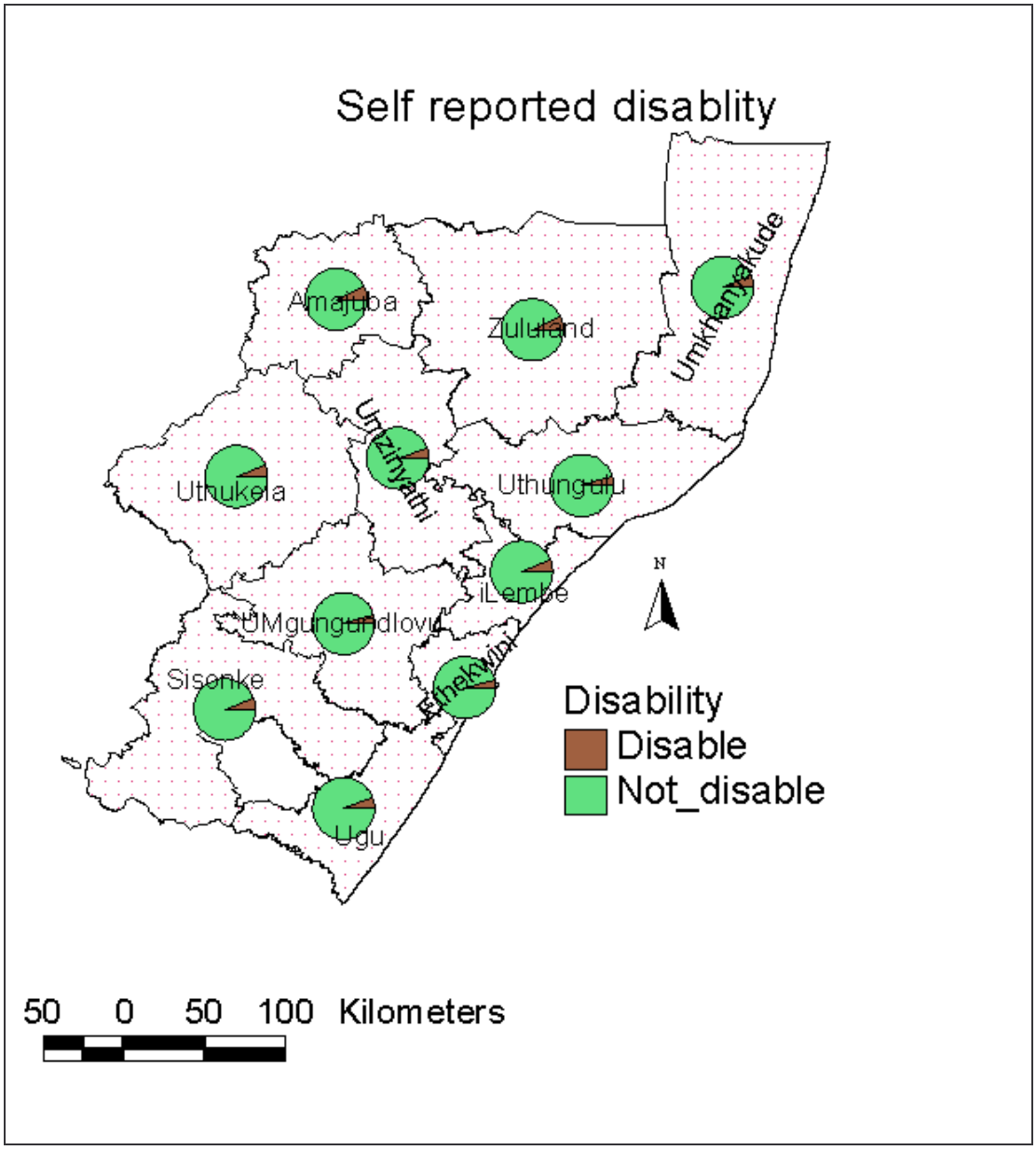


Figure 5.1. Districts of KZN: self reported disability, 2001.

5.1.1 Present school (any educational institution) attendance of disable people

In all districts of KZN, more than three-fourth of disabled people are not currently attend in any educational institutions. Table 5.1.2 highlights the fact that, the Zululand (24.70%), Umkhanyakude (23.80%), and Ugu (23.19%) are the best of all concerning present attendance of disable people in school. While the Amajuba

(1.12%), Umkhanyakude (1.12%), and Zululand (1.22%) are the best of all in terms of current attendance of disable people in pre-school. The Ethekwini is the best of all in terms of current attendance of disable people in college, followed by Umzinyathi, while the ILembe is the worst of all because none attend in college. More over in the Sisonke & the Umzinyathi none are currently attend in Technikon & university. For details see table 5.1.1.

Table 5.1.1. Present school (any educational institution) attendance of disable people.

Geographic area	No	Pre-scho	Schoo l	Coll ege	Techn ikon	Unive rsity	Adult edu.	Othe r
Amajuba	78.27	1.12	19.94	0.12	0.16	0.08	0.28	0.04
Ethekwini	82.90	0.82	14.69	0.33	0.28	0.37	0.17	0.45
Sisonke	79.25	0.90	19.55	0.23	0	0	0	0.08
Umgungundlovu	83.35	0.71	14.83	0.18	0.18	0.28	0.12	0.34
Ugu	75.80	0.44	23.19	0.13	0.09	0.06	0.13	0.16
Umkhanyakude	74.23	1.12	23.80	0.08	0.12	0.35	0.19	0.12
Umzinyathi	79.77	0.72	19.04	0.31	0	0	0.10	0.05
Uthukela	79.61	0.89	19.08	0.06	0	0.12	0.06	0.18
Uthungulu	80.14	0.64	18.35	0.21	0.12	0.12	0.18	0.21
Zululand	72.62	1.22	24.70	0.13	0.06	0.06	0.96	0.24
Ilembe	80.46	0.57	18.37	0	0.08	0.33	0.12	0.08

5.1.2 Age group of disabled people

More than two-third (72.45%) of disable people live in KZN, aged 21 year and above, while nearly one–third (23.51%) are aged 5 to 20 years, and 4.04% are aged 0 to 4 years.

From table 5.1.2 we can clearly see that the Zululand (6.15%), Umkhanyakude (5.80%), Umzinyathi (5.26%) are the worst of all regarding disable children aged 0-4 because they do have a higher proportion than provincial average (4.04%). The Umkhanyakude (28.52%), Zululand (27.62%), and Ugu (27.22%) are the worst of all regarding disable teen-agers aged 5-20 because they do have a higher proportion than provincial average (23.51%). The Ethekwini (77.73%), Umgungundlovu (76.23%),

and ILembe (75.86%) are the worst of all regarding adult disable aged 21 years and above because they do have a higher proportion than provincial average (72.45%). From these result we can say that there might be a relation between age & some type of disability because majority of disabled people live in each districts of KZN aged 21 years and above.

Table 5.1.2 Age group of disabled people.

