Addis Ababa University
School of Graduate Studies
Medical Faculty (School of Public Health) and Faculty of
Informatics, Health Informatics Program

Assessment of Use of Information Technology in Pharmacies and Drug Stores in Addis Ababa, Ethiopia

By

Tadesse Gebre (B.Pharm)

June, 2010

Addis Ababa, Ethiopia

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A thesis submitted to School of Graduate Studies
Addis Ababa University
In partial fulfillment of the requirement for the
Degree of Masters in Health Informatics

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Acknowledgments

I am very grateful to my advisor Dr. Mulugeta Betre from School of Public Health (SPH), Medical Faculty, Addis Ababa University, for his unreserved guidance and constructive suggestions and comments from the preparation of the research proposal development to the end.

My honest gratitude also goes to pharmacies and drug stores owners and those pharmacists and druggists in Addis Ababa for their cooperation in the data collection process.

I take this opportunity to extend my thanks to all of my teachers, and other staffs of the Informatics Faculty and School of Public Health, Faculty of Medicine, for their encouragement and other necessary support during the whole research process.

Lastly, my thanks goes to all data collectors who paid due attention during the data collection process.

Dedication

To my wife (Kenatu Tola), son (Robera Tadesse), brothers and sisters who strive to understand the why of things.

Acronyms

AAU	Addis Ababa University
AOR	Adjusted Odds Ratio
ART	Antiretroviral Therapy
CI	Confidence Interval
COR	Crude Odds Ratio
DACA	Drug Administration and Control Authority, Ethiopia
FMOH	Federal Ministry of Health, Ethiopia
HMIS	Health Management Information System
IT	Information Technology
PDA	Personal Digital Assistance
PIS	Pharmacy Information System
RPM	Rational Pharmaceuticals Management
SPH	School of Public Health
WHO	World Health Organization

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Abstract

Background: Advance in information technology (IT) provides easy use and access to exploit its benefits. Information technology is currently important in improving healthcare delivery system. They improve efficiency, effectiveness, and reduce medication errors. However, the use and access of this information technology at pharmacies and drug stores level among drug dispensing professionals is little known in Ethiopia, particularly in Addis Ababa.

Objective: To assess the use and access of information technology among pharmacists and druggists in pharmacies and drug stores in Addis Ababa and to identify the factors that affect the use of this technology.

Method: A cross sectional survey was conducted in pharmacies and drug stores in Addis Ababa. The quantitative data were collected using pretested and self administered questionnaire. The study was complimented with in-depth interview. Data were entered and analyzed by SPSS version 15.0.

Result: A total of 257 pharmacists and druggists participated in the study. The current means of giving service to customers in pharmacies and drug stores was about 93.0% paper-based (manual) system and 7.0% were using computer system. Only 30(12.0%) professionals had internet access in pharmacy/drug store. The most preferred source to obtain drug information was combination of printed sources and drug inserts (manual system) 169(68.1%). Use of IT in pharmacy/drug store was poor.

Conclusions and recommendations: The study indicated poor utilization status of IT for pharmacy practice service. The findings indicated the need for creating awareness among professionals in giving more skill oriented and also formal in-service IT related trainings for the professionals. Further, the drug professional training centers as well as other stakeholders should consider improving the IT facilities for drug dispensing professionals to achieve better universal access and se of IT so as to improve healthcare delivery system, particularly pharmacy practice.

1. Introduction

1.1 Background

Information technology (IT) refers to anything related to computing technology, such as networking, hardware, software, the Internet, or the people that work with these technologies (1). It can be said that information technology deals with the use of electronic computers and computer software to convert, store, protect, process, transmit, and securely retrieve information.

Technology creates efficiency and effectiveness opportunities in almost every industry, including drug dispensing processes. Pharmacy makes use of computer to simplify and improve the traditional paper-based drug dispensing processes. According to one study, computerizing the drug prescription process in a hospital has decreased medication errors. All in all, total error decreased by 55 percent and ordering errors, transcription errors, dispensing errors, and administering errors were decreased by 19, 84, 68, and 59 percents, respectively (2).

However, the availability of this technology is meaningless unless the workers have appropriate skills of using this technology. In one study (3), they had found that most responded pharmacists had home access to personal computers and regularly used computers in the work for drug distribution, information management, and communication purposes. In another study (4), about 88 percent of them had some proficiency in computer applications.

It is stated that health information technology has the potentials to improve the quality of healthcare, reduce medication errors and adverse effects (5). However, to exploit the potentials of IT, the computer proficiency of the drug dispensing professionals need assessment. In addition to this, other factors that may have an impact on the introduction of information technology in the practice of pharmacy were also assessed.

1.2 Statement of the Problem

Drug stores and pharmacies in general are providing healthcare services to a large number of clients/patients and the drug dispensing professionals rely on manual

system on handling drug and patient information. This is time consuming and sometimes ends up in serious medication errors due to human errors. However, computers decrease dispensing errors (2), improve efficiency and effectiveness of organizations performances. Consistent utilization of this technology improves health care quality, prevent medication errors, reduce health care costs, increase administrative efficiencies, decrease paperwork, and expand access to affordable care.

Though technology has advantages in its store, there are some barriers such as lack of computer skills to overcome. This continues to hamper the use of information and information technology in healthcare despite improved IT. In one document (6) it had been noted that lack of access to information remains a major barrier to knowledge-based health care in developing countries and so as to fill this gap, they had indicated a universal access to information for health professionals as a prerequisite for meeting the Millennium Development Goals and achieving Health for All. It has also been noted in one study (7) that some barriers to the wider use of information technology in community pharmacy has been lack of computer skills, for instance, the pharmacists had not used even Windows before, or did not know how to use a mouse or open a computer program.

However, in Ethiopia, the Rational Pharmaceuticals Management (RPM) Plus introduced a Pharmacy Information System (PIS) for antiretroviral drugs. They are implementing the electronic antiretroviral therapy (ART) dispensing tool which enables healthcare workers to track medicines dispensed, drug stock levels, number of patients served, for report generation, and drugs purchased. However, very low Internet connectivity, lack of means to collect reports, and lack of computer skills have been mentioned as challenges by RPM Plus.

Currently, it is assumed that the magnitude of the use of this technology by pharmacists and druggists is little known in the practice of pharmacy in Ethiopia, particularly in Addis Ababa. The study tried to answer: do pharmacists and druggists, who are the members of the healthcare system, particularly in the

medication dispensing process, take advantage of information technology in their drug dispensing practice?

1.3 Significance of the Study

The need for better health information is vital in the age of globalization. Advancement in information technology is having a great impact on the field of pharmacy, particularly affecting physicians, patients, pharmacists, and hospital management in many ways. The findings and recommendations of the study will contribute towards the ongoing efforts of developing better health management information system (HMIS) in the country in general and in Addis Ababa in particular because the outcome of this study may provide an exploratory baseline information for future studies and practice regarding pharmacy professionals and this may also provide information for the ongoing health management information system.

The study will benefit the pharmacies and drug stores by providing information to them to improve the services that they give. This may give them a highlight of delivering effective and efficient healthcare for their clients/patients. In addition to this, it may help them to know the technical, financial, and professional challenges facing pharmacy practice to introduce IT. Basing this baseline information from the study, they may understand and devise a solution to overcome the constraints that hinder them to utilize the potentials of information technology. In line with this, the findings will also provide baseline information for health facility administrators in planning ongoing computer training for pharmacists and druggists.

2. Literature Review

2.1 Role of Information Technology

Information is the lifeblood of any organization, and computer-based information system consists of data, hardware, software, telecommunications, people, and procedures (8). Computer-based information systems are excellent tools for collecting, storing, and presenting facts. In fact, information technology is a critically important set of tools for working with information and supporting the information and information processing needs of any organization. Information technology saves time and overcomes the problem of place to retrieve information while it improves effectiveness and efficiency performances. Wireless technology allows us to get a great deal of advantages. For instance, portable computers (9) such as personal digital assistants (PDAs) can be used to answer drug related information on spot after installing the necessary software onto the PDA. With the help of PDAs, pharmacists can readily answer questions and help to speed up appropriate patient care services. Internet removes boundaries and the limitations of time. Thus, with the help of these technologies, one can access any information from one part of the globe to the other end without time and place constraints.

There were times when many quality pharmaceutical reference books from which to choose, but they were nearly all in book format. These resources are now being slowly converted into an electronic format. Some book publishers merely display their books electronically without change. Publishers have progressed from books, to floppy disc-based, to CD ROM-based, to Internet-based, to PDA-based products (10). Nowadays, someone is able to acquire information and communicate his knowledge from anywhere to anywhere. Technology now allows pervasive computing in pharmacy practice. However, the status of IT in pharmacy practice among pharmacists and druggists is little known in our country.

