ADDIS ABABA UNIVERSITY

SCHOOL OF INFORMATION SCIENCE AND SCHOOL OF PUBLIC HEALTH

HEALTH INFORMATICS PROGRAM

UTILIZATION OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTs) FOR ACCESSING HEALTH INFORMATION BY PHYSICIANS IN ADDIS ABABA PRIVATE HOSPITALS

By

Sahle Kibru

October 2013

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ACRONYMS

CD = Compact Disk

CDMA = Code Division Multiple Access

CIRT = Clinical Information Retrieval Technology

CL = Confidence Limit

CME = Continuing Medical Education

CPD = Continuing Professional Development

CPOE = Computerized Physicians Order Entry

CSA = Central Statistics Agency

EMR = Electronic Medical Record

ENT = Ear, Nose or Throat

FMHACA = Food, Medicine and Healthcare Administration and Control Authority

FMoH = Federal Ministry of Health

Gyn/Obs = Gynecology/ Obstetrics

GP = General Practitioner

EHR = Electronic Health Records

HIS = Hospital Information System

ICT = Information and Communication Technology

LCD = Liquid Crystal Display

NGO = Nongovernmental Organization

OR = Operations Research

PI = Principal Investigator

RW = Read and Write

SMS = Systems Management Service

SPSS = Statistical Product and Service Solution

TAM = Technology Adaption Model

WHO = World Health Organization

WWW = World Wide Web

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ABSTRACT

Background: Information and communication technologies (ICTs) are defined as digital and analogue technologies that facilitate the capturing, processing, storage and exchange of information via electronic communication. ICTs have the potential to improve information management, access to health services, quality of care, continuity of services, and cost containment. So that, the use of Information Communication Technologies (ICTs) within healthcare can makes significant changes in the daily operations of hospitals.

Objective: These were to: identify the available ICTs tools and services to the physicians; identify the purposes of ICTs utilization by the physicians in private hospitals; determine the extent to which the existing information services meet information needs of the physicians; assess the factors to access and utilize of ICTs by the physicians; and explore the knowledge and attitudes of the physicians to utilize ICTs for their work.

Methodology: A cross-sectional survey of 147 physicians in private hospitals in Addis Ababa was conducted to gather the availability and utilization of ICTs for accessing health information to their daily clinical activities. A self-administered questionnaire was used to collect data. Data were analyzed using SPSS version 16.0, and summery measures, descriptive statistics and logistic regression analysis were used for interpreting and presentation the data.

Important Findings: The survey revealed that physicians 34.7% had own Smart phones, 87 have flush disk for their work , only forty-nine(33.8%) physicians survey reported that they have computer available in the hospitals accessed for their works, among those thirty-three (22.4%) physicians reported that they have internet connection in the hospitals. In terms of knowledge and attitudes 74% of physicians had satisfactory knowledge ICTs utilization and 71% of physicians' also favorable attitudes towards ICTs for their daily activities. The study also predicted the relation between the outcome variable and the possible factors. Physicians' activity, working experience, computer access and computer training are found to have significant effect on ICTs utilization. Similarly, physicians' level of specialty, computer accessibility, working burden and taking forma computer training found to have significant effects among possible factors on physicians attitude towards ICTs utilization for daily operations.

Conclusion: Information has been critical part of the medical professionals' /physicians/ armament of tools to provide patient care. Utilizing ICTs can offer the physicians with enhanced access to: key data at all levels from international to local, electronic libraries of evidence, peer reviewed research and practice guidelines, and network of professionals in health and related disciplines. While information access is critical in delivery of quality health care services, there are many problems that are inherent in attempting to meet the information needs of physicians at private Hospitals.

CHAPTER ONE

INTRODUCTION

1.1. Background Information

Information and communication technologies (ICTs) are broadly defined as technologies used to convey, manipulate and store data by electronic means. This can include e-mail, SMS text messaging, video chat (e.g., Skype), and online social media (e.g., Facebook). It also includes all the different computing devices (e.g., laptop computers and smart phones) that carry out a wide range of communication and information functions [1].

According to World Bank 2003, ICTs have been defined by different commentators in various ways. Many definitions focus particularly on the 'newer' computer-assisted, digital or electronic technologies, such as the Internet of mobile telephony. Some do include 'older' technologies, such as radio or television. Some even include the whole range of technologies that can be used for communication, including print, theatre, folk media and dialogue processes. Some focus only on the idea of information handling or transmission of data. Others encompass the broader concept of being tools to enhance communication processes and the exchange of knowledge.

For the purposes of this study, ICTs are defined as tools that facilitate communication and the processing and transmission of information and the sharing of knowledge by electronic means. This encompasses the full range of electronic digital and analog ICTs, from radio and television to telephones (fixed and mobile), computers, electronic-based media such as digital text and audio-video recording, and the Internet.

ICTs are pervasive in developed countries and considered integral in the efforts to build social, political and economic participation in developing countries. For example, the United Nations recognizes that ICTs are necessary for helping the world achieve eight time-specific goals for reducing poverty and other social and economic problems [2].

ICTs are being widely used in healthcare management systems. It has the potential to address many of the challenges that healthcare systems are currently confronting. Globally, ICTs

encompasses all those digital and analogue technologies that facilitate the capturing, processing, storage and exchange of information via electronic communication [3].

The United Nation (UN) through the world summit on the information society has urged African countries to the ICTs to develop key sectors, including health care. Africa faces critical challenges including low level of life expectancy and high level of mortality rates and infectious diseases such as HIV/AIDS, TB and Malaria. ICTs allow Africa to link health facilities, exchange information and make skilled diagnosis as well as achieve more affordable healthcare [2].

The World Health Organization also sees ICTs as contributing to health improvement in developing countries in three ways: 1) As a way for doctors in developing countries to be trained in advances in practice; 2) As a delivery mechanism to poor and remote areas; and 3) To increase transparency and efficiency of governance, these are critical for the delivery of publicly provided health services [4].

Fortunately ICTs in Ethiopia are evolving rapidly and costs become falling equipment and users are become better to time to time. The growth in the use of the internet continues to be exponential and the country now recognizes the importance of investment in telecommunication to extend and to improve network at both local and national level [5].

The demand for improved uses of technologies will remain ever increasing from both user and supplier perspective but more importantly the performance of the health sector will depend on the extent to which these resources are effectively deployed in the face of limiting resources and the pursuit of greater decentralized decision making in the health sector. However the lack of and communication technology policy and strategy in the health has created a situation where past health information communication technology (e-health) either failed to meet their objective didn’t address priorities in the health sectors, increase health inequality or were incompatible to system management culture of the sectors [6]. In addition to these, there were duplication of efforts and inefficient uses of scarce resource in procurement and deployments of ICTs in health sector.

1.2. Problem statement

ICTs are an integral part of digital economy in countries. Individual organizations, both public and private, have deployed ICTs in all aspects of their operations. In so doing, they aimed to achieve efficiencies in their internal processes and improvements in how they interact with external entities, such as partners, customers or governments.

ICT has the potential to improve the quality of life by providing new tools for improving access to information and knowledge management as well as sharing. The effectiveness of the health sector depends on the quality of research and the ability of health workers to transform the results of research into better healthcare services. This requires access to up-to-date scientific and biomedical information as well as opportunities to communicate and exchange information with other researchers, which is greatly facilitated by the application and use of ICT. Some of the key areas for the application of ICT in the health sector include enhancing health administration and management through medical information systems and decision support; linking health centers, delivery services and medical transport to enhance patient access to these facilities; access to and dissemination of health information for medical education and research; and improving access to skilled diagnosis through telemedicine [7].

In order to give patients a better and more accurate diagnosis and treatment, health providers/professionals needs not just information, but also continuous medical education and lifelong learning.

Unpublished studies indicated that, there are problems in the health care delivery services as a result of lack access to adequate and reliable information. Some known and assumed barriers in especially in public hospital in our context: lack of physical access (slow or unreliable internet connectivity, high subscription cost of information materials; lack of awareness of what is available; lack of relevance of available information (i.e. not meeting peoples' needs in terms of scope, style, or format); lack of time and incentives to access information; and lack of interpretation skills. These problems have also been attributed to our health information systems and services, which are not understood, unmanaged and under resourced [8].

To solve those problems knowing what status ICTs in public and private healthcare delivery institutions is important to harness the potential of ICTs systematically. These bring as

improvements and quality healthcare services in hospitals, health centers, clinics and health posts. Thus, this study aims to investigate the availability and utilization of ICTs for accessing health information by physicians in private hospitals in Addis Ababa.

1.3. Rational of the study

It has been argued that healthcare is undergoing a paradigm shift; from 'Industrial Age Medicine to Information Age Healthcare' and that 'the health system cannot remain oblivious to our rapidly changing technological landscape and mindset'. This 'paradigm shift' is shaping health systems, transforming the doctor/patient relationship and having an impact on the quality and efficiency of health care. More broadly the World Wide Web has changed how the public engage with health information, shaped the evolution of health information systems and health service organizations.

There is little if any evidence that the majority of healthcare professionals in Ethiopia have better access to adequate and reliable information. Ethiopia continues to face health threats characterized by ravaging HIV/AIDS pandemics, spread of infectious diseases and the rise of non-communicable (chronic) diseases, high levels of infant mortality and maternal mortality, low levels of life expectancy and deteriorating healthcare facilities [9].

Investment in education and health infrastructure has been a consistent policy of all successive governments in Ethiopia. The tradition of government support for health development has been a catalyst for the advancement of health care delivery in the country. Financing as well as provision of health services has historically involved in public and private sector actors [10].

In recent years, there has been a considerable growth in private health facilities especially in urban areas. Expanding private sector reduces the burden on the government, of ever increasing demand for health care, offers consumers choice and competition. It will help health sector to improve efficiency and quality and can contribute to health equity [10].

In Ethiopia, the private health sector ranges from traditional healers, pharmacies and shop keepers selling health care products, to non- profit and for – profit clinics and hospitals. There are a variety of reasons people use private health sector, including convenience, perceived quality, and confidentiality or because of nothing else is available. More over private health care

in Ethiopia is not just for rich. Africans of all socio-economic background turn to private sector for their health care needs [11].

In the poverty, low education and limited access to health services are the root causes of major health problems in Ethiopia. In addition, the health service delivery system is deficient and in coverage poorly organized [12]. In the absence of a robust funded health infrastructure providing free care, citizens have no option, but to seek out private facilities. The private provision of health services in Ethiopia was legalized as one of the countries means to mobilize resources and improve efficiency in health system. The numbers of private health facilities are increasing steadily, but numbers of private hospitals are still less and most of them are in the Addis Ababa city. In these considerations, currently there are 35 private hospitals and around 242 physicians, above 3000 other health professionals give service in those hospitals. For those reason, to give effective and efficient quality health care the role of ICT tools to accessing up to date information is undauntedly necessary.

1.4. Objectives

1.4.1. General objectives

General objective of the study was to investigate the availability and utilization of ICTs for accessing health information by physicians working in private hospitals in Addis Ababa

1.4.2. Specific objectives

- To identify the available ICTs tools and services to the physicians in private hospitals in Addis Ababa;
- To identify the purposes of ICTs utilization by physicians in private hospitals in Addis Ababa;
- To determine the extent to which the existing ICTs/services meet information needs of the physicians in Addis Ababa;
- To assess the barriers to access and utilize of ICTs by the physicians in Addis Ababa; and
- To explore the knowledge and attitudes of the physicians to utilize ICTs for their work

1.5. Significance of the study

Hospitals are complex, information-rich environments in which people need to collaborate to provide appropriate patient care, with patient care teams at the core of the work. The collaborative environment in a hospital setting would provide an ideal environment in which to gain a deeper understanding of the collaborative nature of information seeking practices and processes of teams. The findings of the study have several implications for information access among healthcare professionals specifically physicians as well as for further research, namely:

The government and health sector policy-makers: the findings will provide the employers, health administrators and managers with useful information that could be used in the planning and management of ICTs for the purpose of providing quality healthcare services.

Medical education providers: recommendations are aimed at ensuring that physicians are adequately prepared to adapt to the eminent changes in their workplace and to be able to effectively utilize ICTs.

Medical professionals/physicians/: measures are designed to extend and enhance the capacity of physicians to utilize the potentials of ICTs in the interest of their profession. Medical professionals will increasingly find themselves needing to use ICTs both in their work tasks and in their interventions with patients.

1.6. Scope of the Study

This stud was limited to private hospitals in Addis Ababa region. A total of 35 hospitals and 242 physicians who are working in those selected hospitals included in this study. The study was intended to investigate availability and utilization of ICTs for accessing health information by physicians in Addis Ababa private hospitals from February, 2013 to June, 2013.

1.7. Organization of this Thesis

This thesis organized in five chapters. The first chapter discusses the introduction, the objectives, the relevance and rationale of the study. The second chapter presents the literature review that has been made prior to and during the conduct of the research thesis. The third chapter describes the methodology employed to conduct this thesis. The fourth chapter describes analysis of the findings in terms of results and discussions. The final chapter, chapter five provides the conclusion and recommendation of the study. References and Annexes are also part of this study.

CHAPTER TWO

LITERATURE REVIEW

2.1. ICT application in the healthcare

The healthcare industry today faces huge challenges, due to ever increasing demands. Healthcare professionals are under pressure to continually improve the services they offer to care for a growing number of patients - often with inadequate resources. In other industries, ICT solutions have been adopted to raise productivity and enable innovation, and are now widely accepted as part of daily work practices.

According to research done as, the application of information communication technology in the healthcare system divided in to two broad categories; First ICTs on the pharmaceutical industry, second ICTs on the healthcare industry.

Pharmaceutical industry is available from the further application of ICTs to the: operation and management of clinical trials (example. e-recruitment); monitoring post-launch usage and outcomes; Marketing and distribution of pharmaceuticals (example. 'cyber-detailing'); implementation of integrated e-commerce and supply chain management systems in healthcare supplies; development of internet health 'portals' and healthcare information for both medical practitioners and patients; and Further development of electronic prescription and clinical decision support systems.

Looking at the impact of ICTs on ***healthcare*** reveals an enormous range of opportunities for significant cost reductions and service enhancements, through what is often broadly referred to as 'e-health'. In so doing it focuses upon e-health applications in four key areas, namely:

1. Payer applications - including management of government funding and delivery programs, health insurance and the use of e-commerce and electronic communication to coordinate healthcare organizations and activities throughout the system;

2. Provider applications - including the applications of e-health in private for-profit, not-for-profit and public hospitals and clinics, the use of e-commerce and internet based systems linking and integrating health services;

3. Practitioner applications – including the adoption of practice management tools, clinical tools and online communication systems, telemedicine and remote diagnostics, the use of clinical decision support systems (CDSS) and evidence-based care in diagnosis and treatment; and

4. Patient applications - including new forms and locations of care delivery, the emergence of the internet and of informed consumers and of new information and health intermediaries, and the use of online pharmacies [13].

