

Health informatics deployment in Nigeria

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Abstract

Information and Communication Technology (ICT) has become a major tool in delivery of health services and has had a revolutionary impact on how we live and perceive the world. ICT has given birth to the contemporary “Es” such as e-learning, e-commerce, e-governance, e-banking, e-shopping and e-health, the primary focus of this paper. In this paper, we discuss ICT in Nigeria with focus on three common ICT indicators: Internet, computing and telephony. We review the past and present state of health informatics in Nigeria, in comparison to the United Kingdom as examples of less developed and developed nations. We also analyse the problems facing successful implementation of health informatics in Nigeria and suggest possible solutions.

Keywords: Information and Communication Technology, ICT Indicators, health Informatics.

Introduction

ICT enables people to interact and communicates no matter the distance, also makes it easy for us to obtain goods and services in convenient ways. The world in which we live in today has been changed by ICT. ICT has the potential to transform radically the delivery of health care and to assist in defining strategies to address future health problems. ICT has assisted in driving down healthcare costs (Remlex, 2007); and improved the delivery and effectiveness of healthcare services through help in disease management, improved patient safety and decision support for practitioners (O’Carroll, et al, 2003). Various systems have been developed to aid health care delivery such as local area network based patient information systems (Modai et al, 2002), and online health information for patients and medical personnel (DG INFOS, 2006). Despite Nigeria’s claims to have reorganised its health care delivery system since Bamako’s 1987 initiative, which focused on how to increase access of good health care systems, the government is yet to implement any ICT policy in the health sector. In this paper, we discuss the problems facing the use and implementation of ICT in Nigeria health informatics.

The World Bank (2002) ICT was defined as ‘the set of activities that facilitate the capturing, storage, processing, transmission and display of information by electronic means’. Frenzel (1996) defined ICT as ‘a tool that is radically altering the balance of power between institutions, governments and people by broadly disseminating important information’. ICT in the health context is unlikely to alter the balance of power between institutions, but it is assuredly a tool that can aid dissemination of information through electronic media. In this paper, we will define ICT as a tool or technology for gathering, storing, retrieving, processing, analyzing and disseminating information electronically. There are many factors that determine the implementation and use of ICT such as ICT expert knowledge, user’s attitudes, etc. ICT is a fusion of telecommunication and computing with the aim of disseminating and processing information.

The advent of ICT in many developing countries can be linked to international organisations (such as World Health Organisation, World Bank, United Nations Development Program, etc), research institutes and educational institutions. For example, in 1993 Mongolia was provided with personal computers funded by the World Health Organisation to support health care services in the country (Braa, et al., 1995).

In Nigeria, the history of ICT initiatives can be traced to the 1950s when electronic and print media were formed but there was little progress until National Broadcasting Commission (NBC) and the Nigerian Communication Commission (NCC) was formed in the early 90s. In the late 1990s, NCC licensed some wireless telephone operators and

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ICT in Nigeria and the United Kingdom

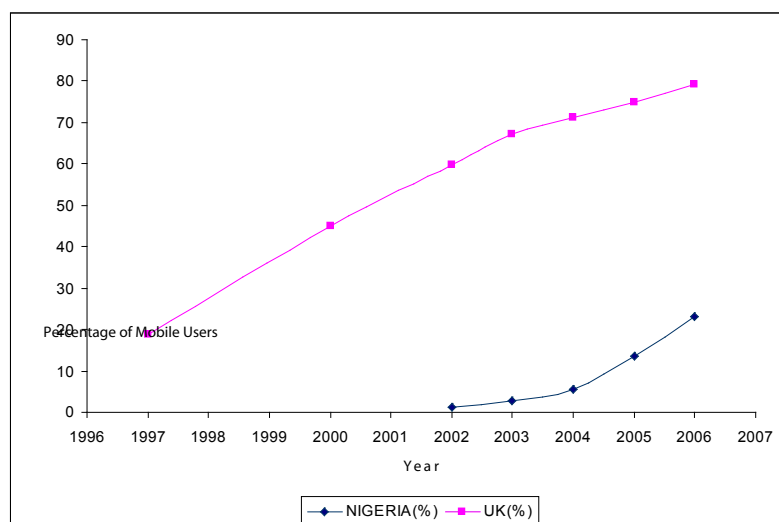
Today, we live in a world in which aspects of human life such as services, business, research, security, culture, religion, education, commerce, entertainment and health are all influenced by ICT. In the context of this paper we will discuss ICT as the driving force of health informatics. According to

the commission was reconstituted in 2000 so as to function well. (Emadoye, 2002). A year later after proper commissioning of NCC, the Obasanjo administration established the National Information Technology Development Agency (NITDA) to see to implementation of ICT policy in Nigeria, although this has little significant effect on the Nigerian economy (Idowu et al, 2003a). Three specific components of a successful ICT system (telephony, Internet and computing) are further discussed below in the Nigerian context and briefly compared with that of UK, an example of a developed nation.

