Using ICTs to Enhance Healthcare in Zambia

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Abstract

This paper examines an electronic record system in Zambia, where Information and Communication Technologies (ICTs) have been adopted and are being used innovatively in one area of the health sector – perinatal care. The paper explores how the system known as the Zambia Electronic Perinatal Record System (ZEPRS) is being used in Lusaka, the capital city of Zambia. Having carried out fieldwork in 2005 where interviews were conducted and observations made in relation to the system, the paper makes the case that such use of ICTs is contributing to human development and subsequently helping to meet some of the Millennium Development Goals (MDGs). This paper therefore makes the case that ZEPRS, one of a first of its kind in sub-Saharan Africa, is a good example of a programme that is being used to meet United Nations (UN) MDGs, of which enhancement of health is one of them.

Key Terms: ICTs, ZEPRS project, healthcare, Africa Information Society Initiative, UN Millennium Development Goals.

Résumé

Cet article porte sur un système d'archivage électronique en Zambie. Dans ce pays, en effet, les technologies de l'information et de la communication sont rentrées dans les mœurs et sont utilisées de manière novante dans un des sous-secteur de la santé – La santé périnatale. L'article examine l'utilisation du système dénommé Zambia Electronic Périnatal Record System (ZEPRS) à Lusaka, la capitale, du pays. Au terme de ses travaux sur le terrain effectués en 2005, constitués d'interviews et de séance d'observation relatives au système, l'auteur soutient la thèse selon laquelle pareil usage des TIC contribue au développement humain et éventuellement à la réalisation de certains des objectifs du Millénaire pour le Développement (OMD). En conséquence, cet article fait sien l'argument selon lequel le ZEPRS, un des pionniers en son genre en Afrique au sud du

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Sahara, demeure un exemple valable de programme mis à contribution pour la réalisation des OMD des Nations unies, au rang desquels figure l'amélioration de la santé.

Mots clés : TIC, Projet ZEPRS, Santé, Africa Information Society Initiative, Objectifs du Millénaire pour le Développement (Nations Unies).

Introduction

More than ever before, ICTs are having a huge influence on human lives. There has been a tremendous amount of research on this aspect, particularly in respect to developed countries. More recently, research attention has shifted to the impact of ICTs on Africa and in particular sub-Saharan Africa. There is an understanding at national, regional and international levels that ICTs are a catalyst for social and economic development. For instance, at the national level, this is evident in Zambia's national ICT policy, which was officially unveiled in March 2007. At the regional level, this understanding is evident in the Africa Information Society Initiative (AISI), which began in 2003. At the international level, the two United Nations' World Summits on the Information Society (WSIS) held in 2003 in Geneva and 2005 in Tunisia lend credence to this understanding.

In general, a plethora of studies exists on the potential of ICTs to enhance social and economic development (Hafkin and Huyer 2006; Song 2003; Green 2002; Ohmae 2000). For example, Hafkin and Huyer (2006) explore various aspects of how ICTs are being used to empower women, including the problems that limit such empowerment, namely inadequate ICT policies that fail to meet women's needs in the knowledge society. On the other hand, Song (2003) offers several possibilities of ICT use especially in rural and under-served areas, including the view that ICTs can help to provide efficient social services, enhanced informal social safety nets, and an increase in the potential of rural areas to receive more industrial investment, as well as the potential of ICTs to empower communities to gather and assess the information needed to formulate decisions and to be heard. Various ICT studies show the importance of ICTs in development. However, such studies also often fail to emphasise the importance that health plays in the social and economic development of countries, including how ICTs can be and are linked to health in order to support social and economic growth. In this context, this article sets out a framework for exploring the enhancement of healthcare within the context of ICTs and demonstrates the potential benefits by drawing on the ZEPRS project in Zambia which focuses on perinatal healthcare.

In order to understand the need for enhancement of health in development, the article sets out a discussion grounded within some contemporary development theoretical concepts. The article subsequently incorporates perspectives on social constructivist technology in order to cultivate a relationship between development, health and ICTs. This leads to a discussion on health and ICTs in relation to the ZEPRS project. In this regard, particular reference is made to some of the UN MDGs that relate to health and how they inform human development. The article concludes by making the case that such a project can be used as a good practice and is possibly generalisable to other aspects of healthcare, including other development agendas not only in Zambia but also in other parts of the developing world.

