

Utilization of Geographic Information System (Gis) In Demographic Analysis Of Census Data In Awka Metropolis In Anambra State, Nigeria

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-----ABSTRACT-----

When inference is desired regarding some attribute of a particular geographic region, it often happens that data are not directly available for that region. However, it may be that data are available over the same general area, but reported according to a different set of regional boundaries. Recently, powerful computer programs called geographic information systems (GIS's) have enabled the simultaneous display of such "misaligned" data sets. Today, there is a huge amount of data gathered about census and its analysis is not critically done well to bring out some basic and important attributes of the census data. This is usually due to non-availability of the required tools in carrying out that and doing that manually is very cumbersome and tedious. In order to take care of these lapses have necessitated this research work on the utilization of GIS in demographic analysis of census data in Awka metropolis in Anambra state, Nigeria This work focuses on census data from two most recent consecutive censuses conducted between 1991 and 2006. In Anambra state Nigeria, there is always a problem of census enumeration because tools that would help to get actual figures which will help government and individuals in tactful and strategic planning .This software geographic information system (GIS) would help to solve the disturbing problem. The population density map was developed using dot density where each dot represents a population. The output of this is a functional geo-spatial distribution of a population in Awka metropolis.

KEYWORDS: Demography, GIS ,Census

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I. INTRODUCTION

Census analysis is often not critically analyzed to bring out some of the basic and important attributes of census data information (Okeke, 2013). This is usually due to non-availability of the required tools for carrying out such analysis. This research work suggests the use of geographical information system (GIS) as an integrating technology that gives geo-spatial distribution of the population. Information on population growth and landscape change are critical among decision makers, planners, and local land users who rely on such information to assess the physical extent, characteristics, and consequences of past and future population development.

The geographical information system (GIS) is very important for sustainability and economic growth in consideration of population distribution of an area. It is a computer-based tool for mapping and analyzing features and events on earth. GIS technology integrates common database operations, such as query and statistical analysis with maps (Shahab, 2008). GIS manages location-based information and provides tools for display and analysis of various statistics, including population characteristics, economic development opportunities and vegetation types ((Rushton, Elmes and McMaster, 2000)). GIS allows someone to link databases and maps to create dynamic displays (Shahab, 2008). Additionally, it provides tools to visualize, query, and overlay those databases relating to census enumeration in many ways not possible with traditional spreadsheets (Shahab, 2008). Geographic information research and technologies have experienced over four decades of development, from the mainframe to the workstation to the desktop, and to today's laptop and mobile devices. Every important GIS development is driven by a significant breakthrough of mainstream information technology.

For example, the 1980s was characterized by the popularity of personal computers that were increasingly becoming affordable to university departments, governmental agencies and private sectors. The ever increasingly urbanized world has created various problems of environment, climate, consumption of resources, and public health, which are closely linked to the side-effects of urbanization such as sprawl, congestion, housing affordability and loss of open space. These problems need to be addressed at various levels of spatial planning and decision making. For instance, in urbanization management, special and specific consideration should be given to the relationships between land use, transportation, and the environment. GIS offers the power to integrate biophysical and socio-economic data, which can help to understand the forces driving urban growth and development. GIS is highly dependent upon other existing sources of data, particularly the census datasets. A GIS leverages the flexibility of geographic data. Raw data are static (non-changing) and offer only a limited amount of flexibility on real-world applications. When raw data are transformed to geographic data through a GIS, the capability for enhanced data use and analysis (i.e., data flexibility) significantly increases. At a minimum, overlaying two geographic data sources provides sufficient new information, better analytical means, and additional flexibility to not only help someone visualize the real world but also helps them make an informed decision (Galati, 2006). Geographic information system is defined as a system for capturing, storing, checking, integrating, manipulating, analyzing, and displaying data which are spatially referenced to the earth. (Shahab, 2008). Geographic information system needs spatial data, this makes it unique. Here spatial means –related to the real world location. That is why GIS is based on geographic concepts. Moreover census figures are not always accurate in Nigeria, and some people in the towns will be counted while others would not, some people would be employed while others would not and some states are more marginalized than others, why is it that you must vote where you register only, all these questions will be answered only when accurate and standard census process is being taken using geographic information system (GIS) (Okeke, 2013).