Exploiting these advantages of technology is open for everyone. However, this seems not easily achieved in developing countries like Ethiopia unless some

conditions fulfilled. Because in a document (6) it had been noted that lack of access to information remains a major barrier to knowledge-based health care in developing countries and so as to fill this gap, they had indicated a universal access to information for health professionals as a prerequisite for meeting the Millennium Development Goals and achieving Health for All. To meet this goal, they further considered that significant problems to overcome in some countries include inadequate power supply; lack of computer equipment and information technology support; lack of computer skills; and resistance to use the technology among health professionals.

2.2 Pharmacy Information System

An information system is a set of interrelated components that collect, manipulate, store, and disseminate data and information and provide a feedback mechanism to meet an objective. We interact with information systems everyday, both personally and professionally. Knowing the potential of information systems and putting this knowledge to work can result in a successful career, organizations that reach their goals, and a society with a higher quality of life.

Being an information system, pharmacy information system has the advantages of providing functions such as medication dispensing, inventory control, billing of medication, drug information provision, and drug interactions notifications (11).

Pharmacy information system is one of the components of the healthcare information systems (12). Pharmacy information systems (PIS) are computer systems that help to fulfill the needs of a pharmacy department and through the use of such systems, pharmacists and druggists can supervise and have inputs on how medication is used. Pharmacy information system is either a stand-alone system that can be used in private pharmacies (pharmacy department only) or it can be integrated with hospital information systems (Figure 1). When integrated

with other departments of the hospital, it can communicate with all the sections or departments. This minimizes time of calling (telephone conversation) and pharmacy professionals can easily communicate online with prescribing physicians. The following are some functions that pharmacy information system can provide for pharmacy department (13, 14):

Prescription management: It can be used to manage prescriptions for inpatients or outpatients. When drug dispensers receive prescription orders, this is matched to available pharmaceutical products and then dispensed accordingly taking into consideration whether the patient is an outpatient or inpatient. It is possible to track all prescriptions passed through the system. In pharmacy practice it helps to reduce medication errors through its in built error detecting programs.

Inventory Management: When drugs are dispensed manually, it is very difficult to maintain accurate inventory. However, pharmacy information systems aid inventory management by maintaining an internal inventory of all pharmaceutical products, providing alerts when the quantity of an item is below a set of quantity and providing an electronic ordering system that recommends the order of the affected item and with the appropriate quantity from approved suppliers. It also helps to indicate if there are leaks from a stock. At any time it is possible to know the medicine stock level.

Patient Drug Profiles: When used in a hospital setting, the system manages patient drug profiles, that is, it contains details of current and past medications used by the patient, known allergies and physiological parameters. Anytime a prescription is ordered for the patient, these profiles are used for clinical screening.

Report Generation: Most systems can generate reports such as medication use patterns. Report generation takes a lot of time if a manual system is used. Timely and accurate report generation is one of the advantages of this system.

Interactivity with other systems: When a pharmacy information system is a component of a hospital information system (13), it is important that pharmacy information systems should be able to interact with other available systems such as the clinical information systems to receive prescription orders and financial information system for billing and charging.

To exploit these opportunities, drug professionals should possess some knowledge of computer skills, but the current status of pharmacists and druggists in the use of pharmacy information system is unclear. Currently, with the exception of the one that is utilized by RPM Plus, utilization of the pharmacy information system is almost little known among pharmacists and druggists. Thus, this needs study.

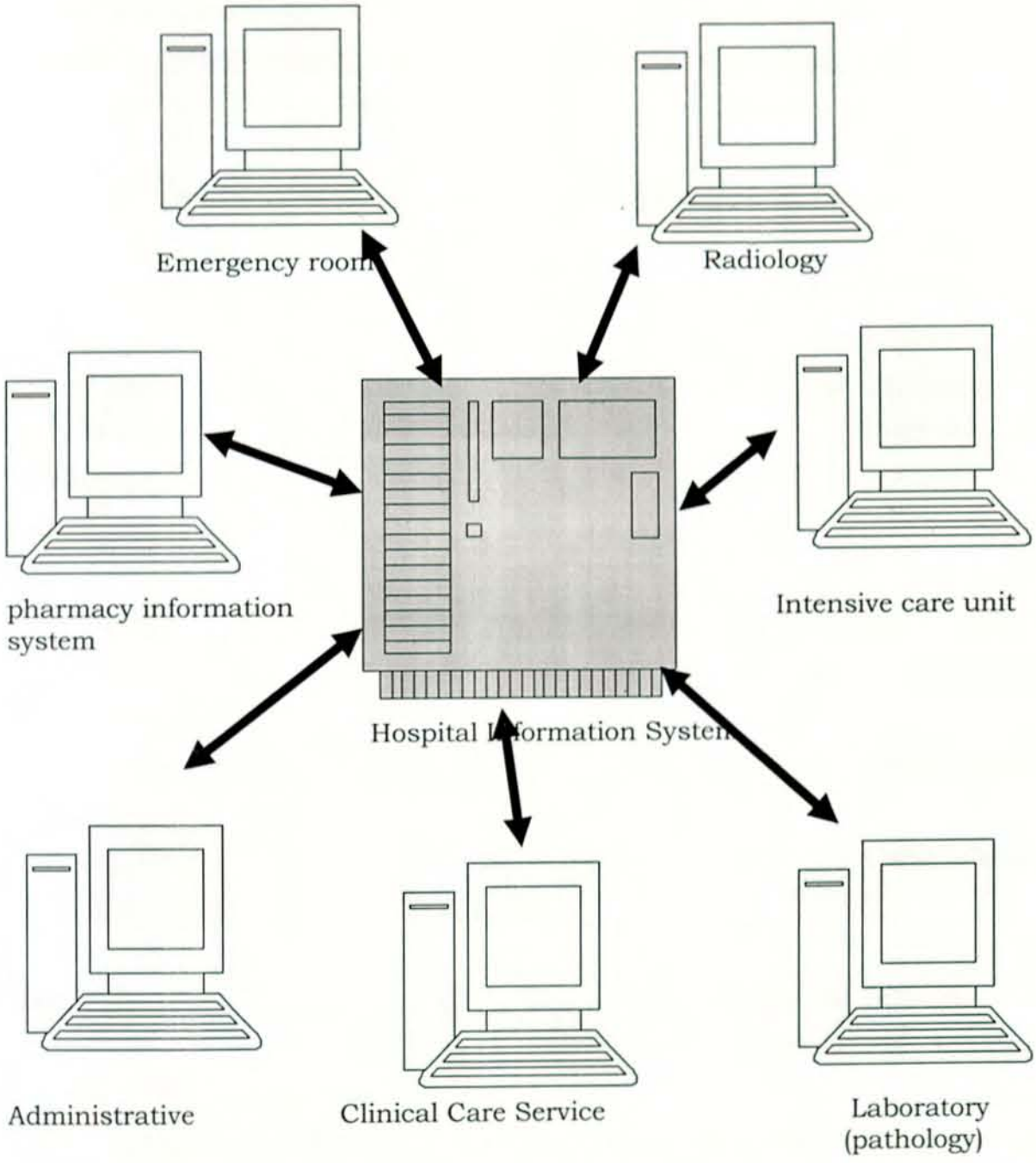

Figure 1: Schematic representation of hospital information system with integrated pharmacy information system.

If the pharmacy is in the hospital it can be integrated with the hospital information system and through that it can interact with the rest of the departments in that hospital. In an integrated system, each departmental system communicates with the other systems through either a centralized or decentralized network.

2.3 Overview of Information Technology in Health Services in Ethiopia

Recognizing the potentials of information technology in improving health services, the Ethiopian Government has issued an information technology policy (15). The goal of the policy concerning health is to modernize and expand improved health services coverage using IT. The Government has stated to commit itself to a nation-wide application of ICT for health service delivery and the following are some of the specific objectives:

- To establish a general database of health information center and disseminate information aimed at improving health service delivery, coverage and quality across the country.
- To introduce a health-net program for health professionals to keep abreast of developments on diseases and their cures.
- Linking hospitals, health research institutes and health centers with information network at the federal and regional levels.

Among the strategies, one is creating an electronic information network for rapid access by health professionals throughout the country on health and pharmaceutical information.

The government of Ethiopia has already known the competitive advantage of information technology so that it is putting every effort to exploit its benefits. To cite few instances, among the working areas for which attention is given was education

(SchoolNet) and administrative parts (WoredaNet) and Ministry of Health is also working so as to introduce Health Management Information System in the health sectors.

In addition, there are also some promising practical beginnings for the use of pharmacy information system in our country. For instance, the Rational Pharmaceuticals Management (RPM) Plus program (16) which has been working in Ethiopia since 2003 in HIV/AIDS program in collaboration with USAID/Ethiopia is using this system.