New technologies and mainly ICT certainly play an important role and determinant for this transition of healthcare from an institutional, "clinical-centered" towards a "patient-centric" approach.

ICT will complete the realization of the "digital hospital" by facilitating and enabling the clinician's work at the point of care (security, decision support, increased productivity, mobile information access, reduction of errors, and reduction of the overall costs).

Moreover ICT will have a challenging and great opportunity in reshaping the healthcare beyond the hospital's environment by making possible the "home care" and the "personal healthcare".

Involved technologies will be:

- ✓ New user interfaces, beyond the mouse and keyboard paradigm (simple, intuitive and natural interaction approaches between the user and the computer, multimodal and adaptive interfacing, user profiling and personalized user interfaces);
- ✓ Wireless & mobility with specific focus on near range communication (body area network and personal area network);
- ✓ Sensor technologies (vital sign sensors including biosensors, activity sensors, ambient sensors, tracking and localization systems, medication tracking);
- ✓ New Internet technologies for easy collection and ubiquitous access to widespread clinical data, for a powerful deployment of new healthcare services and as an effective inclusion tool for people at risk of exclusion (social networking, Web 2.0);
- ✓ Web services (telemonitoring, health coach, diet & fitness services, disease management service, etc) [14].

The research “Leapfrogging for Modern ICT Usage in the Health Care Sector” classified ICT techniques in the Health Care sector [15]. The study proposes the classification as shown in Figure1. The heart of the classification is in the interaction between the medical personnel and the patient. Both the systems that support discussions in the interaction situation: these are called the customer support and consultation tools. These tools become active as a relationship between the patient and care-taking personnel has been established. Customers, the patients, as well as the medical staff have however the interaction needs to be established, timed and synchronized, and for these purposes the study introduced the systems of interaction support tools and process support tools.

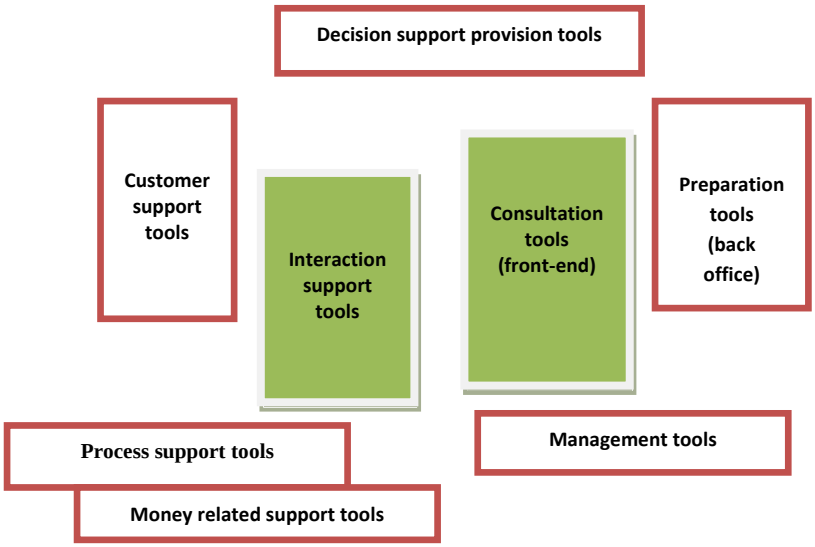


Figure 1: Classification of ICT tools in Health Care

Adopted from Leapfrogging for Modern ICT Usage in the Health Care Sector (Reima Suomi, 2000)

Customer support tools

Information systems in this category are targeted at giving support for the customer, patient, in his or her daily coping with his/her health (sickness), as well as specifically in interactions with Health Care Personnel or systems. In the broad sense, all information systems contributing to the well-being of humans belong to this category. More specifically, however, we should focus on systems that help the patients in coping with health data. A simple spreadsheet where someone keeps track of his/her weight would belong to this category.

Interaction support tools

With these systems we mean mainly computerized reservation systems for consultation. They are often pioneering applications. With modern Internet-based techniques, these systems can be turned into self-services. From the personnel point of view, different systems to keep track of consulting hours and other activities belong to this category. As a further step, the whole consultation process can be conducted through information systems. Finally, the whole hospitals can become virtual ones.

Consultation tools

Consultation tools are there to help the care-taking personnel in the customer interaction situation. This area is of key importance: “the doctor-patient relationship tends to be of primary importance to most patients”. They deliver the basic patient data, and may direct the consultation situation through data input demands and workflow and customer interaction process recommendations. To give an example, surgeon operations are often a most critical point in a care-taking chain for a patient. However, current systems and work-habits do not cater for proper information to be collected for them. Solutions that allow for fluent collection of data without disturbing the delicate actions or surgery are badly needed.

Decision support provision tools

Whereas the consultation tools deliver the basic patient data, with decision support provision we refer to information systems that deliver general information that needs to be assessed and assembled for use in the specific consultation situation by the care-taking personnel. It is well known that the amount of medical know-how is growing very fast all the time. Internet has been here the tool that has suddenly made huge amounts of information accessible for every doctor.

Process support tools

Process support tools guide and escort the patient through different caring activities in the Health Care value system. They of course interact with the interaction support tools, but take a broader view on the process than just one consultation interaction. Here critical things are among other the routing of the customer through different consultations, and taking care that needed data follows the customer. From the viewpoint of the service points, even and right-sized load is a key

factor. Major cost benefits can be gained here through directing the customer to the right level of consultation, at the right time and place. These systems are among the most difficult to implement, because they are co-operative in nature.

Money-related support tools

Money-related support tools master the money flows in Health Care. They are used also by the customer, but the more they can be handled as back-office -functions the better for the customer. Through these systems, the payer, say public administration and insurance companies, get involved to the processes. Because of the strong players in the field and the huge economical values at stage, even information technology innovations have traditionally born fruit there. To emphasize the complexity of the area, for example in many country, for a long time the budgeting system distributing state support for different Health Care organizations was one of the heaviest to use and maintain in the whole public administration.

Preparation tools

Preparation tools are systems at a service point that help the care-taking personnel to prepare for the customer interaction, but are not self-active at the consultation time. Typical examples are different systems for handling laboratory activities and mastering x-ray pictures. Decision support provision of course heavy interacts with these system tools.

Management tools

Management tools support the management of healthcare. Most importantly, they collect statistical data for directing purposes from all other information systems. Management tools can be very classically divided into systems at operational, tactical and strategic level. Especially strategic planning tools are badly needed. In this study definition, strategic decisions are decisions that affect the total amount of resources available for a certain purpose. To take an example, for years the Finnish political decision makers have had difficulties in deciding, how many doctors should be educated. Some years reductions in education are demanded, some year's proofs of doctor shortage are presented.

Research reviewed “Interventions for promoting information and communication technologies adoption in healthcare professionals” the following classification identifies the five broad categories of ICTs in healthcare system [3]:

1. Electronic Medical Records (including patient records, clinical administration systems, digital imaging & archiving systems, e-prescribing, e-booking);
2. Telemedicine and telecare services;
3. Health information networks;
4. Decision support tools for healthcare professionals;
5. Internet-based technologies and services.

Each of these ICT categories encompasses various applications that have specific functions in healthcare settings. Those applications have the potential to improve information management, access to health services, quality and safety of care, continuity of services, and cost containment [4].

However, in the healthcare industry, although ICT is widely used, it has still not yet reached its full potential. Part of the reason for this is that healthcare providers are typically more cautious than their counterparts in other industries; a sensible outlook given that they are dealing with human lives [16]. Nevertheless, the enormous challenges facing the healthcare industry are now forcing healthcare providers to seek better efficiencies in an effort to stretch limited funds further and keep up with new medical advancements [17].

As mentioned the above application of ICT tools in healthcare, this study mainly tries to explain the existing information service availability and utilization status in our private hospitals in those points of the two ICT application areas which are interaction support tools and process support tools.

2.2. Hospital information system

Nowadays healthcare organizations globally increasing recognize the importance of investing in information technologies to improve the quality of care delivery and reduce costs. In health and treatment field, it is an undeniable necessity to use the efficient information to systems for meeting goals of efficiency, productivity, quality of services and customer satisfaction [18]. Hospital Information System (HIS) is a mechanized document and information management system in hospitals.

According to the wide developments in medical technology and increase in the patients' expectations, the increasing need of using HIS in hospitals has been considered more. In the era of information explosion and technology in health and treatment field, experts believe that any hospital lacking HIS in the 21 century is unable to compete with other hospitals. Hospital Information System is a strong information tool contributing managers in hospitals administration and making correct decision and considerably increases the positive performance of hospitals [19].

2.3. Information need and sources

2.3.1. Information need

The health sector is highly information-intensive. Providing effective health services requires the extensive collection of patient data in analogue and digital forms, which are then processed and disseminated within the same institution or sent to other institutions. E-health also serves to broaden the information and communication horizons of healthcare workers. Knowledge, information and data can now be accessed and exchanged locally, nationally, regionally and globally. These opportunities apply equally to developing countries and to developed countries although, clearly, the challenges are greater in the developing world. The face of public health services is changing as they adopt ICTs [20].

On the other study shows that there are six main reasons why medical trainees and doctors in practice use clinical information searching [21]. Reasons one, two and three refer to cognitive objectives and situations where doctors search for information on their own. These are associated with individual mental faculties and individual intentions as related to information-seeking

behavior, namely updating knowledge or learning new knowledge: (1) to updating knowledge or learning new knowledge (to answer a clinical question, solve a problem, or support decision making related to clinical practice); (2) to fulfill an educational or research objective not or indirectly related to a specific patient (to learn about, present, read, teach or write); (3) to search in general, or satisfy personal curiosity or interests;

Reasons four to six refer to organizational objectives and situations where doctors search for information with others in a health organization context. These are associated with social actions as related to organizational issues of information-retrieving processes: (4) to share information and negotiate with patients, family or community caregivers (e.g. health education); (5) to exchange information with other health professionals, namely colleagues or members of health organizations (e.g. to answer a question raised in clinical encounters); and (6) to plan, manage or monitor tasks with other health professionals (administrative functions and management of patient care within health organizations)

Clinical Information-Retrieval Technology (CIRT) is increasingly used in clinical practice. For example, doctors have adopted handheld computers and Internet connections to medical databases in an attempt to improve access to clinical information at the point of care and at the moment-of-need [21]

A Case Study done Kenyatta National Hospital in Kenya, study participants (health professionals) needed information for their practices, even if they don't acknowledge this; they don't really seek information, they talked more of 'being constantly informed'. In this study seven distinct categories of information were discerned from the participants' statements about the kinds of information they required for their clinical work: (a) Patient care information; (b) Pharmacological (Drug) information; (c) Recent advances in medicine (d) Latest approaches to treatment modalities; (e) Medical-legal information; (f) Latest information on current practices in medicine; (g) Clinical trials and case reports. Needs for information arise continuously during the course of clinical practice, especially for the physicians in training; for example during patient examination, when participating in ward rounds or attending conferences. In order to give their patients a better and more accurate diagnosis, they needed not just information, but also continuous medical education and lifelong learning [22].

2.3.2. Information sources

Access to relevant information and knowledge is critical to the delivery of effective healthcare services. There are wide ranges of resources available to physicians to meet their ever-growing information needs. Consultation with respected senior colleagues, medical textbooks, printed journals, Internet medical resources and conferences are among the preferred sources among the physicians over the years [23].

Research done in Barcelona, Spain In order to gain an indication of the information practices, doctors were asked to identify what were their most frequently visited information sources:- International medical news updates, National medical news updates, International academic journals, Workplace information, National academic journals, Professional education, National public institutions, International public institutions [24].

Similarly research done in Kenya, interviews with respondents (health professionals) confirmed that they had established their own personal information domains – their own routes to information using a cluster of resources – *professional networks, professional societies, and e-resources, specific journals and reference materials*. For the junior doctors and registrars, study and training stimulated much of their information needs, satisfied through *printed textbooks* and *journals,* the *Internet, Google searches* and *medical databases* such as the Medline. Most professionals acknowledged approaching work colleagues in the office or in the team for information. They also made use of colleagues on professional courses to remain up to date. Frustrations in getting access to up to date textbooks and journal articles were noted. The potential of full text e-resources and reference materials were confirmed. They needed rapid access to reliable and relevant information when encountering new and/ or difficult conditions. Journals and the Internet were essential for general updating; specific reference sources were used for clinical support. In response to the question on the mechanisms they use to address situations when faced with dilemmas of diagnosis and treatment, the respondents identified the sources of information they used most frequently: Professional colleagues: All the participants interviewed indicated regular use of colleagues and other medical specialists as their preferred first information source choice alongside textbooks and journals [22].

The Internet has become the major integration platform that allows to access and to integrate any kind of information that is electronically available. This also comes true for the healthcare

system. Healthcare organizations use innovative information technologies in order to optimize business processes. Online health information and virtual communities are examples for the way how patients and their relatives use ICT in order to manage their disease. Studies show that health information seeking via Internet has become a normal activity [25]. Doctors and other healthcare professionals state that patients have changed their attitudes towards them, especially, that they have started discussing about therapy and medication. A lot of patients have become members of online groups, e.g. forums and chats, and find support in these virtual groups. With respect to ICT used as a therapeutic means the majority of the solutions are home care applications. Examples are electronic health records, integrated clinical signs monitoring and medication reminders.

Several researchers in library and information sciences have monitored the information- seeking behavior of physicians with the sole aim of addressing these needs. The rapid growths of the Internet and its impact on medical sciences over the years have introduced a new dimension to patient care and research output. Because of the explosive growth of Internet service globally, patients are becoming better informed of their medical conditions and are seeking for improved clinical services based on available information on the Internet. This development in turn is placing an increasing demand on doctors to keep abreast of developments in medicine [26].

Research done in a hospital in Kenya, when the participants (health professionals) were asked the main reason they used the Internet; communication by e-mail topped the list of the uses of the Internet, others uses included: medical searches, academic research, general heal information and leisure. The most prevalent uses of the e-mail as cited by the respondents were: Professional and social communication; Receiving journal alert and information on new publications; Communication with professional associations and colleagues; Personal and social communication; E- Medicine alerts and updates; and E-journals alert services.

