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APPLICATION OF GIS.doc

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Access to specialized health care is always one of the major goals of every government. Solving the problem of access to specialized medical services requires adequate information about the specialist hospitals that are available and their areas of specialties. Bearing in mind that the government is not in a position to provide for all the needs of its population, there will always be the need to deal with private specialist hospitals. It will be easy to make decisions on which specialist hospital to contact for specific needs should the need arise. This research work designs and implements a GIS-based database management system for Specialist hospitals in selected local government areas of Lagos State. The system provides queries for retrieving information on the available specialist hospitals based on specified criteria. It calculates the distance between two given hospitals, finds the hospitals that fall within a specified range from a given hospital and also, finds the nearest hospital to a given one. Decisions can be made on the choice of specialist hospital based on the result of the queries.

Keyword: Application, Geographical Information System(GIS), Health facilities, Administration.
1.0 INTRODUCTION
Access to specialized health care is always one of the major goals of every government. Solving the problem of access to specialized medical services requires adequate information about the specialist hospitals that are available and their areas of specialties. The facilities provided by the government through its general and teaching hospitals are not enough to take care of its ever growing population. The need for privately owned specialist hospitals also stems from the lack of willingness of majority of the working class population to spend their time queuing up at the government owned hospitals for service. They prefer to patronize private hospitals where they can get fast and efficient service. The issue of inadequate facilities in the government hospitals also cannot be over looked. Therefore, there will always be the need to deal with private specialist hospitals despite the apparent huge difference in the cost of service. When this need arises, it should be easy to make decisions on which specialist hospital to contact for specific needs.

The GIS solution that is proposed in this research is able to provide information on specialist hospitals that are available and their locations.

2.0 LITERATURE REVIEW
2.1 Specialised Health Care
Lee, et. al. (1976), in their book “Primary Care in a Specialised World” discussed specialties and specialists in the medical field. They declared that the growth of specialisation has led to the decline of general practice, which is the backbone of primary health care. This growth that has been a phenomenon since 1940s is a reflection of a number of factors. These include: consumer demand, nature of health insurance coverage, professional attitudes, government policies and advances in biomedical research and technology. These trends have continued and have been accompanied by a proliferation of specialities and subspecialties, resulting in a great decline in general practice. They maintained that it is very likely that the trend towards specialisation will continue and that increasing number of doctors in general practice will seek specialisation in other fields. This will result in a decrease in the number of doctors available for primary health care.
Odusanya and Nwawolo (2001) conducted a research to identify the career aspirations of house officers and factors influencing these aspirations in hospitals in Lagos. House officers are physicians-in-training who provide the bulk of direct medical care for patients in teaching hospitals. During the period of internship, the house officer is trained under supervision, acquires necessary skills and fine-tunes career aspirations. Factors influencing specialty choice include expectation of material rewards, societal appreciation of specialty and specialists, response of specialty patients to treatment and the role of specialty teachers. Specialties viewed positively in these dimensions such as surgery, obstetrics and gynaecology, internal medicine and paediatrics are more highly favoured and tend to be more attractive to doctors than other specialties. The study showed that 94% of interns had indicated specialty choice during the first year. The preferred specialties were surgery (35%), obstetrics (28%), paediatrics (14%) and internal medicine (12%).

The five top areas of specialisation identified in the research are surgery, obstetrics and gynaecology, dental science, paediatrics and internal medicine.

2.2 Use of GIS in Health Management

A GIS is an information system that is designed to work with data referenced by geographic coordinates. In other words, GIS is both a database system with specific capabilities for spatially referenced data, as well as a set of operation for working with the data. GIS is a powerful tool for handling spatial data. Its ability to manipulate, integrate and analyse the spatial data and its corresponding attributes at high speed is unmatched by any manual methods.

The awareness of the great benefits of GIS to the health industry has grown. Public health departments, public health policy/research organisations, hospitals, medical centres and health insurance organisations use GIS.
Application of GIS to health started in 1984, when John Snow (an English physician), provided an example of how mapping can be used in epidemiological research. He was able to identify the water source responsible for an outbreak of cholera in London by mapping the locations of those afflicted with the disease.

