ICTs and Health Technology at the Grassroots Level in Africa

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Acronyms

DRC	Democratic Republic of Congo
GDP	Gross Domestic Product
HCPs	Health Care Professionals
HR	Human Resource
ILO	International Labour Organization
MDGs	Millennium Development Goals
OECD	Organisation for Economic Co-operation and Development
R&D	Research and Development
RN	Registered Nurse
RSA	Republic of South Africa
UK	United Kingdom
UNECA	United Nations Economic Commission for Africa
USA	United States of America
WHO	World Health Organization

Introduction

One of the central questions of the 21st century is how technology is producing a change in our mode of operation and how its benefits can be used and applied positively. Today's communications technology has enormous potential for helping people and communities improve their circumstances. The communications environment in which most people live has changed radically over the last decade, both in relation to the information people have access to, and the opportunities people have to communicate their own perspectives on issues that concern them.

Knowledge transfer should not be a one-way street. Too little regard is being given to the role and potential of local, traditional and indigenous knowledge, especially from rural communities, in the global equation. Efforts to reverse the situation have faced several challenges.

The difference in opportunities to access information has been referred to as the "digital divide". This term has become widely used to denote the inequity in the opportunities presented by the new technologies commonly known as Information and Communication Technologies (ICTs). The expanding digital divide is making a new dimension of poverty (information poverty), which is highly significant and visible. The potential levels of impact (both present and future) derived from this technology-related gap are fairly serious.

With scarce resources available for very basic development needs, such as water and sanitation, education, food security, and income generation, one may wonder why countries should then bother to provide these new technologies, and whether they are not unnecessary luxuries in many contexts. It should be realized that these technologies are nothing more than advanced information tools to be used if and when their use is beneficial. Among a poor farmer's first priorities is to get sufficient food for his family. ICTs can help him find better prices for his produce and enable him to buy more and higher quality food. The issue of ICTs and the digital divide is ultimately about greater choices. New technologies are not a solution by themselves.

2.   What are ICTs?

ICTs is an acronym for Information and Communication Technologies.   It is a technology that has revolutionized communication for the past two decades. It is a term used to describe both modern and old forms of communication ranging from the radios and telephones to the modern technologies such as the Internet and mobile communications. There is a convergence[1] of all these technologies.   In health, various systems have been developed with a view to effectively and efficiently delivering health services. ICTs have been used in various e-health initiatives such as telemedicine[2], electronic data records, e-learning and in health management information systems**.**

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[1] A term applied to the way in which computing, telecommunications and, more recently, television are moving towards a common technological basis characterized by the use of digital systems.
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puting, telecommunications and, more recently, television are moving towards a common technological basis characterized by the use of digital systems.

3.   The Case of *AfriAfya*

AfriAfya is a consortium of seven health NGOs (partner agencies) in Kenya, together with the Ministry of Health. The partner Agencies are: Aga Khan Health Services, Kenya; AMREF (African Medical and Research Foundation); CARE Kenya; Christian Health Association of Kenya (CHAK); HealthNet Kenya; Plan Kenya; World Vision Kenya; Ministry of Health, Kenya.

The idea for *AfriAfya* was based on the realization that while modern ICTs had provided commercial entities, universities, ministries, research institutions and big hospitals with information for their activities, it had done little for rural communities in the area of health. Rural and poor communities missed the benefits that arise from these modern communications, in both giving and receiving information. The agencies involved recognized that these new communication methods were not understood sufficiently well to be put into practice in much of the African continent.

It was noted that while there is severe shortage of up-to-date health information in rural settings, there is an abundance of health information in the various forms of ICTs especially the Internet, and yet the ICTs were not impacting rural communities.

AfriAfya was thus inaugurated to explore possible ways of improving communications for health and social development.