Alerting services are highly valued; minimizing the risk of missing critical information was important for the doctors [22].

2.4. Factors affecting utilization and accessing ICTs Tools/services

Different authors identified different ICT issues in the health sectors which can directly or indirectly affect effectiveness of ICT utilization. Among the issues are legal and regulatory problems associated with ethical issues such as patient's rights of access, privacy, security, and confidentiality of patient data. On the other hand technical problems related to acceptance by the users, especially health care professionals who are ICT illiterates, hard and software standards, interoperability, safety of the technology, institutional challenge and financial problems are the major challenges in the use of ICTs in the health sectors which should be taken under consideration during implementation and utilization of ICT in the healthcare organizations [27].

Previous studies have found that training is a major determinant of ICT utilization by healthcare profession and influences the integration of these technologies into clinical practices. However, many factors may influence the effectiveness of educational strategies, such as characteristics of the learner, the intervention itself, characteristics of the behavior that the intervention is trying to change, and the context in which the intervention is conducted [28]. Characteristics of the intervention include the source of the information, the content, and the channel by which it is delivered [29].

Research don reviewing different literatures indicated that, the evidence on the efficacy of some applications, such as teleconsultations, email consultations computerized health records and clinical information retrieval technologies, is limited or shows limited effect. However, other ICT applications, such as some decision support systems, computerized reminders, computerized advice on drug dosage and interactive health communication applications have shown benefits for the healthcare system and may improve patient health outcomes [16]. Furthermore, patients want clinicians to use ICT.

With increasing computerization in every sector of activity; ICTs are expected to become tools that are part of healthcare professional practice. Nonetheless, it appears that ICTs such as electronic medical records and the Internet remain underused by healthcare professionals [30].

Many studies indicated that, one of the salient difficulties primary care physicians consistently reported through the years was the amount of time spent seeking for information. Apart from the time factor, primary care physicians also encountered other difficulties when seeking

information: a lot of irrelevant material, difficulty finding correct search terms, inefficient indexes in books and journals, and badly organized journal volumes in their own practice [31].

On the basis of studies clinical questions generated for US primary care physicians; taxonomy was developed of 59 obstacles found when answering questions with evidence. The obstacles were organized according to the 5 necessary steps in asking and answering clinical questions: acknowledge a gap in information, formulate a question, seek relevant information, formulate an answer, and apply the answer to patient care. Six obstacles seemed prominent: (1) the extraordinary amount of time necessary to find information; (2) reformulation of the original question, which often is vague and could be interpreted in multiple ways; (3) discovery of an optimal search strategy; (4) lack of a good source of information; (5) uncertainty as to whether all relevant information has been found; and (6) inadequate synthesis of many pieces of evidence into a clinically useful approach [31].

Summary of Literature

Researches	Authors	Sample	Place	Methods	Conclusion
Application of information and communication technology (ICT) in health information access and dissemination in Uganda	Walter Omona and Robert Ikoja-Odongo (2006)	21 librarians ,60 library users Interviews from six administrators involved in ICT administration	Public Hospitals library and Institution of Health administration In Uganda	Case Study using self-Administer questioners and Interview	A number of challenges must be addressed if the full benefit of the use and application of ICT in health information access and dissemination is to be realized in Uganda, and draws the attention of all the stakeholders in the health sector to the need to support and promote ICT as the most effective tool for health information access and dissemination.
Utilization of ICTs for Accessing Health Information by Medical Professionals	Dr. George M. Gatero (2010)	The total number of respondents to interview was reached heuristically	Kenyatta National Hospital in Kenya	Case study using Semi-structured interview	Many critical information needs of the medical professionals were not being met adequately.
The integration of Information and Communication Technology into medical practice	Francisco Lupián ez-Villanueva, Michael Hardey, Joan Torrent, Pilar Ficapal (2010)	An online survey of the 16,531 Physicians	Physicians Association who had a registered email account in Barcelona	Cross sectional study using mail survey	The integration of ICT within medical practice cannot be adequately understood and appreciated without examining how doctors are making use of ICT within their own practice, organizational contexts and the opportunities and constraints afforded by institutional, professional and patient expectations and demands.
Physicians' culture of uses of online medical information to improve patient care practice	Etsub Birhanesilassie (2009)	273 physicians	Addis Ababa public hospitals	Cross sectional descriptive study	There is low literacy on internet browsing, preference of hard copy, poor attitude to online source, ignorance of quality of online source and online medical information sources imply culture of uses of online medical information source is far from optimum.
How do primary care physicians seek answers to clinical questions? A literature review	Dr.Herma C.H.Coumou and Dr.Frans J.Meijman (2006)	21 research papers and three literature reviews were examined	A review of the international literature	A literature review	Primary care physicians have several options for finding quick answers: building a question-and-answer database, consulting filtered information sources, or using an intermediary such as a clinical librarian.

CHAPTER THREE

METHODOLOGY

3.1. Study area and period

3.1.1. Study period

The study was conducted in Addis Ababa city administration from December 21/2012 to June 7/2013.

3.1.2. Study area

Addis Ababa is the capital city of Ethiopia and the largest city in the country, located in the heart of the country on the area of 540 square kilometer. It is situated between 9 degree latitude and 38 degree east longitude in the plateau that stretches at the range of 2,200 – 2, 800 meters of altitude above sea level. The lowest and highest annul range of temperature are between 9.89 to 24.64 degree centigrade [32].

Health services in Addis Ababa are provided by the Federal government hospitals, Addis Ababa regional health bureau, private and NGO health facilities. In the city, there are a total of 47 hospitals, 52 health centers, 573 clinics, 189 pharmacies, 232 drug stores and 163 drugs & medical supply importer and distributor which are managed by different organizations [33].

The hospitals Owned by Ministry of Health provide services to referral cases throughout the country. Defense and police hospitals offer services for their staffs.

Addis Ababa Regional Health Bureau is responsible for both curative and preventive healthcare of the city, under which there are 5 public hospitals and 35 hospitals private/NGO, one regional laboratory, one clinical nurse training school, 37 health centers, and 7 clinics which are serving the general public [33].

3.2. Study design

The study employed facility based cross sectional descriptive quantitative method using self-administered questionnaires.

3.3. Study population

The study/source populations are all physicians working in clinical care at the private/NGO hospitals in Addis Ababa. Physician mainly working with ICTs/computer/ attached medical instruments in daily operations, in that case they are appropriate respondents to study utilization of ICTs tools/services for their daily operations

According to Addis Ababa city administration health bureau report, there are 35 private/NGO hospitals in the city. This report also indicated that about 242 physicians currently working in those Hospitals. All those Hospitals and physicians were study area and source population of in this study.

3.3.1. Inclusion criteria:

physicians mainly working on medical/clinical care in private hospitals

3.3.2. Exclusion criteria:

For the sake of getting pertinent data, Non Ethiopian physicians and physicians whose working experience is less than one year were not included in this study.

3.4. Sample size and Sampling procedure

3.4.1. Sample size

For the quantitative determination of physicians' ICT utilization for medical practice, the sample size is calculated using single population proportion formula. Since The status of ICT utilization with clinical practice by physicians in Ethiopia is not known, an assumption of 50% was taken.

An assumption also made, any particular outcome to be of 5% marginal error and 95% confidence level of certainty (α=0.05) and with contingency of 10%. Based on those assumptions the actual sample size of the study population was computed.

$n = (Z_{a/2})^2 \frac{P(1-P)}{d^2}$

Where:

n = sample size

$Z\alpha/2$ = critical value at 95% confidence level of certainty (1.96)

P = proportion of physicians that utilize ICT for their work

D = precisions (marginal error)

Thus $n = \frac{(1.96)2\ (0.5)(1-0.5)}{(0.05)2} =$ 384 Total sample size = 384

Since, the size of the source population is less than 10,000 the sample size was corrected using the formula: sample size = $\frac{n*N}{n+N}$ where N is the size of source population

Thus $n = \frac{384*242}{384+242}$ = 149 sample size

Non response rate = 10% * 149 = 15 thus, Total sample size is 149+15 = **164**

3.4.2. Sampling procedure

All /35/ private/NGO hospitals in Addis Ababa that were functional during the time of study were included in this study. During data collection 242 physicians were working on those hospitals permanently. Among those Physicians, 164 physicians directly involved in clinical practice in those hospitals were randomly selected and included in the study.

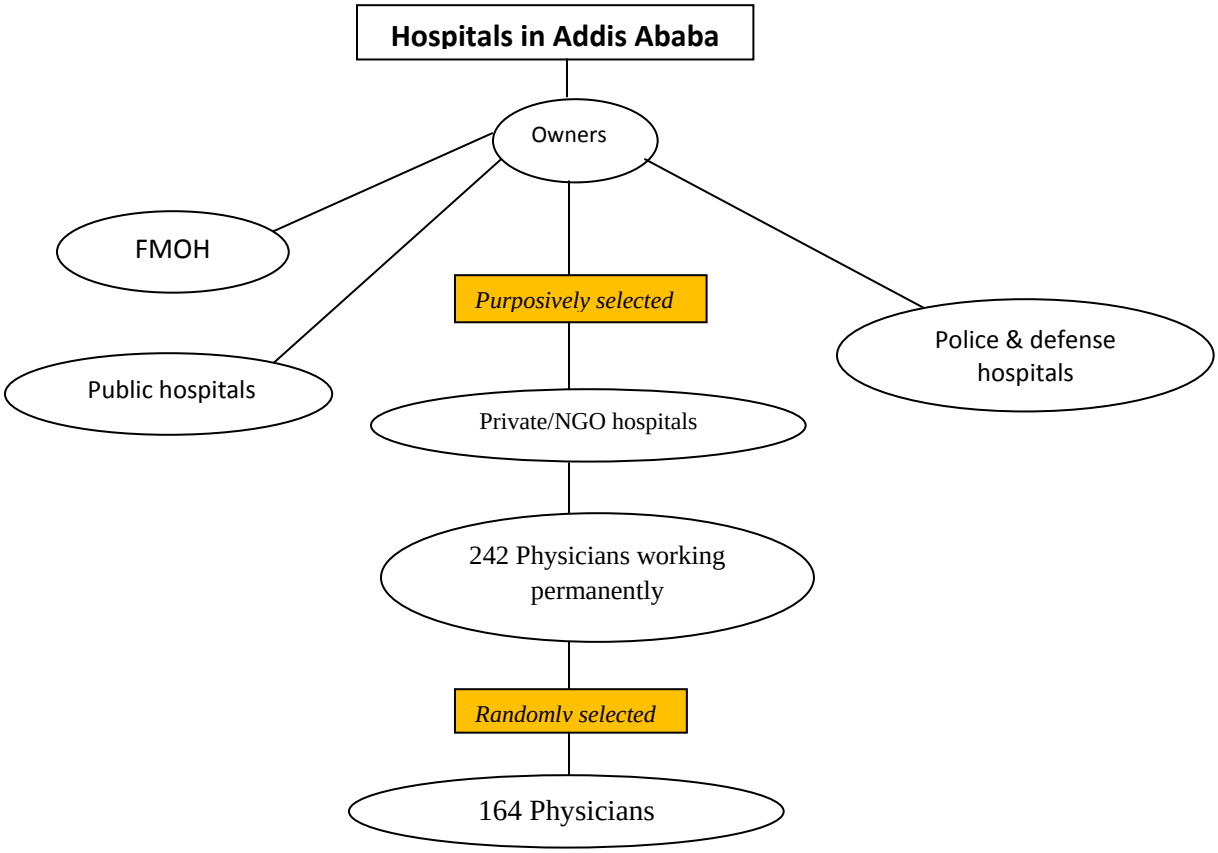


Figure 2: Sampling Procedure

3.5. Variables in the Study

3.5.1. Dependent variables

- Utilization of Health information communication technologies (ICTs) of physicians
- ICTs knowledge and attitudes of physicians

3.5.2. Independent variables

- Socio demographic characteristics /age and sex of respondents/
- Field of specialization
- service year of respondents
- Education status/level of specialty
- Activities of the physicians
- Accessibility of ICTs tools and Services/computers/
- Computer training
- Working burden of physicians

3.6. Operational Definition

Access to ICTs Tools/Services: The level of availability of ICTs tools/services like computer, Internet, electronic documents etc. for Health service needs of physicians in the Hospitals

Clinical Decision Support System: A computerized system that aims to assist healthcare providers in making appropriate decisions regarding patient care.

Computerized Provider Order Entry: A computer system that allows for the direct entry of medical orders by physicians and other healthcare providers

Electronic Medical Record: A digital record found in a unique care setting (e.g., the physician office or the hospital) and containing data specific to that care setting.

Favorable Attitudes: Respondents who scored the second quartile (≥ 50%) and above for a set of seven questions of attitude towards ICTs utilization in daily hospitals activities are considered to have a favorable attitude.

Frequency ICTs utilization: Average sum of measured by using indicators (computer with accessories, Internet communication equipment, PDAs, flash disk, CD-rooms, LCD-projectors, Video conferencing, video or digital camera, telemedicine, EMR, home monitoring/cell phone) the response of these categories were (Never, rarely, weekly, daily).

Health Information Systems: An information system used within a healthcare organization in order to promote efficient communication, documentation, and record keeping within the organization.

ICTs Utilization: Refers to the routine as well as occasional use of ICTs tools/services like computers and its Applications including Internet browsing for the purpose of health information and healthcare

Information and Communication Technologies: Tools that facilitate communication and the processing and transmission of information and the sharing of knowledge by electronic means.

Satisfactory ICTs Utilization: Respondents who scored equal to or above the second quartile (≥ 50%) score for the ICTs utilization indicators in the set of questions.

Unfavorable Attitudes: Respondents who scored below the second quartile (≥ 50%) for a set of seven questions of attitude towards ICTs utilization in daily hospitals activities are considered to have a favorable attitude

Unsatisfactory ICTs utilization: Respondents who scored less than second quartile (<50%) score for the ICTs utilization indicators in the set of questions.

3.7. Data collection procedures

Data collection tools

The data collection tools development was guided mainly by the objectives of the study. The variables converted in to close ended questions mostly but also some to open ended questions. The questions were compared with similar instruments developed in third world countries or countries thought to have comparable contextual environments with Ethiopia, like Kenya, Nigeria, South Africa and Uganda and it also compared with similar studies in Barcelona and Canada. Additional questions were taken from similar studies, the wording of questions was changed, some questions merged or split or modified to avoid ambiguity. The organization and formatting of the questions were changed to ensure the questionnaire went smoothly. In relative terms, sensitive questions were put at the end, answer scales to attitude questions were adapted from similar studies, and skip patterns were designed later to avoid asking individuals irrelevant or annoying questions.