He plotted the distribution of deaths on a map and determined that an unusually high number of deaths were taking place near a particular water pump.

He petitioned the local authorities to remove the pump’s handle to make it unavailable for use. After this was done the number of deaths reduced. His work stands out as one of the most famous and earliest uses of GIS in health.

GIS has continued to be used in public health for epidemiological studies. By tracking the sources of diseases and the movements of contagions, agencies can respond more effectively to outbreaks of disease by identifying at-risk populations and targeting intervention.

While health care professionals in the public sector were the early adopters of GIS, its use in the private sector has grown substantially [Rosenberg, 1997]. Its applications cover site analysis to increase market share of existing hospitals or to select an appropriate location for a new hospital. It also includes demographic analysis to estimate the demand for various types of services.

How consumers access the services of managed health care providers is controlled by geographic location. Matching locations to where employees live or work ensures that primary care physicians are available throughout the network and that the types of specialities required by specific populations are located reasonably close to these populations. Employers prefer health care providers with facilities located where employees will not need to travel far to obtain care.

The development in the field of GIS is a continuous thing and more applications are being discovered.
2.3 The Study Area

The study was carried out in four Local Government Areas (LGAs) of Lagos State, made up of two adjacent LGAs selected from the northern (Ikeja and Kosofe) and two adjacent from the southern (Eti Osa and Lagos Island) part of the state. Eti Osa, Ikeja and Lagos Island can be regarded as centres of business activities as a lot of business outfits, banks, offices industries and markets exist in the LGAs. Residential areas are also present.

Kosofe LGA is not so highly industrialised and can be regarded as mainly residential.

3.0 METHODOLOGY

3.1 Data Types and Sources

Data for the study include:

i. List of registered private hospitals was obtained from the Private Hospital Registration Authority, Lagos State Ministry of Health. Information such as Private hospital registration authority number, address, names of proprietors, year of establishment and classification are part of the data.

ii. List of government specialist hospitals obtained from the department of Research and Statistics, Lagos State Ministry of Health.

iii. Administrative map of Lagos state showing the local government areas, major roads, towns/settlements and tracks. This was obtained from the department of Survey, Lagos State Ministry of Lands and Housing.

The registered health facilities were classified into clinics, maternity centres, convalescence homes, hospitals, diagnostics centres and laboratories. Only those classified as hospitals were selected for the study.

3.2 Data Acquisition

The coordinates of each hospital were obtained at the front of the building occupied by each hospital. Attribute data were obtained through oral interviews with hospital representatives.
3.3 Map Processing
The administrative map of Lagos State, showing local government area boundaries, major roads and towns/settlements was scanned. The scanned map was geo-referenced and digitised. The maps for the selected LGAs were extracted from the digitised map.

3.4 Data Validation
Data validation was mainly in the form of confirmation of names, addresses and other relevant details of the registered specialist hospitals. This is necessary because the list obtained from the ministry is old and quite a number of the details are no longer valid.

3.5 Database Creation
The GIS database was created using ArcView 3.1 software. Positional and attribute data collected were inputted into the system.

3.6 Data Processing
Data was processed using ArcView 3.1. Sample queries were designed (for example) to:

i. Display specialist hospitals in each of the LGAs.

ii. Calculate the distance between two hospitals.

iii. Locate hospitals within a specific distance from another hospital.

iv. Locate the nearest hospital to a given hospital.
4.0 RESULTS

Sample outputs for the above queries are shown below:

5.0 CONCLUSION AND FURTHER STUDY

This research provides information on the spatial distribution of specialist hospitals in the LGAs selected for study. The importance of the database management system is its use as a source of information on the available specialist hospitals. This has been demonstrated through the use of queries to select hospitals based on different criteria. Such a system will be of great use to the ministry of health, health facilities planning and monitoring organisations and also, the specialist hospitals.
Areas of further studies should include implementing the system on a larger scale to cover the whole of Lagos State. It should also examine the possibility of using such a system (when combined with population map) to assess the adequacy of health facilities in Lagos State.

REFERENCES


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