Telephony System in Nigeria

In 1960, after independence, Nigeria had a population of about 45 million people with 18,724 functioning telephone lines - a teledensity ratio of 0.04 telephones per 100 people. During the subsequent period of military rule, which lasted almost 30 years, there was little or no development in the telecommunication industry. A breakthrough in this sector emerged in 2001 when the Obasanjo administration introduced a Global System for Mobile (GSM) Communication system and established the National Communication Commission (NCC) to license GSM operators in Nigeria. NCC currently licences four communication companies; MTN (Mobile Telephone Network), CelTel (which was then ECONET Wireless Nigeria Limited), NITEL (Nigerian Telecommunication Limited) and GlobalCom (Global Communication).

Figure 1
Number of Mobile Phone subscribers
Data source: The World Fact book



At the launch of Nigerian mobile telephony in 2001, there were only a few thousand lines available from the operators and services were too expensive for the average Nigerian to purchase. The following year, the number of mobile subscribers stood at 1.5 million (Nigerian Tribune, 2003) and prices continued to fall. Towards the end of 2003, MTN alone had about 1,650,000 active subscribers on its network, while CelTel (then Econet) had over one million subscribers and MTel and Global Com had close to a million subscribers (The Guardian, 2004). By the end of 2004, the GSM operators had recorded well over seven million subscribers, which is a real explosion when compared with about half a million working lines from NITEL in 2001 (Okoruwa, 2004). This shows that Nigerian telecommunication industries

experienced rapid growth in terms of usage and subscription.

The pervasive growth of GSM in Nigeria has deeply affected the Nigerian economy. In comparison, other ICT indicators like Internet and computing still have a very low diffusion rate. Use of and access to mobile phones in Nigeria has increased (Adomi, 2005) and the average Nigerian can access a mobile phone either through a personal subscription or via commercial phone centres which cost about 8p (\$0.15) to 12p (\$0.23) per minute. It is not unusual to subscribe to two, three or four providers at the same time but rarely can one find a Personal Computer (PC) in the home of an average Nigerian. At 2007 in Nigeria, there are 34 million telephone lines with 1,670,767 fixed lines and 32,265,827 mobile phones (ThisDay, 2007).

The use of mobile phones started in 1997 and 2003 in UK and Nigeria respectively. As at 2006 about 32 million Nigerians (23% of the population) and about 48 million people in the UK (almost 80% of the population) use mobile phones. Figure 2 shows there is a wide gap between the percentage of user in Nigeria and UK. From figure 1, it might be argued that UK market is becoming saturated while that of Nigeria is still far behind. It may be difficult to predict when the Nigerian market will be saturated due to factors affecting the use of mobile phones such as poverty and network coverage problems.

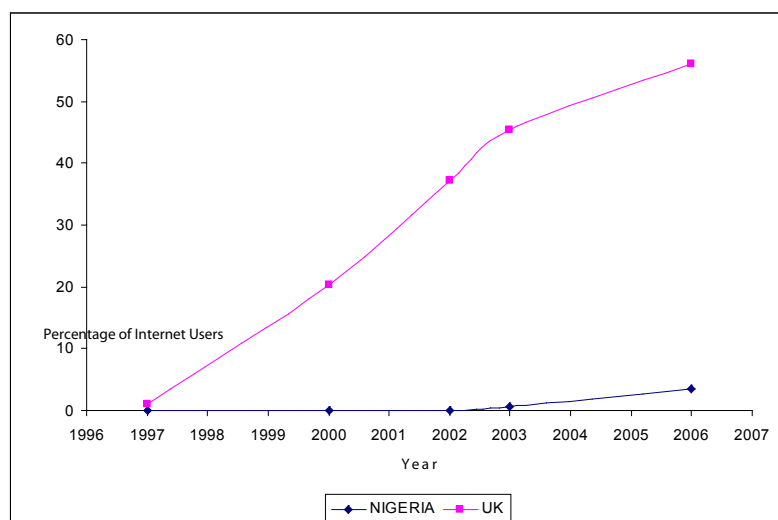
Internet in Nigeria

The Internet is playing a useful role in almost all aspects of modern life. In the health sector, the Internet can be a useful tool for accessing up to date information about health (Ajuwon, 2003). The use of Internet for health care systems such as teleradiology, remote neonatal monitoring system, electronic patient record system, Internet based patient information system (DG INFSO, 2006) is well documented, though uptake of such systems is variable; unfortunately, access to the Internet in Nigerian hospitals is rarely available.