The survey instrument /questionnaire/ are organized into five segments: a). Socio demographic and practice details; b) Available ICTs and use; c) Access and Purposes of ICTs used by physicians; d) Accessing information services and barriers of utilization; e) knowledge and perceptions of physicians on ICTs.

Data organizers' recruitment and training

Data were collected using structured questionnaire. One supervisor/main investigator/ and four data collectors have participated in the data collection process using the questionnaire. Two days intensive training was given to the data collectors and supervisors on how to conduct the data collection.

Every private Hospital in Addis Ababa was targeted for data collection. Each of the four data collection organizers were in charge of two sub-cities. The data collection organizers visited each Hospital they managed to access and distributed the question to the physicians in the hospitals. A support letter from Ethiopian Food, Medicine and Healthcare Administration and Control Authority was requirement to get entry to the Hospitals administrators first to get permission to talk to physicians in the hospitals. Hospital administrators or medical directors were always given a briefing on the purpose of the study, consent form, and issues included in the

questionnaire. Once approval obtained, the data collection organizers went door to door to each physician's office to talk in person about the research, the process of ending up and in the particular hospital, confidentiality of replies, time required to filling in the questions, and ultimately requested consents of physicians. On the last foot not of each page of the questionnaire, the phone and e-mail contact of the principal investigator were given in the case study subjects had inquires related to the topic of research.

Most of the time, physicians agreed to take part, except in few instance when they refused from the outset due to a busy schedule or computing priorities. Very few physicians filled in the questions on the spot even though that was the preferred request from data collection organizers.

When a physician finished completing the questions, they put questionnaires in a box placed in Matron Office or reception office and kept until the data collection organizers come back for collection. When the data collection organizers received the filled in question, they cheeked for completeness and thanked the physicians.

3.8. Data processing and analysis

The returned questionnaires were checked for completeness, cleaned manually and the data were entered into SPSS version 16.0 for analysis.

Frequencies tables, proportion and cross tabulations were used to summarize descriptive statistics of the data and tables and graphs are used for data presentation.

Bivariate analysis was used primarily to check which variables have association with the dependent variable individually. Variables found to have association with the dependent variables were entered in to Multiple Logistic regression for controlling the possible effect of confounders. For multivariate analysis, the necessary adjustment was done for the possible confounding factors to identify the predicting factors for the outcome variables. Hence, internal comparisons between the variables were done based on adjusted odds ratio. In line with this statistical significance was observed using 95% Confidence Interval (CI).

3.9. Data Quality Control

Data quality was assured using different techniques in each step of the study

Before the data collection: Self-administer questionnaires, was constructed with references to published similar study to capture the necessary variables and information.

A three days training were given for the four data collectors on the purpose of, objectives and data collection process of the study by the principal investigator. In addition to the type, contents and intention of the questions, the data collectors were trained on how to communicate and convince the respondents in order to enhance the interests of physicians which is fundamental to get a valid data.

During data collection: the principal investigator was working together with the data collectors to observe the quantitative data collection process. Continues follow up and supervision were strictly practiced by the principal investigator.

After data collection: Data were coded and entered properly in to SPSS version 16 for analysis. Frequencies and cross tabulation were used to clean the data by checking missed values, outliers, inconsistencies and of questions.

3.10. Ethical considerations

Ethical clearance was obtained from the Ethical review board of AAU. Communication with the different administrative bodies and Hospitals was made through formal letter obtained from the AAU and FMHACA.

After the purpose and objective of the study have been informed, verbal consent was obtained from each study participants. Participants were also informed that, participation was on voluntary basis and they can withdraw from the study at any time if they were not comfortable about the questions.

In order to keep confidentiality of any information provided by study subjects, no names or other personal identification of the study participants were collected. Individual replies were remaining anonymous and was not be transferred to or access by a third party.

3.11. Dissemination of result

The research report will be first submitted and presented to school of information science and school of public health in Addis Ababa University.

Upon getting joint approval of school of information science and public health, the final report of the research will also be shared with FMOH, Addis Ababa regional health bureau, all hospitals included in this study, and all other interested parties.

On top of that any interested parties enthusiastic to learn from the research findings or methods or any parts of this research will be offered a copy of this report. The result may also be presented in various conferences.

CHAPTER FOUR

ANALYSIS OF RESULT AND DISCUSSION

4.1. Results

4.1.1. Socio-demographic Characteristics and work burden of Respondents

Among the 164 questionnaires distributed to an equivalent number of respondents in each hospital only 147 questionnaires were filled and collected, marking an overall response rate of about 90%.

One hundred eighteen (80.3%) of the respondents were males while 29 (19.7%) were females. Fifty nine (40.1%) of respondents age found between 41 to 50 years, 53(36.1%) found between 31 to 40, and the rest 7.5% and 16.3% age of respondents found ≤30and between 51 to 65 respectively. From147respondents who participate in this study, 27(18.4%) were MD, 98(66.7%) specialist, and 22(15%) were subspecialists (table 1).

Of those who had specialist and subspecialist post graduate training 23.53% specialized in Gynecology/Obstetrics, 21.85% in pediatrics, 15.13% in internal medicine,10.92 in radiology, 10.92 in surgery and the rest 17.64 in different specialist and subspecialists *(dental, Anesthesiology, Dermatology, Emergency medicine, ENT, Ophthalmology, Orthopedics, cardiology, Others)*. The median values of physicians' years of service were 14 years with standard deviation 8.23 and range 1to 34 years (table 1).

The survey also revealed that 95 (64.6%) of the respondents were working on clinical practice only,24(16.3%) clinical practice and teaching & research, 15(10.2%) clinical practice and management, and the rest 10(6.8%) working on clinical practice, teaching & research and management activities (table 1).

About twenty percent of physicians reported they care for patient about 40 hours a week while the majority of the physicians (79.59%) worked more than 40 hours a week.

In terms of the number of patient seen in a typical working day about 37.4% of physicians saw less than 25 patients a day, the majority of the physicians (55.8%) saw 25 to 30 patients a day and 6.8% saw more than 30 patients a day. Table 1 and 2 shows that socio demographic and working burden of the respondents respectively.

Table-1 – Socio-demographic characteristics of respondents, Addis Ababa, April-May, 2013

	N=147	
Characteristics	**Frequency**	**Percent**
Sex		
Male	118	80.3
Female	29	19.7
Age distribution of respondents[1] (Years)		
≤30	11	7.5
31-40	53	36.1
41-50	59	40.1
51-65	24	16.3
Highest level of education		
MD	27	18.4
Specialist	98	66.7
Subspecialist	22	15.0
Work experience of the respondents[2] (years)		
≤5	16	10.9
6-10	29	19.7
11-15	36	24.5
16-20	26	17.7
21-25	16	10.9
26-30	17	11.6
31+	7	4.8

Ta**le 1 continued**

Field of specialization		
Anesthesiology	6	4.1
Dental	2	1.4
Dermatology	1	.7
Emergency medicine	1	.7
ENT	2	1.4
Gyn/ Obs	28	19.0
Internal medicine	18	12.2
Ophthalmology	1	.7
Orthopedics	2	1.4
Pediatrics	26	17.7
Radiology	13	8.8
Surgery	13	8.8
GP	28	19.0
Cardiology	1	.7
Others	5	3.4

[1, 2]Categorization for age and work experience distribution is done using STURGES rule (K=1+3.22(log n)) and W= (L-S)/K. where K is number of class and W is width of classes

Table-2- work burden of the respondents, Addis Ababa, April-May, 2013

	N=147	
Characteristics	**Frequency**	**Percent**
Activates of the respondents		
Clinical practice only	95	64.6
Plus teaching and research	24	16.3
Clinical practice and management	15	10.2
Plus teaching and research and management	10	6.8
Patients seen per day[3]		
<25	55	34.7
25-30	82	55.8
>30	10	6.8
Working hours per week[4]		
<40	4	2.7
40-48	90	61.2
>48	53	36.1

[3]Twenty five patients is an average number of physicians sees in the eight working hours of a day
[4] Forty hours a week is calculated on the assumption that there are five working days a week and each day a physician is supposed to do work 8 hours.

4.1.2. Available ICTs Tools and Services utilization

4.1.2.1. ICTs Tools

Table 3 shows that ICTs tools availability in accessing to the physicians. There were listed traditional and new ICTs tools asked to assess the availability and frequency of utilization of those tools. Accordingly, 74.6% of the respondents had computer with accessories for daily work, 34.7% had own Smart phones.

On this finding, the traditional ICTs tools were founded less available and used by respondents relative to new ones. Accordingly, Walkie-talkies, radio call, TV and likes have used very limited number of respondents /2%, 2% and 17.7%/ respective amounts for their daily works.

Most of the respondents were using video conferencing units, digital cameras; telemedicine diagnosis equipment, flash discs and likes were irregularly in their daily operations.

Table-3- The availability ICTs tools and frequency of used by physicians in private Hospitals, Addis Ababa, April- May, 2013

Available ICTs	Average frequency of utilization of ICTs tools N=147									
	Not at all		Daily		Weekly		Monthly		Irregularly	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Walkie talkies/handheld transceiver/	142	96.6	3	2.0	0	0.0	0	0.0	2	1.36
Radio call	141	95.9	3	2.0	0	0.0	0	0.0	3	2.0
Computer with accessories	15	10.2	110	74.8	6	4.0	1	0.6	15	10.2
Printers	44	29.3	14	9.5	7	4.8	3	2.0	79	53.7
Fax	106	72.1	3	2.0	2	1.36	2	1.36	34	23.1
TV	80	54.4	26	17.7	3	2.0	0	0.0	38	28.85
Internet communication equipment	21	14.3	92	62.6	9	6.1	0	0.0	25	17.0
Generators or solar power	84	57.1	24	16.3	2	1.36	1	0.6	36	24.5
CD ROMS	30	24.5	32	21.8	6	4.0	3	2.0	76	51.7
PDAs/smart phone/	85	57.8	51	34.7	2	1.36	2	1.36	7	4.76
Flash disks	19	12.9	53	36.1	11	7.5	1	0.6	63	42.85
Video conferencing units	100	68.0	1	0.6	3	2.0	2	1.36	41	27.89
Video or digital cameras	55	37.4	3	2.0	6	4.0	2	1.36	81	55.1
LCD projectors and screens	69	46.9	5	3.4	13	8.8	4	2.7	56	38.1
Cell phones	18	12.2	119	80.9	0	0	1	0.6	9	6.1
Telemedicine diagnostic equipment	108	73.5	4	2.7	1	0.6	0	0	34	23.1
Telehealth	134	91.2	1	0.6	2	1.36	0	0	10	6.8
Home monitoring equipment	130	88.4	1	0.6	1	0.6	1	0.6	14	9.5

4.1.2.2. ICTs Services

The availability information services in the hospitals were assessed by a set of seven questions. The questions are in two categories 1st services available by hospitals and secondly services available through personals arrangements. Accordingly, forty-nine (33.8%) of the 142 physicians reported that they have computer available in the hospitals for their works, the rest 59.2% have no computers in their work place (table 4). Thirty-three (22.4%) physicians reported that they have internet connection in the hospitals, On other hand, one hundred thirty-nine (94.8%) physicians reported using computer for supporting their work. Furthermore 15.6% of physicians reported using computer in the home, 8.3% of physicians reported using computers in the work place, and 70.7% physicians reported using computer in home and work place. The reported survey shows, one hundred forty-four (98%) of the physicians reported using internet in different places and for different purposes. The physicians reported that, the most accessed sources of information were medical books (37.4%), electronic documents (25.85%), internet/www (13.6%), individual colleagues (11.6%), and morning sessions (10.9%). More detailed information was availed table 4 and figure 3&4.

Table- 4- ICTs Services Availability and Accessing to the Physicians, Addis Ababa, April-May, 2013

	N=147	
Characteristics	**Frequency**	**Percent**
Computer available in the hospitals accessing for the physicians		
Yes	49	33.3
No	98	66.7
Internet connection with those hospitals computers		
Yes	18	12.2
No	27	18.4
I don't know	4	2.7
Using Hospital libraries for information		
Yes	37	25.2
No	110	74.8
Most information services accessing by the physicians		
Electronic documents	35	23.8
Individual colleagues	17	11.6
Medical books	59	40.1
Morning sessions	16	10.9
Internet/www	20	13.6

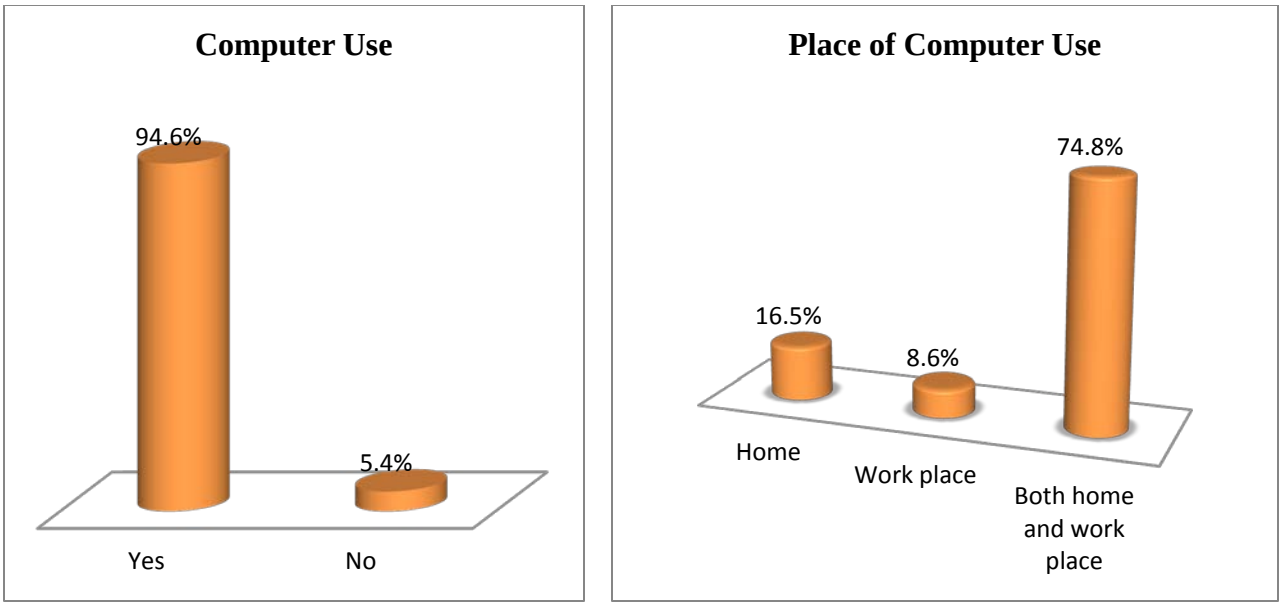


Figure 3: The computer utilization of physicians in private hospitals, Addis Ababa, April- May, 2013

