COMPARISON STUDY ON ICT IN THE HEALTHCARE SYSTEM OF DEVELOPED AND DEVELOPING NATIONS

Chel-Mari Spies, Mark Muwanguzi
Tshwane University of Technology
Computer Engineering Department
Pretoria, South Africa
chel.spies@gmail.com, mmuwanguzi@gmail.com

ABSTRACT
Today ICT is in a position to play a major role in various industries across the globe. It is being used in the financial industry to predict the markets, transport and freight industry to track shipments of goods in real time, education to remotely teach students through massive open online courses (MOOCS), its being used in all sectors of the banking industry, retail and wholesale industry for online transactions and to keep track of stock, just to mention a few.

In the health industry, ICT usage is still lagging behind as compared to other industries especially in developing nations that are in dire need of this technology to bridge the gap of the lack of health professionals. According to the 2006 WHO report, there is a deficit of 2.4 million doctors and nurses in the world with Africa having a health workforce density of 2.3 professional health workers per 1000 people. With the advancement and reduced costs of technology, ICT is in a position to greatly improve healthcare systems.

In this paper, a study is made on the current stance of ICT in the healthcare sector, making a comparison between developed nations and developing nations. Emphasis will be put on success stories of ICT in the healthcare system of developed nations and how these can be adopted to African developing nations that are in more need of this technology.

KEY WORDS
eHealth, mHealth, Telemedicine, EHR

1. Introduction
With the advancement of technology in the past years and the reduction in size and cost of this technology, ICT is in a position to revolutionize the health care system of both developed and developing nations.

Developed regions such as North America and Europe are a step ahead of developing regions such as Africa in the use of ICT in their health care systems despite the fact that developing regions lack professional medical personnel and ICT is in a position to bridge this gap [1].

ICT can be used in several branches of the health care system such as: medical records management, diagnosis, prognosis, decision support, patient care management, patient referrals, appointment bookings and reminders.

2. Benefits and Challenges of Health ICT

2.1 Benefits of Health ICT
Benefits of effective ICT use in health care systems affects not only patients but also doctors and the general community in which it is being implemented [3].

These benefits can be grouped into 8 different categories:

- Geographical access: With the shortage of medical personnel worldwide with emphasis on developing nations, most medical professionals are practicing in urban areas where they can get better monetary value for their skills. This leaves rural communities defenseless to disease outbreak [2].

  With the help of technology through telemedicine, medical professionals do not have to physically be present to see patients. Both mobile and desktop devices are being used to send patient specific information and cases to doctors who in turn give patient specific advice.

- Improved effectiveness of health programs: With the use of Health ICT, health programs such as medical record management with the implementation of Electronic Medical Records (EMR) and health/disease surveillance through electronic surveillance (eSurveillance) are made more effective [2].
For example through eSurveillance, field workers capture patients’ data in the field and this data is sent in real time to authorised medical personnel [3].

- Improved efficiency: Health ICT is not used to replace the health workers but is meant to be used as a tool to improve their efficiency and reduce the time it takes to perform their tasks [2].

For example with the proper use of EMRs, patients’ data can be electronically shared between hospitals and thus reducing on number of tests and duplication of procedures.

- Improved quality of care: Through tools like clinical decision support systems and expert systems, remote diagnosis and treatment of patients that normally wouldn’t see expert doctors has been made possible [4].

- Safety: Counterfeit drugs make up 10% of the drugs being sold worldwide. With the help of ICT, authenticity of drugs can be verified ubiquitously by patients.

For example in Ghana and Nigeria, mobile phone text messages are being used to verify drugs through the mPedigree program. Genuine drugs have a code which a patient sends to authorities through an SMS to check the authenticity of the drugs.

- Knowledge Generation: With improved data collection and storage in EMRs, patient data and medical cases are better stored. This data can later be shared or analysed to generate knowledge such as disease patterns and outbreak predictions.

- Economic impact: In developing nations mobile money payments are being used to pay for healthcare services and buy medication

- Integration: With the advent of Health Information Exchange, patients’ data can be securely shared amongst different health information systems.

2.2 Challenges of Health ICT

Despite its numerous benefits, ICT adoption in the health sector is still lagging behind other industries especially in developing nations. There are various reasons for this such as:

- Government intervention: Most of the Health ICT projects running in developing regions such as Africa are pilot projects run by Non-Government Organizations because of this, they cannot be scaled country wide and the data cannot be integrated into the national health system.

In developed regions such as North America, the government gives monetary incentives to hospitals and clinics to adopt health ICT into their practice.

- Lack of infrastructure: One major hindrance to worldwide adoption of health ICT is lack of ICT infrastructure. Most rural areas in developing regions lack the infrastructure to support health ICT interventions [5].

- Psychological barriers: Psychological barriers are also a concern when considering the roll-out of ICT in rural areas where little or no technological implementation is known.

- Lack of expertise: The simple presence alone of ICT is not enough to improve health [6], but the effective use thereof is of vital importance in any attempts made to improve overall healthcare conditions and success.