Methodology

The article reviews some aspects of development approaches in order to chart the course of declining medical healthcare and how this is being mitigated in newer development paradigms such as human development. It is, however, beyond the scope of this article to give an exhaustive account of development approaches. Also, the author has no intention of providing detailed accounts of the development approaches discussed here. As part of the methodology, the article uses extracts of interviews with workers of the ZEPRS project who include project officers and nurses. The assessment of the viability of the ZEPRS project is also undertaken as a result of the observations made during the course of the field work.

Reviewing Development Concepts to Understand the Need to Enhance Healthcare

There is a myriad of interpretations and understandings of the term development. Qing (1999) discusses development in relation to 'growth, expansion, making something stronger, more effective or more available to everybody' (1999:57). Sen (1999) argues that development is about the freedoms that people enjoy such as education and health, while Kim and Weaver (2003) observe that 'development is defined as economic globalisation' (2003:122). After Zambia's independence in 1964, its social and economic development was one of the strongest in sub-Saharan Africa. Like most countries, this was the period when Zambia's development was underpinned by modernisation. The modernisation period meant the creation of jobs, expansion of industries, provision of state subsidies in agriculture, as well as in education and health. In respect to health, this meant everyone had access to free healthcare. However, the Zambian

economy began to experience a steady decline in the late 1970s due to high oil prices at the time. This had a knock-on effect on copper prices which slumped on the international market. As Zambia's main foreign exchange earner is copper, the fall in copper prices also meant that there was a negative impact on its economic growth. The country's economic malaise was also compounded by its inability to pay back its balance of payment to countries that had lent it financial support. This was due to high interest rates. As a result, many services that received government subsidies such as agriculture, education and health began to suffer.

The introduction of neo-liberal development approaches like Structural Adjustment Programmes (SAPs)[1] that were encouraged by international financial organisations such as the International Monetary Fund (IMF) and the Word Bank (WB) only seemed to exacerbate the suffering of most of the people. The IMF and the WB insisted that Zambia and other countries that were experiencing an economic decline should implement SAP if they were to qualify for financial aid. These included, among other conditions, the privatisation of state-run enterprises, liberalisation of the economy, reduction of government expenditure and the removal of state subsidies. The privatisation of state-owned enterprises was considered as a precursor to efficient management of the enterprises. The liberalisation of the economy was to encourage competition while the removal of subsidies was to encourage long-term economic growth with less dependency on state funding. The emphasis therefore was on achieving macro-economic (national economic) growth at the expense of micro-economic stability, that is, basic social needs. The effect on healthcare of a neo-liberal development perspective such as SAP was such that the removal of health subsidies and consequent introduction of user fees had an adverse effect on most poor people. This meant that many facets of healthcare have been affected, including perinatal health. It might be argued that women's health suffered the most not only because they were directly affected in perinatal health but also in many aspects of health, such as looking after the sick and the aged.

Although the removal of subsidies, as well as the sale of state enterprises, including other changes that developing countries had to adopt to meet SAP conditions, seem severe and harsh in many instances, commentators like Sahn et al. (1997) have argued that SAPs have not necessarily harmed the poor in Africa but benefited them albeit in a small way. Sahn et al. (1997) admit that, although programmes like SAP may be inefficient in tackling poverty, 'contrary to much conventional wisdom, the evidence suggests that trade and exchange rate policy reforms in them-

selves do not harm the poor, but instead tend to raise their real incomes'
(1997:94). Such an observation has also been made by Engberg-Pedersen
et al. (1996) who argued that, as a result of SAPs, at least as far as
agriculture is concerned, pricing and marketing have improved especially
for those in urban areas. Creevy (2002) also argues that although SAP
has had a negative impact on the poor, some of them have done well due
to the informal financial networks that have emerged.

However, these commentators neglect to assess what the full impact
has been on health and how, as a result of this, social and economic develop-
ment might decline rather than improve. It is as a result of such decline that
Baliamoune-Lutz (2005) argued that the poor have become poorer while
the rich have become richer. Rugumamu (2005:5–6) further posits that

> The continent [Africa] scores poorly on every major human development
> indicator: life expectancy, infant mortality and school enrolment. Above
> all, Africa is defined by diminishing economic growth, growing unemploy-
> ment, high debt levels, balance of payment problems, a falling share of
> world trade and adverse terms of trade. Although the continent accounts
> for about 10 per cent of the world's population, its economies account for
> only 1 per cent of the world's GDP.

