



Patients benefit from HMIS through more efficient and professional services.

Realising a lasting jump in health care performance

Challenges and achievements in the Tanzania health sector

The health sector is a large and complex social service sector. It is one of the largest sectors in terms of professionally trained workers. The health sector is defined by a high degree of standardised procedures and professional norms. Since the 1980's the role of information and communication technologies (ICTs) has become of growing importance. The International Institute for Communication and Development (IICD) is working in Tanzania to support health care development by use of ICT tools.

The health sector in Tanzania

Since independence in 1964 the country struggles to improve health services. During the late 70's the service level in health was relatively high. Economic problems and structural adjustment devastated the health sector, causing falling numbers of health workers, decrease of available materials, and the referral system breaking down. Also the rural-urban inequality increased sharply.

The implementation of the Sector Wide Approach (SWAp) in 1998 in the health sector has resulted in greater

sector coherence and consistency, supported by the decentralisation of responsibilities to local government. Efforts have also been made to improve the skills of health staff, which combined with other government measures had a positive effect on the service quality of health care. However, the quality of and access to health care in rural areas is still lagging behind, also caused by the difficulty of retaining staff in remote regions.

Despite the improvements gained, effectiveness and efficiency of the sector as a whole needs to further progress

to ensure better performance and quality of health care. Information and communication technology can and will play a major role in supporting this process.

The challenges and the tools

In Tanzania, most people (70%) are living in rural areas where access to health care is poor. Yet the epicentre of health care expertise and resources remains in the cities. Isolation from the rest of the medical world, lack of up-to-date reference material and lack of consultation possibilities has led to low quality of diagnosis in rural areas. People who can afford it come to cities for their health care: in huge numbers and at enormous cost. In this environment telemedicine offers great possibilities for patients in rural areas, because they can get specialist consultations in their own hospital.

A heavy burden on the sector is the lack of professionally trained health workers, especially in remote areas. Recent research by McKinsey estimated the shortage of health workers at 58,000 as to cover minimum needs. This implies a tripling of the existing capacity. Most stringent is the shortage of doctors and clinical officers.

For health staff it is difficult to have access to training courses, there is insufficient access to conventional medical and public health information resources, such as journals, which for health workers are essential to stay up to date with medical developments as to provide good health care. E-learning offers huge potential as it can improve the quantity and quality of training for health workers, also those in remote areas, where continuous professional development is a challenge.

Health facility management suffers from inefficient management practices due to shortage of staff, high turnover rates and inadequate health utilization data. The quality of information from health facilities does not meet the required standards, takes a lot of time from the staff to collect, and data rarely reaches policy makers in time for informed decision making. The ICT structure in Tanzania has developed to a level where it is realistic to computerize some of the routine processes in hospital management. A Health Management Information System (HMIS) improves the ability to collect, store and analyse health data, increase data accuracy, increase accountability, and improve tracking of health trends. This information leads to better health care planning, improved diagnosis and more patients getting access to health services, whilst at the same time hospital staff is enabled to work more effectively and professionally.

At present the ICT initiatives in the health sector are quite scattered. For people working in health a platform where they can share experiences and find information on ICT activities will create considerable added value and provide cost effective solutions. A web based platform can support awareness raising, knowledge sharing, networking and information provisioning for a wide and dispersed user audience.



In trying to tackle these diverse challenges the sector is facing, the ICT for health projects IICD is supporting are covering a wide range of activities to strengthen the sector and improve performance.

The IICD health programme

The challenge for ICT is not to become 'an additional burden', but to be a useful tool to alleviate problems and to increase performance. The methodology IICD developed for its programmes is based on participation and genuine ownership and helps to jointly construct valid and robust ICT solutions in a low resource setting.

The ICT for health projects can generally be categorised in three types of interventions, based on the different groups of project users.

