

# ICT and Electronic Health Priorities:

## Engaging ICTs as a “Tool” for eHealth Prioritization on Human Development and Poverty Reduction in the African Region

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### SUMMARY

The association connecting information and communication technologies (ICTs) and well-being or poverty remains vague and research today has resulted to divergent conclusions. This paper defines ICTs as “tools” that facilitate communication and the processing and transmission of information and the sharing of knowledge by electronic means. In the African region context, we examine ICTs utilization that aims to improve the provision, access and information management in the health sector. This paper considers access to information as very important benefits that can be achieved in many areas including economic growth, education and healthcare. In healthcare, the roles that ICT plays in ensuring that health information is provided to healthcare providers and consumers to support improving the health of individuals and strengthening health systems, disease detection and prevention are crucial to development and poverty reduction as stated in the UN’s MDGs. For example, access to appropriate information can minimise visits to physicians and periods of hospitalisation for patients suffering from chronic conditions, such as asthma, diabetes, hypertension and HIV/AIDS. This will in turn reduce the cost of healthcare provision. ICTs have the potential to impact almost every aspect of health sector. The paper then proposed how ICTs can be used to reduce poverty and ensure that health information is well administered and reaches the right people, at the right time and in the right form.

**Keywords:** Health information, eHealth, ICT uses, Poverty, Developing countries.

### 1. INTRODUCTION

One fundamental application area, especially following the UN’s Millennium Development Goals (MDGs), is the opening of health information systems based on ICT to improve the management and the quality of health care for development at lower cost. Many different types of eGovernment projects have been implemented around the world, as well as in developing countries.

Restructuring of health information systems has become an essential trend in the entire developing world since the implementation of primary health care as a global strategy for achieving the health for all goals [1]. With the UN’s MDGs (Millennium Development Goals), UNESCO’s EFA (Education for All), Africa Union’s NEPAD (New Partnership for African Development): all goals geared eventually towards improving the human development index.

In the face of finite resources (both financial and personnel), there is urgent need to prioritize among the various goals themselves with respect to the impact of ICTs. With such priorities as laid out in line with health related targets of MDGs. The Millennium Development Goals (MDGs), which were agreed upon by the United Nations in 2000, center on development and the reduction of poverty. Health is an integral part of development and poverty reduction; it is in fact, central to poverty reduction. Indeed, the MDGs place health at the heart of development [2]. This means, therefore, that in order for the goals to be attained there is needed to consider the efficiency and effectiveness of the information systems that support the health sector. According to [2], the importance of ICTs in meeting health goals has been recognized.

ICTs have been defined by different reviewers in various ways [3, 4, 5, 6, 7, and 8]. Many definitions focus particularly on the ‘newer’ computer-assisted, digital or electronic technologies, such as the Internet of mobile telephony. Some do include ‘older’ technologies, such as radio or television. Some even include the whole range of technologies that can be used for communication, including print, theatre, folk media and dialogue processes. Some focus only on the idea of information handling or transmission of data. In our study we cover the broader concept of ICTs as tools to enhance communication processes and the exchange of knowledge.

In developing countries, avoidable diseases and untimely deaths still wreak a lofty toll. Inequality of access to basic healthcare services affects distinct regions, communities, and social groups. Under-financing of the healthcare sector in most countries has led to quantitative and qualitative deficiencies in service delivery and to emergent gaps in facility and equipment maintenance. Inefficient allocation of scarce resources and lack of coordination among key stakeholders have made duplication of efforts, overlapping responsibilities, and resource wastage common and troublesome problems.

eHealth is defined as an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies [9]. In a broader sense, the term characterizes not only a technical development but also a state-of-mind, a way of thinking, an attitude and a commitment for networked, global thinking, to improve health care locally, regionally and worldwide by using ICTs.

The author considers that the “e” in eHealth does not only stand for electronic but implies a number of basic e’s, such as: efficiency, enhancing quality of care, evidence based, empowerment, encouragement, education, enabling, extending, ethics and equity. The World Health Organization (WHO) defines eHealth as the cost-effective and secure use of ICTs for health and health-related fields. ICT provides a range of technologies for gathering, storing, retrieving, processing, analysing, transmitting and receiving data and information. These include radio, television, mobile phones, computer and network hardware and software, as well as the services and applications associated with them, including videoconferencing and distance learning.

eHealth is an umbrella term that covers a variety of areas such as health informatics, digital health, telehealth, telemedicine, eLearning and mobile health. eHealth can contribute to health systems strengthening in several ways by improving the availability, quality and use of information and evidence through strengthened health information systems and public health surveillance systems; developing the health workforce and improving performance by eliminating distance and time barriers through telemedicine and continuing medical education; improving access to existing global and local health information and knowledge; and fostering positive lifestyle changes to prevent and control common diseases.

Most countries are at some stage of health sector reform, trying to provide expanded and equitable access to quality services while reducing or at least controlling the rising cost of healthcare. Health reform processes have many facets and that there is no single model being adopted by all countries [10]. ICTs have the potential to make a major contribution to improving access and quality of services while containing costs. Improving health involves improving public health and medical programs designed to provide elective, emergency, and long-term clinical care; educating people; improving nutrition and hygiene; and providing more sanitary living conditions. These in turn ultimately involve massive social and economic changes, as many health challenges go well beyond the health sector.

The health sector has always relied on technologies. ICTs form the backbone of the services to prevent, diagnose, and treat illness and disease [11]. ICTs are only one category of the vast array of technologies that may be of use. Given the right policies, organization, resources, and institutions, ICTs can be powerful tools in the hands of those working to improve health [12].

Advances in information and computer technology in the last quarter of the 20th century have led to the

ability to more accurately profile individual health risks [13], to better understand basic physiologic and pathologic processes [14], and to revolutionize diagnosis through new imaging and scanning technologies. Such technological developments, however, demand that practitioners, managers, and policymakers are more responsible in assessing the appropriateness of new technologies [15].

There have been spectacular developments in ICTs around the world over the past few years. ICTs have penetrated virtually every segment of society and projections suggest increased penetration rates. Though distinctions are often made between new ICTs such as computers and mobile phones, and old ICTs such as radio, television, and landline telephony, the current technological convergences increasingly blur such divisions. Thus, single devices such as mobile phones can now receive, process, store and display text, image, sound together, and the Internet which change the opportunities for people to share opinions, experience, and knowledge.

The findings indicate that mobile phones contribute to reduce poverty and improve rural livelihoods by expanding and strengthening social networks; increase people's ability to deal with healthcare emergencies; increase temporal accessibility; and amplify efficiency of activities. The use of mobile phones will in turn reduce costs of healthcare services.

Reliable information and effective communication are crucial elements in public health practices. The use of appropriate technologies can increase the quality and the reach of both information and communication. Increased information helps people to improve their own health. At the same time, social organizations help people achieve health through health care systems and public health processes. The ability of impoverished communities to access services and engage with and demand a health sector that responds to their priorities and needs is influenced by wider information and communication processes intervened by ICTs.