A population and housing census is of great relevance to the economics, political and socio-cultural planning of a country. Reliable and detailed data on the size, structure, distribution and socio-economic and demographic characteristics of a country's population is required for planning, policy intervention and monitoring of development goals (Census Enumerator's Manual, 2006). A population census is the major source of data. The housing condition of the population provides a reliable indicator of citizen's well being. Information on housing is dispensable to planners and policy makers in evaluating housing conditions, estimating housing needs and formulating housing policies. Most countries of the world conduct population and economic censuses at regular intervals. Population census information is of great value in planning public services for governments at all levels, such as cities, counties, provinces, and states. Both population and economic census data are also used by private companies or community organizations for various purposes, such as marketing studies, situating new factories or shopping malls, developing social service programs.

The United Nation (UN) defines census as total as total process of collecting compiling, analyzing, evaluating, publishing and disseminating demographic economic, social and housing data pertaining at a specified time to all persons and all building in a country or in a well delineated part (Census Enumerator's Manual, 2006). By definition therefore, the essential features of a population and housing census require that each individual person and each building is enumerated separately and only once and that the census operation is confined to a well defined territory and reference period. Arnett (2005) defines census as a periodic count of the population. It is the process of obtaining information about every member for a population (not necessarily a human population). It can be contrasted with sampling in which information is only obtained from a subset of a population. As such it is a method used for accumulating statistical data, and also it is also it is vital democratically. The counting or listing of a certain region is done by a census enumerator commonly on a federal or state basis.

Nigeria has had a long history of census taking. The first census was in 1866. The censuses of 1866, 1871, 1896, were restricted to Lagos Island and parts of Lagos Mainland. The censuses of 1901, 1911 and 1921 covered, in addition to Lagos a few more urban towns in the colony. Most of these censuses were actually population estimates. Although the census of 1952/53 was elaborate in organization, its non-simultaneity, which has implications for possible double counting is considered its weak points. The first post independence census in Nigeria was carried out in 1962. This was out rightly cancelled and another conducted in 1963. The 1963 census results became the official figured and was used until the 1991 census was accepted. There was a census in 1973 but the results were declared unacceptable on account of massive inaccuracies. The 1991 census broke the myth of failed censuses in Nigeria. Also 2006 Nigeria had their last census, though many several uses to a

nation. It provides the total characteristics in every town, village or /and locality. This information provides data for planning programmers in education, health, housing and other social services at all levels of governance. In addition to its use by government, information derived from census helps business/private sector to plan their activities. Then it is the objectives of this research work to develop a census density map of Awka metropolis in Anambra state Nigeria using dot density and to develop different geographic information system of different maps showing different attributes of population like map of 2006 population, map 1991 population, map of age distribution of Awka metropolis, map of roads in Awka metropolis and population density of each, all these attributes of population appears in layers which helps government in planning and good decision making (Okeke,2013).Demography is the statistical study of human population (<https://en.wikipedia.org/wiki/Demography>). It can be a very general science that can be applied to any kind of dynamic living population. It is also study of human population on their size, composition and migration are the big three of demography jointly producing population stability,Development of Awka metropolis map in Anambra state Nigeria was done by transforming digitized map into geographic information system software, the map features were measured starting from left hand side of the map, and horizontal and vertical axis were taken (Okeke, 2013).The output from scanned map is often used to generate vector data. This involves automatic or user controlled raster to vector conversion. The resolution of scanned map is very important because it affects the generalization of features in the map (Shahab, 2008).

II. RESULTS

In comparison to the present system, the new system will be less time consuming and is more efficient since map of Awka metropolis (Awka north and Awka south) will be shown in layers indicating population density (population density is the population per unit area) of a particular area like that of Nise, Mgbaukwu, Okpuno, Oba-efemili, Mbaukwu, Amawbia, Awka, Nibo, Umuawulu, Urum, Amanuke, Isiagu, Amansea, Ebenebe, Isuanaocha, Ugbenu, Ugbene, Achalla, age distributions of certain age limit like 0-9years to be children, 10-20 years to be adolescent,21-35 years to be early adults, 36-70 years to be late adults ,71- 99years to be old adult and 100 and above to be aged, Towns in Awka south and north local government are Nise, Mgbaukwu, Okpuno, Oba-efemili, Mbaukwu, Amawbia, Awka, Nibo, Umuawulu, Urum, Amanuke, Isiagu, Amansea, Ebenebe, Isuanaocha, Ugbenu, Ugbene, Achalla,, Buildings, number of males, number of females, Roads and total number of population. Census analysis will be very easy in the new system as it is automated which will help government to be proactive in planning and in decision making.