1. Support **policy-makers** with creating a conducive policy environment. Health is a key sector for development and plays a crucial role in poverty eradication. Therefore, a concerted and guided use of ICT in the health sector is crucial for a more cost-effective and better performing sector, which avoids duplicating activities and provides quality services.
2. Improving the management of and access to information and knowledge for better health care delivery by **health staff and/or health students**: health data is arguably one of the most important aspects of health care intervention. Three types of information are needed for health staff:
 - **Health, hospital and patient information**: accurate and timely data, on e.g. the number of patients, types of deceases, types and cost of interventions, helps to plan and prepare health policies. An efficient information system also has the potential for better coordination, transparency and accountability. The health sector in most developing countries suffers from inefficient management practices due to a number of factors, including a shortage of staff and high turnover rates, the low quality of information from health facilities and the extensive time needed from health staff to collect the data.
 - **Professional development and Continuous Medical Education (CME)**: although health staff often works in rather isolated areas it is crucial to be kept up-to-date with the latest developments. Therefore tools like Internet, audio-conferencing, CD Roms and Personal Digital Assistants can help to keep health staff informed



A field visit in the Mwanza region to show neighbouring hospitals how AfyaPro is used in practice.

and allow health staff to keep their knowledge and skills up to date.

- **Telemedicine:** using information and communication technologies for the exchange of vital information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interest of advancing the health of individuals and their communities (WHO, 2004). This can be an effective tool in the delivery of professional health care services to improve the delivery of health care where distance is a critical factor.
3. Improving access to information for patients and/or people in the community: this may involve health education and campaigns (Public Health) using radio, Internet or television in the appropriate location, transmitting the appropriate content, in the appropriate language.

The Tanzania health programme

The health sector is a relatively new sector within the IICD Tanzania country programme. In 2005, a national Roundtable on health was organised, by the Ministry of Health and Social Welfare (MOHSW), Christian Social Services Commission (CSSC), Tanzania Commission for Science and Technology (COSTECH) and IICD jointly, which resulted in a portfolio of complementary projects. Much attention was paid to ensure that these initiatives would not become islands.

Harmonization of initiatives, standards for data formats,

	Project users	Possible ICT interventions
1	Support policy-makers with creating a conducive policy environment	ICT policy and strategy development in the health sector ICT implementation plan
2	Improving the access to and management of information and knowledge for better health care delivery by health staff and/or health students	<p>a. Management of health, hospital and patient information</p> <ul style="list-style-type: none"> - Management and logistics of patient care - Administrative systems - Patient records - Ordering and billing systems - Disease surveillance and epidemiology - Quality assurance systems - Patient information - Biomedical literature search and retrieval <p>b. Professional development and Continuous Medical Education</p> <ul style="list-style-type: none"> - Health research - E-learning <p>c. Improving the delivery of health care</p> <ul style="list-style-type: none"> - Telemedicine and remote diagnostic support - Diagnostic imaging
3	Improving the access to information for patients and/or people in the community	<ul style="list-style-type: none"> - Advocacy to improve services - Interactive communication - Media approaches

Table 1: possible ICT interventions per user group

hard and software, guidelines for investments are crucial to reduce investments and recurrent costs. The multistakeholder and participatory approach makes this possible.

Strategizing ICT for Health

In line with Tanzania's national ICT policy, the Ministry of Health intends to develop an ICT policy and implementation strategy for the health sector. Chief executives realize the potential of ICT, but awareness and capacity at broader levels need to be increased.

In this project, Christian Social Services Commission (CSSC), Tanzania Commission for Science and Technology (COSTECH) and the Ministry of Health and Social Welfare (MOHSW) undertake ICT awareness raising and capacity building among its staff and stakeholders to develop an ICT implementation strategy.

The objective is to develop a policy implementation strategy to deploy ICT in a useful and affordable way in the Health sector. This is based on a process of consultation of relevant stakeholders in the sector.

Specific objectives are:

- A white paper prepared on ICT policy in the health sector and an implementation strategy for the next five years.
- Ministry staff exposed to a participatory approach through public-private consultative meetings and capacitated in ICT policy development.
- Acceptance by main stakeholders in the health sector for a harmonized and a cost-effective way of embedding ICT into the health sector with priority for the area where it has highest impact.
- Inventory of different on-going initiatives and promote their integration through an inclusive process.