Owing to the negative effects that SAP has had on ordinary people, the
development paradigm has undergone a shift to embrace the Human De-
velopment approach. The Human Development concept differs some-
what in focus from earlier development paradigms. Rather than focusing
on a country's macro-economic growth, the paradigm focuses on many
facets of human development, not just the financial and economic aspects,
to include microeconomic basic social needs. Therefore, rather than ex-
amine only a country's gross domestic product (GDP) which is one pointer
to indicate a country's economic growth, the paradigm focuses on indica-
tors that encourage human development. Human development is meas-
ured by the Human Development Index. This uses a number of different
indicators to measure a nation's human development, including life ex-
pectancy, literacy, education, and standard of living. These indicators can
also be drilled down for gender differences, including access to and use of
ICTs. This allows an understanding of how a country's population is faring
in, for example, its citizens' standards of living, human rights, equality,
including social justice (UN Human Development Report 1990).

The 2006 Human Development Report ranks Zambia 165 out of 177
countries, showing that it is one of the least developed countries in the
world. The report also suggests that there is a slow but steady diffusion of
technology use in regard to Internet and mobile phone uptake. However,

the report shows that life expectancy is very low, with female life expectancy at 37.1 compared to 38.2 to that of men. Unlike the other development concepts such as modernisation, the Human Development concept gives greater consideration by making more explicit elements of human development such as health that are important to the wellbeing of people.

For example, the Millennium Development Goals (MDGs) are a good indicator of how human development puts ordinary people's wellbeing at the heart of development and include:

- the eradication of extreme poverty and hunger;
- achievement of universal primary education;
- promotion of gender equality and empowerment of women;
- reduction of child mortality;
- improvement of maternal health;
- combating HIV/AIDS, malaria and other diseases;
- ensuring environmental sustainability; and
- development of global partnerships to achieve development.

In all the goals, health is most prominent in three. Highlighted in the three areas are issues such as child mortality, maternal health and the combating of HIV/AIDS, including other diseases like malaria which are one of Zambia's major health concerns. For example, Zambia's infant mortality rate stands at 102 while the under-five mortality rate is at 182 per every 1000 live births. Maternal mortality rate is at 750 per every 100,000 live births while the HIV prevalence is at around 17 per cent for ages between 15 and 49 (UN Human Development Report 2006). Bearing in mind these challenges in health, how can and how are ICTs being harnessed to enhance healthcare in Zambia? Furthermore, how can subsequent enhancement inform human development and contribute to meeting some of the MDGs?

Adopting Technology with a Social Constructivist Perspective to Enhance Healthcare

The Zambian government has suggested that ICTs can be harnessed to contribute to the achievement of the MDGs in its National ICT Policy (2006). One of the ICT policy goals is 'To improve access to quality healthcare as close to the family as possible through the deployment and exploitation of ICTs and other modern technologies' (Zambia National ICT Policy 2006:43).

The introduction of an ICT project such as ZEPRS is a good case in point where the MDG goals of eradicating child mortality, maternal health and HIV/AIDS and other diseases like malaria are beginning to meet the above ICT policy goal. By so doing, they also help to promote the wellbeing of ordinary people. However, in applying ICTs to healthcare, it is vital to understand that its application should be context specific in order to meet the particular needs of a local community. Wyatt et al. (2000:8 & 9) reveal that technologies are, by and large, understood within three categories:

> The first [as] "technological determinism", in which technologies emerge as if from nowhere and then proceed to transform the society into which they are diffused. [The] second as "technology as neutral" also has the technology emerging from nowhere but, that people choose how they want to use it. The third as "constructivism", [which] emphasises the origins and development of technology, demonstrating how people are involved in the creation of technical networks, not only in how they are subsequently used).

Based on the preceding discussion, it is evident that technology does not operate in a vacuum. Therefore, in order to enhance healthcare in Zambia, the adoption and use of ICTs would need to be context specific to meet the demands of the people they were intended for. Adopting ICTs as if by themselves they might influence change in the enhancement of healthcare may leave unfulfilled its adoption and use. This is because this way of adopting ICTs often fails to contextualise its relevance to the needs of local people. For instance, many telecentre projects in Africa have since folded (Heeks 2005; Jellema & Westerveld 2001). Part of the problem had to do with the assumption that what worked in the West would work in the North without consideration of what the North actually needed. Oxaal and Baden (1997) assert that, for any development project to work, the needs of the local community have to be taken into consideration. Therefore, a deterministic approach in adopting ICTs to enhance healthcare may not work well in a Zambian environment.