The rest of the paper is organized as follows. *Section 2* describes the position of ICT in accomplishing health-related target of MDGs. *Section 3* describes the potential uses of ICTs in the health sector. *Section 4* discusses the constraint and challenges of ICT in eHealth system perception. *Section 5* presents the emerging trends as drivers for broadband ICT services.

*Section 6* suggests some issues in ICT to be considered during interventions for the African region development. *Section 7* highlights some recommendations while *Section 8* concludes the paper.

## 2. Positions of ICTs in Accomplishing Health-Related target of MDGs

Health is at the heart of the MDGs, in recognition of the fact that health is central to the global agenda of reducing poverty as well as an important measure of human development [16]. Three of the eight MDGs are directly health-related: Reduce child mortality (goal 4); improve maternal health (goal 5); combat HIV and AIDS, malaria, and other diseases (goal 6). The other MDGs include health-related targets and reflect many of the social, economic, environmental, and gender-related determinants that have an impact on people's health. Achieving them will also contribute to improvements in the health status of millions of people around the world.

These targets include: Eradicating extreme poverty and hunger (goal 1); improving education (goal 2); empowering and educating women (goal 3); improving water and sanitation systems (a key component of goal 7); and improving international partnerships (among other things to improve access to affordable, essential drugs on a sustainable basis – goal 8). The eight MDGs do not work in isolation and therefore cannot be treated in isolation. Policy efforts and discussions need to consider the broader health determinants that affect people's lives [16].

In the following we summarize the positions that ICT might be able to play in achieving the highlighted health-related MDGs.

Many development institutions and researchers have explored the connection between ICTs and efforts to reduce poverty and achieve the other MDGs, including the Organization for Economic Cooperation and Development [17], the U.K. Department for International Development [18], the Swedish International Development Cooperation Agency [7], and researchers [2, 19, 20, and 21]. The main conclusion of these and other studies is that ICTs, when integrated effectively into development programs can be useful tools in efforts to reach the MDGs.

According to [6] argues that there is growing evidence of the ability of ICTs to:

- facilitate management and transfer of knowledge
- bring previously unattainable markets within the reach of the poor;
- provide new and more efficient methods of production; and
- improve the delivery of government services.

SIDA adds that, increasingly, examples can be found “where the thoughtful use of ICTs has markedly

addressed various aspects of poverty. Despite the various pitfalls associated with deploying ICT projects, there is growing evidence that the use of ICTs can be a critical and required component of addressing some facets of poverty. It is quite clear that ICTs themselves will not eradicate poverty, but it is equally clear that many aspects of poverty will not be eradicated without the well-thought-out use of ICTs. [7]. At the same time, it is difficult, if not impossible, to establish “proven empirical links” between the use of ICTs and the achievement of the MDGs. As [3] points out: ‘measuring the impact of ICT on health generally seems to be fairly difficult because there are obviously many other factors that impact health’.

The ideal for setting policy in any area is to rely on a strong evidence base of what does and does not work. In the case of ICTs and health, strong evidence-based information that draws on impact assessments or outcome measurements is not easy to find. Published evidence currently available on the use of ICTs in health tends to be at the proof-of-concept stage. The idea of using a particular technology in relation to a particular medical condition or within an area of the health care system has been shown to work. However, it is harder to find examples of analysis that moves beyond the project purpose to look at the particular processes that might help achieve international development objectives – such as the MDGs – or to look at the conditions that might need to be in place to scale up the intervention and what might be the impact of such activity [22]. This is where it is essential to look also at analyses of pooled experience, consensus statements, and policies.

Health technologies are evidence-based when they meet well defined specifications and have been validated through controlled clinical studies or rest on a widely accepted consensus by experts [11]. Nearly all of the reviews indicate that there are useful applications for ICTs in health care. Some have been able to identify positive outcomes at the population level. Several also provide concrete suggestions for policymakers and donors. One of these suggestions is that policymakers should be cautious about recommending increased use and investment in unevaluated technologies.

The use of ICTs is also growing in many areas of health communication, including consumer, patient, and provider education; decision and social support; health promotion; knowledge transfer; and the delivery of services [23]. In the next section, we look at the usefulness of ICTs in the health sector.

There are many ways that ICT can help in achieving the MDGs in the health sector as noted by [20]: ICTs enable monitoring of the progress made in achieving

MDGs; they facilitate information sharing on diseases and other health related problems; they enable monitoring and tracking of the health status; they facilitate exchange and sharing of knowledge between policy makers, practitioners and advocacy groups; they can facilitate telemedicine; and they can also facilitate access to health information for practitioners, policy makers, and consumers of health care.

In relation to healthcare service delivery, for example [24] mentioned eHealth projects under implementation in Uganda, South Africa and Nigeria (UHIN, Cell-Life and MindSet Health, LAMIS respectively). In line with this, [19] indicated that developing countries face challenges in providing accessible, efficient and equitable health services to their people. The authors argued that if opportunities offered by ICTs are combined in right mixture with human, material and financial resources; it will take healthcare delivery to the next level.

According to [25] states that: ICT is changing how health care is delivered and how health systems are run. Today, ICT is fundamental for health systems to meet obligations to deliver care, pursue research, educate students, treat patients and monitor public health. ICT in its many forms is essential for coordinating complex activities, ensuring quality, fostering collaboration and sharing the growing body of knowledge in health.

According to [21] advocated: ICT as a tool for poverty eradication and economic growth in Nigeria context. This is in line with the first MDGs that aim to halve the number of people living in extreme poverty between 1990 and 2015. The authors identified three concepts for poverty eradication in Nigeria as follows: empowerment, opportunity and enhancing security. They argued that the government of Nigeria must take urgent steps to facilitate these concepts by providing enabling environment for ICTs to thrive and for Nigeria to meet demands for MDGs in 2015.

### 3. Potentials Uses of ICTs in the Health Sector

According to WHO, the use of ICTs in health is not merely about technology [2], but a means to reach a series of desired outcomes, such as: health workers making better treatment decisions; hospitals providing higher quality and safer care; people making informed choices about their own health; governments becoming more responsive to health needs; national and local information systems supporting the development of effective, efficient, and equitable health systems;



policymakers and the public becoming more aware of health risks; and people having better access to the information and knowledge they need for better health. The evidence regarding ICTs in health is usefully viewed with reference to the key aspects of the WHO eHealth strategy. According to [11] summarized in three categories as follows:

#### Policy

- Ensure public policies support effective and equitable eHealth systems.
- Facilitate a collaborative approach to eHealth development.
- Monitor internationally accepted goals and targets for eHealth.
- Represent the health perspective in international gatherings on major ICT issues.
- Strengthen ICT in health education and training in countries, supporting a multilingual and multicultural approach.

#### Equitable access

- Commitment by WHO, Member States, and partners to reaching health communities and all populations, including vulnerable groups, with eHealth appropriate to their needs.

#### Best use

- Analyze eHealth evolution, impact on health; anticipate emerging challenges and opportunities.
- Provide evidence, information and guidance to support policy, best practice, and management of eHealth systems and services.
- Identify and address needs for eHealth norms, standards, innovation, and research.

Disease Control Priorities Project in its latest publication, *Priorities in Health* [24]:

- Information, surveillance, and research.
- Management of health services.
- Human resources.
- Financing.