Development of Management Information System for Health Facility

The project developed a customized Health Management Information System (HMIS) for use in 26 health facilities of the Evangelical Lutheran Church Tanzania (ELCT). Currently the HMIS is in use by 5 hospitals and in 2009 the system will be implemented in at least 5 other ELCT hospitals. The HMIS collects health data to be used by the hospital management and also to meet the needs of the MTUHA, the government registration system for the health sector.

Direct users are the hospital employees, who are enabled to work more effectively and professionally. The HMIS provides timely and accurate information leading to better health care planning, improved diagnosis and more patients getting access to health services. An over 30% financial improvement is recorded through better revenue collection, improved patient flows and use of capacity.

The system considerably reduces the possibilities for corruption and malpractices as it provides insights in process, work, financial and stock flows. This transparency can be damaging to certain parties that benefitted of the situation before. Therefore an incentive structure and careful change management are required.



Nurses taking part in an AfyaMtandao field visit in the Mwanza region.

The project team has developed an approach to Change Management. A '14 steps approach change management' guide is in preparation.

The HMIS platform used is the open source software Care2X, which integrates data, functions and workflows in a health care environment. Software, for the entire management and reporting tool from facility to national level, is developed by the Health Information Systems Programme (HISP) of the University of Oslo. It is the intention to develop a generic Tanzanian version, and hereto ELCT programmers are cooperating with the University Computer Centre (UCC) in Dar es Salaam. Software includes modules for patient registration, billing, laboratory results, pharmacy management, stock/inventory management, x-rays, doctors' office and ward management.

IICD works with the ELCT health facilities and the Christian Social Services Commission (CSSC), the branch organisation that ELCT is a member of, on improving health management and reporting. Using information for your own purpose provides a strong incentive for delivering quality data, which in turn improves the national reporting.

At district level, the University of Oslo's HISP programme assists in analysing and integrating the district health data, which also contributes to the national health reporting.

District Health Management Information Systems (DHMIS)

In September 2008 the full integrated health reporting for Mwanza district has been generated automatically: A novelty for Tanzania.

Reliable data is vital for health workers to provide cost efficient and effective health care to the population. Also, timely and accurate information is crucial for policy makers to be able to make well-informed decisions to improve national health care.

The implementation of a District Health Management Information System (DHMIS) aims to improve the ability to collect, store and analyse health data, increase data accuracy

and effectiveness of intervention, increase accountability, and improve tracking of health trends in the district. Information on patient registrations, diagnoses, treatments, lab tests, billing and pharmacy records are being digitalised. The HMIS is rolled out in eight hospitals and four offices of the City Medical Officer and Faith Based Organisations. ICT training and change management take place both at facility and district level.

The district authorities appreciate the project and have financially supported 7 additional health clinics to join the initiative.

The AfyaPro software used for the DHMIS is developed by NPK Technologies, a Tanzanian company that started to produce health software as a spinoff of the IICD Kinondoni e-Governance project. The software functions well, reporting tools are adapted to the needs of the customers and the company provides a good support structure. Presently a financial module is added to the system. IICD purposely choose to work with two different types of HMIS software as to maintain the stimulus of some competition, to enrich the lessons learned and to broaden the scope for developing good practices.

The ELCT HMIS project and the DHMIS project are ultimately quite similar and converge, but do differ in some aspects. Besides working with different types of software and being active in different regions, in the DHMIS project more emphasis is put on integrating data at district level. In the ELCT project more emphasis is placed on developing detailed functionalities for health facilities and on change management.

Modular Strategic Implementation of ICT in Health Care Facilities

It is widely accepted that ICTs can assist various functions of health care facilities. However, the mere presence of ICT in a health care facility does not guarantee its usefulness in improving the quality and efficiency of delivering health care. In fact, if implemented in an ad-hoc and unplanned manner, they actually have a higher potential to be an additional burden in terms of maintenance and operational expenses. Therefore a clear strategic model is needed that will take into consideration the various characteristics and requirements of each health care facility. This strategy must be modular in that a health facility can choose the module that best meets their urgent requirements. A modular approach also ensures that ICTs can be implemented in a phased manner so the changes for the local staff and management structure come gradually and are not overwhelming. In this project ICT is implemented in two district hospitals using the phased implementation philosophy. Magu District Hospital uses the Connectivity and the HMIS modules. The Sengerema Designated District Hospital is implementing the Connectivity, Continuous Professional Development and Public Internet Facility modules.