RPM Plus introduced a pharmacy information system for the use of antiretroviral drugs. They are implementing the electronic ART dispensing tool which enables health care workers to track medicines dispensed, stock levels, number of patients served, and patient treatment information. The tool generates drug consumption and stock on-hand reports needed for drug quantification and distribution at national and regional level. However, lack of computer skills have been mentioned by RPM Plus as a challenge.

Another promising point (17) that can reduce the above mentioned challenges is that strong government interest to strengthen the Ethiopian Health Information System can be considered as one opportunity for future development. One of the areas where the government has committed to bring about considerable improvements is communication. Accordingly, the government of Ethiopia has recently embarked on a project to network all regions and woredas using a combination of fiber, microwave, wireless, and satellite technologies, while at the same time, expanding the mobile network rapidly. This is expected to contribute to better communication and information system including health information.

One document (18) indicated that the Ethiopian national drug registries are rated as extremely useful if the World Health Organization could offer preferred generic e-Health tools as generic prototypes for adaptation. However, in the same document it

is noted that a significant challenge in building IT capacity in the health sector is the information and communications technology illiteracy of graduates and this was thought to limit the promotion of access to electronic health which brings awareness to the use of IT.

2.4 Internet Skill and Access

More than ever before organizations all over the world are focusing on information as a key resource and to fulfill this purpose, it is understood that information technology use such as Internet enables healthcare organizations and drug professionals in getting the right information into the hands of the right people at the right time (19). It is stated that health information technology has the potentials to improve the quality of healthcare, reduce medication errors and adverse effects (5).

The internet has made many things possible. The Internet is a global network of networks which makes vast amount of information available, such as online libraries, reference works, medical databases, and online shopping. One can access reliable medical information databases such as MEDLINE, through PubMed (http://www.ncbi.nlm.nih.gov/PubMe/). MEDLINE now contains books and six million articles from about 3500 medical journals. The World Wide Web (WWW) is the part of the Internet that is most accessible and easiest to navigate. The Internet and the Web provide an enormous amount of information.

Unless drug professionals, particularly druggists and pharmacists who are practising in the drug dispensing operations understand the skill and importance of Internet, they can not exploit the potentials of this technology. According to one survey (20), the use of Internet in community pharmacies was shown that about 88 percent at least one personal computer was connected to Internet and out of this, 47 percent for drug orders, 90 percent for e-mail, 41 percent for pharmacy

homepage, 89 percent for drug information and 14 percent was for electronic commerce. From this study one can clearly see that the computers connected to the Internet were mostly utilized to obtain drug information and used for e-mail purposes. Besides this, the pharmacists were requested for their future perspective of Internet and 87 percent of them assumed that in the future, the Internet will be indispensable tool for a community pharmacy.

In another study (21), almost 50 percent of the pharmacists believed that the Web use can improve customer counseling and this was followed by time management (44 percent). Forty-three percent responded that they would increase capital investment on information technology substantially. In the same study, it was also noted that a lack of understanding of the Web potentials plays important impediment in using information technology in their pharmacy practice. Furthermore, the younger pharmacists tend to use the IT tools much more than their counterparts (87.6 percent for less than 40 years old versus 41.3 percent for 60 or older population.

Drug related counseling is of growing importance in daily pharmacy practice and the availability of appropriate resources of drug information is essential. One of such resources that provide drug information is the Internet. It is suggested (20) that in addition to the traditional sources of drug information, new technologies like Internet are becoming more and more important tools in the daily practice of pharmacy. Pharmacists and druggists need to adapt to these new methods to remain the primary specialists for providing drug information to consumers as well as other health care professionals.

As one study conducted (22) in one region of Ethiopia indicates, 80% of the dispensers said that they do not get up-to-date information about drugs and 60% of them are limited only to inserted leaflets that come with drugs as source of drug information. However, it is known that Internet is readily valuable tool in acquiring

drug related information. The magnitude of the utilization and access of Internet by pharmacists and druggists is little known in the practice of pharmacy in Ethiopia particularly in Addis Ababa. Thus, IT utilization of pharmacists and druggists needs study.

The following conceptual model may summarize the above reviews:

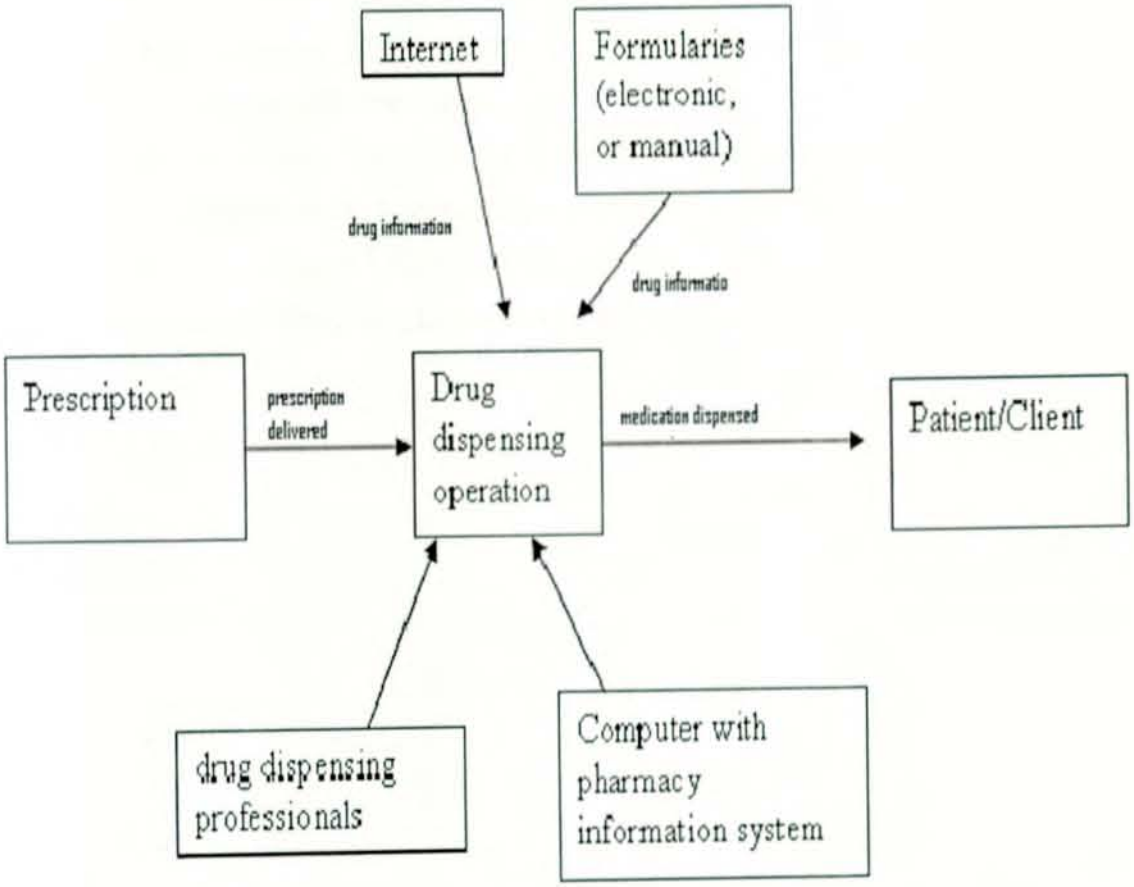

Figure 2: A conceptual Model of Activities involved in the drug dispensing Operation in pharmacies and Drug Stores in Addis Ababa.

3. Objective

3.1 General objective

The general objective of this study was to assess information technology (e.g., computer and Internet) use and access by pharmacists and druggists in pharmacies and drug stores in Addis Ababa and to identify factors that affect the use of this technology in these facilities.

3.2 Specific Objectives

- To assess pharmacists and druggists access to health information technology resources;
- To assess the use of information technology by pharmacists and druggists in Addis Ababa pharmacies and drug stores.
- To identify factors those affect the utilization of information technology at pharmacies and drug stores level.

4. Methods

4.1 study area

The study was carried out in Addis Ababa which is the capital city of the Federal Democratic Republic of Ethiopia. The Addis Ababa City Administration is divided into 10 administrative sub cities and 99 Kebeles. Addis Ababa is the diplomatic capital of Africa. The Organization of African Unity and the UN Economic Commission for Africa have their headquarters here. Addis Ababa had a total population of 2,738,248, consisting of 1,304,518 male and 1,433,730 female (23). According to the 2008 Health and Health Related Indicators (24), it had been indicated that Addis Ababa has 33 hospitals in general among which 5 are federal hospitals under the Ministry of Health and the other 28 hospitals are private, NGO and Other Governmental Organization, 28 health centers, 94 special clinics, 99 higher clinics, 146 medium clinics, and 103 lower clinics. Furthermore, the indicator shows that the City has 15 public, 3 NGO, and 135 private pharmacies, and 83 private drug stores, 53 drug importers, 39 whole seller companies, and 12 drug manufacturers. But, according to unpublished report retrieved from the Ethiopian Drug Administration and Control Authority for the purpose of this project, there are 155 pharmacies (including hospital pharmacies) and 165 drug stores currently working in Addis Ababa.

