

Level of Penetration and Challenges Facing Adoption of I.C.T. In Ghanaian Hospitals

George Essien, Frank Amoani Arthur, Michael Omari

Computer Science Department, Takoradi Polytechnic, P. O. Box 256, Takoradi, Ghana

ABSTRACT

The purpose of this study was to find the level of penetration and challenges facing adoption of ICT in the operations of Ghanaian hospitals. Four hospitals in the Western Region of Ghana were selected namely; Esikado Hospital, Takoradi Hospital, Nagel Memorial S.D.A. Hospital (Takoradi), and Axim Government Hospital. The questionnaires were administered to staff of these Hospitals. At least 25 questionnaires were administered to each hospital while two or more questionnaires were administered to each Unit of the hospitals. At the end of the study it was found that the level of ICT penetration in the healthcare delivery in Ghanaian hospitals is low and the main challenges facing the adoption of ICT tools in the operations of the hospitals are inadequate ICT tools and frequent breakdown of the few tools available.

Keywords: Information and Communications Technology (ICT), Telemedicine, Ultrasonography, e-health, Out Patient Department (OPD).

1. INTRODUCTION

Information and Communications Technology (ICT) is making dynamic changes in society. It is impacting positively in all aspects of life. Information and Communications Technology (ICT) is an umbrella term that includes any communication device or application, encompassing radio, television, cellular phones, computer and network hardware and software, satellite systems as well as the various services and applications associated with them, such as videoconferencing and distance learning (Rouse, 2005).

ICT has enhanced operations in the field of business, education, entertainment, government and healthcare delivery. For example in the banking industry, computers and application software are used to calculate interests and taxes. ATM (Automatic Teller Machine) is used by customers to withdraw money and check balances.

In education, ICT is used to manage students' personal records and process results. Students use computers and smart phones to browse the Internet for information.

In governance, Ministries use computers to process data. For example the Finance ministry uses computers to prepare budgets and the Controller and Accountant General's Department also use computers to prepare payroll for workers.

In healthcare delivery, ICT is used for patient medical record keeping and Telemedicine. Telemedicine is defined as bringing healthcare access to rural locations by enabling Practitioners to evaluate, diagnose and treat patients remotely by using telecommunications technology. ICT is also used in medical equipment such as Ultrasonography (USG). An ultrasonography also referred to as an ultrasound scan, or sonogram, is a device that uses high frequency sound waves to create an image of some part of the inside of the body, such as the stomach, liver, heart, tendons, muscles, joints and blood vessels (Nordqvist, 2015).

The use of ICT in these fields has enormous benefits associated with it. Among these benefits is faster speed of disseminating information, secure method of storing information, accurate data processing, increasing productivity, and reduction of cost of production. Due to these benefits associated with the use of ICT, many countries all over the world have incorporated ICT in their healthcare delivery and Ghana is not an exception.

In Ghana, the Government launched the national e-health strategy in July 2010. The key strategies under the national e-health strategy are; Streamlining the regulatory framework for health data and information management, Building sector capacity for wider application of e-Health solutions in the health sector, Increasing

access and bridging equity gap in the health sector through the use of Information and Communications Technology, and Towards a paperless records and reporting system (Afarikumah, 2014). According to the World Health Organization (WHO), e-health is defined as the transfer of health resources and healthcare by electronic means.

Since the Government of Ghana launched this e-health strategy, much has not been achieved in the healthcare delivery in Ghana. It is for this reason that the 67th Annual New Year School and Conference opened at the University of Ghana Legon, on the 11th January, 2016 had its focus on the use of Information and Communications Technology (ICT) to improve healthcare delivery in Ghana. The event was on the theme: “Promoting Universal Health for Sustainable development in Ghana: Is ICT the game changer?” (Dery, 2016).

During the formal opening of that New Year School, Professor Yaw Oheneba-Sakyi, Dean of the School of Continuing and Distance Education, College of Education, University of Ghana, said Technology and e-health can make a huge impact at reducing the cost of healthcare delivery. He also said what is really missing in the long term solutions is the little recognition given to ICT as the indispensable driver of transformation and the main key to lasting solution to some of the perennial challenges confronting health sector (GhanaWeb. 2016).