There are specific objectives for each hospital. The objectives for Magu District Hospital are:

- Implementation of HMIS to increase operational efficiency
- Training of HMIS users
- Change Management Training to deal with changing organisational procedures and information flows resulting from ICT use
- Increased internet connectivity

The objectives for Sengerema Hospital are:

- Implementation of the internet access module in the hospital
- ICT training for the hospital school of nursing and school for medical officers. This will be one of the first schools to have integrated ICT in the curriculum, both for nurses and clinical officers.

The overall objective is to develop practical knowledge on ICT implementations and disseminate this within the sector.

E-Learning Incubator for Health Workers

Health workers need to be trained continuously to stay up to date with medical developments and provide good health care. The present shortage of qualified health workers is severe. E-learning will contribute to the improvement of this situation and might be an incentive to remote health workers. E-learning in health is new in Tanzania. It has huge potential as it can improve the quantity and quality of training for health workers, also those in remote areas, where continuous professional development is a challenge.

The E-learning Incubator project incites health training institutions to integrate e-learning in their programmes if appropriate. The project acts as a centre of excellence in the field and assures awareness raising, training, support in the development of proposals and actual development of e-learning courses in the health sector.

Telemedicine

The Telemedicine project aims at introducing telemedicine in Tanzania, and to develop good practices and a platform for awareness raising, knowledge exchange and policy making in this field. Tanzanian communities, especially those living in rural areas, will have increased access to good quality health care because they can get specialist consultations in their own hospital. The telemedicine platform used is iPath: a collaborative online platform for exchange of medical knowledge, distance consultations, group discussions and distance teaching in medicine. Doctors can upload medical cases to the web interface for consultation and receive advice and diagnosis from doctors in Tanzania and abroad.

In the first two months of operation (March and April 2008) about 60 consultations took place, which is a promising start. Most consultations were in internal medicine, paediatrics, radiology and dermatology.

The project owner is the Evangelical Lutheran Church (ELCT). ELCT owns and manages 20 hospitals, 5 paramedical institutions, over 160 dispensaries and health centres and various projects and programmes, thus providing health care within a range of about 15% of the

national health services in Tanzania. The project is closely linked to another project with ELCT on HMIS.

ICT4Health Network AfyaMtandao

The implementation of ICT in the health sector requires knowledge, good practices and appropriate procedures to spread through the sector and to professionalise health management. AfyaMtandao (HealthNet in Swahili) will contribute to this.

The ICT initiatives in the health sector are quite scattered and a platform where experiences and knowledge can be shared and information and support asked for will offer added value and cost effective solutions, while at the same time providing a tool for community building.

The network will develop based on the needs articulated by its members.

AfyaMtandao will assist members with ICT support services like ICT training and an ICT helpdesk.

Objectives:

- To create an organisational nucleus around which members can exchange knowledge, share experiences and innovate ICT in the field of health care delivery in Tanzania
- To build and develop health professionals' online communities around areas like telemedicine, health management information systems and e-learning.
- To assist members in timely and effective technical ICT support.

www.afyamtandao.org

Development impact

Development is a complex process and it is difficult to measure the impact of information and communication technology (ICT) on health care isolating its effect from other influences. Even within the setting of a project this is not an easy exercise. Nevertheless, it is important to have mechanisms in place for monitoring and evaluation (M&E) that enable those involved in the project to assess over time the effects of ICT interventions on health care.

IICD's monitoring and evaluation (M&E) system is considered a tool for learning rather than control, and the process is carried out by a local organisation in Tanzania. The M&E approach is twofold: gathering data regarding the impact and the profile of end-users of the projects and using questionnaires and focus groups to gain an insight from the participants themselves on how the project has affected them.