4.2 Study Design

The study was descriptive cross-sectional survey by design complimented with qualitative in-depth interview.

4.3 Study population

All Pharmacists and druggists working in Addis Ababa public and private pharmacies and drug stores and who had been licensed by the Ministry of Health and who had obtained a Certificate of Competence for Drug Trading from DACA or permitted to work were the study population.

4.4 Sample Size

According to unpublished report retrieved from the Ethiopian Drug Administration and Control Authority (DACA) for the purpose of this project, there are 155 pharmacies (including that of hospital having one hospital pharmacy each) and 165 drug stores currently available in Addis Ababa. In each pharmacy or drug store, there is only one pharmacist or druggist who is licensed to run the the institution. In this study, therefore, all those licensed or permitted professionals who were in 320 pharmacies and drug stores were included in the study. These professionals were directly involved in the drug dispensing process. Thus, all pharmacists and druggists who fulfilled the above conditions (who had been licensed by the Ministry of Health and who had obtained a Certificate of Competence for Drug Trading from DACA or permitted to work in the 320 facilities) and who were actively on duty at the time of the survey in that institution were included in the study as study subjects.

For the qualitative study, four pharmacists and four druggists were purposely sampled to be interviewed the qualitative questions. A total of ten semi-structured guide questions were used for the in-depth interviews. Face to face interview was conducted with these key personnel to supplement the data obtained through the quantitative questionnaire survey and to capture broader issues not easily addressed by the quantitative questionnaire survey.

4.5 Sampling Procedures

For the quantitative study, all pharmacists and druggists who were actively on duty at the time of the survey in that institution and who had been licensed by the Ministry of Health and who had obtained a Certificate of Competence for Drug Trading from DACA or permitted to work in the 320 facilities were the study subjects. Hence, all the pharmacists and druggists working in the facilities and

fulfilled the above conditions were included in the study. The list of all the facilities had been retrieved from DACA.

A purposive sampling technique was employed for the qualitative study. Among the pharmacists and druggists who responded to the quantitative questionnaire and those who had drug dispensing experience in pharmacy and/or drug store were made to participate in the interview.

4.6. Data Collection Procedures

For the quantitative survey, self-administered structured questionnaire was employed to get a response about the use of health information technology by pharmacists and druggists. The questionnaire was created by combining investigator's ideas and those adapted from other studies. The questionnaire was pretested in prior to the actual study period.

The data collection tools had qualitative and quantitative sections. Concerning the quantitative part, data was collected from study subjects using pre-tested and self-administered structured questionnaire. Six data collectors who were diploma holders were recruited. Two supervisors who had an experience working as data clerk were also recruited. Training was given on the desired data collection techniques and assurance of data quality. The questionnaire was addressed personally to the respondents. Respondents were visited at their respective working places.

The quantitative questionnaire was divided into seven parts.

From part 1 to part 5, the responses were expected in the form of 'Yes or No' or 'options' are provided. Parts six and seven responses were in the form of Likert Scale which used a 5-point Likert scale that ranged from 'strongly disagree to strongly agree'.

The data collectors recruited were hired from the sub city which was most accessible to them in order to make easy to locate the pharmacies and drug stores in their vicinities. The data collectors had responsibility to distribute the questionnaire as well as help the study subjects fill the form. The data collectors had been given training on how to help the subjects while filling the form. They collected back the questionnaires that they had distributed. Each data collector was provided with a list of pharmacies and drug stores that they had got assigned to. To increase the response rate, both the supervisors and the investigator closely observed the daily data collection processes. Each day the principal investigator together with the supervisors had checked on randomly selected filled questionnaires to observe completeness and consistency for potential correction.

Regarding the qualitative data collection, four pharmacists and four druggists were in-depth interviewed ten questions at their working areas. The interviews were conducted face to face and recorded manually and transcribed for the purpose of analysis by the investigator.

4.7. Operational Definitions

The following words and phrases are operationally defined.

Pharmacy information system: It is an information system which is either a stand alone (a pharmacy department computer with pharmacy information system and which is not linked to any department) or integrated (pharmacy computer linked to other departments and the drug database and drug information is readily available to all permitted members of the hospital) with hospital information systems and which comprises functionalities like medication dispensing, inventory control, billing of medication, drug information, and alerts (11, 13).

Information Technology: Information technology (IT) refers to anything related to computing technology, such as networking, hardware, software, the Internet, or the people that work with these technologies (1).

Health information technology: It is a system where medical professionals store the information usually contained in a patient chart on a computer, rather than on paper.

Pharmacist: Who has a B.Pharm or above and is licensed by the Ministry of Health and obtained a Certificate of Competence for Drug Trading from the Ethiopian Drug Administration and Control Authority or permitted to run or work in the pharmacy.

Druggist: Who has a diploma and is licensed by the Ministry of Health and obtained a Certificate of Competence for Drug Trading from the Ethiopian Drug Administration and Control Authority or permitted to run or work in the drug store.

Information technology use: Getting the benefits of technologies such as computers, Internet, PDA, pharmacy information system in order to ensure up-to-date and efficient professional standards of practice (for example, pharmacy).

Professional internet use: those Webpages such as WHO webpage, DACA Webpages, PubMed Webpages that provide trusted drug information.

Computer and software skill: Having taken computer and application software training.

4.8 Variables

Dependent Variables

The main dependent variable is information technology use (exploiting the benefits of information technology).

Other dependent variables are:

- Professional internet use
- Computer and software skill
- Pharmacy information system use

Independent Variable

1. Demographic variables (age, sex, level of education, professional category, year of service),
2. type of information technology,
3. type of software,
4. factors affecting use of information technology.

4.9 Data Analysis Procedures

The data obtained from each study participants was cleaned to remove omissions, duplicates, and misunderstandings. This was edited and entered into a computer using Statistical Package for Social Scientists (SPSS) software for analysis. Frequency distributions and cross tabulations were made with the variables. Logistic regression was employed to obtain odds ratio (OR) statistical associations. This was considered significant at P-value <0.05 and 95% confidence interval. The results of the analysis were presented in percentages and tabular form.

The collected data from the in-depth interview (qualitative data) were analyzed manually. Responses of each key informant were initially categorized based on thematic issues addressed; then similar issues were merged to the selected thematic area. In addition to this, some of the ideas of key informants were quoted as it is.

Concerning the factors that favor pharmacy information system use were assessed by analyzing responses to a set of eight selected questions from the Likert scale. The variables were aggregated and the continuous scores from this category were converted into 'does not favor PIS use' and 'favors PIS Use'. The scores above the second quartile (>50%) were categorized as 'favors PIS Use' and those equal to or below (50%) were grouped as 'does not favor PIS use'.

4.10 Data Quality Management

Various efforts were made to assure the data quality. Some of these quality assurance methods were making the questionnaire as simple and clear as possible, all the data collectors had diploma (with relatively better information technology skills). There were also supervisors. Training was given both to data collectors and supervisors. The training focused on obtaining consent, privacy issues, personal relation and ethics in social research. Data cleaning and entry was done by the principal investigator daily. Personal supervision was made to ensure the quality of the data collected during the process of data collection. The questionnaire was pre-tested by using pharmacists and druggists working in pharmacies and drug stores in Adama (Nazret) town a week before deployment for data collection. This helped to make final corrections of the questionnaire. The pretest was carried out in English, but finally the study was conducted in Amharic. Short briefings were given to the informants when the questionnaire was distributed to make sure the respondents understood what the researcher wanted to investigate. Completeness and legibility of the questionnaire that got filled by the respondents were checked on spot. The researcher tried to carefully enter and analyze the collected data.

4.11 Ethical Considerations

Ethical clearance to conduct the study was obtained from the School of Public Health's Research and Ethical Committee of the Addis Ababa University, Medical Faculty. Permission was obtained from Addis Ababa Health Bureau in written form and from all the institutions involved in the study, the consent was obtained verbally. This informed consent from each study subjects were obtained after clear explanation about the purpose of the study was made. The study subjects were assured for the confidentiality of their responses by anonymity of the responses.

4.12 Dissemination of Results

Study results will be communicated to all potential stakeholders for possible intervention. Furthermore, all attempts will be made for presentation on annual conference and possible publication.