3. Health ICT Adoption in Developing and Developed Nations

ICT adoption in developing and developed nations greatly differ. Most of the health ICT interventions in developing nations are run by Non-Government Organizations or private companies and are small scale where as in developed nations such as USA, the government has a drive to implement health ICT across the nation. In addition to that most health ICT projects in developing nations are funded by donors where as in developed nations, investors take a lead role in funding these projects [7].

In the next section we give a brief indication of some of the health ICT being used in both developing and developed nations.

3.1 Health ICT in Developing Nations

3.1.1 iAfya mobile health Application implemented in Ghana, Nigeria, Uganda and Zambia

The iAfay mobile phone application enables healthcare workers to access relevant, current health information and resources in order to provide improved service delivery [8].
Furthermore, the application contains educational content in the form of illustrated health messages and videos which can be helpful to target audiences.

In addition, the application has been released in Kiswahili in order to reach and assist an audience not fluent in English.

iAfya brings users and third party health partners (e.g. insurance companies and professional healthcare practitioners) closer together by putting them in touch with one another.

3.1.2 IHISM (Integrated Healthcare Information Service through Mobile Technology) implemented in Botswana

IHISM allows healthcare workers and the general public to capture, store, process, transmit, and access patient health records using a mobile phone-based software application [9].

The system eliminates redundancy and reduces time spent inputting data into the system, thereby lowering costs and increasing efficiency.

Members of the public can inquire information about HIV/AIDS by sending SMS messages and will then receive a reply directly to their mobile phones.

3.1.3 RapidSMS implemented in Rwanda

Rapid SMS was designed to support community health workers in assisting new mothers and caring for newborns and young children [10].

It is an open-source framework developed for data collection and analysis. It permits two-way communication and information exchange to facilitate logistical coordination.

The system was intended to help healthcare workers to identify and address possible causes of deaths among women and young children, and suggest possible prevention strategies.

3.1.4 Riders for health implemented in Gambia, Kenya, Lesotho, Malawi, Nigeria, Zambia and Zimbabwe


It is used by partner organisations in sub-Saharan Africa to train drivers in vehicle maintenance in order to keep their fleets in a reliable and running state so that healthcare to remote areas are never interrupted and healthcare worker efficiency is maintained.

3.1.5 SAHEL (Satellite African e-HEalth vaLidation) implemented in Kenya and Senegal

SAHEL includes three types of services:

- Training of healthcare professionals in rural areas.
- Linking treatment centres to central medical centres to provide diagnoses and treatment.
- Managing patient files in order to monitor AIDS (in Kenya) and malaria (in Senegal).

It employs broad-band internet service which can be rolled out rapidly and needs minimal telecommunications infrastructure [12].

3.1.6 Text messaging for health implemented in South Africa

This project uses text messaging on mobile phones to encourage patients with type 2 diabetes to enquire about related issues from peers, with the target demographic of low-income women living in South Africa [13].

The purpose is to determine if people in a similar situation can provide social support and offer messages of motivation and effective education.

People living with diabetes are questioned on the management of their illness. They answer questions about their health conditions and daily habits at randomly assigned times during the day.

3.2 Health ICT in Developed Nations

3.2.1 Proteus Digital Health (PDH) – USA

Proteus Digital Health is a California, USA – based health IT Company that develops electronic products and services that improve the effectiveness of medication by monitoring a patients’ prescription adherence [14].

Proteus Digital Health recently raised $45 million for their latest product, an ingestible sensor component that monitors your body’s vital signs, medication you are taking and how your body reacts to medication [15].
3.2.2 HealthTap – USA

HealthTap is a San Francisco, USA-based health IT Company that offers a free question–answer platform between physicians and the general public across different devices both mobile and desktop [16].

HealthTap has a growing network of medical professionals with over 50,000 doctors across the world from different specialities answering questions posted by the general public.

HealthTap recently raised over $20 million to include voice capability to their current product [17].

3.2.3 Withings – France

Withings is a French electronics company that makes connected health devices [17].

Withings has products such as wireless scales, activity trackers and wireless blood pressure monitors all of which wirelessly send vital readings to a mobile application [18].

3.2.4 Electronic health records – USA

In the United States the government is currently encouraging health providers and hospitals with monetary incentives to meaningfully adapt the use of Electronic Health Records (EHR) [7].

To date USA has over 50% of doctors’ offices and 80% of hospitals meaningfully using EHRs.

4. Conclusion

From the examples listed above a clear distinction between health IT use in developed and developing regions can be drawn. There are two main differences and these can be characterized by the nature of health IT being used and the scale of the projects.

4.1 Nature of Health IT

Due to the lack of resources, health IT in developing nations is mainly focussed on mobile phone text messages. Smartphone mobile applications coupled with innovative electronic devices are being used to capture vital signs, convey information and monitor patients remotely in real time.

4.2 Scale of Health IT Projects

In developing regions such as Africa, most of the health IT projects are small scale, they may stretch across different countries in the region but the number of people they are affecting is not high.

In developed regions such as North America and parts of Europe, the government and private firms are investing in health IT firms to scale their products across the world [17].

References