The Internet initiative in Nigeria started in 1994 with the efforts of the Nigerian Internet Group. At this time the only access to the Internet was provided by NITEL and it was extremely expensive. NITEL was pressurised to build an infrastructure backbone to make Internet service more accessible and cheaper; by the end of 1997 NITEL provided a backbone of 2 Mbps bandwidth and five strategically-located points within the five major cities in Nigeria (Olayinka, 2000). Since that time various Internet service providers have emerged and terms like "browsing and surfing the net" are common slang among average Nigerian yet Internet penetration remains very low in Nigeria. In 2004, Nigeria, with a population of almost 130 million people, had 750,000 Internet connection points compared with South Africa with population of 45 million and Internet connectivity of 3.1 million (World Fact Book, 2005). In 2006, the number of Internet hosts was 1,549 with 5,000,000 Internet users 645,179 Internet hosts and over five million Internet users in Nigeria and South Africa respectively (World Fact Book, 2007). Figure 2 shows the relative numbers of Internet users in Nigeria and the

UK between 1994 and 2006 with that of UK. There is still a wide gap between the 2 countries, despite the fact that Internet use began in Nigeria in 2000; at present, less than 4% of the Nigerian population have access to Internet, while in the UK, over 50% of the population have access to Internet. If Internet access is to be increased in Nigerian hospitals and Nigeria as a whole, Nigerian government may need to address the obstacles to the use of ICT, which might affect the use of ICT in Nigerian hospitals.

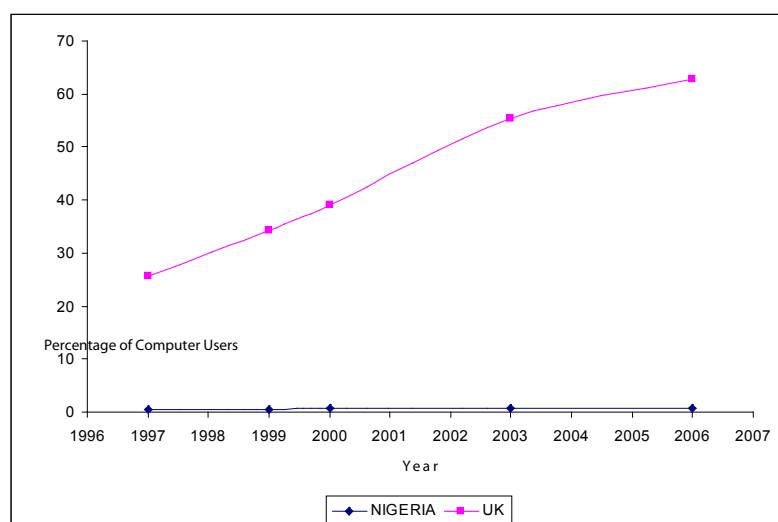
Figure 2
Number of Internet Users in Nigeria
Data Source: The World Fact book



Computers in Nigeria

The first computer emerged in Nigeria in 1948 when the Nigerian Ports Authority bought a 'Visible Record Computer' from International Computer Limited (ICL). In 1963, IBM (International Business Machines) established the IBM African Education Centre at the University of Ibadan in Western Nigeria, enrolling fifty-two students from Nigeria and other English speaking African countries (Anyanwu, 1978). In the same year, a computer was used to process the Nigerian national census data. After the completion of the programme in 1965, IBM donated its training centre to the University of Ibadan. In 1973, computer education started in three universities; namely, University of Ife (now known as Obafemi Awolowo University), University

Figure 3
Number of Personal Computers in Nigeria
Data Source: The World Fact book



of Lagos and University of Ibadan. There were 20-25 computers in the whole of Nigeria before 1973 with six of these computers being associated with multinational companies (Nwachuku, 1994).

A few years after computer science education commenced in Nigeria, the government establishments and parastatals (such as West African Examination Council, National Electric Power Authority, Joint Admission and Matriculation Board) and commercial banks showed interest in computing and this made the number of computers in the country increase to about 70. At 1977 only three computer companies namely; IBM, NCR and JCL which are subsidiaries of foreign computer companies had a presence in the country and the decree promulgated by the government in favour of indigenous vendors in 1977 forced IBM out of the country and led to influx of indigenous computer vendors which remain at 2007 in the business of marketing computers and accessories (Nwachuku, 1994).