5. Results

5.1 Quantitative Study

5.1.1 Socio-demographic Characteristics of Respondents

The pharmacists and druggists who participated in the study were licensed or permitted by DACA to work in pharmacies and drug stores in Addis Ababa. A total of 320 questionnaires were distributed to all the professionals working in the institutions and at last 257 respondents participated in the study. The overall response rate was 80.3% and the remaining about 20% were non-respondents, this was because, some were not willing to fill the questionnaires due to time constraint and the remaining questionnaires had more than 50% missing responses (disadvantages of self-administered questionnaires) and thus, not included in the study.

As shown in Table 1, of all the 257 respondents, 109(42.4%) were pharmacists and 148(57.6%) were druggists. Concerning the gender proportion, 164(63.8%) were males and 93(36.2%) were females. Regarding the type of institutions in which the professionals were working, of all the 257 total respondents, 99(38.5%) were working in private pharmacies. Drug stores had 110(42.8%) respondents. Of all the respondents 30(11.7%) were serving in government and private hospitals. Sixteen (6.3%) of the professionals had been in Kenema and NGO pharmacies.

As also shown in Table 1, all the responded professionals were working in all the ten sub cities of Addis Ababa with the highest number 52(20.2%) in Bole subcity.

Among the 257 respondents, 127(49.4%) had been in pharmacy practice for a period of one to five years and 48(18.7%) had 6-10service years. Twenty four (9.3%) respondents were in practice for 11-15 years, and fifty eight (22.6%) professionals were working for more than or equal to 16 years. The professional service ranged from 1 to 37 years with median age of 5.00 and mean (±) of 9.1 (±8.72).

Table 1: Socio-demographic characteristics of respondents in pharmacies and drug stores in Addis Ababa, Ethiopia, March 2010.

Characteristics	Frequency	%
Gender n=257		
Male	164	63.8
Female	93	36.2
Professional category n=257		
Pharmacist	109	42.4
Druggist	148	57.6
Type of institution currently Working in n=257		
Hospital (government) pharmacy	9	3.5
Hospital (private) pharmacy	21	8.2
Private pharmacy	99	38.5
Kenema pharmacy	12	4.7
NGO pharmacy	4	1.6
Drug store	110	42.8
Others	2	0.8
Name of subcity of the institution n=257		
Arada	26	10.1
Gulele	14	5.4
Yeka	28	10.9
Kirkos	35	13.6
Nefas Silk/Lafto	22	8.6
Kolfe Keranyo	22	8.6
Addis Ketema	27	10.5
Akaki/Kaliti	7	2.7
Bole	52	20.2
Lideta	24	9.3

Of all the 257 respondents, 120(46.7%) were between the age of 20-30 years. Seventy six (29.6%) had been between the age of 31-40 years. Thirty three (12.8%) were between 41-50 years. Only 28(10.9%) were more than or equal to 51 years. The age of the respondents ranged from 21 to 68 years with median age of 31 and mean (±) of 34.8 (±10.492).

5.1.2 Information Access in Pharmacy Practice

When respondents were asked about the current means of giving service to customers in pharmacies and drug stores (Table 2), of the 257 respondents, 239(93.0%) responded to paper-based (manual) system and 18(7.0%) to electronic system. As to the response to the question about 'information source mostly used during drug dispensing', manual systems like pharmacopoeias, drug inserts, and other books all together constituted most of the responses which was 169(66.3%). The internet and other electronic part was only 6(2.4%) of the entire respondents group as compares to manual system.

Another question was asked if the respondents had confidence when there is lack of up-to-date drug information during drug dispensing. Among the total 245 respondents to this question, 70(28.6%) answered to 'very confident'. A very appreciable number 125(51.0%) responded 'confident'. 'Not confident' and 'I do not know' were 35(14.3%) and 15(6.1%), respectively.

The pharmacists and druggists had been asked if the pharmacy in the hospital was connected to electronically prescribing system in the hospital. Of all the 49 respondents 16(6.2%) responded 'yes' and 33(12.8%) answered 'no' and 'no response' was 208(80.9%), because this question was only specifically related to those professionals specifically working in hospital pharmacies.

Table 2: Information access Practice in pharmacy practice among respondents in pharmacies and drug stores in Addis Ababa, Ethiopia, March 2010.

Characteristics	Frequency	%
Current means of giving service to Customers n=257		
Paper-based (manual)	239	93.0
Electronically (computer)	18	7.0
Information source mostly used during drug dispensing n=255		
Pharmacopoeias and other books	44	17.3
Internet and other electronic sources	6	2.4
Drug inserts	35	13.7
Pharmacopoeias, drug inserts, and other books	169	66.3
Nothing	1	0.4
Connection of hospital pharmacy to electronic prescribing system in the hospital n=257		
Yes	16	6.2
No	33	12.8
No response	208	80.9
Feelings of professionals when service is provided manually for clients n=254		
Excellent	52	20.5
Very good	82	32.3
Good	69	27.2
Fair	40	15.7
Bad	6	2.4
I do not know	5	2.0

Regarding the feelings of professionals when service is provided manually for clients (shown in figure 3) was that 'excellent and 'very good' feelings together constituted 134(52.8%). 'Fair' and 'bad' feelings together constituted responses of 46(18.1 %).

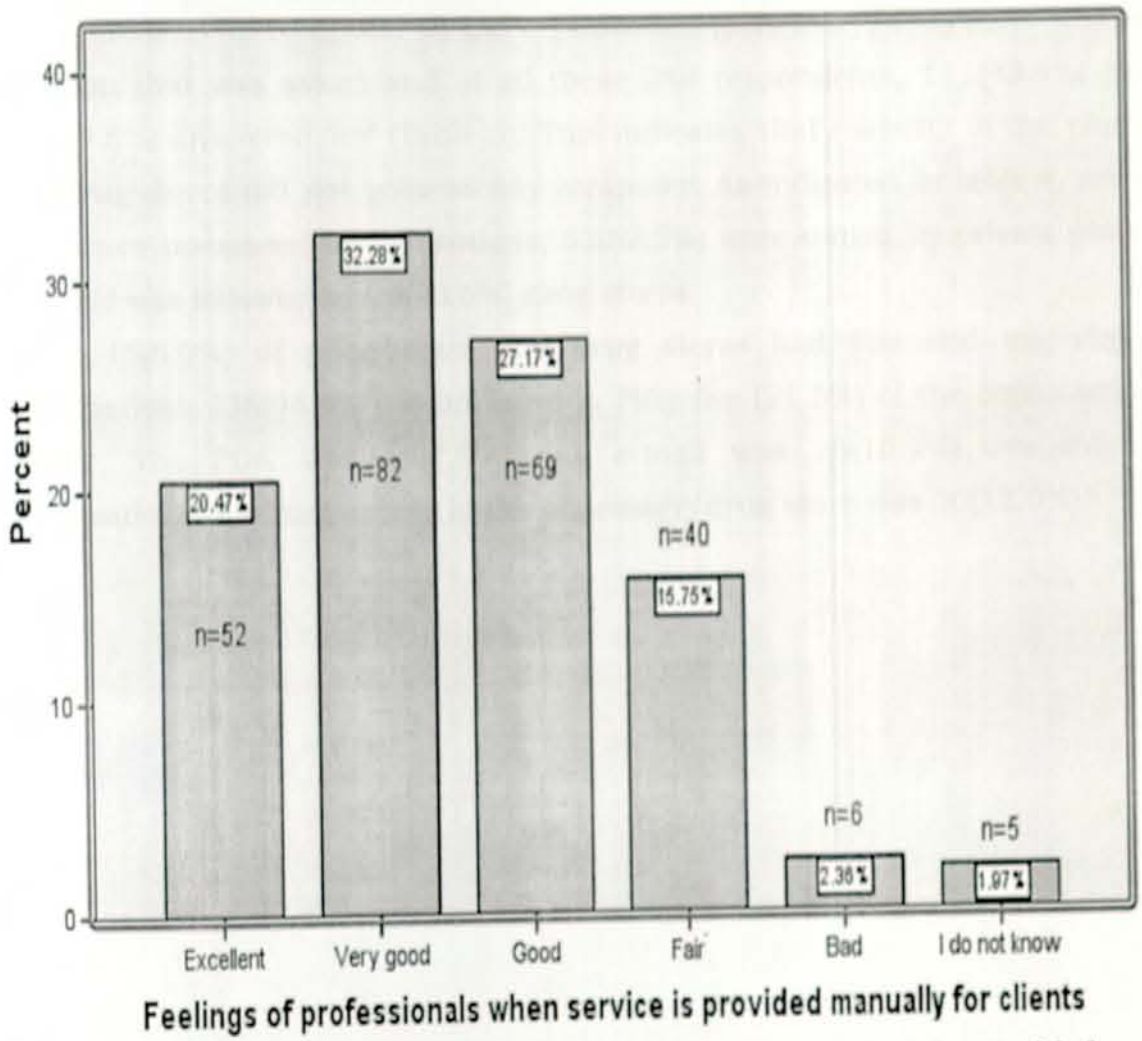

Figure 3: Feelings of professionals when service (dispensing) is provided manually for clients (n=254), Addis Ababa, March, 2010

5.1.3 Information Technology Access

Regarding personal computer possession by professionals (Table 3), 90(35.3%) had their own personal computers and 165(64.7%) did not possess any computer. Of all the computers, 50(19.5%) were desktops and 40(15.6%) were laptops.