Consisting of 7 projects, the ICT health programme currently reaches approximately 2,050 users and 322,260 beneficiaries. For 2009 a growth to approximately 6,025 users and 582,800 beneficiaries is estimated. But as the programme is quite young - formulation of the projects started in 2005 and first implementation in 2006 – it is early to measure real impact. However, data has been gathered and focus group meetings have taken place, and certain effects and impact start becoming clear as the outcomes below show.

Capacity building

Capacity building is a major component of the programme. In 2007 and 2008 several training courses have taken place, like basic maintenance for health projects, Care2X/PHP (open source software), HMIS awareness and Training of Trainers. For these training sessions 39 questionnaires have been analysed and the trainees affirmed to have achieved their training goals: enhanced ability to use, maintain and assemble computers, managing daily work comfortably including planning, programming and scheduling of presentations, troubleshooting and sharing knowledge with other ICT experts.

Various seminars were organised, and an analysis was made of questionnaires received from 80 participants. Their goals for attending were: to learn about the AfyaMtandao network and how they can be involved; networking; to gain knowledge on ICT and telemedicine in particular; to be informed about other technologies; to learn of more opportunities and means of updating and improving performance in their institutions and organisations.

The participants furthermore indicated that the participatory nature of the seminars offered the opportunity to enter into discussion and exchange experiences, which enabled them to get a clearer vision on the mission, structure and action plans for their projects and come up with solutions to tackle certain problems in the health sector by using ICT in areas as e-learning and telemedicine.

Impact of the programme

From May to August 2008, monitoring and evaluation data from 54 users of the D-HMIS and 3 locations of Health Facility Management ELCT projects was collected. The data show that better record keeping was the main motive for joining the project. Other motives include the need to improve institutions' health services, attaining knowledge, self development and improving communication. Other outcomes are the following:

Awareness shows to what extent users of the project have become more aware of the possibilities of ICTs for health care, in their work or daily life. In 2008, awareness was 69%, which is very high, especially compared to last year when this was still 57%.

Empowerment indicates what users have learned and how they applied their new knowledge and skills in practice, for instance by using the computer to search for information, or by helping others. Empowerment is also very high, with 65% of users claiming to feel more empowered as a result of the project (compared to 44% in 2007).

Economic impact in the health sector is not about earning more money for the user. It is about indirect economic benefits, such as more efficiency for the hospital or better job perspectives for the individual. The increase in economic impact is significant and very large since last year. In 2007, only 48% of users saw an economic impact of the project. In 2008, this number increased to 57%.

Sector Impact looks at the improvements in quality of



The HMIS provides timely and accurate information to all hospital staff.

hospital and health care in general, for instance by improvements in record keeping. 56% of users see an impact on the organisation, which is quite high, especially since the projects have only been implemented recently.

Negative impact measures negative (unforeseen) aspects of the project, such as e.g. only catering for privileged people. Unfortunately, negative impact is slightly high and higher than last year, with 49% of users claiming to also see negative impact of the project. The statements “Through this project I am now planning to find a job with another organisation” and “This project reaches mostly the privileged” result in some agreement amongst the users. Irregular power supply is another reason for discontentment.

In some projects the link between achieving one’s goals and participation in the project is quite direct, like for example in the District Health Management Information System project, where well kept and easily accessible patient records can now be found as a result of the project.

In cases where people indicated that their goals were not achieved, they would like to have received more on-the-job training or possibilities to practice. Practising is sometimes not possible due to a lack of infrastructure and/or Internet connectivity in their institutions. Another obstacle to achieve goals was explained by a staff member who indicated that: “the data system was to be used in multiple departments and coordination was difficult as the importance of keeping data up-to-date was not considered as important by some of the other departments”.

Lessons learned

Although a relatively new programme, lessons are learned continuously through the feed back mechanism of the monitoring and evaluation questionnaires and focus group

meetings. Some of the lessons are applicable to project implementation in general, others more specific for the health sector and/or ICT project implementation.