In 1978 the Nigerian computing profession experienced some development; four computer companies namely: Debis Computers, Data Science, Datamatics, and Joint Komputer Kompany (JKK) were established and Computer Association of Nigeria (COAN) was inaugurated (now Nigeria Computer Society) which later gave birth to Computer Professional of Nigeria. Between 1982 and 1983 149 new computers were installed because by that time banks were moving from manual way of operations to full automation. 1983 was the same year that the first micro computer exhibition took place in Lagos. In 1984, state government began to use computers in various ministries especially the finance ministry and by the end of 1986 there were another 99 computer installations. It was around that time that Nigerian universities computer centres emerged. By 1987, Nigerian National Petroleum Corporation (NNPC) began to lay fibre optical cable for a computer communication network.

Despite the 60-year history of computer use in Nigeria, the diffusion and usage of computers in Nigeria is still very low due to the cost of Personal Computer (PC) which is very high for an average Nigerian. The majority of desktop computer systems found in Nigeria are cloned, because 2 PCs can be cloned for the price of a new branded system of the same specifications. In general, it is only the multinational companies (especially oil companies) and banks that can afford to purchase branded computer systems (Osuji, 1984). Figure 3 compares the estimated percentage of the number of personal computers in Nigeria with that of UK. There is a wide gap between the UK and Nigeria, the percentage of computers in Nigeria is less than 5% of the population while in the UK it is almost 70% as at 2006. The research institutes, banks, and oil companies are the major users of computers in Nigeria and very few individuals. It may take more than 20 years before Nigeria can be at the same level with UK in the use of computers due to low income of most Nigerians.

In 2007, the Nigerian government established an initiative called Computer for All Nigerians Initiative (CANi); a Government Assisted PC Programme

(GAPP), which aims to expand the usage of computers within the country by making computers (laptop and desktop) available for all Nigerians at affordable prices (Copine, 2007) through a public-private partnership between NITDA, Microsoft Corporation and Intel Corporation. One potential problem is that there is a need for a computer literacy programme in the country to support the aims of CANi. If NITDA is not careful, the people that will benefit from the initiative are the people that already have one or more computer system at home.

Out of the three selected ICT indicators, mobile telephony has the highest number of users, for both the UK and Nigeria. The reason for high rate of mobile phone usage/ ownership is that they are cheaper to acquire and some of the obstacles to the use of ICT in Nigeria do not affect mobile phone users. In UK, between 1998/1999 the number of computer users intersected that of mobile phone and in the next 2 years the number of Internet and computer users may intersect again. In Nigeria, it is only the use of mobile phone that is growing fast; other ICT indicators are still growing slowly. It may be difficult to predict when the percentage of Internet and computer users will equal with that of mobile phone users because it is cheaper to buy mobile phones than PCs and prediction is difficult.

Nigerian Health Informatics: Past and Present

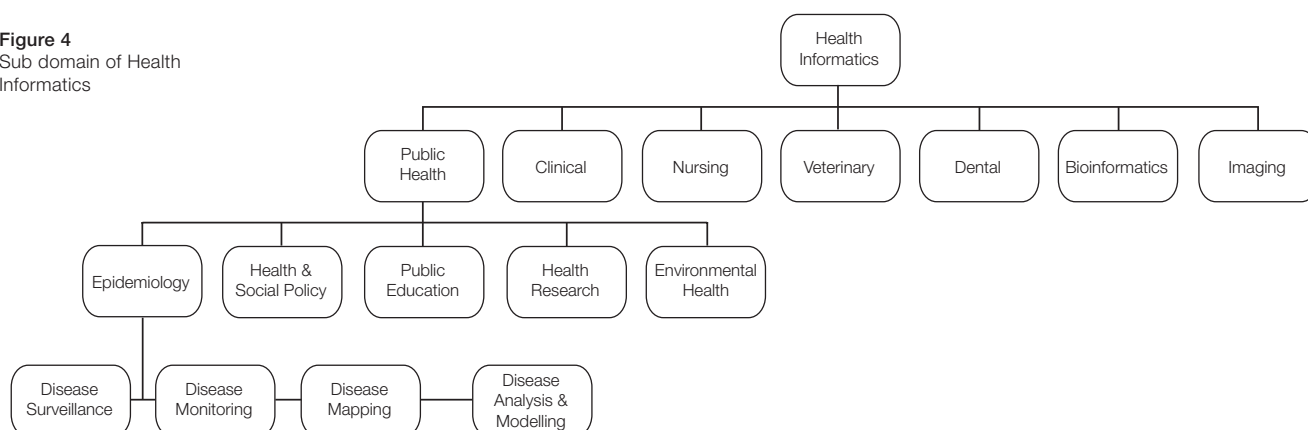
Nigeria has one of the highest mortality rates in sub-Saharan Africa; (WOCON, 2004) with a population of 140,003,542 (Nigeria Census, 2006) which is the highest in Africa but with inadequate health care delivery system. According to Hyman & Silver (2004), inadequate health care delivery might give birth to health risk which means that Nigerian may be liable to health risk. The problem of inadequate health care delivery are arguably minimised in countries like United Kingdom (UK) whose health services make more extensive use of ICT. The Nigerian health sector would have been improved, if government had exploited the potential of ICT like other developed nations of the world (NHS, 1998).