The availability of computer in the organization (pharmacy/drug store was another question that was asked and of all those 256 respondents, 111(43.4%) 'yes' and 145(56.6%) answered 'no' (Table 3). This indicates that majority of the pharmacies and drug stores did not possess any computer. As indicated in table 4, among the computers possessed by institutions, 52(52.5%) were owned by private pharmacies and this was followed by 29(26.6%) drug stores.

About 15(6.0%) of pharmacies and drug stores had Fax and majority of the organizations 236(94.0% did not have it. Fifty five (21.5%) of the organizations had printer. The PDA was 19(7.9%) and e-mail was 26(10.2%) available in the organizations. Internet access in the pharmacy/drug store was 30(12.0%).

Table 3: Information technology access among respondents in pharmacies and drug stores in Addis Ababa, Ethiopia, March 2010.

Characteristics	Frequency	%
Possession of personal computer by the professionals n=255		
Yes	90	35.5
No	165	64.7
Type of computer possessed by professionals n=257		
Desktop	50	19.5
Laptop	40	15.6
No response	167	65.0
Presence of computer in the Organization (pharmacy/drug store) n=256		
Yes	111	43.4
No	145	56.6
Presence of FAX in the pharmacy/drug store n=251		
Yes	15	6.0
No	236	94.0
Internet access in the organization n=249		
Yes	30	12.0
No	219	88.0
Use of personal digital assistance in the organization n=239		
Yes	19	7.9
No	220	92.1
Presence of printer in the organization n=256		
Yes	55	21.5
No	201	78.5
Use of e-mail in the organization n=254		
Yes	26	10.2
No	228	89.8

Of all the computers possessed by the institutions (Table 4), 52(52.5%) were owned by private pharmacies and 29(26.6%) were owned by drug stores.

Table 4: Computer possession by institutions (pharmacies and drug stores) in Addis Ababa, Ethiopia, March 2010.

Institutions n=256	Frequency	%
	n=111	
1. Government Hospital pharmacy n=9	6	66.7
2. Private Hospital pharmacy n=21	15	71.4
3. Private pharmacy n=99	52	52.5
4. Kenema pharmacy n=12	4	33.3
5. Drug store n=109	29	26.6
6. NGO pharmacy n=4	4	100.0
7. Others n=2	1	50.0

5.1.4 Computer Experience/Skills and Software Use

As indicated in table 5, among 257 professionals, 188(73.2%) had taken computer training. Concerning the place where training had been taken, 72(28.0%) was at private training center and this was followed by 55(21.4%) at pharmacy college or university. 'Use of information technology in improving efficiency and effectiveness' of pharmacy practice was 247(96.5%) 'yes' by the professionals, whereas use of computer for prescription processing in pharmacy/drug store was only 15(6.1%) and a very significant number of professionals 231(93.9%) gave their negation by saying 'no'.

As shown in Table 6, of all respondents 232 who had answered to the question 'type of application software skill possessed, 29(12.5%) could navigate internet and 78(33.6%) did not possess any software skill and 15(6.5%) had software skill of word processing, database management, and spreadsheet/excel.

The pharmacists and druggists were also asked to express their opinion regarding 'the need of application software to be taken in the future'. Of these respondents, one hundred thirty two (51.4%) answered 'yes' to take a training of application software and 120(46.7) did not respond to this question, whereas 5(1.9%) answered 'no'.

Regarding the 'type of software training to be taken', 115(44.7%) of the respondents need to take all the applications softwares namely, spreadsheet/excel, database management, word processing, and internet navigation, but only 10(3.9%) respondents wanted to take internet usage training.

Table 5: Computer Experience/Skills among pharmacists and druggists in drug stores and pharmacies in Addis Ababa, Ethiopia, March 2010.

Characteristics	Frequency	%
Computer training taken n=257		
Yes	188	73.2
No	69	26.8
Place where computer training taken n=257		
At pharmacy training School	44	17.1
At college or university	55	21.4
Self-taught	23	8.9
At private training Center	72	28.0
No response	63	24.5
Reasons for not taking computer training n=257		
Lack of time to learn	53	20.6
Lack of money	7	2.7
lack of computer	3	1.2
Lack of interest	5	1.9
No response	189	73.5
Interest of working on computer n=239		
Yes	224	93.7
No	15	6.3
Importance of information technology in improving efficiency and effectiveness of the work (attitude) n=256		
Yes	247	96.5
No	9	3.5
Use of computer for prescription processing in the organization n=246		
Yes	15	6.1
No	231	93.9

Table 6: Software skill among respondents in drug stores and pharmacies in Addis Ababa, Ethiopia, March 2010.

Characteristics	Frequency	%
Type of software skill possessed n=232		
Database management	2	0.9
Word processing	14	6.0
Spreadsheet/excel	3	1.3
Internet navigation	29	12.5
Some(database management or word processing or internet or spreadsheet/excel)	91	39.2
All(database management, word processing, internet, spreadsheet/excel)	15	6.5
No skill	78	33.6
Type of software training to take in the future n=257		
Word processing	4	1.6
Spreadsheet/excel	2	0.8
Internet navigation	10	3.9
Graphics	2	0.8
Database management	27	10.5
All (database management, word processing, internet, spreadsheet/excel)	115	44.7
No response	97	37.7
Need of software training in the future n=257		
Yes	132	51.4
No	5	1.9
Missing	120	46.7

Even though 188(73.2%) had taken computer training, 68 respondents have stated some reasons for not taking computer training by the professionals. Among these reasons were lack of time, lack of money, lack of computer, and lack of interest 53(77.9%), 7(10.3%), 3(4.4), and 5(7.4%), respectively (figure 4).

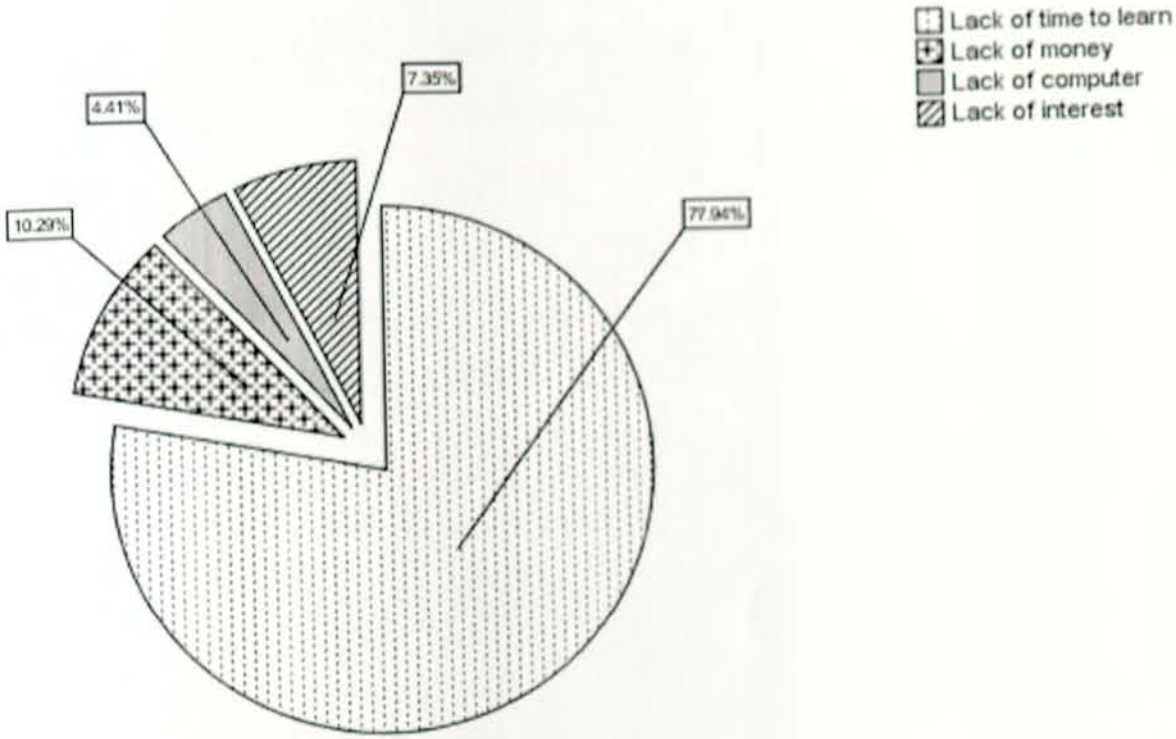

Figure 4: Reasons for not taking computer training by respondents in Addis Ababa pharmacies and drug stores, Ethiopia, March, 2010.