3.1   How ICTs have been used in *AfriAfya*
AfriAfya has used a range of ICTs. It attempts to combine modern and traditional communication methods. Some of the ICTs that have been used include:
- ❑ Audio programmes and video shows
- ❑ Diskettes, CD-ROMs and memory sticks with adapted health information in local languages
- ❑ Pamphlets, flyers and print-outs of desired information
- ❑ Mobile phones for both voice and data – bulk SMS using a customized software
- ❑ World Space radios – downloading selected Internet information
- ❑ Incorporating messages into traditional communication channels – drama, plays and songs

ICTs have generally been used to repackage health and development information. They have been used to link and dialogue with communities, researchers, and academia as well as to collaborate with partner organizations to implement health information systems.

Communication of up-to-date relevant health information to rural communities, production and sharing of local content and community mobilization has been done using ICTs.

4.   Role of ICTs in E-health at the Grassroots Level

At the level of community participation in the development arena, experience indicates that while the rhetoric is very much present, the structures to ensure a circular flow of information between and within local communities or between local communities, development workers and policy-makers are lacking. This is both at the national and international levels. A lot of valuable information, which is generated at the higher level rarely gets to the intended beneficiaries. In return, feedback from local communities on their own interpretations and solutions based on the impact of information or programmes intended to alleviate local problems scarcely ever gets back to the designers at the macro level, or to other communities with similar problems.

There are various e-health projects that have been started, aimed at making use of ICTs to benefit the rural communities.   Some of the projects are described as follows:

4.1   Telemedicine project

This project was founded in 2004 by the African Medical and Research Foundation in partnership with the ministries of health in Kenya and Tanzania.   This was after the realization that health care and technology were converging fast in Africa. The majority of people in Africa remain rural based and their health care is minimal. In contrast, the epicentre of health care expertise and resources in Africa remains in the cities.   AMREF noted that health care had not physically expanded to the rural areas despite the efforts of both government and international organizations. This is because of the enormous logistical costs and social change needed to make this both effective and efficient.

AMREF realized that if modern ICTs are innovatively and appropriately used, they would improve access, quality and cost of health care for rural populations. AMREF developed a concept to connect rural health care facilities to the centres of excellence in the cities electronically in a regional 'health intranet' and in turn to the world, enabling access to bodies of medical knowledge hitherto inaccessible. In this way health care is taken to the patient rather than the other way round.

AMREF has been in the medical field since 1957 and they have been using voice radio equipment to communicate. This had its own limitations ranging from unreliability, lack of accuracy and reliance on memory without much documentation. Also, given that some hospitals are in very rural set-ups, patient follow-up faced many challenges.   Medical staff also faced some challenges which included:
  ❑   Poor infrastructure and austere logistics when performing operations

❑   Professional and social isolation which resulted in poor morale and staff turnover

The telemedicine project is perceived to address these problems. In addition, AMREF has started a distance e-learning programme that aims at upgrading the skills of 26,000 nurses through distance learning.

4.2   Community health information systems

There are a number of projects working to develop community information systems, as well as to strengthen existing health information systems that are being funded by the Rockefeller Foundation (RF). These projects are run by *AfriAfya*, AMREF Kenya, Aga Khan Health Services (Community Health Department), Tropical Institute of Community Health (TICH) in Africa, and Moi University. The first project was designed to forge linkages with these other RF-funded projects to complement them and to harness the learning that has taken place and allow its application elsewhere. The project also aims at allowing the outcomes of sharing community information to be monitored and the impact to be evaluated.

AfriAfya works with Aga Khan Health Services (AKHS) in the coast region, AMREF Kenya in Eastern Province, Moi University in Eldoret and Tropical Institute of Community Health and Development (TICH) in Nyanza region. The project areas are Kwale, Kilifi, Makueni, Kisumu, Siaya and Homa Bay districts. These are rural districts located in the Coast, Nyanza and Eastern provinces that have high levels of poverty and HIV/AIDS prevalence, and where the Rockefeller Foundation grantees already have other ongoing projects.