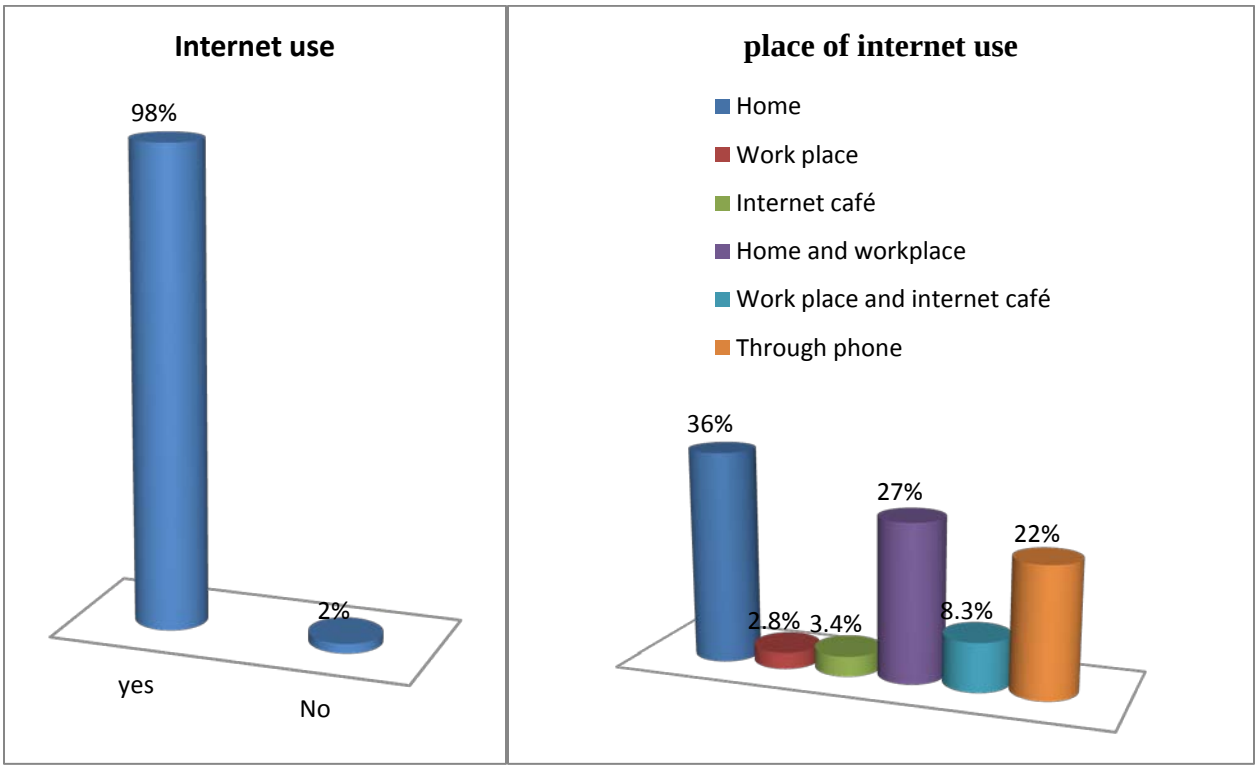


Figure: 4 Internet utilization physicians in private hospitals, Addis Ababa, April- May, 2013

4.1.3. ICTs Application and utilization

4.1.3.1. Utilization of ICTs tools for different applications in the hospitals

In addition to sought to assess the type of ICTs infrastructure and information services, in this survey included what were the purpose of ICTs for the daily work of the physicians, functionality of services, information access and information exchange among the physicians. Accordingly, 22.4% of the respondents were using computerized physicians order entry (laboratories, radiology, therapies). Almost all hospitals or respondents reported that above 98% use computers for financial management, human resource, patient care management, health supply and logistics always. All respondents (147) were using cell phones for consult professional colleagues and 45(30.6%) telehealth/home monitoring. Table 5- shows detail availability and frequency of use of ICTs in work place by respondents.

Table-5- The purposes of ICTs tools and applicable frequency of uses by physicians in private Hospitals, Addis Ababa, April- May, 2013

ICTs applications	Average frequency N=147					
	Never		Rarely		Always	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Electronic medical record/EMR/	114	77.6	0	0.0	33	22.4
Smart cards or Biometrics	147	100	0	0.0	0	0.0
Physician order entry – laboratories	114	77.6	0	0.0	33	22.4
Physician order entry – radiology	101	68.7	0	0.0	46	31.3
Physician order entry – prescribing	114	77.6	0	0.0	33	22.4
Physician order entry – therapies	114	77.6	0	0.0	33	22.4
Pharmacy and dispensing	36	24.5	0	0.0	111	75.5
Hospital information systems	100	68.0	14	9.6	33	22.4
Health insurance	40	27.2	0	0.0	107	72.8
Health education	87	59.2	60	40.8	0	0.0
Telemedicine	121	82.3	26	17.6	0	0.0
Telehealth or home monitoring	102	69.4	45	30.6	0	0.0
Healthcare supplies or logistics	0	0.0	35	23.8	112	76.2
Patient administration systems	0	0.0	0	0.0	147	100
Financial management	2	1.4	0	0.0	145	98.6
Human resource management	0	0.0	0	0.0	147	100
Consult professional colleagues	0	0.0	147	100	0	0.0
Browsing information/internet/www	3	2.1	44	29.9	100	22.4
Teaching/instruction	125	85	22	14.97	0	0.0
Research	123	83.67	24	16.3	0	0.0
Word processing	2	1.36	71	48.3	74	50.34

4.1.3.2. Information sources and Information needs of the physicians

In order to gain an indication of the information practices, physicians were asked to identify what were their most frequently visited information sources, preferable sources and accessibility of information services. Based on the report 100(68%) of the physicians frequently accessed information source is medical text book and guidelines, 29(19.7%) electronic documents, 10(6.8%) individual colleagues, and the rest internet/www and other sources.

On the other hand, regarding the most preferable information sources, the report indicate that 50.3% of respondent prefer medical text book and guidelines, 26.5% internet/www, 18.4 electronic documents, and the rest individual colleagues. More details were available in the table 6.

Table-6- The information sources used by physicians in private Hospitals, Addis Ababa, April- May, 2013

	N=147	
Characteristics	**Frequency**	**Percent**
Frequently accessed sources of information		
Medical text book	100	68.0
Clinical practice guide line	29	19.7
Individual colleagues	10	6.8
Internet/www/	5	3.4
Journal foreign	3	2.0
Most preferable sources of information		
Medical text book	74	50.3
Clinical practice guide line	27	18.4
Individual colleagues	2	1.4
Internet/www/	39	26.5
Journal local	1	0.7
Journal foreign	4	2.7
Adequacy of information source found in the hospitals		
Yes	29	19.7
No	118	80.3
Satisfaction of physicians from the sources of information		
Yes	77	52.4
No	70	47.6

4.1.4. The Knowledge and Attitude of ICTs Using for Daily Work

4.1.4.1. Basics ICTs Knowledge of the physicians

Ninety four (63.9%) of the respondents have completed basic computer training, almost all 147 respondents use computers and computers accessories for different purposes, and 144(98%) of respondents using internet. Similarly, 131(89.1%) of respondents knows medical websites and 143(97.3%) of the respondents have email address and they can send and receive messages.

Table -7- Basic Knowledge of the physicians/respondents/ About ICTs, Addis Ababa, April-May, 2013

	N=147	
Characteristics	**Frequency**	**Percent**
Taking formal Computer training		
Yes	94	63.9
No	53	36.1
Using computers for different purposes		
Yes	147	100
No	0	0.0
Having Email address able to receiving and sending messages		
Yes	143	93.3
No	4	2.7
Physicians trained and using EMR		
Yes	33	22.4
No	114	77.6
Physicians knowing the different medical websites		
Yes	131	89.1
No	16	10.9

EMR: including patient records, clinical administration systems, digital imaging & archiving systems, e-prescribing,

Basic knowledge of respondents about using computers and the internets based on the set of five questions. As indicated in the figure 5, 109(74.15) responded as cumulative average of the questions "YES" hence categorized as having "Satisfactory knowledge", whereas those who responded "NO" are labeled as having "Unsatisfactory knowledge".

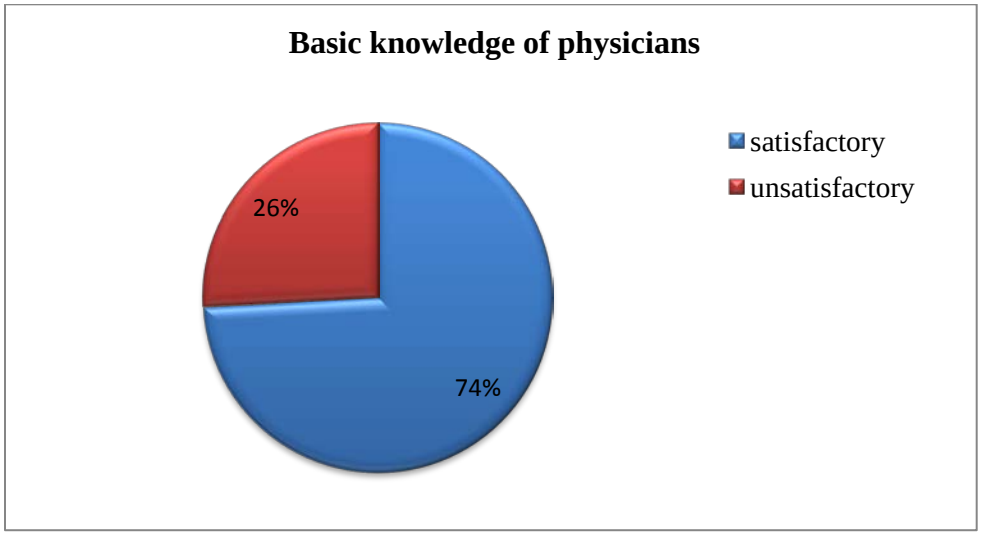


Figure 5: basic knowledge of physicians about computer and electronic medical information, Addis Ababa, April-May 2013

4.1.4.2. Attitudes on the contribution of ICT to the clinical practice

One hundred forty four (95.2%) of the respondents reported to "agree or "strongly agree" to the statement that using ICTs is important in day to day operations. About 143 (97.3%) of respondents reported to "Agree or "Strongly Agree" to the statement that using ICTs in their daily work to improve quality patient care. Similarly 97.3% of respondents reported to "helpful" or "very helpful" of medical information available from the internet or electronic based information sources. More detailed information about perception of respondents on ICTs for clinical purpose was available in table 8.

Table-8 – Perceptions on the contribution of ICT to the clinical practice, Addis Ababa, April-May, 2013

N=147

Characteristics	Frequency	Percent
Relevance of medical information available from the internet or electronic based information systems		
Very helpful	53	36.1
Helpful	90	61.2
Undecided	4	2.7
Using ICTs important for your day- to- day operations		
Strongly Agree	65	44.2
Agree	75	51.0
Undecided	5	3.4
Disagree	2	1.4
Computerized patient management system more important than paper based system		
Strongly Agree	16	10.9
Agree	56	38.1
Undecided	48	32.7
Disagree	15	10.2
Strongly Disagree	12	8.2
Feasibility to acquire computer and internet for your hospital		
Strongly Agree	92	62.6
Agree	46	31.3
Undecided	7	4.8
Disagree	2	1.4

ICTs can help increase quality of patient care

Strongly Agree	88	59.9
Agree	55	31.4
Undecided	4	2.7

ICTs are being widely used in healthcare management systems; we can address many of the challenges that healthcare systems are currently confronting us

Strongly Agree	12	8.2
Agree	83	56.5
Undecided	41	27.9
Disagree	6	4.1
Strongly Disagree	5	3.4

The medical information available in offline information source is quite satisfactory that we do not need to look for online sources to answer our clinical questions

Agree	4	2.7
Undecided	2	1.4
Disagree	47	32.0
strongly Disagree	94	63.9

Perception of respondents about utilization ICTs for daily operation was assessed based on the set of seven Likert-scale questions. The responses to these categories were dichotomized into 'Favorable Attitude' and 'Unfavorable Attitude' based on the second quartile score. Respondents who scored above and below the second quartile score are categorized as having a favorable or unfavorable attitude towards ICTs using for daily operation.

As showmen in the figure 6, 71.4% of the respondents have a favorable attitude whereas 28.6% of the respondents have unfavorable attitude towards utilization of ICTs in daily operations.