In considering a neutral approach when adopting ICTs to enhance healthcare, scholars like Wajcman (1991) and Green (2002) have shown that technology is not neutral. As such, it is difficult to expect ICT adoption in healthcare in Zambia to be neutral. For instance, access and use of technology between men and women cannot be said to be neutral because several variables are at odds with this perception. These include but are not limited to education, financial status and other cultural ascriptions. It is the social constructivist perspective of technology that lends credence to potential enhancement of healthcare. This is because the

constructivist approach takes into consideration the fact that, often, technologies are interpreted differently by different users, in different environments and for different purposes (Heap et al. 1995). Using the constructivist perspective in considering the relationship between ICTs and enhancement of healthcare allows users to influence and shape the way they want to use ICTs. Users also interpret and use a technology to render it functional or inappropriate for a specific group. As a result, appropriation of a technology may differ geographically, regionally, locally and according to one's social and economic needs. Furthermore, a constructivist approach allows users to experience a sense of ownership of an ICT project due to their involvement from the time it is introduced to the time it is implemented and evaluated. This allows users to feel a sense of ownership which is an important catalyst for any long term viability of an ICT project.

ZEPRS has the hallmarks of a system that has applied a constructivist approach. Firstly, it has been developed to meet the needs of mostly underprivileged women, as seen from the high population density clinics that operate the system. Secondly, it has sought to use open source software in order to mitigate the costs that come with proprietary software. Thirdly, the project has sought to train local people on developing software for local needs and fourthly, it has sought to build a database in order to advance further research on ailments that usually persist in pregnancy. These steps have ensured that local people feel ownership of the system because it involves them at many levels – firstly, as workers within the system and secondly as users of the system that helps to meet and improve the health needs of pregnant women.

The introduction of the ZEPRS project in under-served communities of Lusaka has meant that such communities stand to gain in the development of innovative ways of integrating ICTs and healthcare. In addition, for any development to be useful, capacity building is of utmost importance to the local community, which is what the training in software has been able to achieve. The fact that the ZEPRS project is concerned with one of the most vulnerable people in the community – women – also helps to encourage the well-being and development of such groups. So, what is ZEPRS and how is it contributing to the enhancement of healthcare in Zambia and subsequently making a contribution to development through the application of ICTs?

Mitigating Healthcare: The ZEPRS Approach

ZEPRS is a perinatal electronic medical record system which was funded by the Bill and Melinda Gates Foundation. It is run by the Centre for Infectious Diseases in Zambia (CIDZ). The system started in 2001 and is one of the first of its kind in sub-Saharan Africa. ZEPRS' premise has been to target pregnant women in order to enhance the potential of their health and that of their unborn children. Essentially, its central theme has been to improve perinatal care through efficient medical record keeping by introducing the use of ICTs. Before ZEPRS' introduction, record keeping was undertaken manually and as a result had a negative impact on several areas of perinatal patient care. These included anything from delayed patient care to difficulties in following up on patients who might need further care due to loss of or difficulty in locating patient records among other challenges. The efficiency that resulted from ZEPRS meant that there was a knock-on and positive effect on other parts of the healthcare system dealing with perinatal care such as longer time allocated to patients by health personnel, easier location of records and easier follow-up on patient care. Goorman and Berg (2000) argue that electronic patient records (EPR) can 'lead to higher quality of healthcare, increase the scientific base of medicine and nursing, and reduce healthcare costs' (2000:1).

The ZEPRS project is for the time being confined to the capital of Zambia, Lusaka, and has networked 24 health clinics which provide antenatal care for women. The main reason for confining the project to the capital city was due to a consideration of both physical and technical infrastructure. One of the challenges for the slow uptake of ICTs in a country such as Zambia has always been the limited (or lack of a robust) physical and technical infrastructure, including human resource infrastructure. It is difficult to expect faster uptake of ICTs where it is needed the most, especially in rural areas of the country which would probably need innovative projects like ZEPRS to cushion the effects of staff shortages and other limitations. Britz et al. (2006) have pointed out that for ICTs to work effectively in any country, connectivity, human intellectual capacity and infrastructure are of utmost importance. Therefore, the challenge remains that Zambia will have to improve on these aspects in other parts of the country if ICTs are to make a difference in rural and remote areas.