Geographic area	0– 4 year	5–20 year	21 year & above
KZN	4.04	23.51	72.45
Amajuba	4.04	24.17	71.79
Ethekwini	2.72	19.55	77.73
Sisonke	2.38	25.94	70.68
Umgungundlovu	4.21	19.56	76.23
Ugu	2.87	27.22	69.91
Umkhanyakude	5.80	28.52	65.69
Umzinyathi	5.26	24.77	69.97
Uthukela	4.08	25.07	70.84
Uthungulu	4.17	23.27	72.56
Zululand	6.15	27.62	66.23
Ilembe	3.49	20.64	75.86

5.2 Access to health care facilities

The total estimated health care facilities that serve KZN province is 394. Therefore, approximately, the province serviced by 41 hospitals, 340 clinics, and around 13 satellite clinics.

The distribution of these facilities for each district is shown in table 5.2 and it clearly tell us that, the Amajuba district served by only one hospital & one satellite Clinic, and the ILembe, Umgungundlovu, Uthukela, and Sisonke served by two hospitals and 1, 3, 0, 0 respectively satellite clinics. The map in fig. 5.2 shows the estimated spatial distribution of total health care facilities found in districts of KZN. Since the spatial data dealing with health care facilities for KZN province is not available free from charge on the Internet, an attempt is made to capture this spatial data by digitizing (on screen digitization) of the scanned map (image) that shows the health care

facilities of the province. Therefore all analysis is done based on an approximate value since there is no exact locational value of these features. So although comments are made as to the distance of health care facilities (and educational institutions) from the formal road network, these must be seen in the light of the data being taken as correct for this hypothetical population.

Table 5.2. Health care facilities for districts of KZN, 2001.

Geographic area	hospitals	clinics	Satellite clinics
Amajuba	1	9	1
Ethekwini	5	36	5
Sisonke	2	20	0
Umgungundlovu	2	39	3
Ugu	3	31	0
Umkhanyakude	6	49	0
Umzinyathi	4	33	1
Uthukela	2	24	0
Uthungulu	5	35	0
Zululand	9	51	1
Ilembe	2	13	2

6. Spatial distribution of infrastructure & natural feature found in district of KZN

6.1 Road network found in districts of KZN.

The map on fig 6.1 shows that the Uthungulu, Umzinyathi, Zululand, and Umkhanyakude districts are the worst of all concerning spatial structure of road network because the road network covers very small area of the district. So there is a need for new facilities to improve these services.

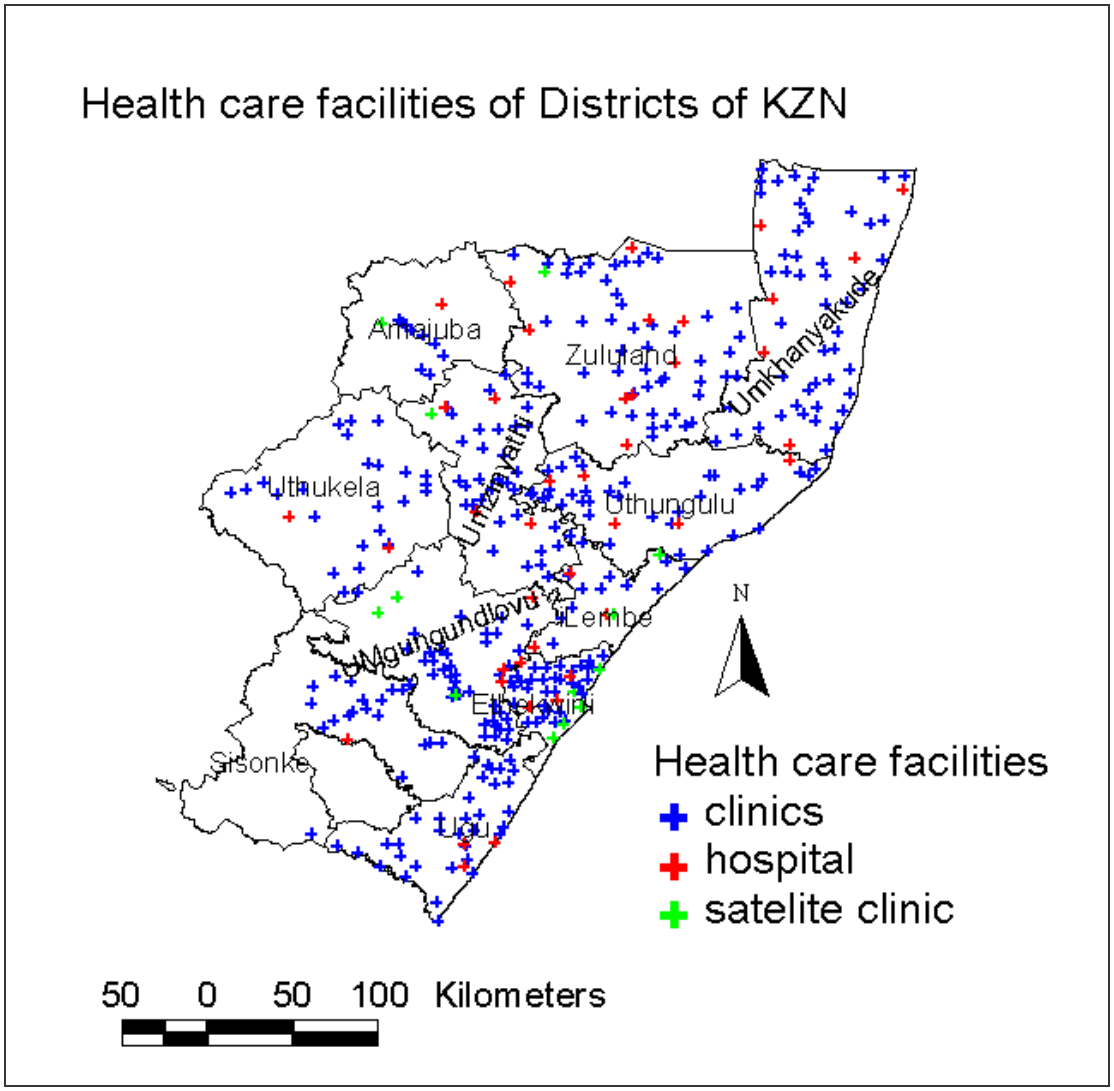


Figure 5.2. District of KZN: Health care facilities, 2001.

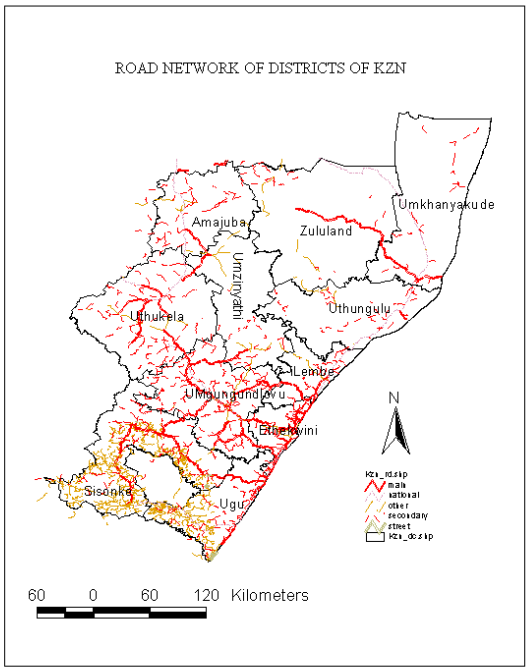


Figure 6.1. District of KZN: Road network, 2001

6.2 Elevation (altitude) of KZN districts

Digital Elevation Model (DEM's) is digital representation of altitude. This can be the altitude of the terrain surface (altitude of KZN in this case) (also called Digital Terrain Model- DTM).