Health informatics which was formerly known as medical informatics was defined by Warner et al (1997) as the science that deals with the use of computers and communication technology to acquire, store, analyze, communicate, and display medical/health information and knowledge to facilitate understanding and improve the accuracy, timeliness, and reliability of decision making. According to O'Carroll, et al, (2003), health informatics was defined as a demonstration of how organisations can use IT to bring their strategic goals from theory into practice. The term medical informatics was changed to health informatics or healthcare informatics when some health officers felt that the term medical informatics had to do with physicians alone (Shortliffe & Blois, 2001) although today some people still use the two terms interchangeably. In this paper we will define health informatics as the application of information systems that allow collection, updating, storing, analysis and management of health related data in order to assist health care delivery.

Health informatics has a number of branches and sub domains, Shortliffe & Blois (2001) grouped health informatics into seven domain namely, clinical Informatics, Nursing Informatics, Veterinary Informatics, Dental Informatics, Bioinformatics, Imaging Informatics and public health informatics which is the focus of this paper. Figure 4 shows the hierarchical relationship between health informatics and its branches. Public health informatics is "the systematic application of ICT to public health practice, research and learning" (ASTHO, 2004 & O'Carroll, et al, 2003). It uses ICT to analyse risk factors to prevent and record health problems, and to promote health. Epidemiology, which deals with health in relation to communities, is our focus in this paper.

The history of health informatics in Nigeria started in the late 80s when a collaborative research project between the Computing Centre of the University of Kuopio, Finland and Obafemi Awolowo University, and Obafemi Awolowo University teaching Hospital (OAUTHC), Nigeria (Idowu, et al, 2003a) was initiated and this initiative was part of INDEHELA (a long term research project on Informatics Development for Health in Africa) details of which can be found at <http://www.uku.fi/indehela/>. The joint project produced a very rudimentary hospital information system based on the Veterans

Figure 4
Sub domain of Health Informatics



Administration's (VA) Admission Discharge Transfer, running on a stand-alone PC, which was in use at OAUTHC in 1991(Daini et al, 1992). According to Daini et al (1992), the group then organised the first International Working conference on Health Informatics in Africa which was held April 19-23, 1993 at Ile-Ife, Nigeria (HELINA, 1993).

In the late 1990s, the Finnish / Nigerian research team decided to expand their rudimentary hospital information system with the aim of developing a comprehensive system suitable for use in all Nigerian teaching hospitals and medical centres. The plan then was that by 2001 all the teaching hospitals in Nigeria would have Health Informatics units which could make use of standardised software. In reality, though some hospitals have computer or IT units, these serve primarily to support word processing for typing pools and offices. Development of the commercial software 'Made in Nigeria Primary Healthcare and Hospital Information System' (MINPHIS) ran alongside the doctoral programme of one of the staff of the Department of Computer Science & Engineering, Obafemi Awolowo University, and was completed in 2004. Unfortunately, the system was not tested at OAUTHC and only five teaching hospitals and medical centres use the system as of 2007. The primary reason for this limited use is the cost of purchasing the commercial software. As Finnish/ Nigerian research team were working on primary healthcare and hospital information system, a Norwegian and South African team focused on a district-level information management system (Anja, 2002).