Clearly each of these pillars can benefit from the use of ICTs. In practice, the use of ICTs in the health sector has tended to focus on three broad categories that incorporate these pillars:

### 3.1. Improving the performance of health care systems

Health systems are very complex. So too are the types of processes and information needs that are handled in health care systems. To be useful, information systems must capture and process data with broad diversity, scope, and level of detail.

The nature of health care systems, particularly as regards information, is markedly different from most other sectors. In banking, for example, there are limited terms used, limited transaction possibilities, and simple information needed about customers, and well established standards for data exchange among banks so that most transactions can be performed at automated terminals by the customers themselves.

The options for information systems within health care are much more complex due to the array of data types. For example, the automation of patient records must deal with a variety of data requirements and specification problems found in many health care data types which are exacerbated by the size and complexity of the medical vocabulary, the codification of biomedical findings, and the classification of health conditions and interventions.

Nomenclature issues include concepts such as procedures, diagnoses, anatomical topography, diseases, aetiology, biological agents such as classification of micro-organisms, drugs, causes for health care contact, symptoms and signs, and many others. Possible combinations and detailing represent a staggering number of possible identifying coding requirements.

Information systems within the health care system – patient records, tracking of disease prevalence, monitoring drug supplies, maintaining ordering systems for supplies, billing procedures – all stand to benefit from the use of ICTs. ICTs are the basis for the development and operation of information systems and enable the creation and application of knowledge. Information systems function at many levels of sophistication and complexity — from very specific to very general.

Example 1 (gives three examples of information systems that have been developed in South Africa health sector context): One is stalled, one has been reasonably successful and the third failed completely, according to its evaluation team [26]. All three examples illustrate the need to:

- pay attention to past experience;
- involve users in the planning and design of the system;
- build information cultures;
- strengthen capacity of users;
- set realistic goals; and
- focus on the benefits of the system, rather than the technology.

1. A National Health Care Management Information System (NHC/MIS) was designed to cover medical records, patient registration, billing and scheduling modules in select hospitals in all nine provinces. Most provinces have minimum patient records. The National Health Information System Committee of South Africa (NHISSA) has prioritized the standardization of the Electronic Health Record. The South African Department of Health (DoH) is working with the Home Affairs National ID System (HANIS) Project to incorporate its data elements onto a smart card being developed by the project. The information will include: a minimum patient record, which includes ID verification; blood group; allergies; donor status; last ten diagnoses, treatment, prescriptions; and medical aid. Reliance on the HANIS system is perhaps questionable, however, since it has been in the pipeline for a number of years without any meaningful progress.

2. The South African District Health Information System (DHIS) was launched in 1998 in all provinces. This was the first systematic data-gathering tool that could be used to identify public health issues. It enabled all the 4,153 public clinics to collect information on ten national health indicators. DHIS is facilitated by the Health Information Systems Programme (HISP). On completion of a three-year pilot project in the Western Cape the HISP model (comprising training methods, data-handling processes, and software tools) resulted in the development of a coordinated strategy following acceptance and endorsement as the national model by NHISSA in the latter half of 1999. The HISP approach to the development of a DHIS, is based on a six-step implementation model:

Step 1 – establishment of district information teams, Step 2 – performance of an information audit of existing data handling processes, Step 3 – formulation of operational goals, indicators and targets, Step 4 – development of systems and structures to support data handling, Step 5 – capacity building of health care providers, and Step 6 – development of an information culture. The HISP model has been exported to other countries, including Mozambique and Cuba.

3. The South African province of Limpopo has 42 hospitals (two mental health facilities, eight regional facilities and 32 district facilities). The area is one of the poorest in South Africa. The overall goal of the project was to make use of information systems to improve patient care, the management efficiency of hospitals and generally increase the quality of service. Among the functions of the proposed information systems were: master patient index and patient record

tracking; admission, discharges and transfers; appointments ordering; departmental systems for laboratory, radiology, operating theater, other clinical services, dietary services and laundry; financial management; management information, and hospital performance indicators. Introduction of the systems ran well over time and budget and were implemented only in some of the hospitals. Major factors identified as contributing to the failure of implementing this system (which are likely to apply to other situations), included: failure to take into account the social and professional cultures of healthcare organizations and to recognize the need for education of users; computer staff underestimation of the complexity of routine clinical and managerial processes; different expectations among stakeholders; the long process of system implementation of systems in a sector where managerial change and corporate memory is short; and failure of developers to identify and learn lessons from past projects.

*Source: Electronic Government, Issue 2, Vol. 1, 2004:31; [www.hisp.org](http://www.hisp.org). South African Health Example, 5 Review 2001, [26].*

All three project examples were “big” projects – covering an entire province or across the country. A clear lesson about big information system projects is that they should actually start small – as pilots or prototypes – with careful monitoring and assessment to test out the challenges and issues that are likely to emerge. These are the key lessons: careful planning, regular involvement of, and communication with stakeholders, and enabling local initiatives and adaptations to the overall plan.

In Bangladesh, a project with a different scale was developed to register, schedule, and track immunization of children. Based in the city of Rajshahi, a computerized system was introduced to replace a manual record-keeping system [27]. Over a period of three years, the new system was able to increase immunization rates from around 40 percent to more than 80 percent. A critical reason for the project’s success was that it was designed to meet the interests and needs of various stakeholders, and to provide them with tangible benefits. The project reduced the time health workers spent searching records; made it easier for managerial staff to supervise the immunization system and monitor performance; and improved immunization protection for children and ultimately their health, benefitting all the families reached by the system.

Fundamental to the effective use of ICTs is the concept of added value – all participants must get out of an information system at least as much as they put in. The system must generate benefits greater than its cost;

otherwise it becomes a burden. Information systems are almost totally dependent upon the staff that provide and record the information, yet the staff is usually the lowest valued and least involved. If the benefits of their contribution are not evident to the staff, there is a high probability of building inaccuracies, instability, and future failure.

It is important to remember that the context in which ICTs in healthcare systems operate, the clinical patterns they support, and the policy environment will all change constantly, and the information systems must respond to these changes. New opportunities will arise, which should be exploited when cost-benefit analysis shows this to be justified. Monitoring and evaluation of information systems and other ICT interventions enables adjustments to be made according to how the changes are perceived, and how they change practice.

### 3.1.1 Key lessons

Here are some of the key lessons in this brief review of the literature and analysis about the role and potential of ICTs in improving the functioning of health care systems:

- An effective approach to setting up information systems is to explicitly identify the objectives of the system and determine the expected results;
- For maximum potential success, an ICT project requires all participants (from the developers of the system to the users and beneficiaries) to view the innovation as adding value to existing systems. If the people using the system do not like, want, or support it, it will likely fail and
- Information systems should never become static or they will lose their value.

## 3.2 Improving health care delivery

Integrating the use of ICTs into existing health systems has helped to improve the delivery of health care in a number of ways [28, 29, 30]. These include: the use of telemedicine to improve diagnosis and enhance patient care; improvements in the continuing professional development of health workers and better sharing of research findings; and efforts to extend the reach and coverage of health care to make an impact on specific conditions.