Since the available DEM (i.e. altitude 2000) covers the whole part of the country (i.e. South Africa), I can't take it as it is with out modification because the area of interest for this particular project is limited only on KZN province. Therefore, in order to get the appropriate data (i.e. DEM of KZN) first clip a grid according to the selected polygon features (i.e. KZN province polygon in this case) and display it (Jenness, 2004).

The map in figure 6.2 clearly shows that the highland areas are found in the Sisonke, Uthukela, and Amajuba districts while the Umkhanyakude, Ilembe, and Ethekwini are low land areas. The possible reason could be these three districts (the Umkhanyakude, Ilembe, and Ethekwini) found next to Indian Ocean.

From this map it is not completely clear whether the highland areas have a lot of variation in elevation, (i.e. there are lots of ups and downs) or are flat areas at a high altitude. . The ragged edges suggest the former. But this needs to be looked at in more detail, because of the implication on their suitability for road construction – lots of ups and downs mean they demand large amount of money (not cost effective).

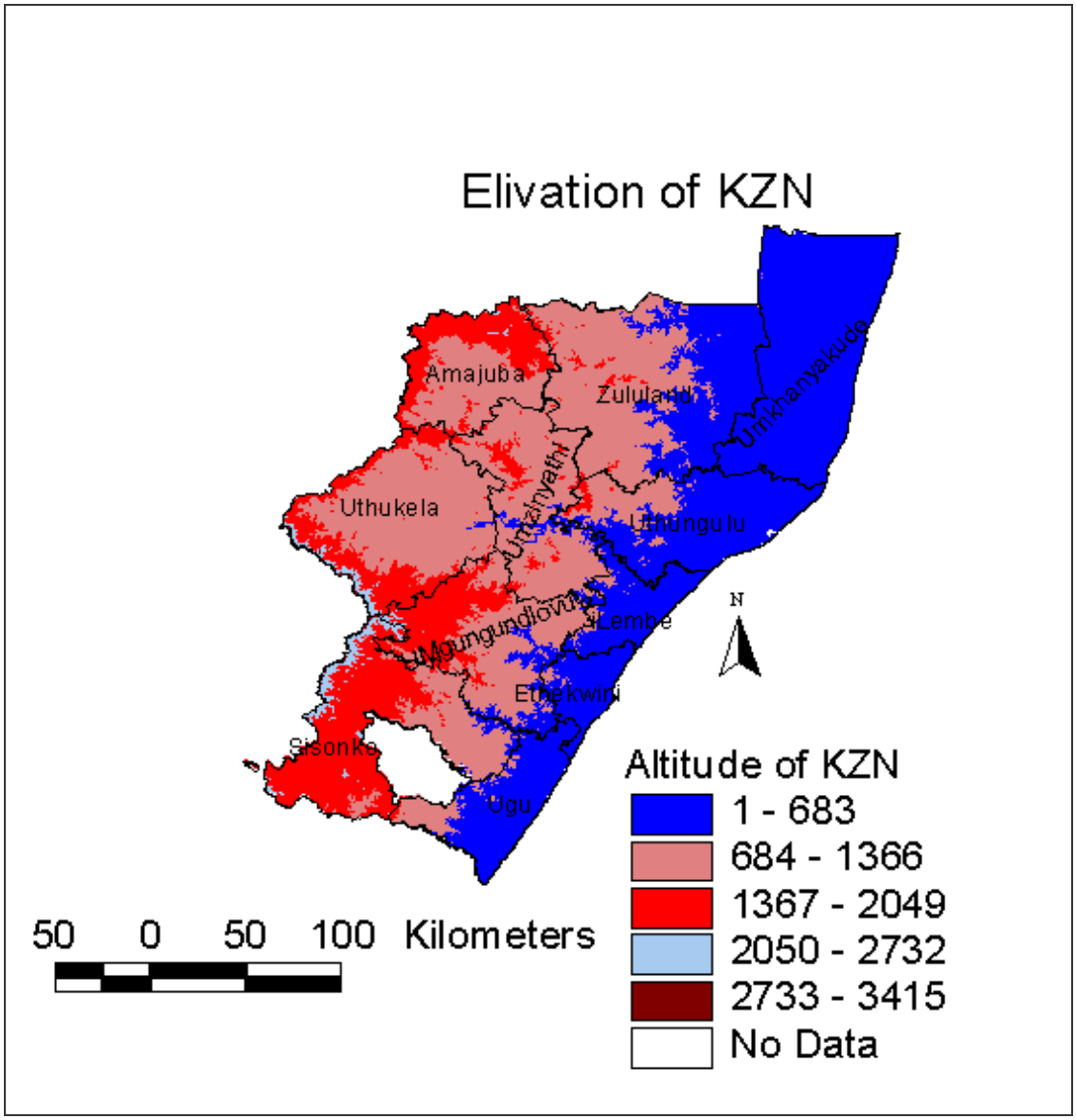


Figure 6.2. District of KZN: Elevation of KZN, 2001

6.3 Landscape or landform of districts of KZN.

A digital elevation model (DEM) is an ordered array of numbers that represents the spatial distribution of elevations above some arbitrary datum's in the landscapes (Moore et al. 1993). In principle, a DEM describes the elevation of any point in a given area in digital formats and contains information of the so-called 'skeleton' lines. Skeleton lines are lines of slope reversals (drainage, crests) and breaks of slope.

Digital Elevation Models can either be stored in vector or raster format. For this particular project work I use DEM's (i.e. altitude of KZN) in the form of raster maps. Each pixel in the raster map contains the altitude of the center of the pixel.

Digital Elevation Models have wide application. They form one of the input maps in many GIS projects. They are also the basis for a large number of derivative information such as slope convexity maps, showing the change of slope angles within a short distance. From these maps, slope form (landform) can be determined – straight, concave or convex. Therefore the slope shape (landform) can be derived from DEM of KZN using Neighborhood Statistics (Jenness, 2004).

Neighborhood Statistics generates a new grid representing neighborhood Statistics from an existing grid (i.e. altitude of KZN). Each cell value in the new grid represents some Statistics (such as standard deviation) from some region of cells surrounding the original cell in the original grid (i.e. altitude of KZN), where the region is called a neighborhood and can come in a variety of shapes and sizes. In doing so, thus, each cell value in the new grid will reflect the standard deviation of values in the neighborhood. Thus from the output map we can deduce which part of the terrain are convex or concave or flat areas and uniform slopes.

The internal relief can be obtained by using the neighborhood Statistics with option of variance that generates new grid so that each cell value in this new grid will reflect the variance of the values in the neighborhood, therefore, the degree of variation on slope length and slope steepness can be assessed.