Various Speakers at the event including Ghana’s Health Minister, Mr Alex Segbefia acknowledged the fact that the best way to improve our healthcare delivery is through the use of ICT. He said, for instance, that ICT could be used to minimize the number of mis-diagnosis and reduce the long queues at health facilities (Dery, 2016). It is against this backdrop that the researcher decided to write on the topic: “Level of Penetration and Challenges Facing Adoption of ICT in Ghanaian Hospitals”. The research focused on the level of penetration and challenges of ICT adoption since the Government of Ghana launched the National E-health Strategy in July 2010.

The paper has two main objectives:

- ❖ To find the level of penetration of ICT in Ghanaian hospitals
- ❖ To find challenges facing the adoption of ICT in Ghanaian hospitals.

The findings of this research will help Ghana Health Service, Ministry of Health, Government of Ghana, and other Stakeholders in the healthcare delivery to know the level of penetration and challenges facing adoption of ICT in the healthcare delivery so that they will create enabling environment for better healthcare delivery.

2. METHODS

The study used Quantitative Research Design. Quantitative research is a formal, objective, systematic process in which numerical data are used to obtain information about the world (Burns, & Grove, 2005). The researcher used questionnaires to collect the data. Two main types of questions that were used in designing the questionnaire were: open-ended and closed-ended questions.

Open-ended questions permit free responses which should be recorded in the respondents’ own words. Such questions are useful for obtaining in-depth information on facts with which the researcher is not very familiar, and also getting opinions, attitudes and suggestions of informants. Closed questions have a list of possible options or answers from which the respondents must choose. Closed questions may be used to get the respondents to express their opinions or attitudes by choosing rating points on a scale.

The researcher used purposive sampling to select the respondents. Purposive sampling is when a researcher chooses specific people within the population to use for a particular study or research project. Four hospitals in the Western Region of Ghana were selected, namely Esikado Hospital, Takoradi Hospital, Nagel Memorial S.D.A. Hospital and Axim Government Hospital.

The questionnaires were administered to staff of those four Hospitals. At least 25 questionnaires were administered to each hospital while two or more questionnaires were administered to each Unit of the hospitals. In all 120 questionnaires were distributed but only 115 questionnaires were received by the researcher.

SPSS version 16 was used to organize the responses (data) into frequency tables and cross-tabulations. Other responses were also used to produce simple graphs using the SPSS. The frequency table, cross-tabulations and graphs were used to discuss or describe the data collected.

3. RESULTS

This section presents findings of the questionnaire and the findings are summarized using frequency tables, cross-tabulation, pie charts and bar charts.

Table 1 below indicates the various health professionals that responded to the questionnaires. In all, 115 responses were received. Some of the professionals include General Nurses, Community Health Nurses, Medical Doctors, Laboratory Technicians, Administrative Staffs, and others such as biomedical scientists, Midwives, Pharmacists, etc.

Table 1: Category of health professionals

Category of health professional	Statistics	
	Frequency	Percent
General Nurse	34	30
Community Nurse	12	10
Medical doctor	4	3
Laboratory technician	8	7
Administrative Staff	13	11
Accounts clerk	2	2
Others	42	37
Total	115	100

Source: SPSS output of field data, 2016

Table 2 shows the various Units of the Hospitals in which respondents worked at the time of answering the questionnaire. Some of the Units include Out Patient Department (O.P.D.), pharmacy, Reproductive Child Health (R.C.H), Antenatal Clinic (A.N.C.) and others.

Table 2: Unit in which respondents work

Unit	Frequency	Percent
O.P.D.	16	14
RCH	17	15
Laboratory	8	6
Pharmacy	3	3
ANC	1	1
Administration	13	11
Account Office	2	2
Others	54	47
Total	114	99
No Response	1	1

Table 2: Unit in which respondents work

Unit	Frequency	Percent
O.P.D.	16	14
RCH	17	15
Laboratory	8	6
Pharmacy	3	3
ANC	1	1
Administration	13	11
Account Office	2	2
Others	54	47
Total	114	99
No Response	1	1
Total	115	100

Source: SPSS output of field data, 2016

Table 3 contains responses on whether respondents are computer literate or not. Three of the respondents did not answer that question reducing the total responses to 112.

Table 3: Is respondent computer literate

Response	Frequency	Percent
No	11	10
Yes	101	88
Total	112	98
No Response	3	2
Total	115	100

Source: SPSS output of field data, 2016

Table 4 contains responses on whether respondents use any ICT tool in discharging duties. The response on this question was 100%.