### 3.2.1 Telemedicine

Telemedicine is a growing field. According to the International Telecommunication Union [31], telemedicine is a powerful tool for improving health care delivery that has been successfully implemented in pilot projects in many countries. Many of these pilots

clearly demonstrate proof of concept – telemedicine can improve diagnosis and treatment of specific conditions.

Health telematics is a composite term for health-related activities, services and systems, carried out over a distance by means of ICTs, for the purposes of global health promotion, disease control, and health care, as well as education, management, and research for health [11]. More restrictive terms that are part of telemedicine include: teleconsultation, teleradiology, telesurgery, telecare, teleducation and teletraining. Although telemedicine can be highly effective, a SIDA report [2] notes that cost is an issue: “in its high-tech implementations, it is unlikely to be cost-effective or affordable in widespread use.

If used wisely, however, telemedicine can be a cost-effective method that richer countries can employ to aid capacity building in the health care systems of poorer countries [32]. A study on the use of teleophthalmology found that the technology transfer was effective in reducing the burden of eye disease and that practitioner in South Africa also learned novel procedures that could help future patients and improve cost-effectiveness. The use of teleconsultations has been assessed in a number of specialties [33]. Some, such as laboratory, dermatology, and cyto-pathology teleconsultations, are not time consuming and are reliable. The effectiveness and cost-benefit of teleconsultations in cardiology and radiology are disputable. An example is the use of telemedicine in rural areas to improve maternal health [34].

Remote Patient Monitoring System (RPMS) especially targeted at providing healthcare to remote areas of Pakistan [35]. Based on advances in ICT, this system enables specialist doctors to provide remote healthcare to the patients. This system is an important step towards providing better health facilities virtually either in situations where appropriate care is either non-existent or insufficient. The system has comprehensive development and evaluation strategy and it is intended to augment the existing healthcare infrastructure targeted at reducing maternal and infant mortality rates. This study also reveals from the user’s perspective that the evaluation of usability of interactive healthcare computer applications.

In Africa, most people are based in rural areas, and their health care is sparse. Yet the epicenter of health care expertise and resources in Africa remains in the cities. The result is that the people come to towns and cities for their health care in huge numbers and at enormous cost. ICTs are beginning to be used innovatively to bring health care to the people in a more effective manner. Telemedicine is one way this

can be done, as the example from the Africa Medical and Research Foundation (AMREF) telemedicine project indicates (see example 2)

Example 2: using telemedicine to improve rural health): AMREF is improving its clinical outreach program with the help of telemedicine. Many sites have been set up to test the approach and gradually expand it across nearly 80 rural hospitals currently served by AMREF across East Africa. The AMREF telemedicine project provides expert second opinion to clinicians in those hospitals supported by the AMREF outreach programme. The primary goal is to improve the quality of and access to specialist care. The secondary goal is to improve care through training using teleconsultations and CME courses.

An AMREF clinician and physicians consult on specific cases. Clinical staff from the rural hospital use e-mail to forward the case notes and supporting images of the patients to be seen the following day. Notes may be scanned images of handwritten notes or PC-based using proprietary software. Digital images of the patient, digital images and/or video clips of any visible wound, and digital images of X-rays can accompany the notes together with the results of any other diagnostic procedures. The outreach clinic accesses the Internet for transmission of the clinical notes and attachments, and begins the virtual consultation.

Consultants meet to prepare opinions and at an agreed time a teleconferencing connection will be established. On completion of the consultations, the entire record is saved on a dedicated library file on the AMREF server. In this way, AMREF helps link thousands more patients in remote areas every year with services and skills in an increasing number of hospitals in Eastern Africa. *Source: www.amref.org*

The examples cited here and the experience elsewhere demonstrate that telemedicine helps countries deal with shortages of health care professionals through better coordination of resources; builds links between well-served and underserved areas of the country; helps link health workers to the latest research and information; and can enhance sharing of experience and professional development. Telemedicine is more than the delivery of hardware and software [31]. Incorporating already-existing technology – such as phone or e-mail – into medical practice and routine consultancies can make a difference.

### 3.2.2. Health Promotion via ICTs Learning

Users of health care such as the general public need to feel that they are also responsible partners in their own health care. Thus they must be educated such that they do realize the health consequences of their lifestyles; they must have access to information about conditions that may afflict them or their loved ones. Thus the education of health care consumers is very important, and again ICT can facilitate this process through radio programs, TV and the World Wide Web. However, we know that there may be a fair amount of information dissemination on radio and TV, but virtually none on the World Wide Web because there is a dearth of content relevant for African countries. In the context of MDG 4 and 5, a role for ICTs is in the education of mothers on ways that they can contribute to reduced child mortality as well as improve their own pre- and post-natal health.

The same applies to MDG 6, where the public may be educated on ways to combat HIV/AIDS, malaria and other diseases. It is in this area that ICTs can be used to “raise awareness in health issues and for stigma reduction” [36]. For example, Botswana has implemented a number of ways through which the population is informed on health related issues, and these are through radio and television.

In a key paper produced as part of a global review on access to health information, [37] concluded that “universal access to information for health professionals is a prerequisite for meeting the MDGs and achieving Health for All. However, despite the promises of the information revolution, and some successful initiatives, there is little if any evidence that the majority of health professionals in the developing world are any better informed than they were 10 years ago. Lack of access to information remains a major barrier to knowledge-based health care in developing countries (as well as in many parts of the ‘developed’ world).”

Using ICTs effectively offers the promise of changing this situation for health workers. One attempt to



improve access to information has been undertaken by WHO and the United Nations Development Programme (UNDP) in India *Source: [http://www.rho.org/html/ict\\_progexamples.htm#india](http://www.rho.org/html/ict_progexamples.htm#india)* was launched in 2000. Key lessons emerging from this project that are relevant to many other initiatives to increase access to basic health information deal with connectivity, capacity, and content. For example, some of these lessons indicate that:

- connectivity took longer to establish than anticipated;
- local capacity needed to be strengthened in terms of both project management and the use of ICTs; and
- content and format of the information needed to be relevant to users' lives and needs, and available in local languages is vital to many community health workers.

A major concern for this project was the need to ensure that already-existing inequalities in health information access were not exacerbated by the introduction of ICTs. Project managers found that a strategic approach was needed to reach health workers less likely to have access to the Internet and computers skills (women, lower-ranked professionals).

Health workers involved in primary health care in developing countries are often isolated. They work in remote settings, often alone, and have little or no access to up-to-date information and opportunities to exchange experiences with colleagues. This situation is beginning to improve as health workers make better use of existing technologies and learn to use new technologies.

In Ghana, Kenya, and Uganda, Satelife has been building experience around the use of personal digital assistants (PDAs) – small handheld devices that enable health workers in remote settings to gain access to information; capture, store and share important health data; and link to the experiences of other colleagues to improve their practices and the outcomes for their patients (see example 3).

Example 3 (Using PDA's in African: Satelife's experience): In Ghana, community volunteers have been using PDAs to collect data as part of a measles vaccination program. In Kenya, medical students were equipped with PDAs loaded with relevant information about their studies in obstetrics/gynaecology, internal medicine, and paediatrics. In Uganda, practicing physicians were given PDAs containing basic reference material as part of their continuing medical education.