The RF-funded project is aimed at strengthening health information systems and health care delivery through provision of relevant, reliable, usable and accessible information in a sustainable and appropriate manner in the selected target communities. The development partners have pre-designed forms used for data collection by the community members. Data are then fed into a computer for level one analysis by the community own resource persons (CORPS). At the partner agency level, they have a data base using Ms Access. Further analysis is then done using SPSS and Epi-Info.

The projects are mainly dealing with Health Management Information Systems (HMIS) and Community Based Health Information Systems (CBHIS). The project's goal is to harness ICTs for community health and development. The information generated by the communities and facilities is used for decision making and planning at their level.

There is also focus on strengthening community-based information systems, and ensuring linkages between these and the formal information system. The projects aim at providing a voice for these rural communities, as well as improved access to health and other development information in an effort to reduce the causes and effects of ill health and poverty.

4.3   Mosoriot medical record systems

In a unique collaboration, the departments of Medicine at Moi University, Kenya, and Indiana Universities in the USA established the Academic Model for the Prevention and Treatment of HIV/ AIDS (AMPATH). Since 2001, AMPATH has been providing care for HIV-infected patients in Kenya' second national referral hospital and a series of rural health centres in western Kenya.

According to the writers of an electronic medical record system for ambulatory care of HIV-infected patients in Kenya, "the AMPATH Medical Record System" (AMRS) is the core to the HIV Clinic Care Service. Clinicians enter data into an 8-page initial encounter patient record and a 2-page return visit patient record. Data are entered into a central electronic data repository for HIV infected patients only programmed in MS Access. After data entry, a summary report is printed that becomes part of the paper record and contains selected clinical data and evidence-based, patient-specific computer reminders for antiretroviral treatment, drug monitoring, and preventive care. Separate modules have been created for the antenatal clinic and the pharmacy. The design of the AMRS has input from the physicians in the HIV clinics who are knowledgeable about the local community and the constraints of a resource-poor setting. To date, the AMRS contains more than 20,000 visit records for more than 3,000 patients, almost half on antiretroviral therapy. Future development includes using wireless connections, tablet computers, and migrating to a Web-based platform.

The writers further state that, "the AMRS is the first functioning comprehensive electronic medical record system committed to managing and improving the quality and efficiency of care for patients with HIV/AIDS in sub-Saharan Africa. It has played a significant role in patient care at all AMPATH sites. It has standardized patient data collection and made data retrieval much faster than the traditional paper-based record. It has enabled evidence-based decision-making for patient encounters and for the health system. The AMRS is affordable and represents a model system for recording critical HIV/ AIDS data in resource-poor settings that will be delivering an increasing amount of HIV care. It will allow those funding the rapid increase in highly active antiretroviral therapy (HAART) to know the return they are getting on their investment and hopefully encourage continued treatment of the worst medical disaster to ever befall humanity."

5. Grassroots Connectivity Initiatives: The Major Challenges

The deployment of ICTs at the grassroots level presents a number of major challenges. Given the present physical, financial and linguistic access constraints, there is urgent need to improve the conditions for equitable and affordable access, through which the benefits of the information age are distributed. Some of the challenges faced in implementing ICTs at the grassroots level include the following:

Policy and legal structures are lacking

Issues regarding legislation and regulation pose mounting challenges, as ICT applications continue to be developed in many areas of the world. In most developing countries, the formulation and implementation of policies in the ICT sector is still very rudimentary, and the situation calls for an integrated set of laws, regulations and guidelines that shape the generation, acquisition and utilization of ICTs. Most countries lack policies and strategies that facilitate the harnessing of new ICTs for rural development, and where policies have been formulated, proper implementation plans and review strategies are often lacking.