There are other software packages developed for hospitals in Nigeria, though they are non-commercial. In 2003, the State Hospital Network known as SHONET was developed for sharing of hospital resources over the computer network in Nigeria. The philosophy behind the development of SHONET was to minimize the cost of running state hospitals; hospital resources such as personnel, laboratory and equipment will be distributed to various zones in the state. The allocation of the resources depend on the diseases that is peculiar to the zone and whenever there is need for any of those resources in another zone within the system,

the hospital equipment can then be allocated over the network (Idowu, et al, 2003b).

In 2004, another system was developed at the Department of Computer Science & Engineering, Obafemi Awolowo University, Nigeria. The system was developed for referral of patients from one hospital to another such that patient's case file, referral note and medical examination result that were transferred manually from one hospital to another could be transferred over a computer network (Idowu, et al, 2004).

Presently most Nigerian teaching hospitals have to generate money by billing patients for the services rendered to them, so as to augment the money received from the government to run the hospital and pay staff salaries. Meanwhile, it is believed that if the use of ICT is adopted the cost of running the hospital on the long run will be reduced and the health care delivery system may be as efficient and effective as it is in the developed world(NHS, 1998).

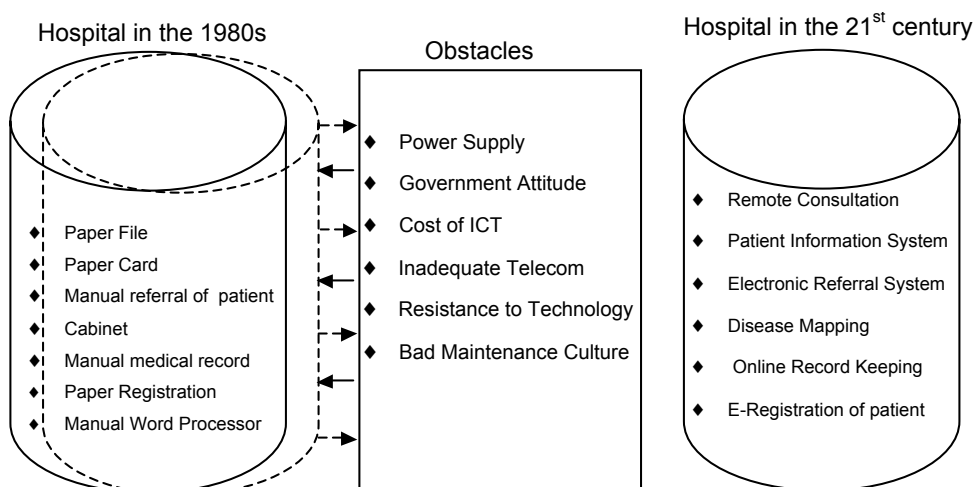
Figure 5 below depicts the state of Health Informatics in Nigeria. The hospitals in Nigeria are battling with opposing forces which serve as barriers to the adoption and infusion of ICT in health sector. The details of these barriers are discussed in the later part of this paper with possible solutions.

Health Informatics: Comparing the United Kingdom & Nigerian Experiences

In the context of developing nations the use of ICT can potentially improve delivery of health care, patient care and reduce cost of running hospital (Mbananga, et al, 2002). In 1996, the UK began to use electronic records and ICT in the NHS and this had reformed the health sector (Hackney et al, 1996).

The United Kingdom (UK), made up of England, Scotland, Wales and Northern Ireland, has a population of about 60 million - less than half the population of Nigeria. In the 1980s, the hospitals in UK were at a level where paper files, paper cards,

Figure 5
Nigeria Health Informatics Model



manual referral systems and manual typewriters for word processing were used as shown in Figure 5. In UK hospitals, patients' records are now in digital format and this makes storage, retrieval and transfer of patients' data economical, faster and easier. Nigeria is still behind because of obstacles (e.g., high cost of ICT equipment, power failure, and inadequate telecommunication facilities) to the adoption and infusion of ICT. UK hospitals found it relatively easy to move away from the traditional, manual ways of delivering health care because other sectors such as banking and educational institutions had adopted ICT.

Until the mid-20th century, the UK government was not involved in delivery of health care; it was philanthropists and social reformers that offered free health facilities to the poor. Later, the government saw the need to provide a free quality health care system and in July 5th 1948 the NHS (National Health Service) was established (NHS, 2007). In 2005, the Nigerian government embarked on a system similar to the UK NHS which is called the National Health Insurance Scheme (NHIS). Arguably establishment of the scheme ought to begin with the introduction of ICT in hospitals because ICT will reduce the cost of running the hospital and improve the delivery of healthcare system if fully implemented (O'Carroll et al, 2003). In UK hospitals, all patients' data are stored on a computer system which is updated each time the patients visit the hospital. In Nigeria, to find the number of patients that visited a particular hospital could take weeks, because numerous files must be checked. Hospitals which are not research-based may not even have records.