The output of this paper is functional geo-spatial distribution of population in Awka metropolis in Anambra state, Nigeria. As shown below

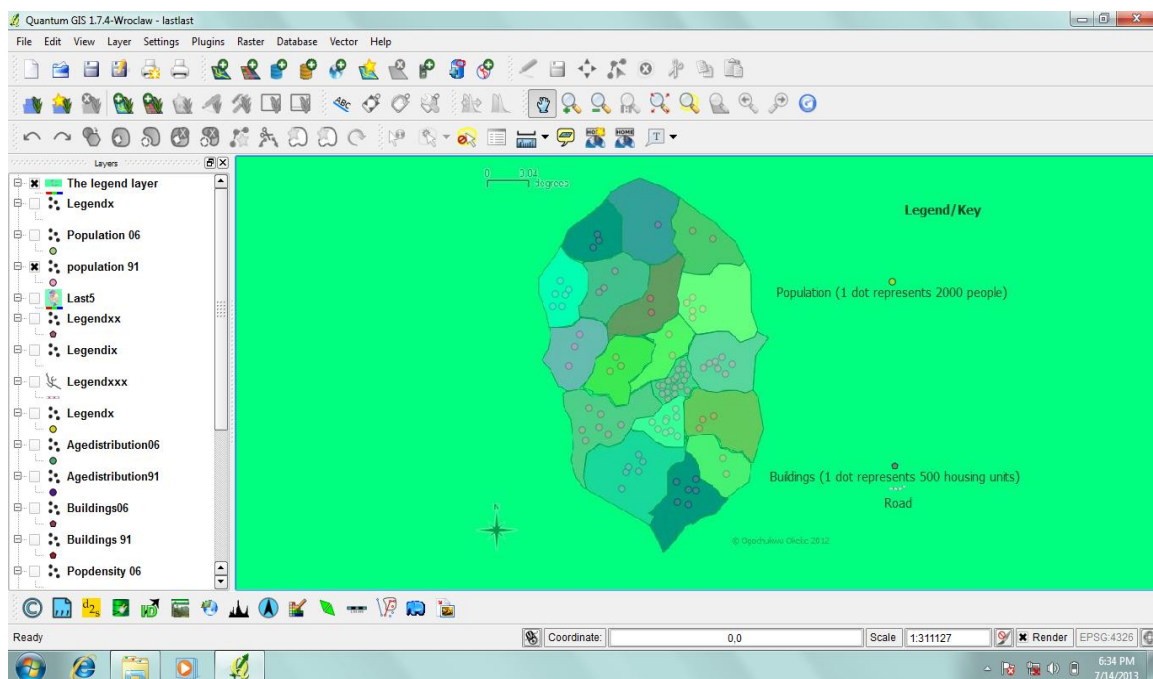


Figure 1.1 Awka metropolis map showing 1991 Census figures using dot density.