Hence, the variance of the height from DEM of KZN would be calculated and displayed. Darker color areas correspond to a large variance in heights and there will be slope reversals or break of slopes, where as in the lighter color areas the opposite is true.

Figure 6.3 shows us that almost all districts of KZN are flat (i.e. no marked ups & downs or variation in elevation with in the area), if we take flatness to be an index of less than 157. Taking flatness as below 78.51 indicates that many areas are not flat.

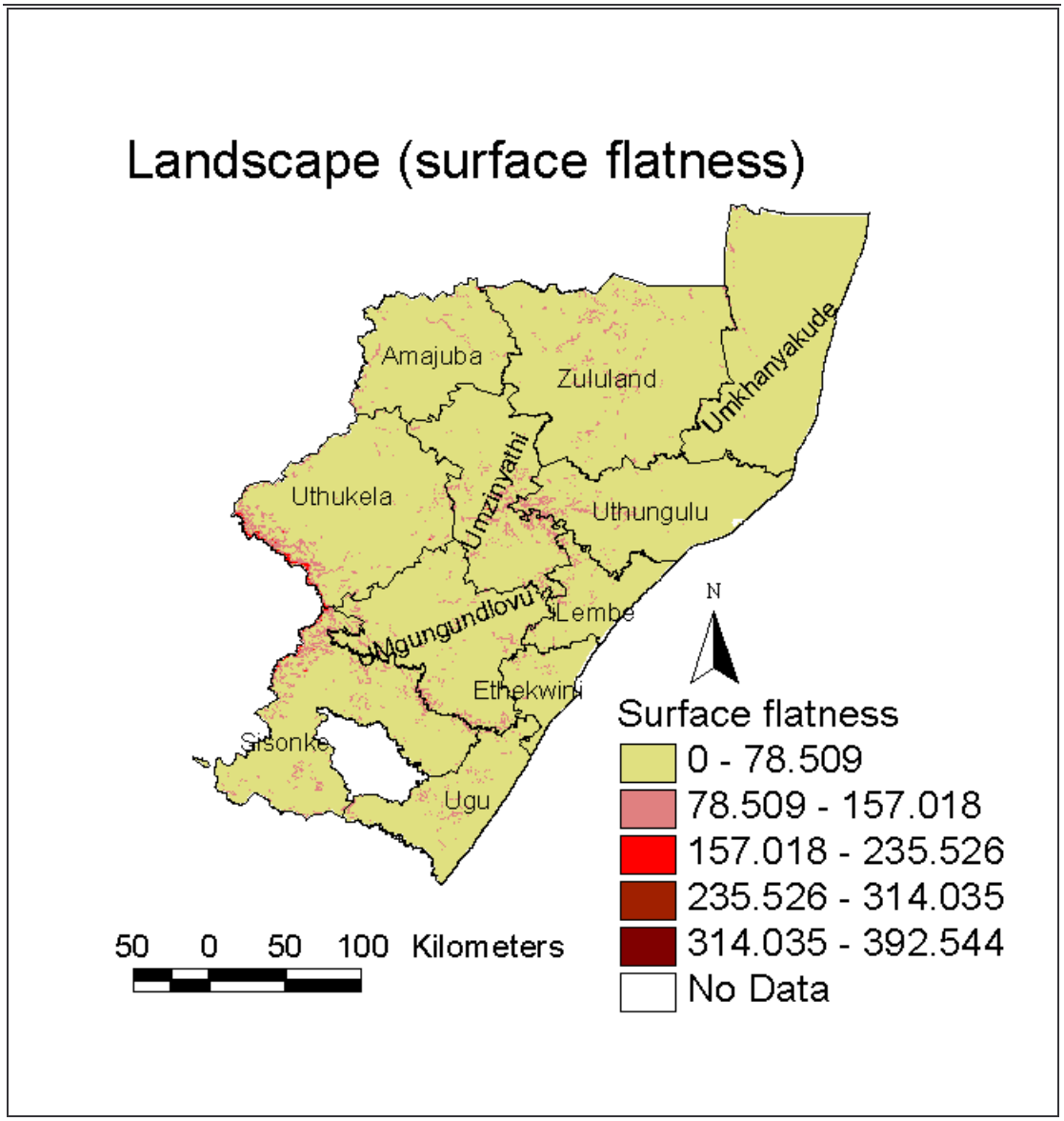


Figure 6.3. District of KZN: Landscape of KZN, 2001

7. HHs main method of disposing of refuse or rubbish

In KZN 49.24 % HHs disposes refuse or rubbish by local authority at least once in a week, 38.42% HHs had their own refuse dump, and 10.36% had no rubbish disposal at all.

It can be seen from Table 7.1 that the Umzinyathi (30.00%), Umkhanyakude (27.67%), and Zululand districts are the worst of all regarding HHs that has no rubbish disposal & removed refuse or rubbish by local authority once in a week While, the Ethekwini municipality & Umgungundlovu are the best.

From the map in Figure 7.1, it can be seen that all districts, except the Ethekwini & Umgungundlovu, has the highest proportion than provincial average regarding HHs using their own rubbish disposal, and has lower proportion than provincial average regarding HHs remove refuse or rubbish by local authority once in a week.

Table 7.1 Proportion of HHs according to disposal of rubbish or refuse, 2001.

Geographic area	Once in a week	Less often	Communal	Own	No rubbish disposal
Amajuba	56.94	0.81	0.65	34.90	6.71
Ethekwini	85.59	0.92	0.52	11.17	1.79
Sisonke	24.77	2.91	1.35	62.18	8.79
Umgungundlovu	46.04	1.28	1.55	45.08	6.06
Ugu	18.90	0.90	0.69	67.42	12.09
Umkhanyakude	6.09	1.16	0.94	64.15	27.67
Umzinyathi	17.65	1.95	1.13	49.27	30.00
Uthukela	28.83	0.58	0.72	52.28	17.60
Uthungulu	23.36	1.76	0.94	56.78	17.60
Zululand	20.00	1.40	0.61	57.25	20.74
Ilembe	23.00	1.20	1.22	60.21	14.37