In UK, the patient records can be accessed in any hospital provided the person in need of such a record is authorized to do so. There is no need to carry patients' files from one hospital to another as the case is in Nigeria. In Nigeria, there are no electronic patient records; files are kept at the medical records section of the hospital. Sometimes, some of the files go missing within the hospital, making it difficult for physicians to trace the medical history of patients. Although few researchers (Idowu et al, 2004) have developed systems to solve referral system in the hospitals but the system were yet to be implemented because the Nigerian government has yet to show interest in any ICT investment in any hospital.

A GP in the UK can make use of the electronic booking service to contact consultants and share the patient's record with the consultant electronically. GPs are also connected via the NHS national network which is an Intranet (NHS Bulletin, 2007). In Nigeria, the physicians in the same hospital cannot share a patient's file within the hospital and an electronic booking service is not available in any hospital in Nigeria.

There are medical national libraries in UK which are online, where authorized medical personnel (doctors, nurses and other clinical professionals) can access information about the latest health research and best practice, anytime the need arises. This type of facility is not available in Nigeria.

Most UK doctors' surgeries and hospital clinics

have computer-based appointments systems; if you are in the waiting room the system will display your name and "waiting", and after the consultation, it will show that you have been attended to. At any time, a doctor can view the number of patients waiting outside in the waiting room, making the running of clinics more efficient and effective. In Nigeria, no such system exists.

In the UK, there is easy and fast access to information, health advice and care through online information systems aimed at the public. In early 1998, NHS Direct was launched to provide 24 hour health advice via browser or phone. This service handles over 500 thousand telephone calls and one million online transactions each month (Clark, 2006). Also, the National Health Service (NHS) developed "NHS Direct online" which provides access to information about healthcare and health through the Internet for citizens and medical personnel (DG INFOS, 2006). Until 2001, when GSM was introduced, the telephone system in Nigeria was severely limited, and in the teaching hospitals, usually restricted to the office of the Chief Medical Director. Even today, no nurses or medical doctors have access to fax, landline telephone and e-mail facility expect intercom in the ward. This illustrates the level of technological development in Nigerian hospitals. Nowadays, hospitals could potentially use mobile phone technology to offer such a service, but maintenance of the service requires funding.

Obstacles to Health Informatics in Nigeria

In Nigeria, seven specific obstacles to the use of ICT and the successful implementation of health informatics are identified; these problems stem from three factors, namely people, government and ICT infrastructure. The obstacles were discovered as a result of personal experience and observation from Nigeria and details are discussed as follows.

i. 'Epileptic' Electric Power Supply

Any country that finds it difficult to provide uninterrupted Power Supply (UPS) to its citizens will definitely have problems with deployment of good ICT services. Nigeria is synonymous with this problem. People brought up in developed nations of the world will find it difficult to adapt to the 'epileptic' electric power supply in Nigeria, which has caused a lot of damage to research institutes computer laboratory equipments, as computer components such as hard disks and motherboards can be destroyed by interrupted and unreliable power supply. ICT equipment was made to function with other infrastructure such as electricity under "controlled conditions" that is when electricity supply is stable and constant. Most internet facilities in Nigeria suffer frequent downtime due to power interruptions and equipment damage.

A few years ago, Ghana celebrated one year without power failure; in contrast, Nigeria, despite its claims to be 'the giant of Africa' rarely has stable and reliable electricity for ten consecutive hours. In developed nations, many companies supply and guarantee electricity and there is no problem of

electric power supply. Nigerian government should critically look at this area of power problem and urgently address it.

ii. Government's Attitude

The Nigerian government has yet to appreciate the use of ICT in health care delivery. Government has not seen ICT as a vehicle that can drive health and provide good health care facilities for the citizenry. Presently, apart from University College Hospital Ibadan Abuja National Hospital, no teaching hospitals or medical centres have websites. The Nigerian government could perhaps support the use of ICT in health care delivery systems by establishing an agency that will see to the deployment of ICT in Nigerian hospitals, with a separate remit and budget from the health ministry. This should aim to ease delivery of health care by allowing staff and patient records to be kept in a database and accessed online.