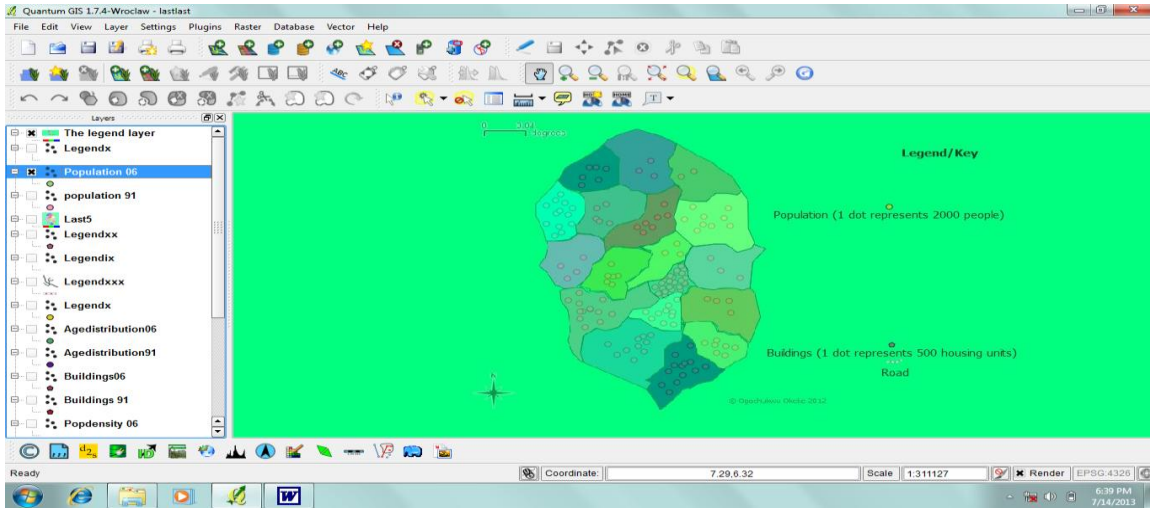


Figure 1.2 Awka metropolis map showing 2006 Census figures using dot density.

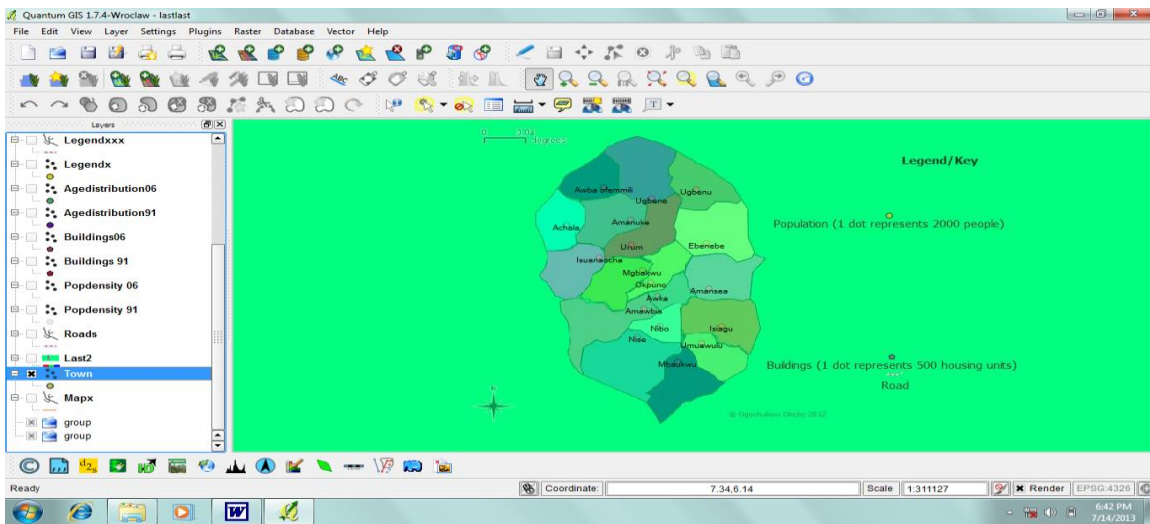


Figure 1.3 Awka metropolis map showing all the eighteen towns in it.

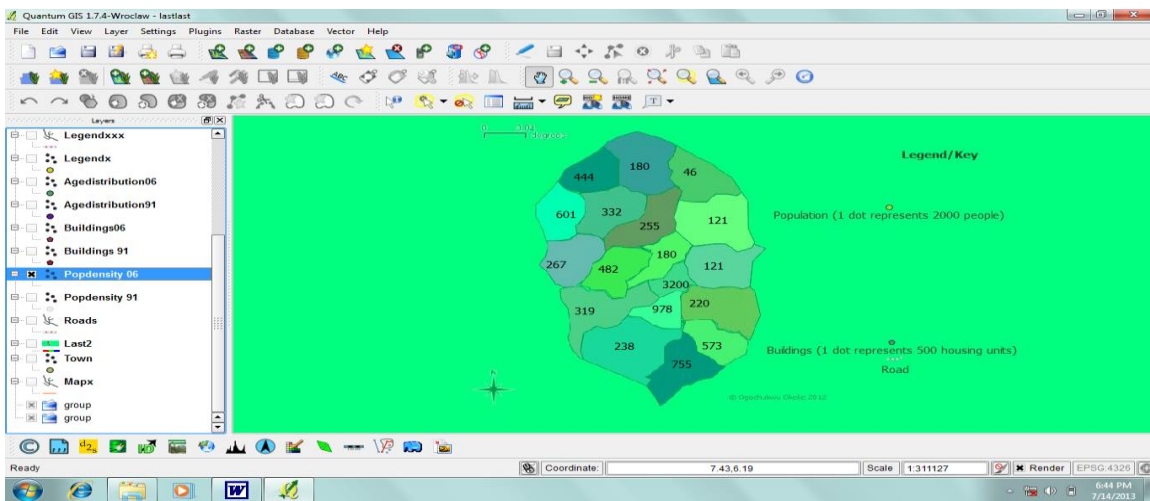


Figure 1.4 Awka metropolis map showing 2006 population density of each town.