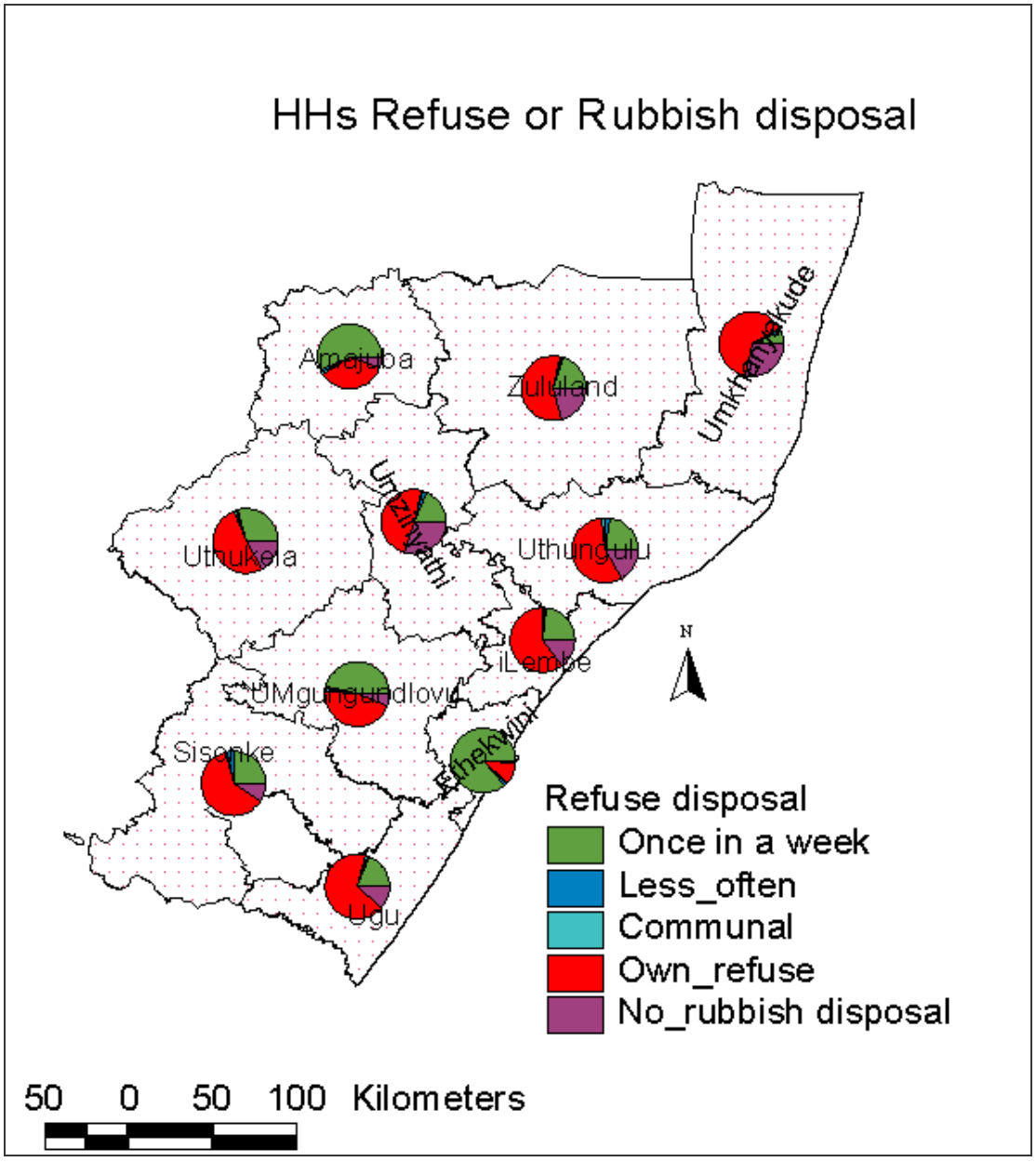


Figure 7.1. District of KZN: HHs mainly disposes refuse or rubbish, 2001.

8. Conclusion

This research report has provided a summary of some of the socio-demographic data available from the 10% sample data of the 2001 Population Census for the districts of KZN. The data have been mapped in an attempt to display the spatial distribution of these variables within each district of KZN. This data set, with the superposition of estimated positions of hospitals etc, has been treated as a hypothetical population, and conclusions need to be seen in this light.

The purpose of this research report is to provide provincial as well as district level indicator on various sanitation, socio-economic and health problems, and also to identify communities with common socio-economic & demographic profiles and thus, specific concerns and basic needs, so State agencies and other service providers can optimally focus their attentions and resources, for this hypothetical population.

None the less the data highlight the need for improved services for KZN province as a whole because 16.14% HHs having no toilet facility at all, 26% HHs accessed water from river/stream and other sources, only 16.95% living in KZN and aged 7 years and above have attained grade 12 & higher level of education, one educational institution serves 129 people, 30.81% travel to school on foot, 32.54% of educational institutions are found outside of 5km of the road network, 31.92% people aged 15-64 yr are unemployed and looking for work, 26.31% HHs had no income & 42.34% had low & very low income, 10.36% HHs had no refuse or rubbish disposal and 49.24% removed their rubbish by local authority once in a week. However, a number of districts need more special attention, regarding needs for new facilities to improve services, since they do have very different (poorer) proportions than provincial average.

After applying a combination of GIS and Statistical technique on census and available spatial data set, I have seen that there are few of migrant laborers found in

the area i.e. KZN. If the person enumerated at “different province” or “foreign usual residence”, he/she might likely to be migrant worker who came from other province crossing provincial boundary or from other country out side of SA crossing international boundary to find a job (or already employed). Their situation is sum up as follows:

Those migrant workers who came from other country and residing in KZN, most involved as legislator, senior officials, and managers; professional; service worker, shop & sales worker; skilled agricultural worker, & fishery workers; and elementary worker. So this result might indicate the fact that there might be lack of professional in these filed of work(except for elementary worker) or there is a good job opportunity with attractive salary, or most are well educated professional in different profession. Even for those elementary workers there might be a conducive atmosphere to do their own business as Street vendor, Shoe cleaning, messenger, laborer, etc since they might not be well educated to be professional worker. In contrary, when we taken into account their economic activity (work Status), most are employed as paid employees that is working for some one to get salary. It seems difficult, being a migrant worker, to be self employed or employer because these work status needs some more money (since SA is not their home land they need some more time and work hard to make enough money) to run their own business unless they already come to this place as investor, company owner, land lord, etc.(i.e. they are already financially well to do).

HHs who are migrant workers and come from other country found only in five districts of KZN. Hence those migrant HHs from other countries who live in Umkhanyakude, all involved as employers, meaning all might be investors who came to this place to invest, or company owners, land lords, etc, or they might make enough money to buy & run their own business even after they came in this area. while those migrant HHs from other country who live in districts, like Uthungulu all

are self employed ,that is, they do have their own small business like small retail shop, farm land, so on.

Since there is HHs headed by children in all districts of KZN, it might be an indication of the effect of HIV/AIDS in the area because their parents might be dead because of the effect of HIV/AIDS. Further more, relatively large proportion of HHs headed by female in some districts of KZN say in Umzinyathi, Zululand, Ugu & Uthukela than other districts, this might indicate that their partner might go some where else to look for job to make money and feed his family, thus it might be an indication of labor migrate from these area to other place.

Since KZN province dominated by black population group it is evident that the dominant population group of female HHs is black. Regardless of population group, most female HHs engaged as Paid employee the possible reason might be they might not have enough money to run their own business or company or they may not have their own farm land. Indeed, relatively speaking, white female HHs involved as self employed are greater in number than other population groups, this could indicate that they may have better financial potential than other population groups to create & run their own business; or they are better aware of the benefit of it than other population groups.

Most employed people live in KZN are doing their job as paid employee regard less of population group, while some exception are observed like self employed workers who came from white population group have better proportion than other population group, one reason might be they are financially well to do than others, or they do may aware of the benefit of running their own business because they might have enough exposure.

A number of HHs residing in KZN having no toilet facility at all, which is a serious problem and should be given a special attention by the organization concerned (local,

provincial, or national). For instance, in Umkhanyakude and Umzinyathi nearly half of the HHs have no toilet facility in the dwelling, the possible reason might be a number of HHs residing in these districts had no income, therefore they can't afford to build their own toilet facility in dwellings and in turn this situation may affect their health.