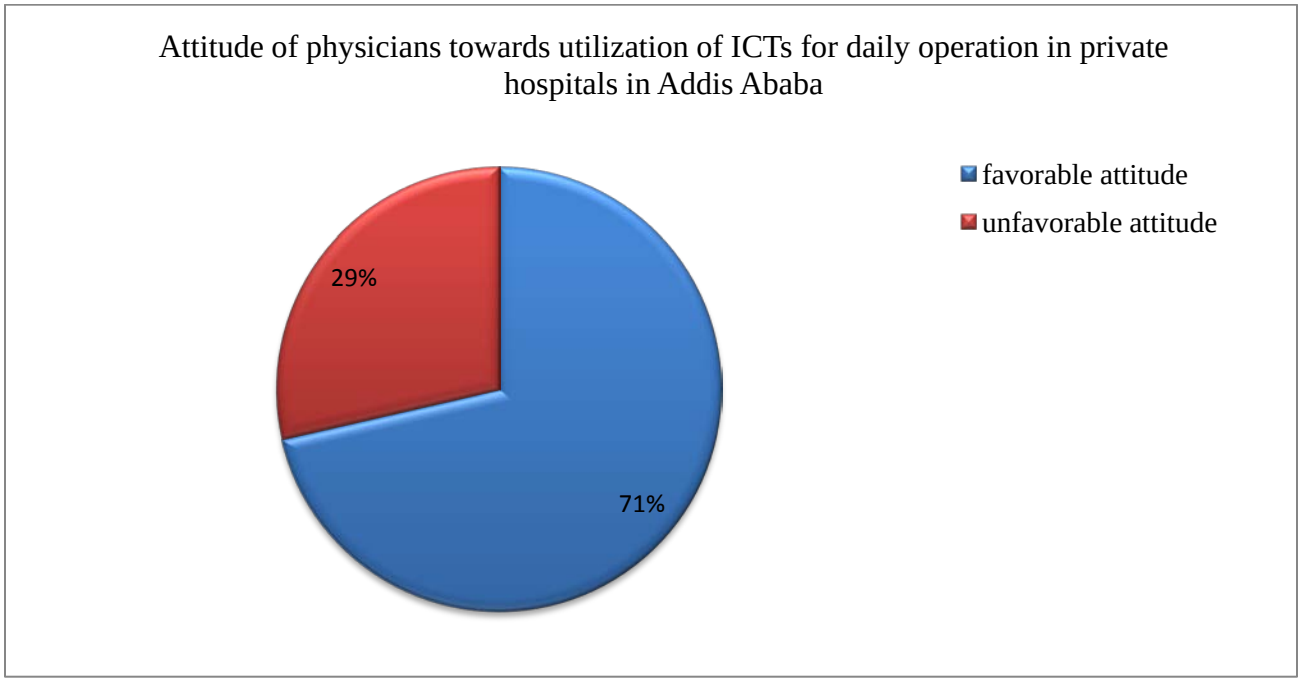


Figure 6: Attitude of physicians towards utilization of ICTs for daily operation in the private hospitals, Addis Ababa, April – May, 2013

4.1.5. Factors to ICTs access and usage for The Physicians

The study examined several barriers to ICT access and usage. Table 9 presents the percentage of respondents and their perceptions on the various barriers. While the analysis of these perceived barriers is good for policy makers, it has to be interpreted with caution, as the answers depend on the respondent and what he/she feels about the barrier in his/her present circumstances.

Physicians identified the challenges of utilization of ICTs in the daily activities. The following table presents their response.

Table-9 – Barriers to ICTs access and usage for The Physicians in Private Hospital, Addis Ababa, April-May, 2013

Limitation of information accesses and used to physicians agreement and responses

N = 147

Characteristics	Yes	No
Lack of access to a hospital library	123	24
Availability and location of information resources are far located and scattered	45	102
Lack of up-to-date books and journal subscriptions	138	9
Lack of computers and internet facilities	129	18
Lack relevance of internet information to the local context	147	0
High cost of information materials	111	36
Lack of computer and internet searching skills	29	118
Lack of general awareness of available information	12	135

The numbers and percentages described above indicated the primary findings of the survey. For more analysis of each of these data and their relationship, predictors of relationship between the outcome variables and the possible factors are presented as follows.

Predictors of utilization ICTs tools of physicians for their daily operations

Frequency ICTs utilization measured by using indicators (*computer with accessories, Internet communication equipment, PDAs, flash disk, CD-rooms, LCD-projectors, Video conferencing, video or digital camera, telemedicine, EMR, home monitoring/cell phone)* the response of these categories were (Never, rarely, weekly, daily) arranged in to Utilized and Non utilized based on above and below second quartile score. Accordingly, the average sums of each response were categorized in to two 'ICTs utilization' and ICTs 'Non utilization'/table10/.

The predictors for utilization of ICTs tools for physicians' daily operations were seen using seven variables sex, age, work experience, level specialty, fields of specialization, computer access and computer training. Accordingly, physicians' activity, working experience and formal computer training are found to have a significant effect in the utilization of ICTs tools. As shown in the table below, physicians working clinical practice and other activities/teaching and management areas/ more likely utilize ICTs tools than clinical practice only [OR (95% CI)=3.33(1.50,7.41)]. Similarly, increasing working experience more likely utilize ICTs [OR (95% CI = 2.86(1.05, 7.81)] and physicians taking formal computer training more likely utilize ICTs than not taking computer training [OR (95%CI) = 3.30(1.59,6.86)]. More detail information is found in the table 10 below.

Table-10: Multivariate logistic regression of selected variables in relation to ICTs utilization in private hospitals, Addis Ababa, April-May, 2013

Variables	ICTs tool: utilization	Non utilization	COR (CI: 95%)	AOR (CI: 95%)
Sex				
Male	73(61.86)	45(38.14)	1.32(0.58,2.99)	1.93(0.83,4.53)
Female♫	16(55.2)	13(44.8)	1.00	1.00
Age				
≤ 40	40(62.50)	24(37.50)	0.94(0.48,1.85)	**0.40(0.20,0.79)***
> 40♫	53(63.90)	30(36.10)	1.00	1.00
Activities				
Clinical practice and others	42(80.77)	10(19.23)	**3.33(1.50,7.41)***	**3.01(1.02,7.99)***
Clinical practice only♫	53 (69.23)	42(30.67)	1.00	1.00
Specialty				
MD	17(62.96)	10(37.04)	1.13(0.48,2.68)	0.76(0.31,1.87)
Post MD♫	72(60.00)	48(40.00)	1.00	1.00
Working experiences				
≤ 5	13(81.25)	3(18.75)	3.55(0.87,14.40)	0.46(0.11,1.96)
6-10	17(56.92)	12(43.08	1.16(0.44,3.05)	1.15(0.38,3.47)
11-15	28(77.78)	8(22.22)	**2.86(1.05,7.81)***	0.52(0.20,1.35)
16-20	16(61.5)	10(38.50)	1.31(0.48,3.58)	0.56(0.19,1.59)
> 20♫	22(55.00)	18(45.00)	1.00	1.00
Computer accessibility				
Yes	32(65.3)	17(34.7)	0.74(0.36,1.51)	0.45(0.15,1.86)
No♫	57(58.16)	41(41.84)	1.00	1.00
Taken formal Computer training				
Yes	74(78.7)	20(22.3)	**3.30(1.59,6.86)***	0.90(0.44,1.85)
No♫	28(52.83)	25(47.17)	1.00	1.00
Field of specialization				
GP	23(82.1)	5(17.9)	2.87(0.66,12.60)	0.70(0.16,3.06)
Gyn/Obs	15(53.57)	13(46.43)	0.72(0.19,2.76)	1.26(0.31,5.17)
Internal medicine	10(55.56)	8(44.44)	0.78(0.18,3.34)	0.60(0.13,2.69)
Others	15(71.4)	6(28.6)	1.56(0.36,6.76)	0.95(0.23,4.03)
Pediatrics	15(57.7)	11(42.3)	0.85(0.22,3.33)	0.79(0.19,3.22)
Radiology	11(53.8)	2(46.2)	3.44(0.53,22.43)	0.58(0.57,2.82)
Surgery♫	8(61.5)	5(38.5)	1.00	1.00

***Significant at P-value <0.05 ♫Reference Group

Predictors of attitudes/perceptions of physicians about ICTs for their daily operations

Among the possible factors assumed to have effect on the physicians' attitude towards ICTs utilization in daily hospitals activities, level of specialty, computer accessibility, taking formal computer training and working hours per week are found to be significant. Physicians who are in MD level having more favorable attitude than the physicians who have specialized and sub specialized [OR (95%CI = 3.70(1.05, 13.07)]. Computer access in which physicians works in the hospitals were having more favorable attitude [OR (95%CI = 2.96(1.38, 6.38)]. Similarly, physicians who were taking formal computer training are more favorable than who did not take computer training [OR (95%CI = 3.46(1.61, 7.45)]. More detail information is available in table 11.

Table-11: Multivariate logistic regression of selected variables in relation to physicians attitudes about ICTs utilizations in private hospitals, Addis Ababa, April-May, 2013

Variables	Favorable	Unfavorable	COR (CI: 95%)	AOR (CI: 95%)
Sex				
Male	103(87.3)	15(12.1)	2.19(0.79,5.99)	1.62(0.58,4.47)
Female♫	22(75.9)	7(24.8)	1.00	1.00
Age[1]				
≤ 40	49(76.6)	15(23.4)	0.97(0.45,2.10)	0.66(0.28,1.58)
> 40♫	64(64.55)	19(22.9)	1.00	1.00
Activities				
Clinical practice and others	39(75.0)	13(25.0)	0.90(0.41,1.99)	0.76(0.30,1.88)
Clinical practice only♫	73 (76.8)	22(23.2)	1.00	1.00
Specialty				
MD	24(88.9)	3(11.1)	**3.70(1.05,13.07)***	2.42(0.63,9.33)
Post MD♫	80(64.4)	37(31.6)	1.00	1.00
Working experiences[2]				
≤ 5	12(75.0)	4(25.0)	0.87(0.23,3.37)	0.36(0.05,2.41)
6-10	22(75.9)	7(24.1)	0.91(0.30,2.82)	0.88(0.22,3.65)
11-15	28(77.8)	8(22.2)	1.02(0.35,2.99)	0.51(0.14,1.79)
16-20	20(76.9)	6(23.1)	0.97(0.30,3.14)	0.93(0.23,3.77)
> 20♫	31(77.5)	9(22.5)	1.00	1.00
Computer accessibility				
Yes	37(75.5)	12(24.5)	**2.96(1.38,6.38)***	**0.12(0.34,0.40)***
No♫	50(51.0)	48(49.0)	1.00	1.00
Number of Patient seen per day[3]				
<25	42(76.4)	13(23.6)	0.81(0.15,4.29)	**3.19(1.31,7.78)***
25-30	63(76.8)	19(23.2)	0.83(0.16,4.24)	**2.47(1.01,6.24)***
>30♫	8(80.0)	2(20.0)	1.00	1.00

Taken formal Computer training				
Yes	78(83.0)	16(17.0)	**3.46(1.61,7.45)***	1.64(0.69,3.36)
No♫	31(58.5)	22(41.5)	1.00	1.00
Internet connection				
Yes	14(77.8)	4(22.2)	1.06(0.33,3.47)	2.96(0.80,10.94)
No♫	99(76.7)	39(23.3)	1.00	1.00 `
Field of specialization				
GP	22(78.6)	6(21.4)	0.91(0.19,4.39)	3.79(0.53,27.2)
Gyn/Obs	21(75.0)	7(25.0)	1.11(0.24,5.23)	3.89(0.54,28.19)
Internal medicine	14(77.8)	4(22.2)	0.95(0.17,5.23)	0.38(0.07,1.98)
Others	15(71.4)	6(28.6)	1.33(0.27,6.61)	1.57(0.28,8.87)
Pediatrics	20(76.9)	6(23.1)	1.00(0.21,4.86)	1.74(0.32,9.63)
Radiology	11(84.6)	2(15.4)	0.61(0.08,4.41)	0.68(0.12,4.09)
Surgery♫	10(76.9)	3(23.1)	1.00	1.00
Working hours per week[4]				
<40	3(75.0)	1(25.0)	2.68(0.26,27.44)	2.44(0.01,4.45
40-48	73(81.1)	17(18.9)	**3.83(1.80,8.15)***	0.67(0.27,5.66)
>48♫	28(52.8)	25(47.2)	1.00	1.00

*Significant at P-value <0.05 ♫Reference Group

[1]Categorization for age the mean age was 38.7 years, based on this categorized above or under 40 years

[2] work experience distribution is done using STURGES rule (K=1+3.22(log n)) and W= (L-S)/K. where K is number of class and W is width of classes

[3]Twenty five patients is an average number of physicians sees in the eight working hours of a day

[4] Forty hours a week is calculated on the assumption that there are five working days a week and each day a physician is supposed to do work 8 hours.

4.2. DISCUSSION

The study tried to assess the status of ICTs in private hospitals in Ethiopia. As studies conducted assessing the availability and utilization of ICTs tools and information service among physicians in private hospital in Ethiopia are limited, this study contributes as base line information in this area.

The study found out a considerable number of physicians were engaged in additional non-clinical jobs and work burden over eight hours to see more than 26 patients a day suggest physicians are stretched which may have repercussion on the quality of care provided in hospitals. In table 2 indicated 36% of respondents working above 48 hours per week and 63% of respondents sees about 25 and above patients per day.

The study sought to assess the type of ICT infrastructure, including the availability and utility of ICT tools and information services that support and provide clinical functionality, information access and exchange among the medical professionals. Accordingly, above 95% of the physicians responded that they haven't use 'traditional ICTs tools'/*Walkie talkies, radio call, TV, and likes*/ for their work. On the other hand, physicians more frequently utilize 'new ICTs tools', about 40% of the total respondents using PDAs /smart phone/ for internet gathering, 85% of respondents using cell phone for consultation and about 40% flash disk and CD ROMs (table3).

In this study 33.3% of the total respondents were accessing computers in their office, among this only 12.2% were having internet connection. This finding shows less utilization compared to study done in Nigerian physician's utilization of internet in tertiary hospitals where physicians access 73% internet connection in their offices [26].

Almost, all participants responding using internet access in day to day's activities, but not at their places of work. About 85% of the physicians' responses lack of Internet facilities at their place of work. But the respondents accessed the services from their own 52% home by using CDMA, 32% though smart phone and the reset from commercial cyber cafes outside the hospitals. This finding is very low comparing to other similar studies, internet accesses in government hospitals accessing in work place in Ethiopia (25.2%), Nigeria (74.4%) where physicians were utilizing internet in work place [26, 34].

The finding shows that, majority of the respondents had personal computers at home and PDAs. This means they are interested in using computers and other ICTs tools are might be compensating for the lack of ICTs facility at work place. The group of physicians is more likely to use ICTs tools as confirmed by the bivariate analysis where it was shown that physicians working additional activities/ teaching and management/ of significant positive association between ICTs utilization having searched medical information and other hospitals information management.

The study also sought to assess purpose of those ICTs tools accessing for the physicians utilized. Accordingly, 22.4% of the total respondents work with computerized physicians order entry/CPOE/ in their daily work. This result very low compared to study done in Barcelona physicians' integration of ICTs in to medical practice where 78.5% of the physicians work with CPOE and very similar to Uganda physicians where 27.6% were utilizing CPOE [24, 35].

The study indicate that hospitals available ICTs especially computers were used to more of logistics /pharmacy and dispensing (75.5%), patient registration(100%), financial management (98.6%) and managing human resource than information accessing for the physicians and health professionals (table4).

Many of participants were responded at hospitals have limited access to library and information services at their place of work. On account of this, hospitals had no designated library to cater for the clinicians. However, physicians have their own personal medical information sources to update their knowledge. Accordingly, most sources of information of to the physicians were 23.8% electronic documents, 40.1% medical books, 13.6% internet/www and the rest individual colleagues and morning sessions.

