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# The Need for Computerization in Healthcare Delivery

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***Abstract:*** *The role Information and Communication Technology (ICT) play in improving the efficiency and effectiveness of healthcare delivery cannot be overemphasized. However, the effectiveness on current healthcare delivery systems, its political, social, and economic and technology challenges have not been investigated fully. The paper highlights the cases of ICT for healthcare delivery, factors associated with health service delivery and the need for a new landscape in the healthcare delivery system in the nation. Every nation is seeking to improve the quality of its health care and at the same time to control escalating costs. This paper therefore discusses how ICT has contributed to healthcare delivery in different parts of the world; its cost effectiveness and provide a framework for implementation to developing countries, with evidences to why developing nations must embrace the opportunities and benefits of computerization in their health sector reform. The data used were mainly secondary sources of data comprising of electronic journals, literature of various scholars on healthcare delivery systems were also reviewed.*

***Key words:*** *Needs, Computerization, Healthcare and Delivery*

## 1. Introduction

The delivery of comprehensive health care has always imposed a wide array of technical, organizational, and logistical problems. This is true for urban and rural areas alike, but is especially relevant with regard to the considerable problems posed by isolated rural areas, which have traditionally presented health care professionals with overwhelming difficulties. The logistical difficulties created by the unique communication and transportation problems of isolated areas have had an adverse effect upon the efficiency of health service organization, and the unique educational and cultural limitations of remote populations have had a negative influence upon their receptivity to modern medical technology.

The role Information Communication Technology (ICT) play in improving the efficiencies

and effectiveness of healthcare delivery has been well established in developed nations. However, the same is not true for Nigeria and developing countries in general. Traditional and new ICT are being used to diffuse information to rural communities in developing countries and for immunization systems in particular (Gurstein, 2001). Developing countries still lag behind in advances in information technologies although they are increasingly being used in the availability of healthcare in remote areas, (Musa, Meso and Mbarika, 2005). Preventable childhood diseases such as measles, polio and premature deaths still occur particularly in the developing countries due to low immunization coverage (WHO, 1999). In a study to evaluate new tendencies and strategies in international immunization, Martin and Marshall (2002) suggest that "*failure to immunize the world's children with life saving vaccines results in more than 3 million premature deaths annually".* In Uganda, a nationwide survey showed that 46% of the children (12-23 months) had received all the recommended vaccines (UBOS, 2007).

Mbarika (2004) suggests that, healthcare is one of the most fundamental needs for Sub-Saharan Africa. Various approaches have been applied to understand immunization coverage problems, however, there are still acknowledged deficiencies in these approaches and this has given rise to seeking of alternative solutions like the use of new technologies to address some of these problems. Primary healthcare has the role of monitoring outbreaks and providing optimum continuous care for many diseases and is characterized by uncertainty, complexity, time delays and competitive stakeholder viewpoints. ICT offer a platform for health education which plays a major role in the prevention of many diseases.

The World Health Organization targeted measles for eradication in several regions of the world by the year 2010, but despite an effective vaccine there is still estimated to be 30-40 million measles cases and 800,000 deaths per year [WHO, 1999; 2000]. Various approaches have been applied to understand immunization coverage problems, however, there are acknowledged deficiencies in these approaches. This is clearly demonstrated in Uganda, where despite many immunization campaigns through media, health visits and improved health services management, the coverage rate in Uganda is generally still low, less than 60% (WHO, 2001). Developing countries in general, Nigeria to be more specific are faced with the challenges of solving problems that lead to the delivery of poor health services, inefficient use of resources and failure to meet the people's health needs. Governments, donor agencies through several projects have made a lot of contributions towards an increase in immunization rates through improvements of health infrastructure, financing, supplies, staffing and management of national immunization programs. There is need to develop systems that fit the requirements of developing countries that are able to provide information that is critical for evaluation of services, policy design and analysis.