More over a number of HHs access water from river/stream, which can be easily contaminated, hence affect their health. So that there is a need for new improved facility for water supply(especially for potable water) to protect them from the possible damage that may occur, specially for districts like Umkhanyakude, Zululand, Umzinyathi, and Ugu because large proportion of HHs live in these districts having access water from river/stream. In deed, the possible reason for so many HHs residing in Umkhanyakude, and Zululand having access water from river/stream could be, there are a number of rivers found in these district than other districts, therefore they may do have easy access to use them as their source of water. The other possible reason for all four districts mentioned above is that a number of HHs had no income; therefore they can't afford to pay the bill.

In all districts of KZN there are a number of uneducated people aged 7 years and above, even though they differ in proportion comparing to each other. The reason behind might be, since in all districts of KZN a number of HHs hade no income; they couldn't afford the school fee or other school related costs. Other reasons might be lack of awareness of the importance of education, and easy access to school (i.e. not sufficient number of educational institutions in the area, or they are located far from their residence, or located far from the road network, or there might be rivers in between the dwelling and the educational institution, which causes problems of access depending on the nature of the river and it's water level).

A relatively higher proportion of uneducated people are observed in Umkhanyakude and Umzinyathi. Since a number of HHs in this area have no income, so many HHs are financially handicapped hence couldn't afford school fee and school related cost.

More over there are a number of children aged 7 to 14 years who are not currently attending any educational institution in all districts of KZN. Possible reasons might be that it is beyond their parents income status, there might be lack of sufficient number of school's in the area, or they might be located far from the road, rail road network so it puts a constraint on transportation. For instance, in Umzinyathi there are a number of children who are not currently attending any educational institution, the reason could be the road network is not well established in this area so that they can't reach the institution easily. Also there may be more HHs with no income therefore can't afford the school fee. In fact there are a number of schools found in this area but none are close to the road network, thus it might put a hindrance for access to school. Only around one-third are found within 5km of the main road network.

Better average age of pupil who currently attending in any educational institution is observed in Ethekwini municipality than other districts. one possible reason might be since it is urban area there is better transportation access, HHs income also better, they do aware of the advantage of education because they them selves may well educated (at least they do have an exposure). Due to such reason they do send their children (or even them selves) at the right time (the right age on the right place) so that all persons who reach his school age enrolled at an appropriate educational institution and start attending (learning) on the right time & the right age. So there is no unnecessary wastage of time in this area.

In Ethekwini much more educational institution is found in the area than other districts but it doesn't mean that its' number only sufficient to serve the peoples who seek education properly, because the population density of the area should be taken

into consideration. In other words, in Ethekwini, one educational institution serves about 240 people where as in some district like Sisonke one educational institution serve only seventy-five persons, but they are not comparable in-terms of number of educational institution found in the area (and population density too). In fact, since Sisonke is less populated area and schools might have only one (or minimum number of) class for each grade, it doesn't mean that the pupil live in Sisonke could get better service than the one who live in Ethekwini, because in Ethekwini, the educational institutions might have a number of classes for each grade, so that one educational institution could have a potential to serve so many pupil at a time.

Therefore, not only a number of educational institution found in the area determine a better service could be provided, but also its capacity like number of classes for each grade and population density of the area matters as well..

Surprisingly not all educational institutions found in each districts of KZN are found at least within 5km of the road network, even in Ethekwini, where a well established road network is expected.

Indeed among those educational institution found with in KZN province, about 83.40% found with in 10km of the road network, 54.20% found with in 10km of the rail road network, 98.54% found with in 10km of the river course. From this result we can understand that almost all educational institution found with in 10km of the river course, so that depending on their water level/volume and their type, they might have an impact on access to school especially for those areas most people travel to school on foot, and the road network is not well established as well. For instance, of all pupils live in the Zululand, Umkhanyakude, Sisonke, and Umzinyathi about half of them travel to school on foot, more than two-third of educational institution found with in 5km of the river course, and the road network is not well established in addition to a number of HHs had no income at all. Therefore, due to this fact, it is

evident that the pupils residing in these areas face a grate problem for access to school.

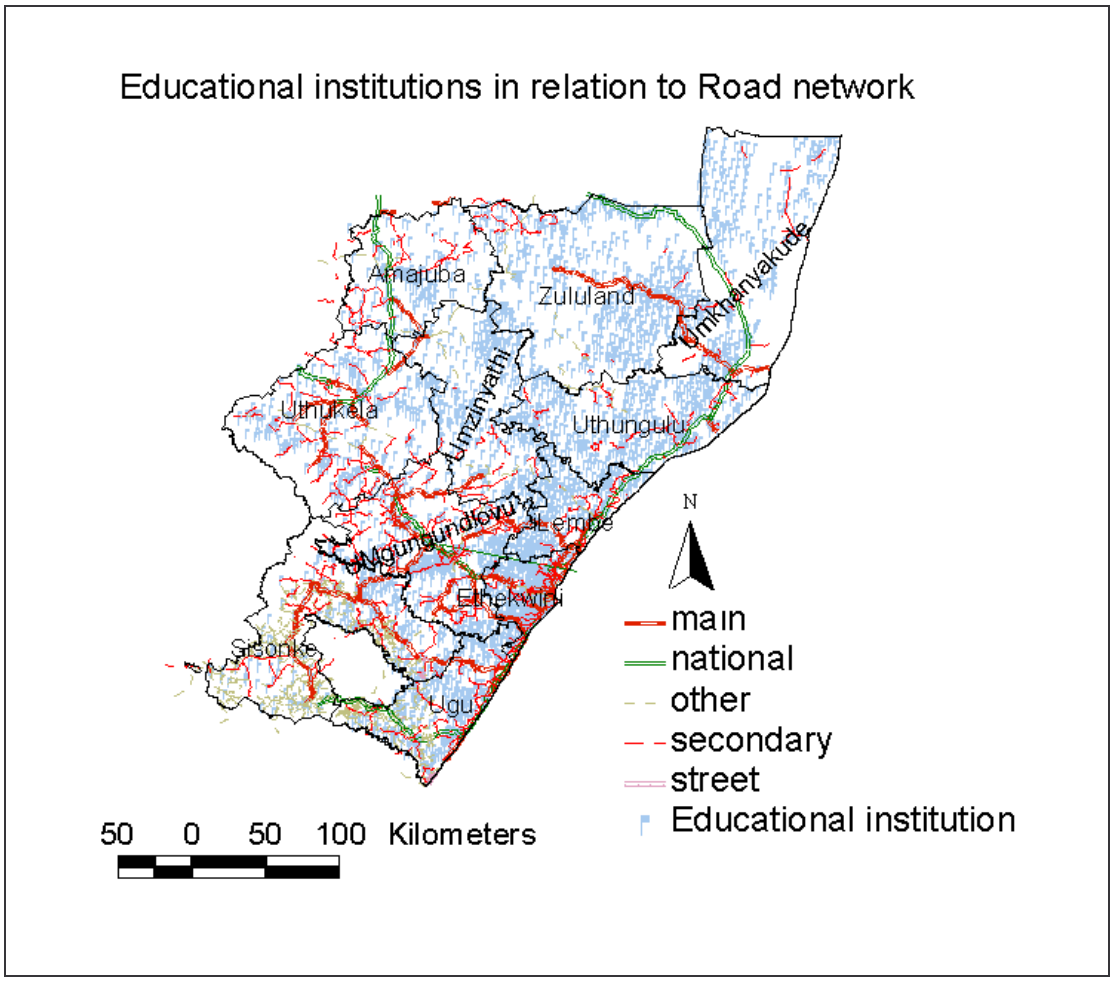
A highe unemployment rate is observed in the Amajuba & the Uthukela district than other districts. One possible reason could be that, since these districts share common provincial and international boundary with Free State, Mpumalanga and Lesotho, a high rate of migrant labor is observed in this area, so that some jobs might be taken by these newcomers.