Table 4: Does respondent use ICT tool to discharge duties

Response	Frequency	Percent
No	63	55
Yes	52	45
Total	115	100

Source: SPSS output of field data, 2016

Table 5 shows the various ICT tools that respondents are using and the number of respondents using those tools.

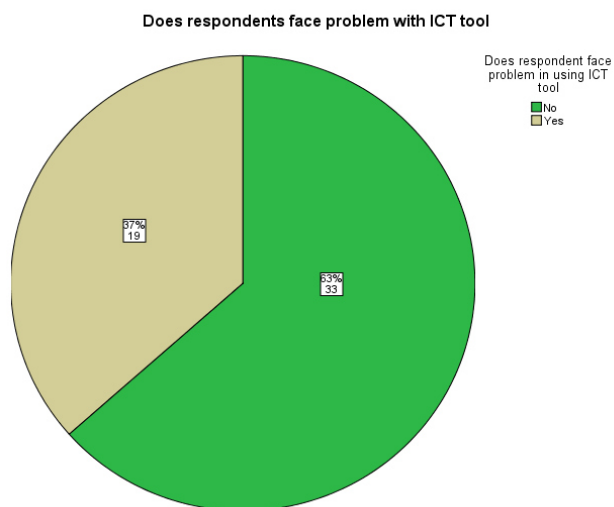
**Table 5: ICT tools respondents use * Number of respondents who use the ICT tools to discharge duties
 Cross tabulation**

Equipment	Number of respondents who use ICT tool to discharge duties	
		Total
ICT tools respondents use		
Computerized Radiography	2	2
Chemistry analyzer	1	1
Scanner	1	1
Digital Thermometer	1	1
Computer	33	33
Pulse Oximeter	2	2
Digital Fetoscope	1	1
Printer	2	2
Image Reader	1	1
Telephone/mobile phone	7	7
Haematology analyzer	1	1
Total	52	115

Source: SPSS output of field data, 2016

Figure 1 is a pie chart that shows the results of a question that seeks to find out whether respondents that use ICT tool to discharge duties face problem with the particular tool.

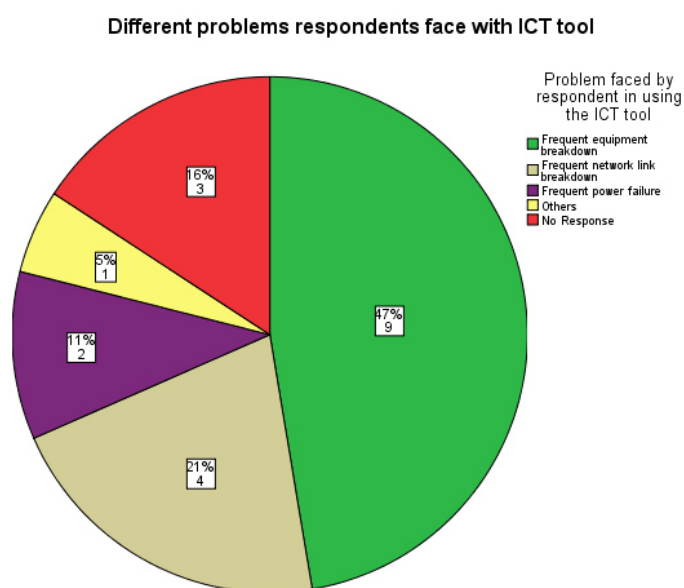
Figure 1:



Source: SPSS output of field data, 2016

Figure 2 shows the various problems faced by respondents who use ICT tools to discharge their duties. Some of the problems include frequent equipment breakdown, frequent power failure, and network link breakdown.