For instance, the government of Uganda has designated ICT as a priority policy area and is harnessing the ICT sector for national development (Scan-ICT Project, 2002). Worst still, ICT penetration is low in the Nigerian healthcare environments, although most of the major hospitals and the medical schools use computers for administrative purposes. ICT have greatly impacted the health sector and are increasingly being used to improve the administrative efficiency of health systems. Service delivery in the health sector is still a challenge in many developing countries due to deficiencies in delivery, facility and equipment upkeep, inequity of

access by rural communities, inefficient allocation of scarce resources and lack of coordination among key stakeholders (Fraser and McGrath, 2000). The use of ICT technologies may increase the quality of health service delivery by providing reliable information and efficient use of resources (Rwashana and Williams, 2007). The availability of information and communication techniques and tools enable rural communities to access health care services which otherwise would be difficult under conventional healthcare systems.

## 2. Literature Review

### 2.1. Cases of ICT in Healthcare Delivery

The use of ICT is rather limited in healthcare particularly in developing countries where healthcare systems are mainly used for storage and transportation of textual information using stand-alone computers. Some of the healthcare systems that have been developed include billing, financial systems, patient registration; computer based record systems and pharmacy systems. Most of lab equipment and radiology equipment are now computerized and linked through data networks. Telemedicine which uses telecommunication and multimedia technologies is now increasingly used for remote consultation, diagnostics and examination of patients over the internet. As far as improving education in health is concerned, ICT are being used for sharing documents, simulations of health scenario planning, training, interactive environments and self managed e-learning.

Health-Net one of the most widely implemented computer-based telecommunications systems in sub-Saharan Africa currently is being used in over 30 countries by around 10,000 healthcare workers to exchange ideas and provide medical solutions to various problems (Mbarika, 2004). Health-Net uses low earth orbit satellites and phone lines to provide email access system of local telecommunications sites used to provide low cost access to healthcare information in developing countries through a link to basic email (Kasozi and Nkuuhe, 2003). Users mainly physicians and medical workers connect to the network through local telephone nodes to access services such as physician collaborations (Mozambique, Tanzania, Uganda). Data collection (Gambia), healthcare delivery (Ethiopia), research (Ghana), medical databases, consultation and referral scheduling, epidemic alerts and medical libraries.

Mozambique a sub-Saharan Africa country launched its first Tele-Medicine project in 1998.This was mainly a link connecting two central hospitals, which was built based on existing terrestrial and satellite communications system using low cost equipment for transmission, exchange and visualization of images and radiographs (International Telecommunication Union,1998). In Uganda Hand held's (EpiHandy) are being used by healthcare staff for communication (e-mail), demographic studies and surveys, consultations and treatment guidelines (Kasozi and Nkuuhe, 2003).

Across Sub-Saharan Africa, the Internet is used to report daily cases of meningitis to monitor emerging epidemics. Satellite uses low orbit communication satellites to link up doctors via the internet through "store and forward technology (Groves, 1996). Satellite provides service to remote medical units through email and internet traffic as international telephone connections to capital cities in the developing world. When epidemic threshold levels are reached, mass vaccination is required and the Internet is used to rapidly mobilize

medical personnel and effectively coordinate laboratories and specialist services (Satellite PDAProject, 2002). Nambazira (2006) designed an online tool for ordering, distribution and monitoring of vaccines from the central stores to the various districts. Some of the functionalities included the capture and generation of reports for vaccine requisitions, supplies, issuances and disposals. A tool with such capabilities may be used in the monitoring of vaccines and that would reduce on the vaccine wastage eventually minimizing the costs.

The above studies show that various technologies have been used to improve healthcare delivery in remote areas although some of the problems pertaining to healthcare are not adequately addressed. There is need to define and capture different viewpoints of stakeholders. It is evidently that the issues that pose more challenges are systemic in nature and conceptualizing such systems should use system thinking tools. In a study carried out to assess health information access and dissemination in Uganda, Omona and Ikoja (2006) suggest that there is need to support and promote ICT as the most effective tool for health information access and dissemination.