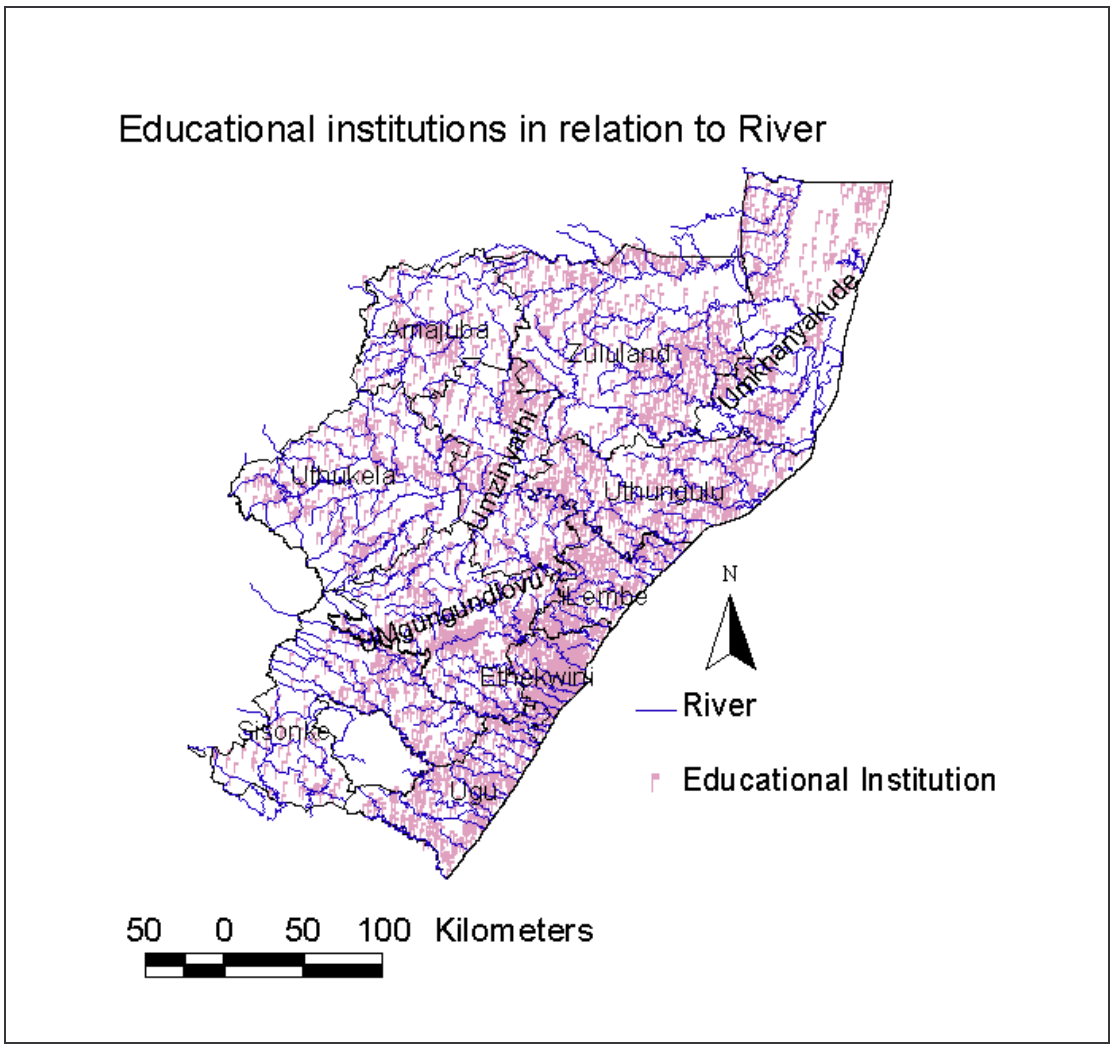
Comparatively speaking, high proportion is observed on sight & physical disability than other type of disability in KZN. The majority of disable people aged 21 year and above, that could indicate that age might have its own contribution for some type of disability. But doesn't mean that the more you get old the more you will likely to be disabled, even if some, like sight power and physical fitness decreases when the age increases (get old). Though, most of disable people do not currently attend in any educational institution, some of (about one-forth) them attend in schools and few are attending in higher educational institution, which is encouraging because disability doesn't mean that incapability of doing anything.