The Ghana project yielded compelling evidence of the value of PDAs for data collection and reporting. Data from 2,400 field surveys were submitted to the

implementing agency by mid-day following a vaccination campaign in a particular location. They were analysed, and a report was prepared for the Ministry of Health by the end of the day. Previously, data entry would have taken 40 hours using paper and pencil surveys. The Kenya and Uganda pilots demonstrated the value of using PDAs for information dissemination. In Uganda, 95 percent of physicians reported that using the reference materials over a three-month period improved their ability to treat patients effectively. This included improvements in diagnosis, drug selection, and overall treatment. In Kenya, the majority of students actively used the treatment guidelines and referred to the medical references and textbooks stored on the PDA during their clinical practice [47].

Another use of technology in Uganda has had an impact on maternal mortality. The Rural Extended Services and Care for Ultimate Emergency Relief (RESCUER) pilot project in eastern Uganda made use of a VHF radio and mobile walkie-talkies to help empower a network of traditional birth attendants, to partner with the public health service centres to deliver health care to pregnant women. This resulted in increased and timelier patient referrals, as well as the delivery of health care to a larger number of pregnant women [38]. It also led to a reduction in maternal mortality from 500 per 100,000 in 1996 to 271 per 100,000 in 1999.

Two strong messages that come through in the experiences highlighted in this section: There is a need to ensure that ICT use in the health sector reaches out to the poorest populations and there is a strong focus on linking rural, remote, difficult environments that are underserved with the resources that are located in the central health services.

In this regard, people living in rural areas are the major beneficiaries in ICT initiatives will help meet the MDGs including those related to health [39]. However, Food and Agricultural Organization (FAO-2003) report points out that “there has been virtually no progress in making the Internet available in the least developed countries, especially in the rural areas.” More MDGs can be addressed by including rural populations in the group of beneficiaries of ICT initiatives in the health sector, as the rural poor constitute the most vulnerable population group. Roughly 75 percent of the world's poorest live in rural areas.

Health conditions in rural areas are generally poorer, and access to information, services and supplies is most limited. Implementing ICT initiatives probably means encouraging intermediaries, such as NGOs, health

educators, academic institutions, or local entrepreneurs, to act as conduits for information available via technologies such as the Internet, and the poor, through translation, adaptation and use of more traditional means of communication.

### 3.2.3 Key Lessons

These are some of the key lessons in this brief review of the literature and analysis about the role and potential of ICTs in health care delivery:

- Telemedicine provides benefits of resource coordination, urban/rural linkages, and connecting remote health staff to centralized health expertise and resources.
- Incorporating already-existing technology, such as phone or e-mail, into medical practice and routine consultancies can make a significant difference.
- While there is still limited evidence of improved access to learning in the developing world, there is strong potential for e-learning in health as demonstrated by a variety of successful small projects around the world.
- Multiple ICT routes can, and are, being used for e-learning in a mixed toolbox approach (for example, using Internet, radio, SMS, PDAs and print materials).

### 3.3 Improving communication around health

People absorb new information, ideas, and approaches by making sense of them in terms of their own local context and social, economic and cultural processes. They assimilate, adapt, and incorporate them into their daily realities in ways that help them better deal with the local situation. ICTs present a range of opportunities for the delivery of health information to the public, and for developing greater personal and collective communication. Commentators view ICTs as also representing a way for health workers to share information on changes in disease prevalence and to develop effective responses. They provide opportunities to encourage dialogue, debate, and social mobilization around a key public health concern. However access remains an abiding issue, particularly in developing countries [40].

Approaches that are being used for any of these purposes include:

- developing Internet information portals;
- using mass media to broadcast widely;
- developing interactive programming on broadcast media;

- making more effective use of existing communication systems; and
- developing community access points (CAPs).

### 3.3.1 Information via the Internet and other ICT media

ICTs are presenting health communicators, media, and other stakeholders with a range of new and stronger opportunities for health information dissemination. Whether this dissemination is effective or not requires further analysis, but the actual mechanisms for distributing health information and debate have clearly been expanded by the advent of ICTs.

#### 3.3.1.1 Information and communication via the Internet

There are increasing numbers of health-focused portals and information sites aimed at providing information to consumers as well as sites dedicated to health workers, individuals and a range of health-related communities of interest.

##### A. Patient focused

Navigating these information sites and determining which are worthwhile is becoming an increasing challenge for patients and health workers alike. A systematic review of "Web-based therapies" intended to encourage an individual's behaviour change found that 16 of 17 studies revealed the outcomes of improved knowledge and/or improved behavioural outcomes for participants using Web-based interventions [41]. Outcomes included increased exercise time, knowledge of nutritional status, and slower declines in health. [42] concluded from another systematic review that there were some positive effects on health outcomes from the use of information sites on the Internet. However, much of this was based on anecdotes and opinion rather than well-designed controlled studies. [43] concluded that because of the amount of information and the immediacy of access to it (for those with connectivity), the issue of quality of information was important. The author highlighted several rating systems that had been used but identified methodological problems with many of the approaches. The author suggests that health workers have an important role to play in educating patients to be critical users of the information they find on the Internet. As pointed out by [37] that health workers too "need critical appraisal skills to be able to distinguish unreliable from reliable sources of information."

##### B. General focus

There are a growing number of sites and portals directed at general public audiences or at particular groups of users, such as people living with HIV and AIDS, or media professionals who want background

information and data for health reporting. Many international NGOs have recognized the potential of the Internet for extending traditional communication projects, as well as for developing new approaches; such as providing resources for communications online. There is a need for policymakers to share learning and to collaborate around HIV and AIDS communication eResourcing to maximize this avenue of media support.

### 3.3.2 Increasing effectiveness of communication systems

ICTs such as Geographical Information Systems (GIS) can facilitate health sector planning, and help predict and identify the spread of emerging disease conditions. In Bangladesh, for example, GIS data has been used to warn the health authorities about the likely location and spread of cholera in coastal areas. In India, the Malaria Research Centre in New Delhi has used images from India's remote sensing satellites to map areas where a malaria-carrying mosquito was likely to be found on the basis of ecological factors conducive to its breeding and survival. Their model correctly predicted exact breeding locations, which were then targeted for specific control measures. An estimated 50 million inhabitants were at risk from this mosquito, whose presence was in some cases unknown to the health authorities until the satellite aided study was carried out [44]. In Africa, the Uganda Health Information Network (UHIN) has been making use of PDAs to provide early warning information about the spread of communicable diseases such as measles or cholera, as the following example describes.

Example 4 (Preventing illness in Uganda): Veronica is a midwife in the Rakai District in southern Uganda. She uses her PDA for her work and for her community. She travels to the wireless router that stores the surveillance report for the entire district and where she uploads reports from the rural health clinic where she works. She also can download news and medical information. If there is an outbreak of measles somewhere in the district, she will learn of it before it reaches her community. She can advise people how to prevent catching it. Equally, if her report shows a local rise in cholera, the district will review her data and send medications and specialist assistance to help out. It used to take six months before the district would respond to this type of distress message, if at all.