5.1.5 Internet use

As shown in Table 7, in pharmacy/drug store the most preferred source to obtain drug information was combination of printed sources and drug inserts 169(68.1%). However, internet and other electronic sources were only 13(5.2%). Only 69(27.5%)

had visited the Drug Administration and Drug Control Authority of Ethiopia Webpage. Among the respondents, 245(95.4%) had expressed their opinion about the usefulness of internet in pharmacy/drug store. Use of internet drug resources to obtain drug information was 94(36.6%), but 163(63.4%) did not use.

Table 7: Internet use by respondents in Pharmacies and Drug stores in Addis Ababa, Ethiopia, March 2010.

Characteristics	Frequency	%
Use of internet drug resources to get drug information n=257		
Yes	94	36.6
No	163	63.4
The most preferred resources to obtain drug information n=248		
Printed sources	41	16.5
Internet and other electronic resources	13	5.3
Drug inserts	21	8.5
Printed sources, drug inserts	169	68.1
Nothing	4	1.6
Usefulness of internet in pharmacy/ drug store n=256		
Extremely usefull	140	54.7
Very usefull	76	29.7
Usefull	29	11.3
Slightly usefull	2	0.8
No comment	9	3.5
World Health Organization (WHO) Webpage access n=255		
Yes	57	22.4
No	198	77.6
Visit of DACA Webpage n=251		
Yes	69	27.5
No	182	72.5
Visit of Ethiopian Ministry of Health Webpage access n=248		
Yes	44	17.7
No	204	82.3
Institution connection to internet =233		
Yes	26	11.2
No	207	88.8

As described in table 8, of all 249 respondents, only 30(12.0%) had internet access in pharmacy/drug store and about 219(88.0%) did not have any access to internet in their pharmacy/drug store work areas. Internet access for respondents (Table 8) was 30(12.0%) and pharmacy/drug store connection to internet (Table 7) 26(11.2%) were not matched; the internet connection should have been equal to or greater than the professionals' internet access in the institution.

The overall access for internet for the professionals was 30(12.0%) and about 219(88.0%) did not have any access to internet in their pharmacy/drug store work areas (Table 8).

Table 8: Internet access by pharmacists and druggists in their institutions in Addis Ababa, Ethiopia, March 2010.

Institutions	Internet access for respondents		
	Yes Number (%)	No Number(%)	Total(%)
	n=30	n=219	n=249
Government Hospital pharmacy	2(22.2)	7(77.8)	9(100.0)
Private Hospital pharmacy	3(15.0)	17(85.0)	20(100.0)
Private pharmacy	16(16.5)	81(83.5)	97(100.0)
NGO pharmacy	2(66.7)	1(33.3)	3(100.0)
Drug store	7(6.6)	99(93.4)	106(100.0)
Kenema pharmacy	0(0.0)	12(100.0)	12(100.0)
Others	0(0.0)	2(100.0)	2(100.0)
Overall total	30(12.0%)	219(88%)	249(100)

5.1.6 Factors Affecting Use of Information Technology in Pharmacy Practice

As shown in (Table 9), fourteen selected variables that were expected to be the possible problems that may affect the utilization of IT by pharmacists and druggists were asked to be responded by the professionals. The responses were expected in the form of 'strongly disagree to strongly agree'.

Two hundred thirteen (83.6%) strongly agreed or agreed to the question 'lack or inadequacy of know-how/skill/training' as a factor that affected the utilization of information technology by the professionals. However, 37(14.5%) respondents have disagreed or strongly disagreed to this point. A great number of respondents, 245(97.3%) agreed or strongly agreed among 252 professionals to the question 'lack of finance' as a problem. Lack of interest to utilize IT was another question that was asked. When 'disagreed and strongly disagreed' were added together, 137(53.7%) among 255 respondents gave their attitude that lack of interest affected IT introduction into the practice of pharmacy. About 156(62.9%) of the professionals were not aware of the competitive advantage of IT in pharmacies and drug stores. If incentives for the introduction of IT into pharmacies and drug stores were provided, about 172(69.4%) professionals had strongly agreed or agreed to use IT. That means to introduce IT there has to be incentive. Concerning the lack of standard, among 246 respondents, 147(59.8%) agreed or strongly agreed that it affected the use of IT in pharmacies and drug stores. The effect of culture on the use of IT was another question that was asked. One hundred seventy eight 177(70.8%) responded that there is no culture of using IT.

Other important issue that was given attention in this study was about respondents' computer phobia/apprehensiveness. With respect to this, 187(76.0%) were disagreed or strongly disagreed. This means they were not phobic to the use of computer. However, some 28(11.4%) reserved their attitudes and 31(12.6%) were phobic or apprehensive to computer.

Regarding the question that the use of IT 'does not improve efficiency and effectiveness' in pharmacy practice was answered by the professionals as 95(37.0%) strongly agreed or agreed. But, 145(56.4%) strongly disagreed or disagreed to this point, which means that IT improves the efficiency and effectiveness of pharmacy practice.

Table 9: Pharmacists and druggists Attitude on Factors affecting the Use of Information Technology in Pharmacies and Drug Stores in Addis Ababa, Ethiopia, March 2010.

Characteristics	Number(%) of respondents				
	SDIS	DIS	I am Not sure	A	SA
Lack or inadequacy of know-how/skill/training N=255	10(3.9)	27(10.6)	5(2.0)	133(52.2)	80(31.4)
Lack of finance n=252	2(0.8)	4(1.6)	1(0.4)	73(29.0)	172(68.3)
Lack of manpower n=251	29(11.6)	98(39.0)	15(6.0)	89(35.5)	20(8.0)
Lack of interest n=255	39(15.3)	98(38.4)	20(7.8)	69(27.1)	29(11.4)
Lack of policy n=250	23(9.2)	69(27.6)	40(16.0)	73(29.2)	45(18.0)
Change management problem n=253	41(16.2)	100(39.5)	35(13.8)	58(22.9)	19(7.5)
Technology transfer problem n=249	14(5.6)	61(24.5)	41(16.5)	90(36.1)	43(17.3)
Lack of management commitment n=254	14(5.5)	55(21.7)	33(13.0)	91(35.8)	61(24.0)
Lack of standards n=245	9(3.7)	44(17.9)	46(18.7)	93(37.8)	54(22.0)
Not knowing the Competitive advantage of IT n=248	16(6.5)	65(26.2)	11(4.4)	113(45.6)	43(17.3)
Do not improve efficiency & effectiveness n=257	61(23.7)	84(32.7)	17(6.6)	65(25.3)	30(11.7)
Computer phobia n=246	64(26.0)	123(50.0)	28(11.4)	25(10.2)	6(2.4)
No culture of using IT n=250	21(8.4)	43(17.2)	9(3.6)	115(46.0)	62(24.8)
Lack of incentive to Use IT n=248	12(4.8)	49(19.8)	15(6.0)	120(48.4)	52(21.0)

NB. A=Agree; DIS=Disagree; SA=Strongly Agree; SDIS=Strongly disagree

Predictors of Factors Affecting Information Technology Use

Fourteen variables from the Likert scale of the factors affecting IT use were aggregated and the continuous scores from this category were converted into 'No, does not affect IT use' and 'Yes, affects IT use'. Those scores which were equal to or below the second quartile (50%) were grouped as 'No, does not affect IT use' and those scores which were above the second quartile (50%) were grouped as 'Yes, affects IT use'. After adjustment was done for possible confounding factors, as it can be seen from Table 10, for all the variables, there were no statistically significant differences on the use of information technology.

Table 10: Multivariate logistic Regression of Selected Variables in Relation to Factors Affecting Use of IT by Pharmacists and Druggists in Pharmacies and Drug Stores in Addis Ababa, Ethiopia, March, 2010.