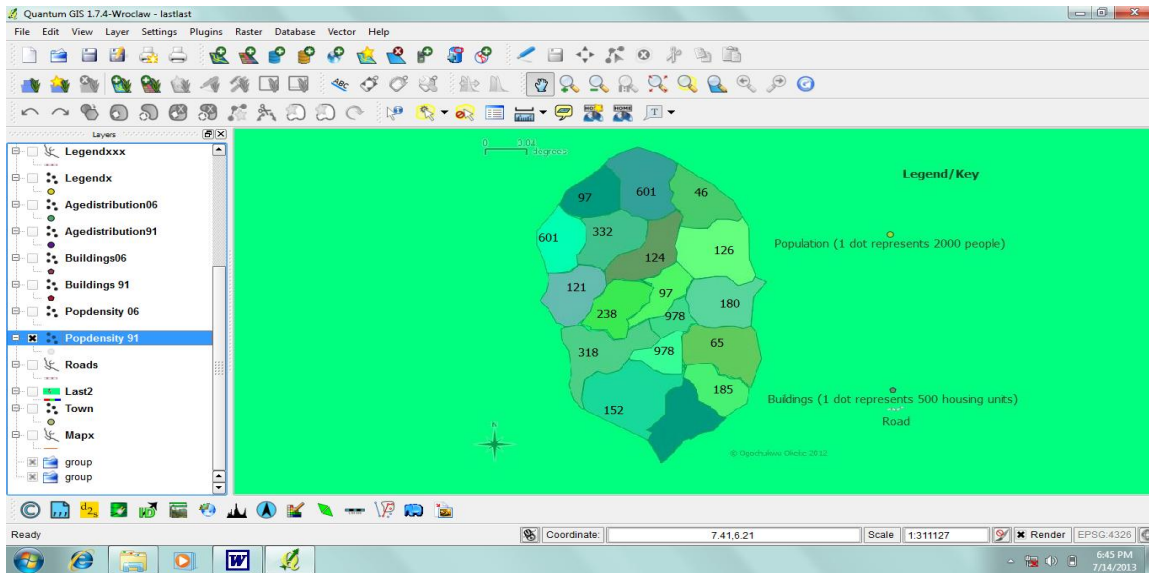


Figure 1.5 Awka metropolis map showing 1991 population density of each town.

III. SUMMARY

This research deals with the challenge of using geographic information system to capture census results in Awka metropolis. Census density map of Awka metropolis was developed using dot density, since many attributes are shown. The map of Awka metropolis together with their legend was displayed. Dot density was used to represent distribution of population and buildings in the area. The old system was analyzed and its drawbacks were critically pointed out and new system dealt with problems in old system, which helps government to be proactive in decision making.

IV. CONCLUSION

Overcount and undercount will be less likely to occur if people participatory in GIS are incorporated into the census and geospatial model. A correlation between census results and other data sources are more likely to reduce data corruption and keep falsification to a minimum. Availability of census data assets in the public domain available to everyone at any one time will put greater scrutiny on the data there by mounting pressure on national population staff to do what is right by taking care that the data collected and released is accurate. The field of GIS had a critical role to play in the use of geo-spatial data and information in national developmental issues, like population and demography, resource management, environmental monitoring and control, regional integration and international cooperation. However, when integrating GIS technology in the development stage in any country, positive steps have to be taken by government and other stakeholders involved in the development and promotion of GIS use for research, training and production of empirical data for policy formulation at the local, regional and national towards environmental monitoring and management, resource management and developmental planning. With GIS as a tool for spatial data collation, processing, storage, indexing, retrieval, analysis and communication, good demographic information about Awka metropolis in Anambra state, Nigeria would be prepared.

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