The data collection aspect of this initiative was particularly successful. The overall process was four times as effective as manual data entry. Even with the costs of hardware and software, it was still 25 percent more effective [47, 7].

### 3.3.3 Greater access to communication tools and opportunities

ICTs are also being used to improve access to communications for health centres and the communities they serve.

#### A. Community access points

Research in Zambia, Botswana, and Mozambique found that access to information about HIV and AIDS was a major concern [45]. Recognizing that it was not possible to provide individual access to such information, the study recommended developing community access points (CAPs) which could act as HIV and AIDS "knowledge centres." Telecenters, and local service providers. Use of such services could be increased by either basing or placing such centres close to primary client organizations – those that were likely to make extensive use of the service – such as the media, schools, and health clinics.

### 3.3.4 Increasing interaction, participation, and amplifying "voices"

ICTs are being seen as presenting new prospects for the voices of those who are not usually consulted – particularly those who are affected by ill health – to be heard, and for that local knowledge to be used to help frame and develop better services and better responses to people's illness.

#### A. New prospects

ICT has resulted in innovative and new communication forms. There is more peer-to-peer communication between individuals, as well as between intermediaries such as the media or health workers. There is more scope for personal reflective communication, anonymous online communication and research and online community networking by communities of interest as well as the traditional communities as defined by geography or social character. For example HIV and AIDS provides many illustrative examples of new communication enabled by ICTs; eForums and news groups abound, as do Websites by both health service providers and health communicators, advocates, international and local groups, and many others.

### 3.3.5 Key lessons

These are some of the key lessons about the role and potential of ICTs in improving communication in health care:

- There is growing evidence that ICTs aid health information dissemination, particularly via online routes.
- There is growing evidence that ICTs increase the effectiveness of some communication systems.

- Increasing access to communications allows more people to be linked to communication opportunities.
- Mass media ICTs, such as radio, remain key in communicating health issues.
- There are demonstrable benefits in combining technologies, particularly some of the older with some of the newer ICTs.

#### 4. CONSTRAINTS AND CHALLENGES

A number of factors can inhibit the introduction and successful application of ICTs in the health sector in developing countries. According to [47] identified four main factors: connectivity, content, capacity and capital.

##### 4.1 Connectivity

With connectivity, there are issues such as the lack of an enabling telecom policy and regulatory environment; lack of access to electricity, solar power options, and power supply back-ups; insufficient infrastructure and connectivity access; and high costs. Embedded in this are issues of broadcasting rights and regulations controlling the media. Connectivity access – measured in terms of telephone access, personal computer ownership, and Internet connectivity – varies widely around the world. Inequitable access also exists within societies. Within the African regions, segments of the population have been by-passed by the products of the information revolution. This is complicated by the fast-changing deployment of new technologies and accompanying standards that constantly raise the level of advancement that must be met by anyone who wants to remain current [48, 49].

This is part of a set of much broader constraints that include insufficient telecommunications infrastructure, high telecommunications tariffs, inappropriate or weak policies, organizational inefficiency, lack of locally created content and uneven ability to derive economic and social benefits from information-intensive activities [50, 51, and 52].

In the health sector, development and digital divides between industrialized and developing countries are wider than the gaps observed in other productive and social sectors. In some cases, the changes brought about by the privatization of health care added to the already high degree of structural inequity that prevails in most low and middle-income countries. Dependable connectivity is needed for reliable transactions. In developing countries reliable broadband connectivity is still limited, and usually only dial-up access is available. Poor telecommunications infrastructure,

limited number of Internet Service Providers (ISP), lack of access to international bandwidth, and high Internet access costs continue to be barriers to widespread use of ICTs. National expenditures among countries, even for countries of comparable income level, vary considerably [53]. Low per capita expenditure in health limits the market for new and expensive technologies.

However, Per capita expenditure in ICT is a better indicator of the real level of ICT investment than expenditure as percentage of the GDP. Some developing countries have expenditures that are comparable to that of developed countries when expressed as percentage of the GDP, although the absolute value per capita is low [54].

##### 4.2 Content

Content factors include the lack of local content creation, the language used and the relevance of content to the local situation. Appropriate language is frequently neglected in ICT programs and little content is available in local languages for health programs.

Another major content issue is the quality and reliability of health information. The Internet can provide a wide range of users with timely, accurate, diverse, and detailed health information. However, its decentralized structure, global reach, levelling of access to the tools of publication, immediacy of response, and ability to facilitate free-ranging interchange also make the Internet a channel for potential misinformation, concealed bias, covert self dealing, and evasion of legitimate regulation. It is very difficult to ascertain and recommend the credibility, motives, sponsorship, and eventual conflicts of interest in the more than 50,000 health Websites in existence. Many healths public-oriented Websites are profit-driven, others promote unproven and even dangerous forms of treatment or products, while others may have good intentions, but contain misleading or false information [55, 56, 57, 58, 59].

Given the sensitive nature of health care information, and the high degree of dependence of health professionals on trustworthy records, the issues of reliability (assuring that data residing in the electronic health records are accurate and remain accurate), security (owner and users of the electronic health records can control data transmission and storage), and privacy (subject of data can control their use and dissemination) are of particular significance and must be clearly and effectively addressed by health and health-related organizations and professionals [60].



Reliability, security, and privacy are accomplished by implementing a number of preventive and protective policies, tools, and actions that address physical protection, data integrity, access to information resources, and protection against unauthorized disclosure of information. There are diverse ways of ensuring the security and privacy of a patient's electronic health record between the physician and the patient's so as to ensure the integrity and confidentiality of the information [61].

In order to have a successful eHealth plan, there is need to further improve the perception of privacy and trust for citizens, new policies will need to be in place to define electronic health record (EHR) life cycle management and access rights. As demonstrated by [46] with the help of a case study, a framework for designing mobile eHealth applications deployment. The study demonstrates the power of using user centred design to create applications that align user's mental models and capabilities with their work environment. Analysis of the study shows that an eHealth application can only diffuse into constrained environments, if its interface does not hinder the workflow of the users; rather it should provide quantifiable benefits to the users in efficiently executing their tasks. However, a comprehensive review and reference source on personal data protection regulation was published by the Pan American Health Organization [62].

#### 4.3 Capacity

While capacity to adapt information to ensure that it is culturally appropriate and relevant is a major challenge, so too is the capacity to use ICTs effectively, and to service and maintain them. A skilled ICT work force is an essential ingredient for the effective use of ICTs in health. Systems professionals and technology products and services providers and project team leaders with high skill levels and experience in working in the sector introducing the ICTs are important components of success. The number of technicians, scientists, and portion of the GNP devoted to research and development is a good indicator of those capabilities.

The most successful efforts to incorporate information and communication technologies have occurred in countries with strong and efficient government and academic institutions committed to investing in education, scientific and technological development, and public services, in tandem with business sectors (for instance, banking and retail commerce) ready and willing to automate their operations. Capacity also refers to inequities in societies and the sharing of resources within the community.