The 24 networked clinics have all been connected using wireless networking and have been subsequently networked with the main hospital of the country known as the University Teaching Hospital (UTH). This meant that referrals have been easier to process due to easier and faster com-

munication between the clinics and the main hospital. ZEPRS is modelled on a similar system at the University of Alabama, Birmingham, United States (UAB) which has been operating for 25 years. According to one of the project officers[2] interviewed, the UAB system generated a significant amount of money for the public health system because individuals and research institutions pay to access UAB's database which was created from the project for research purposes. As a database is also being created by the ZEPRS project, it is hoped that a similar interest might be generated in order to advance further research in perinatal care. Further research resulting from the ZEPRS database means that there is the potential to have more insight and subsequent solutions into ailments that are presented on a continuous basis. For example, if it is found that there are more women who have miscarriages or who die at a particular time during pregnancy, the idea is that the availability of the database would make this type of information easily available to health carers whereupon solutions might be sought. However, without such a database to fall back on, it may prove difficult to know what the major health concerns in women's pregnancies are, during which time they are experienced or how to rectify them.

The following interview extract from the project officer gives insights into the thought process of the database. The project officer revealed that one of the advantages of the system was that it offered analysis of trends happening with pregnant women for the long-term improvement of their health. She pointed out that before the ZEPRS initiative, when a woman died in childbirth, there was rarely an investigation, and therefore no way of finding out what happened to cause the deaths and therefore no trend data to analyse and learn from. The project officer started by making reference to the difficulties of the manual system:

> There is no way to tie up the result after childbirth to what happens before, no way to link outcomes. But with this system you cannot only do totals but you can also click on a particular patient and get those details about the patient, but only clinicians can do that. He can click on the list of patients who died that month and look at other cases where they were treated, where they were referred and at what point in their pregnancy they died.

The database comprises records relating to women's perinatal experiences pre-and post-pregnancy. Only information of a more general nature and not personal records will be accessible for research purposes. The database holds a variety of information, from details about contraception to the weight of their babies and any birth complications. The system also

documents and records the activities in obstetric care as well as the ante-
natal visits including delivery and post-natal visits, all entered into the com-
puter instead of handwritten as the case was before. This helps to im-
prove pregnant women's health and that of their unborn babies because
the database gives ideas on how to improve women's perinatal health.
This can also inform other health centres about how to improve their care-
giving. As such, this is not only beneficial to women but also to communi-
ties as a whole because there is a likelihood of a reduction in healthcare
costs if there are fewer pregnancy complications. The use of the data-
base for potential research itself signals long-term viability beyond the
initial funding period. Consideration of future sustenance beyond the fund-
ing phase is important because, as discussed earlier, some donor-funded
projects do not usually survive beyond the initial funding phase. However,
because a system like ZEPRS attends to the core needs of the communi-
ties, for example, needs of pregnant women, capacity building, database
development, the potential for survival is much greater.

During the initial stages of the programme, CIDZ spent over a year
training nurses. This was a challenge in itself because, as the project officer
pointed out, '75 per cent of nurses have never used a computer' before
and therefore had no prior knowledge. The project therefore not only of-
fered new ICT skills to the nurses but also helped them grow in confi-
dence in their use. In addition, the project also provided other staff mem-
bers with more technical skills by training them in the development and
use of open source software. In writing about electronic patient records in
maternity, Henwood and Hart (2003) reveal how introduction of such sys-
tems might not always be welcome by those who are supposed to use
them. This is particularly when there is no adequate understanding of the
system, including what is entailed in users in terms of their role. In es-
sence, Henwood and Hart (2003) have underlined the importance of user
involvement at all stages of a new system – be it at feasibility, implemen-
tation or evaluation stages. The importance of user involvement is seen in
ZEPRS' training of the nurses as well as in the technical skills training in
the development and use of open source for staff members.

The training and use of open source software in the ZEPRS project
allows the system to be tailor made to suit the community's local needs.
ZEPRS's use of open source software is also advantageous because it
not only encourages creativity and innovation but also cuts down on hav-
ing to rely on proprietary software, thus avoiding the need for constant
and expensive software upgrades. Additionally, creating tailor-made soft-
ware to suit local needs and the environment indicates flexibility and adapt-

ability, particularly for the future. Admittedly, open source is not very popular in Africa where only about 5 per cent of computers run it. Heeks (2005) reveals that this is due to a number of reasons which include a lack of knowledge of open source software, a lack of international links to work with, as well as the fact that there is a lot of pirated proprietary software. These factors subtract from acquiring more knowledge of alternative software and therefore skill development. As such, the use of open source software in the ZEPRS project is a good attempt towards achieving these benefits and avoiding the problems that come with proprietary or pirated software.