### 2.2. Factors Associated with Health care service Delivery

The existing body of literature indicates that there are several factors that influence healthcare delivery. The key issues that were found to be associated with the health care system are grouped under the following:

- Levels of motivation of health workers which is associated with level of facilitation, remuneration, workload, provision of quality training which includes number of trainers, frequency of refresher courses, level of clinical practice and use of materials relevant to local culture.
- Efficiency of health facilities which is affected by the availability of financial resources, availability of equipment, promotional activities and number of skilled health workers and proper management.
- Effectiveness of monitoring of immunisation activities which involves the following monitoring systems for adverse events, documentation of immunisation activities, display of immunisation activities, reporting of immunisation activities and reviews of immunisation plans.
- Effectiveness of immunisation campaigns which is affected by the frequency of change in schedule (how often the vaccine schedules are changed), number of campaigns in a year, availability of allowances, sufficient time for planning and effectiveness of communication (Rwashana and Williams, 2008).

### 2.3. The Need for a New Landscape in Health Care Delivery

Healthcare systems around the world are facing major challenges related to chronic diseases, demographic changes, nursing shortages, medical accidents and rising costs. For example in Europe, the proportion of people over 65 is expected to almost double by 2050 (Eurostat, April 2005.). More elderly people will require prolonged medical care and assistance to ensure they live independently. Furthermore, chronic diseases such as Ebola which is ravaging some Africa

countries, Dengue fever in China are on the increase, as well as their management costs. All these factors are starting to place additional strain on national healthcare systems.

Traditional healthcare institutions offer treatment mainly on the basis of disease symptoms. This approach is associated with high costs and a reduced quality of life for patients. Even though the advantages and benefits of preventive healthcare are widely recognized, current health systems show that majority of the developing countries invest only a fraction of their expenditure in prevention of diseases. Moreover, most healthcare services are delivered inside medical premises. Despite being built for acute events, many hospitals allot a significant number of their beds to chronically ill patients, with considerable cost consequences. Efficient remote monitoring and care are thus required.

Evidence suggests that every year hundreds of thousands of deaths in developing countries are attributed to medical accidents, adverse drug effects and preventable injuries. The majority of these deaths could also be trace to communication difficulties in the healthcare process and lack of information on patients‟ medical history. In the USA, it is claimed that more deaths are attributed to inappropriate medical decisions than to motor vehicle accidents, breast cancer or AIDS (*To Err is Human: Building a Safer Health System*, Washington DC, Institute of Medicine, 2000. Experts consider that the figures are likely to be of a similar magnitude throughout Europe.)

**2.4. E-health**

E-Health is a relatively new term in health care practice and one of the most rapidly growing areas in health and ICT today. The World Health Organization defines e-Health as the cost-effective and secure use of information and communications technologies (ICT) in support of health and health- related fields, including health-care services, health surveillance, health literature , and health education, knowledge and research‟.(WHO 2005). E-health is the use of information and communication technologies (ICT) for health" (WHO, 2008). E-health then encompasses services such as health- related internet information sites, automated online therapy, email consultations, online pharmacies, tile-health, home monitoring systems and virtual clinics. It also includes information technology –based health system developments. It comprises health promotion, disease prevention and care to improve health conditions and equity. Involving different stakeholders with different interests and needs, this requires a plurality of solutions in meaningful contexts.

E-health technologies and processes such as individual electronic health records, clinical decision support systems and intelligent, responsive buildings and equipment have enabled the delivery of safe, high quality healthcare. The culture of healthcare has evolved substantially from the days where mistakes, errors, omissions and duplication were common in healthcare delivery.

This restructuring entails a two-fold paradigm shift:

a) from symptom-based to preventive healthcare and
b) from hospital-centered to person-centered health systems.

## 3. Conclusion and recommendations

Information and communication technology (ICT) combined with wireless and mobile devices are strengthening the production, dissemination and global use of health information. The increasing capacity of information producers, intermediaries and users is triggering the explosive growth of easily accessible information. This paper has provided solution to the major challenge for wider deployment of e-health in developing countries which is lack of hard evidence of benefits and also provides a model for implementation.

Simply, low cost techniques that are sustainable should be developed based on the following strategies for overcoming barriers to the successful integration of ICT into the delivery of immunization healthcare systems. Firstly, the developmental use of standardized systems. Second, the government needs to provide political leadership to accelerate the adoption of electronic health systems and, third to create a public database that holds data at the community level, but is fed through the decision making structure to improve healthcare provision nationally and local level. There is need to adopt new technologies such as grid computing in which the limited computing resources at several locations can be combined to undertake massive computing tasks as provide flexible use of resources for a variety of applications.

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