iii. Cost of ICT Peripherals

The price of computer hardware and software in Nigeria is very high compared with the income of an average Nigerian making them prohibitive for most people, and even government establishments, to buy. Government should encourage indigenous computer companies to produce major components in house by giving interest free loans to them. Research institutes can be used in production of the components because in developed nations like UK research institutes are the ones spearheading technological innovations and development. Nigeria government should encourage research institutes to become actively involved in software development and identification of best practice from other countries; particularly extensive, open source applications.

iv. Telecommunication Facilities

The ICT development problem in Nigeria is due to inadequate telecommunication facilities. Though the International Telecommunication Union (ITU) has rated Nigerian's telecommunication sector as the fastest growing in Africa, this applies chiefly to mobile technology, and the majority of Nigerians have no access to landlines. The Nigerian government should find means of restoring an effective and efficient telephone system that is landline, which is more economical to maintain. Also there is a need for Intranet within the hospitals which will aid communication.

v. Internet connectivity

The Internet help in controlling cost and more importantly it transform the flow of information in health sector. Healthcare organisations use Internet for business processes due to cost reduction which was estimated at 10:1 to 100:1 in routine transactions (O'Carroll, et al, 2003). Communication satellite is not common in Nigeria due to the costs of equipment. As at 2003 no communication satellite has been issued by NCC (Esselaar, et al, 2004). Private or government-run hospitals can not host websites (Oak, 2007) because of subscription and maintenance costs. In May 14, 2007, China built a communication satellite called NIGCOMSAT-1 for Nigeria, which may promote an expansion in the communication sector, though government should also consider the use of fibre optics for hospitals.

vi. Resistance to New Technology

The introduction of new technology is related to the user of the technology which may be positive and negative. Many Nigerians, like any other citizens of the world, will resist new technological developments which will have negative impact on their job. The ideal is for new technology to be associated with new knowledge and skills, through training on how to use the technology. Workers expect training on how to use new technology and a corresponding increase in their income, while the organisation introducing new technology expectation may be to reduce staff strength and cost of operation. Often in Nigeria, downsizing is the issue to be raised before the introduction of new technology and this always leads to resistance by the workers, because of the fear of losing their job. In order to use ICT in Nigerian hospitals, government should training hospital staff on how to use it and not lay them off and employ those with ICT skills.

vii. Lack of Maintenance Culture

Lack of maintenance culture is another problem; even government agencies find it difficult to maintain ICT equipment in Nigeria. Both preventive and corrective maintenance is very important for any ICT equipment. The financial plans for purchases of any equipment should encompass the maintenance of such equipment, and allowances for depreciation in value which is not the case in many organisations in Nigeria This could be enforced by an ICT policy banning any organisation from importing, supplying and installing any ICT equipment for another organisation or herself without maintenance agreement.

Benefit of ICT in Health Sector

ICT has benefited the health sector both in developed nations and developing nations, the benefits affect the hospital's stakeholders: management of the hospital, health personnel and patients.

The use of ICT in health sector reduces the cost of running hospitals (Remlex, 2007). For example, The NHS in UK has its own network known as NHSnet which has benefited all parts of NHS. Apart from data networking and Internet, the NHS spends millions of pounds each year on telephone services across England to aid patient transport services and emergency ambulance because the two areas help the NHS to deliver a good health care facilities(NHS, 1998). ICT introduces potential of sharing of patients files easy without any threat to patient privacy. It is used for hospital management such as admission and appointment management.

ICT improves the efficiency of medical personnel by reducing waiting times and minimise paperwork. ICT makes information available for the use of hospital personnel in an easily readable form. The result of patients' test can be added to the patients' case file as soon as they are ready. To the patients, ICT assists the patients to locate the health facility and personnel, gives 24-hour access to health information and through encryption and password protection can help to keep patients' data confidential.

Conclusion

The state of ICT in Nigeria is incomparable with developed nations like UK. Out of all the three ICT Indicators, mobile phone has the highest number of users in UK and Nigeria. The number of computer users equals to that of mobile phones in UK and with time the number of Internet and computer users in Nigeria may equal to that of UK. In Nigeria, mobile phone has the highest number of users, follow by Internet and computer. In this paper, we have discussed the problems facing the use and implementation of ICT in Nigeria which also have direct effect on health informatics in Nigeria. Since "health is wealth", there is a need for Nigeria government to make use of ICT to improve the delivery of healthcare so as to get out of poverty. In order to coordinate this initiative and tackle some of the problems highlighted, the Nigerian government could to establish an agency, separately from the ministry of health and to empower this agency financially to administer and fund ICT equipment and personnel in government hospitals, while also overseeing the deployment of ICT at a variety of levels, from state hospitals to rural clinics.

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