Other Tangible Benefits

The ZEPRS project clearly has a positive and effective impact on not only pregnant women but clinicians as well. By using the new system, the clinics are not only able to instantaneously communicate with each other online but with the main hospital. This has made referrals quicker and much easier as patients records can be accessed from any system of the connected centres. One nurse who was interviewed revealed the following:

> It is easier to make follow-up appointments at various points. Before the system linked all the clinics, there were instances when some pregnant women would often change centres they attended. This is because when they had been diagnosed with what they considered to be an embarrassing ailment such as syphilis, they probably thought that clinicians at the centres they had been diagnosed from would judge them. Therefore, in order to overcome that concern, they would go from one centre to the next in the hope that their ailment would not be detected and that only their pregnancy would be dealt with. Unfortunately, such thinking was not only risking their own health but the health of their unborn babies as well. But with the inception of the ZEPRS programme, whichever centre women go to in Lusaka, health workers are able to retrieve their records online, are able to see what their health history is and then also able to continue their course of treatment without necessarily asking them too many awkward questions.

Such mechanism is also a cost effective measure because it avoids re-diagnosing ailments whenever a client goes to a new centre. Re-diagnosing can be costly and time consuming. Therefore, the system allows clinicians to only treat already diagnosed ailments and detect new ones without having to do the same every time a client goes to a new health centre.

On following up the above sentiments, the project officer added that the ZEPRS project had helped in saving women's lives in both a direct and indirect way. The following interview extract highlights her views when

she was asked whether she thought the system had contributed to saving women's lives:

> Oh yeah definitely and there is no question in my mind that this will save not only women's lives but newborns' lives. We found with pregnant women it's an easier group to target into because there are about 50,000 babies born in a year in Lusaka alone, it's a lot of lives. And I mean we found syphilis rates of about 6 per cent so if you are looking at about 3000 babies and am not sure of the transmission rates, you could literally look at a few thousand babies to be treated. This system also allows for mothers to be offered HIV testing as they come four or five times during a pregnancy. So in the event that a woman is tested positive, clinicians can refer them to one of the nine district clinics offering ARVs [antiretrovirals], particularly to two of the clinics offering special ARV programmes only for pregnant women so they can feel sort of comfortable. Additionally, when a woman does not qualify for ARVs yet, she can be put on a single drug, which she can take during labour, and a single drug for the baby which is a syrup when a baby is born which reduces the HIV transmission rate by about 50 per cent.

According to the project officer, CIDZ uses the same software design as that used by ZEPRS for the ARV programme to create ARV software. The project officer revealed that because 60 per cent of CIDZ's patients were female, they also correspond to 60 per cent of HIV positive women in Lusaka and Zambia overall. Due to this, such a programme favours and saves the lives of women and their unborn children. Not least because it can help the mother to know her HIV status and start medication if need be but because it also helps to avoid transmitting the virus to the unborn child during child birth. Without such a mechanism within the system, transmission from mother to child would continue unabated.

The system also uses voice over internet protocol (VOIP) which makes patient referrals to UTH much quicker and easier than before. This allows the hospital to prepare well in advance of a patient's arrival by sourcing the needed medical apparatus. It is faster to do so because the hospital is informed well in advance over VOIP and due to this, it is also able to source patient records from their networked system and have them in hand before a patient's arrival. One nurse added that:

> In Zambia, we have a saying that goes "a person well prepared is a person well received". The system has made it easier to avoid any delays in treating a patient, unlike in the past when a patient had to go to the hospital without the hospital having prior knowledge of her imminent arrival. This meant that there were inadequate preparations in terms of medicines or medical apparatus that might have been needed to take care of the patient.

> Most women found they had to wait for long periods before they could be attended to. This of course had repercussions for not only the lives of the pregnant women but the babies as well.

Even access to medical records was apparently a problem because of the chaotic manual filing system that existed before the programme was initiated. Stories were often told of medical files not being found on time or being lost altogether. The project officer narrated an incident in which the filing of medical reports was in a chaotic manner when some members of CIDZ visited the hospital. She revealed that the medical records room at UTH was a: 'Stack of files! Just stacked everywhere - just thrown. There is one picture actually when we went to take a picture of somebody who was pregnant; there were piles and piles of files.'