- Embedding of a project in the host organisation is very important. Experiences show that it is crucial to involve decision makers from the beginning of projects onwards and to help them understand the benefits. A project should not be depending on one person; it has to be carried by a team of people to ensure continuity when staff members leave.
- Thorough knowledge of the policy, environment and people involved in the organisation is necessary and care should be taken of whom to invite when.
- The rapid turn over of staff in the health sector requires frequent re-training within the projects. The ‘emptying’ of institutions, specifically in the faith based health organisations, is caused by major salary differences with the public sector and forms a serious threat to the projects.

Policy

- Support policy-makers with creating a conducive policy environment. To build a consistent ICT implementation strategy in the health sector requires a multi-stakeholder and participatory approach. It helps in identifying areas where performance can be boosted.

Health Management Information Systems

- Hospital management is a very complex field. It entails the development of management skills and a business model for the hospitals. Essential is to have a thorough preparation in terms of awareness raising and training among staff to enable them to take ownership and take decisions with regard to the HMIS implementation.
- Long term support to a hospital is required to assure trouble

shooting and a minimum of system down time. It is important to assure power supply backup for any HMIS.

- Using the HMIS for organisational development instead of simply fulfilling reporting requirements is much more effective; it can then also be used to build management capacity, enable informed decision-making and strengthen lobbying. In Tanzania it became clear that the effectiveness of the HMIS could be strengthened even more when it was linked with the government reporting system. Otherwise different reporting systems might create extra work, whereas now it will save health staff a lot of work.
- As is the case with other projects; in order to be successful, an HMIS needs to be firmly embedded in the organisational processes of an organisation, and needs to be politically and technically supported by the main stakeholders in the sector.

E-learning

- In e-learning using a flexible process approach is more helpful than following a process model. It allows tailoring for your specific audience and securing buy-in from institution's management.
- When applying flexible processes it is important to document the lessons learned and arrangements made, to make goals, opportunities and constraints become clear.

Telemedicine

- The challenge is how to integrate telemedicine in the current practice of health workers, in the health facilities organisations, in the billing system, in the certification and accreditation. In the longer run also issues like the health policy, including the legal status of telemedicine, will have to be addressed.
- Telemedicine applications have shown to be picked up earlier by: young doctors, rather than the more senior doctors who are less computer literate; doctors in remote hospitals, far away from referral hospitals; doctors in hospitals run by foreign missionaries, who tend to promote the use of telemedicine.
- Patients are willing to pay for quality care in rural hospitals. Also the doctor who is using modern technology is respected. New generations of doctors, who are used to

Internet, will change the old practice in the remote hospitals if they are encouraged.

Technology and capacity building

- When using ICT as a tool the main challenge proves not to be technical, but human and organisational. Hence change management is essential to accompany the introduction of these tools, as work flow processes and responsibilities within an organisation change.
- Combine the use of ICT applications with sufficient capacity development activities. A concerted and guided use of ICT which will not only focus on ICT applications for the health sector and ICT infrastructure, but capacity development at all levels in the sector will also be more cost effective and boost performance and quality.
- Budget all the cost of equipment, services and connectivity in one package as to get a clear and concise picture of investment, also for the longer term. Technical support and reliable arrangements with service providers are essential: non-functional systems or connectivity down time will severely undermine the project. Power supply backup in health facilities needs to be in place.
- Experiences have learned that it is better to start with only one subject in one hospital - instead of targeting multiple goals - and to build upon that and expand in the longer run. It is also crucial to give doctors and medical staff the recognition for their important role in and work for the organisation.
- Change management is complex and must be done carefully, step by step. It is recognized that even with the best of intentions, managers and project leaders can sometimes overlook elements of the change process. This can result in workplace disruption and disharmony which impede the success of the change process.

Contact information

For more information on the IICD Tanzania country programme and health programme visit www.iicd.org or send an email to information@iicd.org.

With the right tools, people in developing countries can considerably improve their livelihoods and quality of life. Better access to information and communication technology (ICT) is particularly vital in enabling them to achieve their goals. This is why the International Institute for Communication and Development (IICD) creates practical and sustainable solutions that connect people and enable them to benefit from ICT. As an independent not-for-profit foundation, we put knowledge, innovation and finance to work with partners from the public, private and not-for profit sectors. Together, we can make a world of difference.

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