For example, due to lower rates of literacy, women (and marginalized groups in general) are not given equal access to the benefits of ICTs. Ensuring that women are part of the target group, that gender deliberations have been undertaken by choice of the ICT tool, and that language or cultural norms do not exclude women benefiting from the ICT intervention are important considerations [39]. Several reports have provided highlights of the use of ICT to combat HIV and AIDS. In November 2001, a consultant for the International Development Research Council produced a comprehensive report showcasing several pilot project activities in this area [63].

Among other conclusions, the author recommended the importance of teaching girls and young women how to use the Internet. Other evidence [64] also suggests that women with the mastery of almost any level of ICTs increase their self-esteem and has spill over effects into other activities that work toward poverty alleviation, an important element in decreasing their susceptibility to economic situations that put them at greater risk of catching HIV and AIDS. The Mangelete women's group in Kibwezi, which started the first community radio in Kenya, for example, has trained rural women in the production and use of video to generate income, disseminate new skills, and use the Internet to access the necessary information [65].

#### 4.4 Capital

Generally, there is little investment in ICTs for health in most African countries. The picture is one of fragmentation, with many different varieties of ICTs being acquired from different donors. Very few government-run health services have properly functioning ICTs within them, and there is no reliable infrastructure to enable inter-organizational transfers of information. Invariably, there is no national health information and IT infrastructure to underpin the delivery of health care. As pointed out by [11] that technologies must be "integrated into health services that meet basic needs" if they are to be considered to be essential investments.

In Uganda for example, investment in ICTs for health is less advanced than might be expected, due to institutional, cultural, and financial factors [66]. The financial factor is one that is common to other regions: effective use of ICTs in health will need funding at a higher level than is currently the case. Finding ways to blend private and public resources in ways that contribute to the development of improved; publicly accessible knowledge bases are key challenges.

The only justification for using a particular ICT intervention is that the benefits justify the costs [67]. Those benefits must be identified, not only in monetary

terms but also in terms of improvements in access, quality of care, better return of resource utilization, better clinical end results, user satisfaction, and improvement of the overall community health status. Given the limited and finite resources available to health decision makers, the right choices can be reached only by appraising the alternative options to see which carries most added value, and is affordable and within budgets.

Overestimation of results and consequent unfounded expectations are common pitfalls. A common error has been to regard technology as the solution to logistical, administrative, and knowledge management problems of healthcare. The lesson to be learned for the use of ICTs in health is that technology can be justified economically only if organizations deploy it in a real practice environment and closely track how managers and direct care professionals are using it. This requires the stepwise development and implementation of processes and metrics to monitor productivity and impact [68, 69].

When investing in ICTs, a number of key criteria for evaluating and approving the project must be considered. Investments in ICTs are no different to other significant investments in terms of the procedures that must be followed and the need for rigorously constructed business plans [10]. There are some types of questions that could help in achieving their goals. Part of the cost-benefit analysis includes the question of sustainability. Interventions need to be designed that will have an impact not only in the immediate future but for many years to come. Sustainability issues can include ongoing upgrades, training, and maintenance of the system.

ICT projects, particularly those dealing with information systems, are notorious for running over time and over budget, yet often still failing to deliver all the specified functions in a satisfactory manner. This can be largely avoided by effective project management, including planning, quality assurance, and resource management components. Obtaining an effective system is not simply a process of competitive tendering, local development, or acceptance of an externally funded donated system. The procurement process should be planned and structured, in order to match the solution to the need and circumstances. This in turn needs a systematic approach to defining the requirements and the available resources, including running costs and staff availability.

## 5. EMERGING TRENDS AS DRIVERS FOR POTENTIAL USE OF ICTS

Predicting the future in the ICT sector is a hazardous occupation. As [70] notes, the rate of technological

innovation accelerates technological obsolescence. Technologies are changing rapidly and so too are opportunities. Nonetheless, some broad predictions are possible.

### 5.1 Emerging trends

Five areas of technology likely to offer strong potential for new developments are:

- wireless access to the Internet;
- wider use of telephones, particularly mobile telephony;
- greater exploitation of the power and reach of radio, and the ability of radio content to be locally determined;
- the use of digital video techniques to enable local language communication tools; and
- greater focus on combinations of technologies.

#### 5.1.1 Wireless access

Wireless Internet has the potential to provide low-cost broadband Internet connectivity to underserved and remote areas. Leapfrogging the delivery of a wired infrastructure by moving to wireless or radio technologies is also attractive to developing countries [71]. Wireless technologies may be deployed rapidly to help foster economic development and workforce productivity and to enable delivery of applications in the areas of e-health, eEducation, and eGovernment.

#### 5.1.2 Telephony

A study [72] has identified a strong connection between the use of the telephone and an increased demand for health services in Bangladesh, Peru, and Laos. The analysis at the household level shows that basic telephone service offers opportunities in delivering timely information on health services to households with relatively greater demand for this type of information.

Health workers will be able to track and monitor patients' symptoms using mobile phones with text capabilities in conjunction with a central database. For example, visiting nurses in the field might ask people living with HIV or people with TB a series of yes/no questions about their status, symptoms, and reactions to particular medications. They can also assess the need for more medication in a particular area. This yes/no information can be entered into a mobile phone and

sent to a central database. By creating an up-to-date database of health information, health workers can track infectious diseases in remote areas, coordinate medical supplies, and make better decisions based on more accurate information.

In Egypt, mobile phones have been used to promote maternal and child health. Home delivery was discussed by mobile phone users in rural areas and the phones used to mobilize assistance or transport to qualified health workers if deliveries proved problematic [44]. Example 5 describes how mobile phones are being used in South Africa by 80 counsellors to support people living with HIV to follow the treatment plan for their anti-retroviral drugs and how text messages are helping TB patients remember to take their drugs.

Example 5: (Mobile phones keep track of HIV and TB treatments South African) researchers have developed novel applications for mobile phone technology that improves adherence to HIV and TB treatments. These approaches have obvious benefits for the patients as well as helping to improve the health infrastructure and monitoring systems. The Cell-Life project, backed by local mobile phone giant Vodacom, has developed software and data management systems that let clinic workers use their mobile phones to monitor patients' HIV treatment and spot health problems before they become life-threatening.

The phones are loaded with R55 (US\$8.50) in airtime each month and equipped with a special menu that enables HIV counsellors to record data on a patient's symptoms and whether they are sticking to drug regimes, as well as other factors that might affect their health — such as a lack of money to pay for transport to the clinic, or a shortage of food. The information collected is instantly relayed over Vodacom's network to a central database, which clinic staff can access over a secure Internet connection. Cell-Life has just completed successful pilot projects in townships in Cape Town and Durban, in which about 80 counsellors were trained to use the mobile phones and kept track of nearly 800 patients.

There are plans to expand the project's reach into other provinces, and to develop “reverse billing” software that will enable the clinic to be charged instead of the counsellors using the mobile phones. They could then contact clinic staff in an emergency even if they had no airtime left — a measure that could save lives in

communities with few fixed-line phones. There is also a plan to bring South Africa's other mobile phone networks, MTN and Cell-C, into the project. On Cue, a small company in Cape Town formed by Dr David Green, a TB specialist, has developed a system to send text messages to patients via mobile phones, reminding them to take their medication at pre-determined times. It aims to provide an affordable solution to improve patient adherence to treatment and to reduce associated costs for both patients and clinics.