Before the ZEPRS system, nurses relied on manual paper-based recording which was time-consuming, tiring and had to be repeated each time a client visited a clinic. However, the new system has resulted in better accessing of patient care records and better time management. This has subsequently meant better and more time spent on the patient. In addition, before the introduction of ZEPRS, security and confidentiality risks were high because patients were more prone to losing their referral cards as they had to carry them all the time. Furthermore, there was no guaranteed security and confidentiality on patient records once entered in the 'blue book' (the book nurses use to enter patient details) as it was easier even for non clinicians to have access to the blue book. However, with the ZEPRS system, a nurse has to log on with her password as the only way to enter a patient into the system. Once a patient is cleared, the record is cleared too for the next patient, which is only accessible once again via personalised passwords. This is not to suggest that the ZEPRS system is not open to security breaches as no web-based programme is entirely safe. It is also not being suggested that measures have not been taken to guard against any such eventualities, but merely to point out potential risks.

Considering the Challenges

Technology is always changing and because of this, it is inevitable that the dynamics of such web-based projects like ZEPRS will change as well. As a result, there is a constant need to keep updating the technologies in order to keep up with the latest developments. Therefore, keeping up-to-date not only means continued investment in physical and technical infrastructure, but also investment in human resource and continuous capacity building. For developing societies like Zambia that have limited resources, this might

prove a big challenge even when measures are being put in place such as ZEPRS' capacity building programme. The problem is more evident in rural and remote areas that are far away from the capital city. Therefore, mechanisms need to be put in place to rectify this particular challenge. When a roll-out is planned for other areas in the country, planning of a robust infrastructure needs to be put into consideration, including education, potential for further capacity building and awareness. Hanson and Narula (1990) highlight the need for ICT awareness which they term *social infrastructure.* This is because they see the success of ICTs as dependent on 'creating technology awareness, developing applications and levels of skills' (1990:6). Technology awareness will not only help other parts of the country improve in the area of perinatal health but will be seen as a step towards embracing further use of ICTs in other developmental agendas of the country.

The picture that emerges so far is that there is a clear benefit in the use of ICTs. This benefit can be of further advantage in remote parts of the country where specialised medical practitioners are in low numbers. For example, Chanda (2004) in his look at tele-health reveals how in some remote parts of Zambia there were instances where only a nurse or a technician staffed health centres. In one site, there was only a casual worker in charge of dispensing drugs to patients. Chanda's argument is that it is areas like these that need the integration of electronic medical health systems to compensate for the lack of specialised personnel. The pattern that Chanda describes is also beginning to be seen even in the bigger urban hospitals (although *still far* from the dire description that Chanda gives) as qualified doctors and nurses leave for better jobs else-where; investment in such systems is ever more critical. However, to-gether with the advantages of such systems come challenges that ought to be taken into serious consideration. For example, remote clinics which have few if any trained staff might not be able to take advantage of elec-tronic medical health technologies as they might lack technical skill and know-how. Without adequate technical know-how, the potential of such systems may never be realised in a larger context. Electricity is another matter that may need looking into as well as the other fees which such centres might incur in order to keep an electronic health system running. These are challenges that need attention if ZEPRS' benefits are to be replicated across the country. In their analysis of tele-medicine, Warriner and Martinez (2005) assert that such systems can and do contribute to reducing inequalities in access to health services for women and babies in more rural areas.

Conclusion

Rarely has there been particular emphasis on the well-being of individual human beings in development approaches. In many aspects, the emphasis has been on the general macro-economic development of countries. However, what this article has shown is that the approach to development has changed over the years; from modernisation and neo-liberal SAP approaches where the emphasis was on national development to the human development paradigm which emphasises human wellbeing. The human development paradigm, which is about enhancing people's life choices, offers the potential for meeting some of the MDGs. This is also especially possible with the application of ICTs, as the case has shown in the ZEPRS project. In this case, the use of ICTs in perinatal care has provided the opportunity and potential to directly meet some of the MDGs which include the reduction of child mortality, improvement of maternal health and the combating of HIV/AIDS and other diseases like malaria.