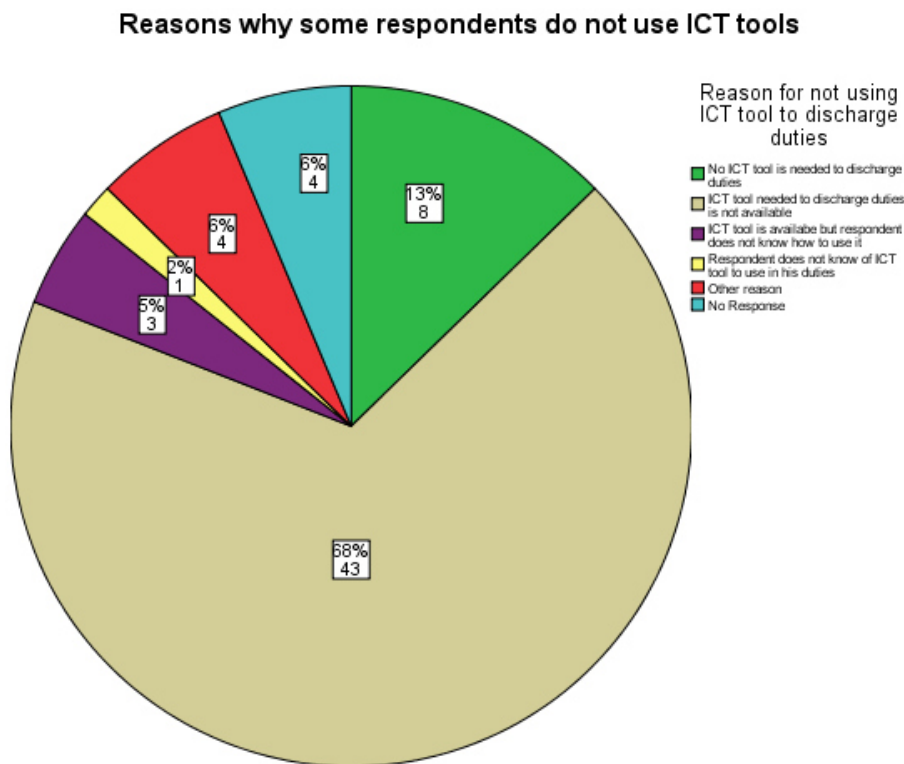
Figure 2:



Source: SPSS output of field data, 2016

Figure 3 is a pie chart that shows the responses to the question that seeks to find out the reason why some respondents do not use ICT tool in his/her duties. Some of the reasons include lack of ICT tool and ignorance about the appropriate ICT tool to use in the cause of discharging his/her duties.

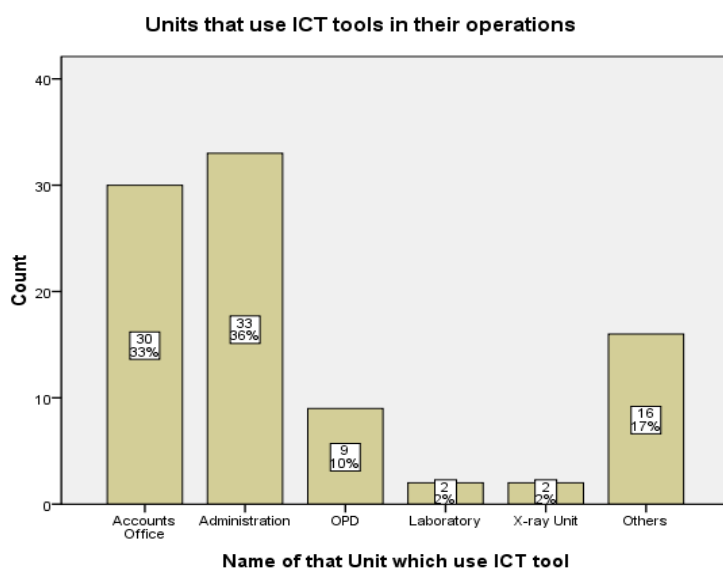
Figure 3:



Source: SPSS output of field data, 2016

Figure 4 contains names of some Units that respondents mentioned when they were asked to mention any Unit in their Hospital that uses ICT tools. Some of those Units include Accounts Office, Administration, OPD, Laboratory, and X-ray Units.

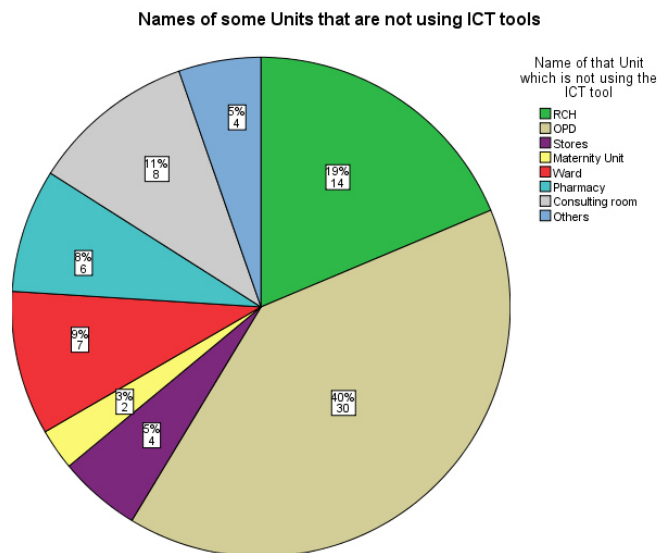
Figure 4:



Source: SPSS output of field data, 2016

Figure 5 is a pie chart which shows the various Units that respondents indicated that those Units are not using any ICT tool to help in their operations. Some of the Units include OPD, RCH, Male and Female Wards, Stores, Consulting Rooms, Pharmacy, and Maternity Unit.

Figure 5:



Source: SPSS output of field data, 2016

Table 6 indicates whether respondents have been receiving refresher courses or in-service training on the use of ICT in healthcare delivery.

Table 6: Does your Unit or Hospital organize Refresher Courses

Response	Frequency	Percent
No	71	62
Yes	40	35
Total	111	97
No Response	4	3
Total	115	100

Source: SPSS output of field data, 2016

Table 7 shows the responses to the question; “mention the major challenge facing adoption of ICT in healthcare delivery at their Unit or Hospital”. With regard to that question, most of the respondents did not answer therefore reducing the response of the question to 45.

Table 7: Major challenge facing adoption of ICT in your Unit or Hospital

Challenge	Frequency	Percent
Frequent machine breakdown	4	3
Lack of Internet access	4	3
lack of in-service training	7	6
lack of ICT tools	11	10
Lack of funds	7	6
Frequent power failure	7	6
Other	5	4
Total	45	39
No Response	70	61
Total	115	100

Source: SPSS output of field data, 2016

4.0 DISCUSSION

The results were discussed under these thematic areas: Respondents' Professional Background, ICT Tools Usage, Units that use or do not use ICT tools and Problems faced by users of ICT tools.

4.1 Respondents' Professional Background

According to Table 1, 30% of the respondents are General Nurses, 10% Community Nurses, 3% Medical Doctors, 7% Laboratory Technicians, 11% Administrative Staff, 2% Account Clerks and 37% are other professionals consisting of Pharmacists, Public Health Nurses, Midwives, Health Assistants, Biomedical Scientists, etc. This shows that the questionnaires were evenly distributed and answered by the required health professionals.

Table 2 describes the various Units in which respondents were working at the time when they responded to the questions. 14% of them worked at OPD, 15% at RCH, 6% at laboratory, 3% at pharmacy, 1% at ANC, 11% at Administration, 2% at Account office and respondents that worked in other Units such as Maternity, Male and Female Wards, Consulting Rooms, etc. constituted 47%. One person however did not indicate the Unit in which he or she was working.

When respondents were asked to indicate whether they are computer literate or not, 88% of them responded Yes, 10% responded No, and 2% did not respond at all (Table 3). This implies that most of the respondents are computer literate and therefore most health professionals are computer literate.

4.2 ICT Tools Usage

According to Table 4, 55% of the respondents do not use any ICT tool to assist in the discharge of their daily duties while 45% indicated that they use some ICT tools. This implies that the level of ICT tools usage in the operations of hospitals is low since more than 50% of hospital staff is not using ICT in its routine operations.

ICT tools were defined for respondents as computers, phones, printers, scanners, cameras, biometric devices, social network platforms such as email, WhatsApp, YouTube, Instant

Messaging, Facebook, Skype, radio, television, and computerized machines such X-ray machines and Ultrasound scan machines.

According to Figure 3, 45% (Table 4) of the respondents who said they do not use ICT tools in their operations indicated various reasons why they do not use ICT tools. Some of the reasons include: No ICT tool is needed to discharge duties, ICT tool needed to discharge duties is not available, ICT tool needed is available but I do not know how to use it, I do not know of any ICT tool that can be used to discharge my duties, etc. Among all the reasons given, the most popular is ICT tool needed to discharge duties is not available.

Table 5 shows different ICT tools that respondents who said they use ICT tool in their duties mentioned. The most common ICT tool mentioned is computer (33%) followed by telephone or mobile phone (7%). Some other equipment mentioned is printer, scanner, digital thermometer, image reader, chemistry analyzer, computerized radiography, pulse oximeter, digital fetoscope, and haematology analyzer. Table 5 also shows that respondents are not using any social network platform such as email, whatsApp in their operations.