About 75% of the total respondents preferred printed documents /text books, treatment guidelines, journals and individual colleagues over internet and electronic documents. This might be explained by the rationale given in an Indian study that the preference of printed resources may be due to frequent ease of access and availability [36].

The respondents did identify the very limited availability of information resources as a major limitation and a barrier to information access; /information materials are simply not available/. Physicians agree with the problems, Lack of access to a hospital library (83.7%), Lack of up-to-date books and journal subscriptions (93.8%), Lack of computers and internet facilities (87.75%), High cost of information materials (75.5%), Lack relevance of internet information to the local context (100%), and about below (30%) also agreed that Lack of computer and internet searching skills, Lack of general awareness of available information, Availability and location of information resources are far located and scattered was also noted by most of the participants as a significant barrier to information access and use. These results are consistent with the one conducted in Kenya in 2010, where above 90% of physicians agreed with the above barriers of information sources [22].

This study also revealed that 74% of the respondents had satisfactory knowledge about computers, browsing internet and electronic medical information. Among the respondents, 63% complete formal computer training whereas only 22% of the respondents take EMR training. Among the respondents 89% of them know different medical web sites and 93% of them had email addresses. The finding indicate that most of physicians without taking formal ICTs training they have motivated to use ICTs for daily operations (table 7).

With respect to the contributions of ICTs to the firms /quality of health/, Table 8 illustrates the different perceptions. The majority of respondents strongly agrees or agrees that ICTs provides increased savings, increased efficiency, improved service delivery, low transaction costs for business health institution/private hospitals/, and improved market performance to the organization that invests in ICTs. This observation is not different from studies carried out in other countries [22].

4.3. STRENGTHS AND LIMITATIONS OF THE STUDY

4.3.1. Strength of the study

- Bing a survey, this study has covered all private hospitals in Addis Ababa, and hence has gained insight into the available ICTs tools, information services, knowledge and perception of physicians and
- This study also provides baseline information for further research.

4.3.2. Limitations of the study

- Similar studies have not been found in Ethiopia, which makes it difficult for benchmarking the results.
- Literature relevant on the topic is very limited, which has not created the opportunity for a more rich literature backing the determinate factors widely implemented and utilized ICTs in private hospitals in Ethiopia.
- Since the study depended on self-reported data, information bias might have occurred and majority of the respondents were mostly use computers and internet which are indicators of ICTs utilization.
- Presence of incomplete questionnaires compromise the power of the information generated from the survey.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1. CONCLUSION

Information has been critical part of the medical professionals' /physicians/ armament of tools to provide patient care. Utilizing ICTs can offer the physicians with enhanced access to: key data at all levels from international to local, electronic libraries of evidence, peer reviewed research and practice guidelines, and network of professionals in health and related disciplines. While information access is critical in delivery of quality health care services, there are many problems that are inherent in attempting to meet the information needs of physicians at private Hospitals. Through preparing questioners and arranging to fill themselves of participants on this study, this research has addressed a number of questions related availability of ICTs tools and information services and helps us better understand current ICTs utilization status at private hospitals in Ethiopia specifically in Addis Ababa.

This study adds to the existing literature by showing that many physicians in private hospitals use different ICTs tools comparing to national norms for their daily operations, searching medical information, patient data management, logistics and medical equipment management, and likes. However for the majority of physicians this was driven by personal efforts since a considerable number were have no computer and internet connection in work place or homes and had to pay their own CDMA or internet cafés to brows information or use their cell phone to home monitoring of patients.

The study underscores the importance of access to information resources in hospital settings. Evidence-based decisions require access to information resources as well as an understanding of how to use them effectively. Results of this study point to the importance of physicians' access to resources that can resolve information needs related patient care, prescribing drug therapy, formulating diagnoses, latest approaches to treatment modalities, current practices in medicine. In general term it points out that computerized physicians order entry /CPOE/. Consistent with previous studies of physicians working in public hospitals, consultations with professional colleagues was found to be the most frequently used sources of information, particularly for

issues to do with diagnoses. Other sources included textbooks and journals, the Internet and pharmaceutical representatives.

Overall, there is a need to support and promote ICT as an effective means for accessing and disseminating health information in all level of health delivery services. This will go a long way in promoting sustained and improved health care service deliveries in the country. Policies should also be put in place at national and institutional level that will encourage and promote the use of ICTs as tools for health information access and dissemination.

5.2. RECOMMENDATIONS

Based on the study findings and the above conclusion, the following short term and long term recommendations are forwarded.

Short term

There is a need to enhance the technological infrastructure on which diffusion and use of ICTs can take place. In the case examined, the lack of an adequate ICTs infrastructure appears to be the principle reason for hindering ease of access to up-to-date and online health information resources, and is clearly a more pressing problem than a lack of available information.

The private hospitals should access up to dated information sources and ICTs tools /computer and internet/ to their health professionals especially physicians.

ICT skills development, training and accessing ICTs tools for the medical professionals' /physicians/ should be seen as more than just urgent measure, but also as vital tools needed for the promotion of evidence based culture, which is essential to improving the quality of medical care.

Reduce the cost of the ICTs tools which are used by health professionals/physicians/ for their daily operations, for example internet services in private hospitals.

The concerned body /FMoH, FMHACA, Health bureau, and privet health institution/ should develop short and long term plan and clear ICTs /e-health/ guideline in Ethiopia.

Long term

Building ICT skills is an important component of any ICT intervention because new skills are required for operating the computers, browsing the internet and making use of various communication tools such as e-mail, ‘chat rooms’, video conferencing etc.

Policy framework must be formulated that will encourage and promote the use of ICTs as tools for health information access and dissemination in all level of health organizations including private health institution. The policies must address the long term users’ and organizational needs; they should also be flexible and constantly reviewed in keeping with technological trends.

The health sector, medical academia, medical association and research institutions must work together to make ICTs expect to contribute to effective and efficient health care delivery in Ethiopia.

REFERENCES

1. Brian E. Perron, Harry O. Taylor, Joseph E. Glass, Jon Margerum-Leys (2010). Information and Communication Technologies in Social Work. Advances in Social Work Vol. 11 No. 1, 67-81
2. United Nations (2006). Information and communication technology vital to development UN Assembly chief. Retrieved online on August 26, 2009 from http://www.un.org/apps/news/story.asp? NewsID=20780&Cr=information&Cr1=technology
3. A.K. Jha et.al (2006). How common are electronic health records in the United States? A summary of the evidence Health Aff, 25 pp. w496–w507
4. Chandrasekhar, C. P. & Ghosh, J. (2001). Information and communication technologies and health in low income countries: The potential and the constraints. Bulletin of the World Health Organization, 79(9), Geneva
5. Ethiopia building on progress a plan for accelerated and sustained development to end poverty (2006). Annul progress report Addis Ababa; ministry of finance and economic development: from www.afdb.org/.../Plan for Accelerated and Sustained_(PASDEP)
6. Ghana establishes ICT policy strategy for the health, (2010). Sector of Ghana international institute for communication and development: from www.img.modernghana.com/images/content/report_content/ICTAD.pdf
7. African Information Society Initiative (1999). National Information and Communication Infrastructure: Policies and Plans. Addis-Ababa: United Nation Economic Commission for Africa, URL : http://www.bellanet.org/partners/aisi
8. Etsub Birhanesilassie (2009). Physicians' culture of uses of online medical information to improve patient care practice in the case of Addis Ababa public hospitals, Addis Ababa university health informatics program, Unpublished Msc thesis.
9. Federal Democratic Republic of Ethiopia Ministry of Health (2010). Health Sector Development Program IV 2010/11 – 2014/15 final draft
10. Vilasini Devi Nair, Sudhakar Morankar, Challi Jira, Kora Tushune, (2010). Private hospital sector development: an exploratory study on providers perspective in Addis Ababa, Ethiopia
11. Patrick Osewe (2006). Strengthening the role of the private sector in expanding health coverage in Africa,
12. FMOH, Health and Health Indicators, Ministry of Heath, Ethiopia, 2007.

13. John Houghton (2002). Information Technology and the Revolution in Healthcare Working Paper No. 4
14. Silvio Bonfiglio (2005). Changes in Healthcare: towards a "patient-centric" approach FIMI PHILIPS, via S. Banfi 1 – 21047 SARONNO (Italy)
15. Reima Suomi (2000). Leapfrogging for Modern ICT Usage in the Health Care Sector, *ECIS Proceedings.* Paper128. http://aisel.aisnet.org/ecis2000/128
16. Gagnon MP et.al (2009). Interventions for promoting information and communication technologies adoption in healthcare professionals (Review), The Cochrane Collaboration Published by JohnWiley & Sons, Ltd.
17. Population Projections for Japan: 2001-2050 (2002). National Institute of Population and Social Security Research (Japan).
18. Ozogul, C.O., E.E. Karsak and E.A. Tolga (2009). Real Options approach for evaluation and justification of a Hospital Information System. The J. Systems and Software, 82: 2011-2102.
19. Seyed Jamaledin Tabibi et.al (2011). Effective Factors on Hospital Information System Acceptance: A Confirmatory Study in Iranian Hospitals Middle-East Journal of Scientific Research 9 (1): 95-101
20. World telecommunication/ICT development report (2010). monitoring the wsis targets a mid- term review
21. Pierre Pluye et.al (2005). Seven reasons why health professionals search clinical information-retrieval technology (CIRT): toward an organizational model Journal of Evaluation in Clinical Practice ISSN 1356-1294
22. Dr. George M. GATERO (2010). Utilization of ICTs for Accessing Health Information by Medical Professionals in Kenya: A Case Study of Kenyatta National Hospital, Journal of Health Informatics in Developing Countries.
23. Davies, K. (2007). The information seeking behavior of doctors: review of the evidence. Health Information and Libraries, 24, 78–94.
24. Francisco Lupián ez-Villanueva, Michael Hardey, Joan Torrent, Pilar Ficapal (2010). The integration of Information and Communication Technology into medical practice, international journal of medical informatics 478–491

25. Kerstin Heuwinkel (2006 **). "**Nursing ICT" Methodological Approach to Analyze Patients' Needs and Expectations, University of Applied Sciences, Germany kerstin.heuwinkel@htw-saarland.de
26. Wok N.Shabi, Olabode M. Shabi, Modupe A. Akewukereke and Emem P. Udofia (2011). Physicians' utilization of internet medical databases at the tertiary health institutions in Osun State, South West, Nigeria health information and libraries journal 10.1471-1842
27. Lemma F. (2004). Design of architecture and implementation issues for a terrestrial and VSAT based national telemedicine network in Ethiopia: Addis Ababa university
28. Farmer A.P et al (2003). Printed educational materials: effects on professional practice and health care outcomes (Protocol). Cochrane Database of Systematic Reviews.
29. Marriott S, Palmer C, Lelliott P (2000). Disseminating healthcare information: Getting the message across. Quality in Health Care; 9:58–62.
30. Brooks RG, Menachemi N. (2006). Physicians' use of e-mail with patients: Factors influencing electronic communication and adherence to best practices. Journal of Medical Internet Research; 8(1)
31. Herma C.H and Frans J.Meijman,(2006). How do primary care physicians seek to clinical question? Literatures review Libr Assoc. 94(1): 55–60.
32. Central statistical agency Ethiopia (2008). Population and housing census in Ethiopia 2007 Addis Ababa: CSA
33. Federal ministry of health /FMOH/ (2011). Health and Health related indicators bulletin is annually published by Policy Planning Directorate, From: http://www.moh.gov.et/
34. Michael Sileshi (2011). Assessment e-health utilization in selected public hospitals of Addis Ababa, Addis Ababa university health informatics program, Unpublished Msc thesis.
35. Walter Omona and Robert Ikoja-Odongo (2006). Application of information and communication technology (ICT) in health information access and dissemination in Uganda, Journal of Librarianship and Information Science 38: 45
36. Grace A, Ajuwn (2006). Use of the internet for the health information by physicians for patient care in teching hospitals in Ibadan, Nigeria, Biomed Digit Libbr. {Online} cited by June 2013 From URL: http//www.pupmedcenteral.nih.gov/articlerender,fogi?artid=17675

ANNEXES

Annex 1: Lists of Private and NGO Hospitals Found in Addis Ababa, April-May,2013

NO	Name of Hospitals	Ownership private, NGO	Number of health professionals serve in the hospital			No. physicians	Total professionals	Address		
			Laborat	Pharma	Other types			kifleketema	Woreda	Phone number
1	Brass MCH	Privet	4	3	16	4	27	Bole	3	
2	Tezena general hospital	Privet	5	3	29	4	41	Kolifekeranio	9	0113711208
3	Teklehymanot general hospital	Privet	-	4	45	10	59	Arada	new	0911211260
4	Betsegah MCH	Privet	2	1	19	7	29	Bole	4	0115545560
5	Addis MCH	Privet	2	3	17	4	26	Arada	13	0115545560
6	Kidus Ghebrele hospital	Privet	8	2	56	13	79	Bole	7	0116187345
7	Yordanos hospital	Privet	2	2	26	7	37	Lideta	12	0115545725
8	Migbarsenay Hospital	NGO	4	2	23	3	32	Yeka	7	0116636154
9	Melbourne hospital	Privet	2	2	13	3	20	Yeka	20	0116602760
10	Addis cardiac hospital	Privet	3	3	18	5	29	Bole	New	-
11	National hospital	Privet	6	3	15	5	29	Yeka	5	-
12	Betel teaching general hospital	Privet	6	7	47	10	70	Kolifekeranio	6	-
13	Betel general hospital 2	Privet	2	6	13	3	24	Lideta	2	0115530103
14	Hayat teaching hospital	Privet	8	5	36	19	69	Bole	13	0118362562
15	Legehar general hospital	Privet	4	4	5	2	15	Kirkose	7	0114431992
16	Amin hospital	Privet	3	2	14	4	23	Bole	17	0114195276
17	Zembaba hospital	Privet	5	6	28	4	43	Akakikality	3	0911759313
18	Federal maremia betoch	Privet	5	1	24	2	32	Akakikality	7	0115546767
19	Abebech gobena	NGO	3	3	20	4	30	Arada	3	0111124540
20	Genet	Privet	-	-	7	2	9	Kirkose	6	-
21	Cure Ethiopia children	NGO	1	1	34	3	39	Gulele	New	0116294603
22	Dinberwa MCH	Privet	3	2	10	7	22	Yeka	13/14	0115514130

23	MCH teaching hospital	Privet	10	8	117	29	164	Bole	New	0116464252
24	Betezata Hospital	Privet	-	-	66	15	81	Kirkose	15	0112757676
25	Kidus Yared general hospital	Privet	6	3	43	6	58	Bole	14	0114424680
26	Girum Hospital	Privet	7	6	54	8	75	Addis ketema	6	-
27	International cardiovascular	Privet	2	5	22	6	35	N/ Lafito	8	0115521593
28	Ethio sudan Tebib MCH	Privet	2	3	12	3	20	Arada	1	0116623916
29	BGM MCH	Privet	3	3	23	6	35	Kirkose	2	0111558755
30	Addis Hiwet MCH	Privet	2	2	18	5	27	Bole	4	0112782076
31	Hemen MCH	Privet	1	3	13	5	22	Arada	1	0115525463
32	Ethio tebib general hospital	Privet	3	4	19	7	33	Addis ketema	4	0116298756
33	Landmark Hospital	Privet	11	6	69	10	96	Kirkose	10	0115521593
34	Kadisko general hospital	Privet	6	5	35	14	60	Bole	11	0116623916
35	Addis general hospital	Privet	5	6	20	3	34	Arada	5	0111558777
	Total		**125**	**119**	**1024**	**242**	**1510**			

Annex 2: Introduction and consent form

Introduction and consent form

Good morning/afternoon, my name is Sahle kibru I am health informatics Msc student in Addis Ababa University School of Information Science and Public Health in Health Informatics Program. I am conducting a research on Utilization of information communication technologies (ICTs) for accessing health information by physicians working in private hospitals in Addis Ababa. You have been chosen just by chance to take part in this study. This information helps us understand the contribution of information technology in the healthcare delivery in Ethiopia. In line with this I would like to ask you some questions. Some of the questions are general but some ask you for personal knowledge and attitude. Based on repeated pre-test average time estimated to fill in the questionnaires is about 20-30 minutes. I want to confirm to you that you have the right to stop the questionnaires at any time or skip any questions that you do not wish to answer. I kindly request you to answer them candidly because your answers are like one important piece of brick in the whole research and determine the outcome of this study. I also confirm to you that your replies will not be disclosed to anyone at all times. They will only assist learning more about ICTs among health care practitioners in Addis Ababa. I especially want your answers because if everyone who is approached participates, our information will be useful. Thank you very much for your willingness to fill the questionnaires.