ZEPRS demonstrates that by harnessing the potential of ICTs in perinatal health, the possibility exists to reduce child mortality. This is possible through continued medical treatment of mothers who might keep changing health centres in order to avoid public awareness of their embarrassing illnesses such as syphilis. Because the system is such that medical records are accessible at any of the 24 centres in the capital city, it means that the mother can continue to receive needed medical treatment when need be. This has a direct impact on the health of the child and consequently reduces child mortality which was the case before the introduction of ZEPRS. Similarly, because mothers are offered HIV testing, they are able to be referred for further treatment when found positive. In the case of the unborn child, when a mother tests positive, measures are put in place during the phase of the pregnancy and during delivery to ensure that there is little to no chance of transmitting the virus to the unborn child. Again, the result is the potential reduction in child mortality and subsequently meeting this particular MDG. These possibilities also mean the improvement of maternal health, which is another goal which can be said to benefit from ZEPRS. Furthermore, because the system allows mothers to be offered HIV testing and then referred for ARVs when found positive and if they are at a stage where they need to start treatment, this also has a direct impact on combating the spread of HIV and prolonging the lives of mothers. The above benefits not only help to meet the MDGs related to health but also offer enhanced life choices as demanded by the human development paradigm. By implication, healthy individuals contribute much more effectively to the overall development of the country.

Evidently, the harnessing of ICTs for healthcare not only has a direct impact on the MDGs described above but also has an indirect impact on the other MDGs. For instance, it is much easier for healthy individuals to contribute to the eradication of poverty and hunger and hence contribute to the development of a country. By virtue of being healthy, it is easier for people to go out and earn a living in order to sustain themselves and their families than when they are unhealthy. This may be a simplistic way of looking at eradication of poverty and hunger because, admittedly, poverty and hunger have more multifaceted elements than simply health. However, being healthy can contribute to the eradication of a problem like hunger, albeit in a smaller way if other factors such as loss of jobs are taken into consideration. However, there exists a link between harnessing ICTs in healthcare and eradication of poverty and hunger, albeit an indirect one. In addition, because ZEPRS' main targets are women, this also has an indirect impact on meeting the goal of promoting gender equality and empowerment of women. In this case by using ICTs in the enhancement of perinatal health, the implication is that women become empowered in their own right as a result. Finally, the fact that there has been an obvious partnership between the funders of the ZEPRS project and the recipients of the system is a good example of how the MDG of developing global partnerships for development is being fostered. Such partnerships and the other MDGs mentioned are integral to the development agenda of Zambia.

In sum, this paper has made the case that ICTs can be harnessed for development and in so doing help in meeting some of the MDGs, particularly those related to healthcare. In this respect, ZEPRS was used as one good practice where ICTs have been introduced to enhance healthcare in Zambia. The analysis of ZEPRS revealed that such a system has the potential to save time spent by clinicians on a manual and subsequently slow system and instead devote more time to clients. The system also availed women the opportunity to have better health checks for themselves and their unborn babies due to easily available and retrievable records. This contributes to saving the lives of mothers and those of their unborn babies. This has a direct impact on the reduction of child mortality, improvement of maternal health and the combating of HIV/AIDS. In addition, the impact is not only on an individual but on a general community as a whole. A healthy population contributes more effectively to a more developed national economy.

ZEPRS' development of a database which is intended for research in order to further improve health is also an innovative way of using ICTs in a developing country like Zambia. Lessons learnt from the ZEPRS project can also be used in other parts of the developing world in the sense that where Zambia has excelled in its use, such lessons can be adopted by other countries and where Zambia has failed, these lessons can be improved upon. As the system is only confined to the capital city, it will be interesting to see what mechanisms will be put in place to roll it out to other parts of the country, particularly those areas in rural and remote parts of the country. This is because such a roll out will provide an opportunity to learn how much of an impact ICT projects like ZEPRS have on the overall development of people in under-served areas of the country. In the meantime, the picture is such that there are evident potential benefits in using ICTs in developing countries like Zambia. This is demonstrated by ZEPRS in its application of ICTs to enhance healthcare. Enhancement of healthcare not only means a step towards the contribution of the individual to human development but also the social and economic development of a country like Zambia.

Notes

1. SAPs are programmes by which the World Bank and the IMF lend in support of economic and institutional reforms rather than for specific investments. These reforms aim at enhancing economic growth through economic efficiency in the use and allocation of economic resources. Thus, SAPs provide loans to countries on the condition(ality) that they embark on a number of economic policy reforms to foster long-term economic growth. Even though SAPs are almost always negotiated in the context of economic crisis and in an effort to resolve balance of payment problems, they are increasingly used to purportedly boost the international competitiveness of borrowing nations (Mensah 2006:4)

2. One of the people in charge of managing the project who has worked on a similar model at the UAB. The author carried out an intensive interview with this project officer who was able to give detailed insights into the project. However, due to anonymity concerns, the interviewee has been referred to as project officer.

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