4.3 Units that use or do not use ICT tools

According to Figure 4, some respondents said Units that use ICT tools in their hospitals include Administration, Account office, laboratory, OPD, and X-ray. Among these Units, ICT tools are mostly used in Administration and Account office. This implies that the level of ICT usage in the core operations of the hospitals is low.

From Figure 5, some respondents also said Units that do not use ICT tools in their hospitals include RCH, OPD, Stores, Maternity, Ward, Pharmacy, and Consulting Room. The Units mentioned constitute the core Units of a hospital and therefore reveals that the level ICT usage in the core operations of the hospitals is low. According to Figure 5, OPD is the most common Unit mentioned. It is in this Unit that patients' records are kept for reference. This implies that in most hospitals patients' records are still kept in paper folders.

4.4 Problems faced by users of ICT tools

Figure 2 revealed the different problems faced by users of ICT tools mentioned above. The problems include frequent equipment breakdown, frequent power failure, frequent network link breakdown, and others. The most common among the problems facing users is frequent equipment breakdown. From Table 6, majority (62%) of the respondents said they are not given in-service training or refresher courses to upgrade their knowledge or educate them on the use of ICT tools in healthcare delivery. This implies that lack of in-service training is a causative factor hindering the use of ICT in healthcare delivery.

According to Table 7, the few respondents (39%) who answered the question said the major challenge facing the adoption of ICT in their Units or Hospitals is "lack of ICT tools". This response has buttressed the reason given by the respondents who said they do not use ICT tool to discharge their duties due to non-availability of ICT tool. This implies that the little availability of ICT tools coupled with frequent breakdown of the equipment are the major problems hampering the adoption of ICT in the hospitals.

5.0 CONCLUSION

The research revealed that most health professionals are computer literate. However, the level of ICT tools usage in the operations of hospitals is low. This low level of ICT penetration was found to be due to lack of required ICT tools and frequent breakdown of the insufficient equipment available. The research also found that there is inadequate in-service training or refresher courses for staff on the use of ICT in healthcare delivery. The few ICT tools currently used are for administrative operations and not the core duties of the hospitals.

6.0 RECOMMENDATIONS

The following recommendations are made based on the findings of the study:

- The Health Ministry should provide needed ICT tools to Ghanaian Hospitals to improve healthcare delivery.

- Practicing health professionals should be given in-service training on the use of ICT in healthcare delivery
- ICT in healthcare delivery must be a core subject in the curriculum of Health Training Institutions.
- Hospital Management should ensure good maintenance culture to maintain equipment.

7.0 REFERENCES

- Afarikumah, E. (2014). Electronic Health in Ghana: Current Status and Future Prospects. Online Journal of Public Health Informatics (OJPHI). Retrieved from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3959911/>
- Burns, N. & Grove, S.K. (2005). The Practice of Nursing Research: Conduct, Critique, and Utilization (5th Ed.). Retrieved from: http://www.researchproposalsforhealthprofessionals.com/definition_of_quantitative_resea.htm
- Dery, S.K. (2016, January 11). 67th New Year School Opens. Graphic Online. Retrieved from: <http://graphic.com.gh/news/general-news/56117-67th-new-year-school-opens.html>
- Enkivillage. (n.d.). Purposive Sampling. Retrieved from: <http://www.enkivillage.com/purposive-sampling.html>
- GhanaWeb. (2016, January 12). E-Health Can Impact Healthcare Delivery. GNA. Retrieved from: <http://www.ghanaweb.com/GhanaHomePage/health/E-health-can-impact-healthcare-delivery-407100>
- GlobalMedia Group. (n.d.). What is Telemedicine? Retrieved from: <http://www.globalmed.com/additional-resources/what-is-telemedicine.php>
- Nordqvist, C. (2015). UltraSound Scans: How Do They Work? Retrieved from: <http://www.medicalnewstoday.com/articles/245491.php>
- Rouse, M. (2005). Information and Communications Technology (ICT). Retrieved from: <http://searchcio.techtarget.com/definition/ICT-information-and-communications-technology-or-technologies#>
- World Health Organization. (n.d.). E-Health. Retrieved from: <http://who.int/trade/glossary/story021/en>