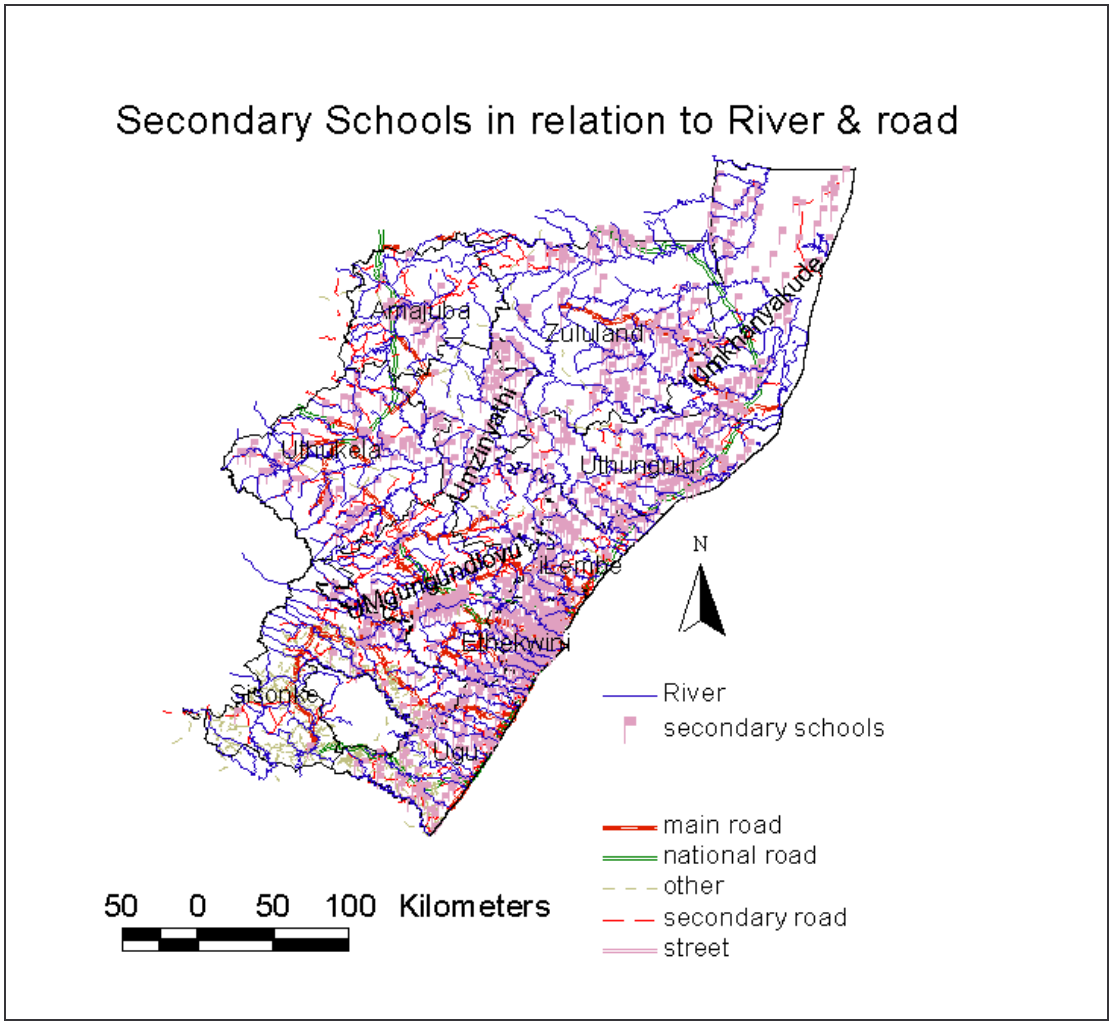
Even though they are not densely populated as compared to other districts of KZN, there may be a need for new road network construction for Umkhanyakude, Zululand, Uthungulu, and Umzinyathi districts, because there are lots of educational institution found far from the formal road network. There are a number of rivers found nearby/in-between the dwellings and these educational institution, and a road is needed to get to the schools, especially, when the water level of the river rises. But before we plan to go ahead with the construction of new road network, we have to take into account the landscape of the area in order to minimize the cost. Areas with no marked variation in elevation (no up & down or raggedness) would be suitable for road construction with minimum cost.

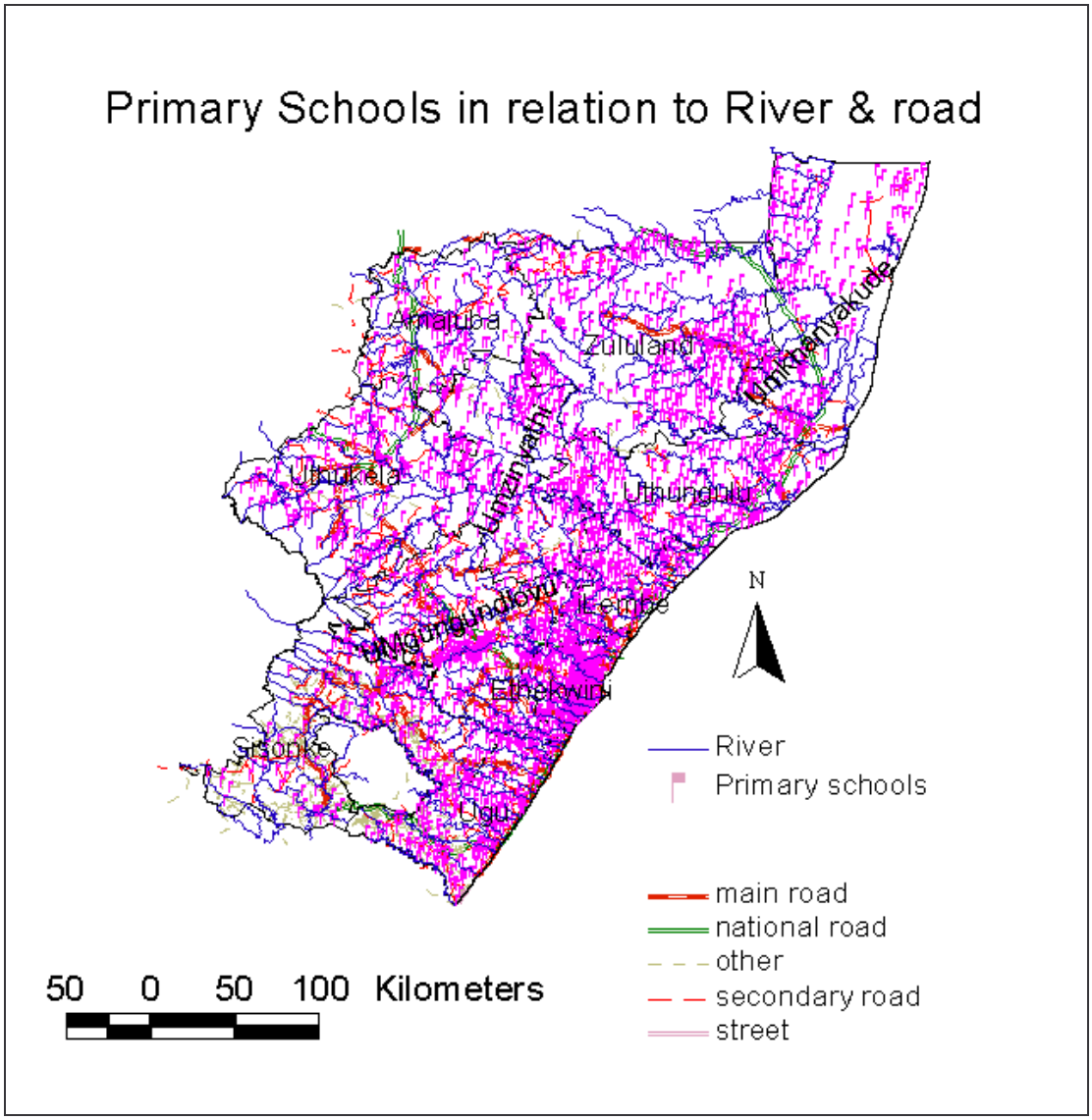
Appendix 1

Maps that show different features of districts of KZN.




Educational institutions in relation to River
Amajuba
Zululand
Umkhanyakude
Uthukela
Umzinyathi
Uthungulu
Ugungundlovu
iLembe
Ethekwini
Sisonke
Ugu
N
River
Educational Institution
50 0 50 100 Kilometers


Secondary Schools in relation to River & road
Amajuba
Zululand
Umkhanyakude
Uthukela
Umzinyathi
Uthungulu
Umgungundlovu
Ilembe
Ethekwini
Sisonke
Ugu
N
River
secondary schools
main road
national road
other
secondary road
street
50 0 50 100 Kilometers


Primary Schools in relation to River & road
Amajuba
Zululand
Umkhanyakude
Uthukela
Umzinyathi
Uthungulu
iLembe
Ethekwini
Sisonke
Ugu
N
River
Primary schools
main road
national road
other
secondary road
street
50 0 50 100 Kilometers

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