Research title: Utilization of information communication technologies (ICTs) for accessing health information by physicians work in private hospitals in Addis Ababa.

Main investigator: Sahle Kibru

Research Advisors: Dr. Adamu Addissie

Dr. Gashaw Kebede

Consent form

I, the undersigned affirm that I am requested with honor to participate in answering the questionnaires. I confirm that I have agreed to provide honest information on aspects of my knowledge, attitude, skill and behavior related to ICTs and health information. The result of these questionnaires could be used in informing the understanding of policy makers, decision takers, managers, practitioners and the public to help them in the process of planning and evaluating related programs aiming at improving health service.

I am convinced that the personal understandings, attitudes and values to be replaying the questionnaires will be kept confidential at all times. I trusted the data collector in keeping anonymity of my replies.

Signature_____ Date _____

Annex 3: self-administer questionnaires

Addis Ababa University

School of Information Science and School of Public health

Health Informatics Program

Please, Thick (√) or Fill your appropriate opinions of entire questions

I. Socio demographic and practice details

1.1.Gender of the respondent a. Male ☐ b. Female ☐

1.2.What department are you working currently?

_____

1.3.In what age range are you? a. 30 years or less ☐ b. 31 to 40 years ☐

c. 41 to 50 years ☐ d. 51 to 65 years ☐ d. 66 years or more ☐

1.4.What is the highest level of education you have obtained?

a. MD ☐ b. Specialty ☐ c. Sub specialty ☐

1.5.What is your field of specialization_____

1.6.What is your total year of services as a doctor _____ years

1.7.What activities do you do other than Clinical practice?

a. Clinical practice only ☐
b. Teaching and Research ☐
c. Management ☐
d. Teaching, Research and Management ☐
e. Other combinations, please specify _____

1.8.On average how many hours do you work in Clinical/patient care practice per week?

_____ hours per week

1.9. On average how many patients do you see each day? _____ Patient per day

II. Available ICTs and use

2.1.What type of ICTs do you use for your work? Please, tick **(√)** in frequency columns

No.	Available ICTs	Average frequency that you use for your work				
		Not at all	Daily	Weekly	Monthly	Irregularly
a.	Walkie talkies/handheld transceiver/					
b.	Radio call					
c.	Computer with accessories					
d.	Printers					
e.	Fax					
f.	TV					
g.	Internet communication equipment					
h.	Generators or solar power					
i.	CD ROMS					
j.	PDAs/smart phone/					
k.	Flash disks					
l.	Video conferencing units					
m.	Video or digital cameras					
n.	LCD projectors and screens					
o.	Cell phones					
p.	Telemedicine diagnostic equipment					
q.	Telehealth					
r.	Home monitoring equipment					
s.	Others, please specify					

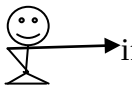
PDAs = Personal digital assistants, also known as a *palmtop computer*, or personal data assistant

2.2.What are the main purpose of ICTs you using in your work? Please, tick **(√)** on the frequency column

No	**ICTs application used in the hospital**	**Frequency of use**		
		Never	Rarely	Always
a	Electronic medical record/EMR/			
b	Smart cards or Biometrics			
c	Physician order entry – laboratories			
d	Physician order entry – radiology			
e	Physician order entry – prescribing			
f	Physician order entry – therapies			
g	Pharmacy and dispensing			
h	Hospital information systems			
i	Health insurance			
j	Health education			
k	Telemedicine			
l	Telehealth or home monitoring			
m	Healthcare supplies or logistics			
n	Patient administration systems			
o	Financial management			
p	Human resource management			
q	Consult professional colleagues			
r	Browsing information/internet/www//			
s	Teaching/instruction			
t	Research			
u	Word processing			
	Others, please specify			

III. Access and Purposes of ICTs used by physicians

3.1.Do you use computer for your work?

a. Yes ☐ b. No ☐  if say No, go to Question #3.4

3.2.If you answer question # 3.1 is Yes, where do you use?

a. Home ☐ b. work place ☐ c. both in home and work place ☐

d. Other place, please, specify _____

3.3. If question # 3.1 Yes, what are the tasks you perform with the computer? (Multiple answers is possible)

a. Word processing ☐

b. Spreadsheets (example MS-excel) ☐

c. Manages medical instruments ☐

d. Manage patient data ☐

e. Browse the internet for information ☐

f. Others, please specify _____

3.4.Have you got any train in computer application?

a. Yes ☐ No ☐

3.5.If yes please, list type of computer application which you train _____

_____

3.6.Do you have email Accounts, like Yahoo or Gmail or other type of email addresses?

a. Yes ☐ No ☐

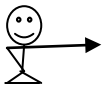
3.7.What are the main modes of communication do you use? (Multiple answer is possible)

a. Email ☐ b. internet ☐ c. cell phone ☐ d. Videophones ☐

e. video conferencing ☐

f. Others, please specify _____

3.8.Do you use the internet

a. Yes ☐ b. No ☐  if say No, go to Question #3.11

3.9.If the question # 3.8 is yes, for what purpose do you use it?

a. E-mail ☐ b. News ☐ c. Entertainments ☐

d. Others, please state _____

3.10. Where do you use the internet?

a. Hospital (work place) ☐ b. Home ☐ c. Internet café/hotspot ☐

d. through Phone ☐

e. Other, please state _____

3.11. What are your reasons for not using the internet?

a. I don't have access to computer ☐

b.I don't have access to internet ☐

c.I don't have time to brows ☐

d. High cost of internet ☐

e. I am not interest ☐

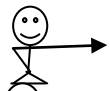
f. Other, please state _____

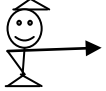
3.12. Do you intend to use the internet in the future?

a. Yes ☐ b. No ☐

3.13. Are computer made available in your hospital for use by physicians?

a. Yes ☐

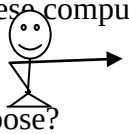
b. No ☐  if say No, Go to question # 4.1

c. I don't know ☐  if say I don't know, Go to question # 4.1

3.14. Are the computers in your hospitals connected to the internet?

a. Yes ☐ b. No ☐ c. I don't know ☐

3.15. If the Question # 3.14 is Yes, Have use these computers?

a. Yes ☐ b. No ☐  if say No, Go to question # 3.17

3.16. If the question # 3.15 is yes, for what purpose?

a. E-mail ☐ b. News ☐ c. Entertainment ☐

d. Check document on e-docs and CD ROMs ☐

e. Medical information updating ☐

f. Other, please state _____

3.17. Are available library in your hospital which have medical books?

a. Yes ☐ b. No ☐

3.18. Why have you not used them?

a. No time to brows ☐
b. The computers are too old or too slow ☐
c. The internet connection is to slow ☐
d. No skill of use of compute ☐
e. No skill of use of interne ☐
f. Other, please state _____

IV. Accessing information services and barriers of utilization

4.1.If you encounter a medical dilemma now, what is the most important source you go to check?

b. Electronic document ☐
c. documents on CD ROMs ☐
d. Individual colleagues ☐
e. Internet/ WWW ☐
f. printed journals ☐
g. Medical books ☐
h. Morning sessions ☐
i. Other, please state _____

4.2. What kinds of information you mostly required for clinical work?

a. Patient care information ☐
b. Pharmacological (Drug) information ☐
c. Recent advances in medicine ☐
d. Latest approaches to treatment modalities ☐
e. Medical-legal information ☐
f. Clinical trials and case report ☐
g. Others, please specify_____

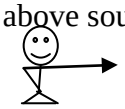
4.3. What medical information sources do you prefer? Please, rank start from best one (1, 2,

a. Medical text books ☐
b. Journals local ☐
c. Journals foreign ☐
d. Clinical practice guidelines ☐
e. Internet/WWW ☐
f. individual colleague ☐

4.4.Which information sources do you accessed frequently? (multiple answers is possible)

a. Medical text books ☐
b. Journals local ☐
c. Journals foreign ☐
d. Clinical practice guidelines ☐
e. Internet/WWW ☐
f. Individual colleagues ☐
g. Others, please specify _____

4.5.Are you satisfied by the above sources of information that you used frequently?

a. Yes ☐  if say Yes; Go to question # 4.7 b. No ☐

4.6.If the question # 4.5 is No, What is/are the reason? Multiple answers possible

a. It contains inadequate information ☐
b. It is not Up to dated ☐
c. It need much time to search ☐
d. It contains irrelevant information ☐
e. It has not well known source ☐
f. Others, please specify _____

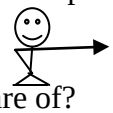
4.7.Do you believe the information source available in a hospital adequate for your clinical need? a. Yes ☐ b. No ☐

4.8.If the question # 4.7 is No, what is (are possible barriers /multiple answer is possible)

a. Lack of access to a hospital library ☐
b. Availability and location of information resources are far located and scattered ☐
c. Lack of up-to-date books and journal subscriptions ☐
d. Lack of computers and internet facilities ☐
e. Lack relevance of internet information to the local context ☐
f. High cost of information materials ☐
g. Lack of computer and internet searching skills/computer illiteracy ☐
h. Lack of general awareness of available information ☐
i. Others, please specify _____

V. Knowledge and attitudes questionnaires

5.1. Do you know any specialized medical websites for professional updates?

a. Yes ☐ b. No ☐  if say No, Go to question # 4.11

5.2.If you say Yes, Which web source are you aware of?

a. Pub Med ☐ b. MEDLINE ☐ c. Embas ☐ d. Pop line ☐

e. Cochrane ☐ f. HINARI ☐ g. I do not remember ☐

h. Other please state _____

5.3.How do you evaluate medical information available from the internet or electronic based information systems?

a. Very helpful ☐ b. Helpful ☐ c. Neither helpful nor unhelpful ☐

d. Unhelpful ☐ e. Confusing/wrong ☐

5.3. Do you agree with the idea that using ICTs important for your day- to- day operations?

a. Strongly Agree ☐ b. Agree ☐ c. Neither agree nor disagree ☐

d. Disagree ☐ e. Strongly Disagree ☐

5.4. Do you agree with that using computerized patient management system more important than paper based system?

a. Strongly Agree ☐ b. Agree ☐ c. Neither Agree nor Disagree ☐

d. Disagree ☐ e. Strongly Disagree ☐

5.5. Do you agree that it is feasible to acquire computer and internet for your hospital?

a. Strongly Agree ☐ b. Agree ☐ c. Neither Agree nor Disagree ☐

d. Disagree ☐ e. Strongly Disagree ☐

5.6.I think using of ICTs can help increase quality of patient care.

a. Strongly Agree ☐ b. Agree ☐ c. Neither Agree nor Disagree ☐

d. Disagree ☐ e. Strongly Disagree ☐

5.7.I think ICTs are being widely used in healthcare management systems; we can address many of the challenges that healthcare systems are currently confronting us.

a. Strongly Agree ☐ b. Agree ☐ c. Neither Agree nor Disagree ☐
d. Disagree ☐ e. Strongly Disagree ☐

5.8.The medical information available in offline information source is quite satisfactory that we do not need to look for online sources to answer our clinical questions.

a. Strongly Agree ☐ b. Agree ☐ c. Neither agree nor disagree ☐
d. Disagree ☐ e. Strongly Disagree ☐

5.9.What possible factors do you think will prohibit your hospital from implementing and using ICTs (computerized patient management system, accessing electronic document and accessing internet) for physician's daily work? (Multiple answers are possible).

a. Not having internet access in the hospital ☐
b. Not having computers with accessories ☐
c. Not having basic skills for using ICTs tools, like computers ☐
d. Not having intention to accessing and use ☐
e. Others, please specify_____

5.10. Any additional comments _____
_____

[Ends]

Thank You very much for your time and for your patience

In the cases of inquiry related to the questionnaires or the overall study process may use the following contact details

Tel: 0913865350 E-mails: sahlekibru@yahoo.com

Declaration

I, undersigned, declare that this thesis is my original work in partial fulfillment of the requirement for the Degree of Masters of Science in health informatics and has not been presented for a degree in this or any other university. All source of materials used for this thesis and all people and institutions who gave support for this work have been duly acknowledged.

Name: Sahle Kibru (B.Sc)

Signature _____

Place school of information science and school of public health, health informatics program, Addis Ababa University

Date of submission October 20/2013

This thesis has been submitted for examination with our approval as the university advisors.

Name of the advisors Signature

Adamu Addissie (MD, MPH): _____

Gashaw Kebede (PhD): _____