High telecommunication costs in most developing countries have been a challenge

There are no telephones in rural areas hence alternative technologies have to be looked into. This makes the cost of basic Internet a strong deterrent in many rural areas. Alternative communication equipment such as the HF radio is very expensive in initial investment, installation and subsequent monthly charges. Although market liberalization has led to the entry of several private sector ISPs, service provision is through government telephone companies, of which service is inadequate in terms of robustness, low band width, congestion and noisy lines. This adds to the cost of connection.

The telecommunication and electricity infrastructure in developing countries is lacking or is poorly developed in rural areas

Satellite and wireless technologies are now in use in some developing countries, but these are largely developed around urban cities. The initial capital for using these alternative technologies is very high.

Lack of local content and language barrier

Information available through ICTs is mostly in English, which the majority of rural communities in developing countries cannot read. There is a marked shortage of relevant material in local languages

that responds to their needs, and this calls for significant investment and support for local content that can address the local needs.

High rate of illiteracy in rural areas

"Illiteracy is a fundamental barrier to participation in knowledge societies" (Mansell, 1998). A large proportion of the rural population of developing country nations, the majority of who are women, is illiterate. Most pictographic and audio-visual information has some text that goes with it. This means that these individuals are disadvantaged and lack the basic skills required to harness the benefits of ICTs. The assistance of intermediaries may thus be required.

Gender insensitivity has been a major challenge

Men and women in developing countries play different productive and community roles in rural development and have different needs and preferences. Women have wisdom and indigenous knowledge that is rooted in culture, traditions, values and experience. They produce more than half the world's food (World Bank, 2000) and face many problems in addressing food security and rural development. When new technologies are introduced, they are seen as a domain for men. Women have often been left out of initiatives associated with new ICTs. Their methods of communication and information exchange should thus be harnessed and be complemented with new ICTs (FAO, 1999). Women also spend most of their income on family welfare and have a greater impact on increasing agricultural productivity and improving the quality of family life.

The youth are another special group that deserves to be integrated in the ICTs projects

The youth have been given little opportunity to contribute to rural development issues, despite their numbers and fresh and innovative ideas. It is only by giving them these opportunities that a critical mass of information-aware people and leaders of tomorrow can be developed to ensure that their countries realize food security and rural development goals.

Inadequate human resources have been a hindrance.   To ensure more meaningful participation in rural development and to pave way for the creation of a critical mass of people that effectively harness ICTs in developing countries, training and capacity building must be an integral part of all ICT projects. To help in ensuring food security in Africa, human resource development through knowledge building and information sharing is very crucial. Users of ICTs have to be trained in the use, application and maintenance of ICTs before they become confident and comfortable enough to use them.

There is lack of localized technical know how. Most staff managing ICT-based projects in rural areas lack adequate training that would enable them to take full advantage of the new technologies. There is need to invest in training and advisory services for information intermediaries, telecentre staff, frontline workers and women's groups. There is need to identify the best training approaches for rural communities, targeting different user categories and different technologies. Such training could be done through conferences, workshops or training of trainers' courses. Introductory and

sensitizing workshops could be organized for different categories of users, and local experts could provide ongoing on-line support.

Sustainability of projects is often not given much consideration. Most projects established with external funding face major challenges after the project period has ended. Sustainability of these projects should be considered right from the onset and, where possible, should have government, private sector and community support. Users should also pay for services at a subsidized rate. There are as yet few examples of success in attaining such sustainability, and there is urgent need for viable models to be developed and tested. For the success of any ICT project in the rural areas, communities should be ready, willing and capable of taking the initiatives and responsibilities to make them sustainable. Once the project life is over a method should be devised to ensure that it is able to generate money and possibly give employment to the local community. It should supplement activities such as farming, agriculture and health issues within the area.

In some projects, emphasis has been more on the technology than the people. Uses that the technology will be put to are never given any consideration. As a result, participation and support often come from a small group of people that in turn remains the only group benefiting from the facility. In many projects, the problem is the information itself because the kind of information that suits the needs of the community and the suitable form through which to convey such information is ignored.