The names and phone numbers of patients are entered in a database and every half an hour the On Cue server reads the database and sends personalized messages to selected patients reminding them about their medication. The messages can be sent in one of three languages and in a range of styles to ensure they do not become boring. Of the 138 patients involved in the pilot, there was only one treatment failure. The idea is now being extended to other areas. [73 and [www.bridges.org](http://www.bridges.org) ]

### 5.1.3 Radio

The most enduring and established of ICTs, radio continues to maintain a central position in developing country health communication. A DFID issues paper [4] points to the contribution of community, national and international radio to health programs in the developing world and describes it as a strategic tool for human development and poverty reduction. There is a wealth of experience of radio health initiatives cited on the Communication Initiative Website ([www.comminit.com/radio](http://www.comminit.com/radio)).

“Soul City” is a high-profile health communication program in South Africa that uses radio, TV, and other media. It has built strong monitoring and evaluation processes into its work and is able to demonstrate strong impact in terms of knowledge, awareness, understanding, and change of practice in selected issues it has covered. Commentators rate radio highly as a cost effective, high penetration medium that offers affordable communication support services to remote, poorly-equipped, and minimally-staffed health facilities and communities. [74]. The established nature of the radio medium and its key role in decades of health communication mean that it enjoys an analytical credibility that other, newer ICTs still lack.

The liberalization of broadcasting in many developing countries plays a role in enhancing the position of radio as a powerful health communication route, although conversely commentators such as [4] point to this increased density of media, radio, and TV, as a potential danger. “This has critical implications for

how health messages are communicated, since there is very real potential for important health messages to be lost in a sea of media. Organizations such as the BBC Service Trust and Massive Effort respond to this by increasing the volume and density of messages in response. So increasingly, increased media complexity may force us to either 'upscale' on mass health promotion campaigns or 'go local' and use community mobilization increasingly to get messages across.

#### 5.1.4 Digital video

Health workers in villages can now carry VCD and DVD players that can communicate a basic message, which can then be followed through with discussion. In the past, video has been expensive to make and difficult to show in rural areas. Production of a video can now be done on a basic computer, and the cost of making a local language video produced by local health workers is less than a few hundred dollars. Portable digital players can be easily used to show the video. This process is only going to get easier. The NGO Gamos has explored this in Mexico, Moldova, South Africa, Cambodia, and Ghana. Impact studies show a remarkable change in knowledge and behavior based on the videos. In Ghana a number of agencies, including the Health Foundation of Ghana, have now trained their staff and are beginning to develop local language videos that can be shared with each other [75].

#### 5.1.5 Convergence and combination of technologies

Convergence and combination of technologies can help many developing countries improve patients' access to medical records and improve access to health information for patients and health workers. It has long been recognized, as a DFID report in 2001 noted, that "a combination of new ICTs and traditional media can provide the widest coverage and ensure that those excluded from education by virtue of poverty, gender, geographical remoteness or conflict are not excluded" [4]. Deciding which technologies to use "should be determined mainly by the specific local context and demand" [8]. In Kenya, AfriAfya has been working for more than five years to explore innovative ways of combining ICTs in different field settings.

Its experience underlines the importance of undertaking information-needs assessments – finding out what information people want – rather than simply supplying them with what is available. It also was quickly evident that despite the large amount of information available on the Internet, very little is directly suitable for dissemination to poor communities. It needs to be repackaged to ensure local suitability and relevance.

## 6. SOME ISSUES IN ICTS FOR THE AFRICAN REGION DEVELOPMENT

The paper concludes that opportunities do exist for the use of ICTs in the health sector of the African regions. However, a number of issues must be carefully considered in each intervention and setting:

- To what degree are the health sector structure and the national regulatory support conducive to problem-oriented, interdisciplinary, rapid-response collaborative technical work and to implementing the political, regulatory, and managerial tasks required to address multifaceted and complex technological problems?
- Have the goals, action plans and potential outcomes and benefits been clearly defined?
- Are there mechanisms for coordinating action led by the public sector in a way that links public, private, and social efforts, and engages with diverse stakeholders to speed the development and use of priority ICT solutions?
- What progress has been made in telecommunication sector reform and expansion of affordable ICT access?
- Are data-related standards and a regulatory and legal support in place?
- Are there mechanisms for developing the capacity of health workers, other intermediaries and community members to make the most effective use of the ICTs available and to develop content that is relevant, applicable, and culturally appropriate?
- What options exist to ensure continuity and sustainability of ICT projects and programs in terms of finance flows, public-private partnerships and building on existing information and communication channels and resources?

It is almost usual to re-emphasize the significance of ICTs to modern regional development, and its criticality to the African region if they must grow along their development vector. The real challenge is to strategically deploy ICTs in the health sector as highlighted above in a manner that simultaneously improves ordinary citizens' lives (poverty reduction).

## 7. RECOMMENDATIONS

The following broad recommendations can be drawn about the use of ICTs in the health sector to enhance the effectiveness of information systems in the African



region. These should be applicable at all levels, and the complexity of putting them into practice is one of the biggest challenges faced in the region in ensuring that the health system benefits, that health workers benefits, and that the people who make use of the health system – the patients and citizens – benefit and their health improves.

- Keep the technology simple, relevant and local;
- Build on what is there (and being used);
- Involve users in the design (by demonstrating benefit);
- Strengthen capacity to use, work with and develop effective ICTs;
- Introduce greater monitoring and evaluation, particularly participatory approaches;
- Include communication strategies in the design of ICT projects;
- Continue to research and share learning about what works, and what fails.

## 8. CONCLUSIONS

There is no doubt that larger proportions of people in the African region are suffering from poverty and lives below poverty level of one dollar per day as specified in World Bank report of 2000/2001. To achieve the goal of connecting all African rural areas/villages to broadband ICTs services, a thoughtfulness of the actions involving ICTs and health indicates that there is still a great deal that needs to be done. However, ICTs can be used to boost the skill and knowledge of health care providers and consumers through education to reduce poverty. One feels that if all the health professionals had access to computers and connectivity, they would try to find time for some e-learning programs, or even simply keeping up to date with all the research that is being carried out.

These will in turn ensure that right information reaches the right people, at the right time and in the right form. For these reasons, the emergence of information source (Internet) is changing the way people live. Service delivery is being applied to all sectors of human life, such as health care. Most African countries have little coverage of society health even though the spread of disease is high. In order to reduce this problem eHealth is an option. As eHealth has impacted on developed countries, it will bring a change also in the African region.

In this study we propose ICTs-based health system as a tool which can facilitate the effectiveness of eHealth for service delivery. The tool provides various facilities to create, specify, and select health care services delivery in achieving health related MDGs. Our tool will serve for both wired and wireless networks. The availability of human, material and financial resources combined with the right flexible ICTs policies and subsidizing ICTs tools and services to the poor is an indicator to implement the opportunities offers by ICT to take healthcare delivery to the next level in the region.

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