Institutional management and policies have been a challenge to ICT implementation. This is both at the level of the implementing organization, the donor and the target community. Participatory management is very crucial at every level of project implementation.

6.   Key Lessons

Experience in information and communication technologies for development (ICT4D) projects has shown that ICTs have to address practical problems to be relevant. It is important to have a two-way communication process and share information that users can identify with. Community information needs must be researched on and appropriate materials and content developed.

The implementers must understand local power dynamics, minimize social exclusion and endeavour to strengthen the social capital. Building relationships to improve livelihoods and economic development is key. A project must focus on community priorities and not the technology. It is important to plan for financial sustainability. Social and institutional sustainability must be incorporated.

Lessons from the project must be shared with practitioners, researchers and donors. Monitoring and evaluations must be continuous.

Experience has proved that ICT skills transfer is relatively easy. However, this is subject to the way it is done. There must be an attempt to adapt to local infrastructure and choose appropriate technologies. ICTs must be blended with traditional information systems and be built on existing information systems.

It has become increasingly clear over the past two years that offering the whole world a phone and a computer screen will not in itself help bridge the digital divide. The new technology is practically worthless unless people are equipped with the know-how, and the willingness, to use it. Those who cannot use it confidently will become increasingly marginalized within the modern world. As Edwyn James (2000) clearly states in his article '*Learning to Bridge the Digital Divide'*, "It is not enough to equip people with computers. It is necessary but not sufficient to provide avenues to information and knowledge. What is more important is to empower people with appropriate educational, cognitive and behavioral skills and tools."

There are some arguments and beliefs that new technology would soon be widely available to individuals and communities worldwide. However, there are also doubts that technology would be a cure for all of today's problems. Merely because people have access to the Internet does not mean their lives will improve. In addition, emerging economies might not compete in the capital-intensive world of information technology and are in danger of being left behind in the information revolution.

7. Tips on ICTs Introduction at the Grassroots

Those introducing the ICTs must engage in ongoing dialogue with local people about the role and impact of ICTs and the context in which they will be introduced.

The local people and the larger community should identify their needs, which should be the driving force behind ICTs projects, rather than the projects or the technology.

Awareness should be raised on how ICTs projects may impact the community and affect people's lives and livelihoods.

Dialogue and debate on who has control of these new tools and what effect they may have on community power dynamics should be promoted. Cultural and social sensitivity to the use of ICT tools for educational and informational purposes should be taken into account.

8. Recommendations to Policy Makers

The Ministry of Health and the ministry concerned with ICTs should work together to put up infrastructure for health management systems.

More rigorous monitoring and evaluation of projects should be done and frameworks or guidelines for measuring impact should be developed.

There should be a shift from technology-driven projects to a more holistic approach in which the wider systemic economic, social and communication aspects of communities are central concerns.

Partnerships should be created with public and private institutional infrastructures (universities, research institutions, schools, libraries, hospitals, NGOs) and built on existing formal and non-formal local organizations and communication networks.

Governments should encourage health workers at the grassroots level to stay long, through incentives such as appropriate compensation, opportunities for distance learning, and so on.

E-health initiatives should be encouraged and promoted through ensuring that ICT equipment for health related activities are zero rated.

9.   Conclusion

The information revolution has clearly shown that ICTs are very applicable and relevant at the grassroots level in Africa. However, it is not true that if you give people the computers they will have the need to access information. It is important to find out what information people have access to, and whether it empowers poor people and gives them a greater voice.

This follows from the fact that knowledge is socially distributed.   Information by itself is insufficient. Maintenance of the information systems resources should also be given the necessary consideration. To ensure sustainability of new communication technology at the grassroots level, there is need to ensure that ownership of both the message and the medium, the content and the process resides with the individuals or communities affected. New technologies should have a bias towards communication that gives voice to the previously unheard, and that has a bias towards local content and ownership.

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