Variables	Affecting IT Use			
	No, Does not affect N(%)	Yes, Affects N(%)	COR(95%CI)	AOR(95%CI)
Gender				
Male	55(44.7)	68(55.3)	1.77(0.99,3.2)	1.89(0.54,6.64)
Female	43(58.9)	30(41.1)	1.00	1.00
Professional category				
Pharmacist	41(49.4)	42(50.6)	1.04(0.59,1.84)	1.67(0.55,5.08)
Druggist	57(50.4)	56(49.6)	1.00	1.00
Means of giving service to customers				
Paper-based	90(49.7)	91(50.3)	1.16(0.40,3.32)	0.54(0.09,3.29)
Computer-based	8(53.3)	7(46.7)	1.00	1.00
Type of computer				
Desktop	16(45.7)	19(54.3)	2.14(0.77,5.93)	2.14(0.69,6.69)
Laptop	18(64.3)	10(35.7)	1.00	1.00
Availability of computer in the pharmacy/drugstore				
Yes	42(51.9)	39(48.1)	0.87(0.49,1.53)	1.04(0.29,3.73)
No	55(48.2)	69(51.8)	1.00	1.00
Computer training				
Yes	70(48.6)	74(51.4)	1.23(0.65,2.33)	1.74(0.21,14.32)
No	28(53.8)	24(46.2)	1.00	1.00
Age groups				
20-30 years	47(54.0)	40(46.0)	1.16(0.56,2.40)	3.61(0.59,22.07)
31-40 years	25(39.1)	39(60.9)	2.14(0.98,4.64)	2.31(0.40,13.28)
41 and above	26(57.8)	19(42.2)	1.00	1.00

Table 11: **Attitudes of pharmacists and druggists on the Use of Pharmacy Information System in Pharmacies and Drug Stores in Addis Ababa, Ethiopia, March 2010.**

Characteristics	Number(%) of respondents				
	SDIS	DIS	I am Not sure	A	SA
I need to use pharmacy Information system n=255	0(0.0)	5(2.0)	2(0.8)	73(28.6)	175(68.6)
There is lack of skilled personnel to use PIS n=252	11(4.4)	53(21.0)	18(7.2)	120(47.6)	50(19.8)
The existing manual system is adequate n=254	68(26.8)	132(52.0)	14(5.5)	29(11.4)	11(4.3)
Shortage of finance to use PIS n=255	17(6.7)	54(21.2)	35(13.7)	89(34.9)	60(23.5)
PIS is expensive n=255	12(4.7)	68(26.7)	84(32.9)	65(25.5)	26(10.2)
I know how to use PIS N=242	10(4.1)	64(26.4)	71(29.3)	79(32.6)	18(7.6)
I have interest to take PIS training n=255	7(2.7)	12(4.7)	4(1.6)	92(36.1)	140(54.9)
PIS increases unemployment among Pharmacists and druggists n=256	47(18.4)	97(37.9)	38(14.8)	41(16.0)	33(12.9)
In the future we will use PIS n=252	6(2.4)	13(5.3)	20(7.9)	111(44.0)	102(40.5)
Administrators of the institution support the use of PIS n=255	15(5.9)	14(5.5)	72(28.2)	87(34.1)	67(26.3)
PIS saves dispensing time n=256	4(1.6)	12(4.7)	17(6.6)	99(38.7)	124(48.4)
PIS minimizes medication errors n=256	5(2.0)	24(9.4)	16(6.3)	102(39.8)	109(42.6)

NB. A=Agree; DIS=Strongly disagree; SA=Strongly agree; SDIS=Strongly disagree

Table 11: **Attitudes of pharmacists and druggists on the Use of Pharmacy Information System in Pharmacies and Drug Stores in Addis Ababa, Ethiopia, March 2010,** (continued).

Characteristics	Number(%) of respondents				
	SDIS	DIS	I am Not sure	A	SA
PIS is suitable for Addis Ababa condition n=254	6(2.4)	16(6.3)	25(9.8)	113(44.5)	94(37.0)
Not knowing from where to purchase PIS n=242	20(8.3)	66(27.3)	51(21.1)	76(31.4)	29(12.0)
I feel apprehensive/ phobic about using PIS n=256	104(40.6)	104(40.6)	20(7.8)	23(9.0)	5(2.0)
PIS is too much complicated for me to use n=256	41(16.0)	91(35.5)	60(23.4)	53(20.7)	11(4.3)

NB. A=Agree; DIS=Strongly disagree; SA=Strongly agree; SDIS=Strongly disagree

Predictors that Favor Pharmacy Information System Use

After adjustment was carried out for the possible confounding factors (Table 12) that influenced pharmacy information system use among pharmacists and druggists, of the socio-demographic characteristics, only 20-30 year age groups 56(52.8%) had shown [OR(95%CI)] = 9.32(1.58,55.09) which indicated a tendency of better favoring the use of pharmacy information system. The wide confidence interval was due to the limited sample size among the age group.

Concerning the professional category, there was also no statistically significant difference between pharmacists 42(41.2%) and druggists 65(50.0%) in the use of pharmacy information system. As to the availability of computer in the pharmacy/drug store, a difference was not observed in the PIS utilization between those possessing and those without. Computer training also did not bring a change between those who had taken training and not taken in the use of PIS.

Table 12: Multivariate Logistic Regression of Factors Favoring PIS Use by Pharmacists and Druggists in pharmacies and Drug Stores in Addis Ababa, Ethiopia, March 2010.

Variables	Favoring Pharmacy information System Use			
	No, does not favor PIS Use (No) N(%)	Yes, favors PIS Use N(%)	COR(95%CI)	AOR(95%CI)
Gender				
Male	80(53.7)	69(46.3)	1.02(0.60,1.75)	1.43(0.47,4.35)
Female	45(54.2)	38(45.8)	1.00	1.00
Professional category				
Pharmacist	60(58.8)	42(41.2)	0.70(0.42,1.18)	1.34(0.48,3.71)
Druggis	65(50.0)	65(50.0)	1.00	1.00
Means of giving service to customers				
Paper-based	116(54.0)	99(46.0)	0.96(0.36,2.58)	0.59(0.10,3.41)
Computer-based	9(52.9)	8(47.1) 1.00	1.00	
Availability of computer in the pharmacy/drugstore				
Yes	47(46.1)	55(53.9)	**1.73(1.03,2.93)**	1.16(0.38,3.54)
No	77(59.7)	52(40.3)	1.00	1.00
Type of computer				
Desktop	21(50.0)	21(50.0)	1.06(0.43,2.60)	1.20(0.45,3.17)
Laptop	18(51.4)	17(48.6)	1.00	1.00
Computer training				
Yes	85(50.9)	82(49.1)	1.54(0.86,2.77)	0.43(0.06,2.77)
No	40(61.5)	25(38.5)	1.00	1.00
Age groups				
20-30 years	50(47.2)	56(52.8)	**2.50(1.26,4.98)**	**9.32(1.58,55.09)**
31-40 years	37(52.1)	34(47.9)	2.05(0.98,4.29)	4.41(0.84,23.08)
41 and above	38(69.1)	17(30.9)	1.00	1.00

5.2 Qualitative Study

Description of the respondents to the in-depth interview

The participants of the in-depth interview were eight key informants consisting of four pharmacists selected from hospital pharmacies, and private pharmacies. Two pharmacists were drawn from hospital pharmacies and the other two were from private pharmacies and their service ranged from 5-20 years. All the four druggists were from drug stores and their professional service ranged from 3-24 years.

After the in-depth interview was conducted, the thematic points discussed were summarized as under:

Computer Skill/Proficiency

Majority of in-depth interview participants have given their opinion that there were some computers in the pharmacy or drug store. Among the four pharmacists interviewed, three pharmacies had computers and one of the pharmacy computers (hospital) was linked with other departments of the hospital. Because of fear of virus, the computer with a drug database was not internet connected but there were other computers connected to internet. In this hospital, physicians prescribe drugs through computer and all the activities such as prescription processing, inventory control, billing of drugs, and report generation have been carried out by this computer linked to other computers of departments. The other three pharmacies were not using computer for processing prescriptions. The four drug stores did not possess any computer.

One respondent said that *the computers are only in the office of the pharmacy for some works unrelated to drug dispensing. Usually they are there almost for clerical activities.*

Almost all the interviewed professionals have given their opinion that computer skill is indispensable for pharmacy practice. Two pharmacists and one druggist had taken computer training, but one gave his comment as follows:

One professional said that *I have knowledge of basic computer skill that I acquired through my personal effort, and I have a general opinion that computer skill helps to control the activities that will be carried out in drug dispensing practice. But it needs due attention to be given by the health authorities in issuing guidelines and the owners of the pharmacies or drug stores and by the drug professionals themselves. In this information age, where the globe is interconnected, the professionals of pharmacy in this country should not be an "island". They have to give particular attention to acquire computer skill. We should get along with the astonishing vast amount of drug information. This comes into reality if the professionals are computer literate and own their personal computers. In advance, above all, the professionals should convince themselves so as to be computer literate and exploit its benefits.*

In addition to this, one druggist said that *I have no computer skill; however, I have decided to take computer training that helps me in drug dispensing after arranging my time.*

Factors Affecting Using IT in pharmacy Practice

The professionals stated that lack of computer skill, finance, and no culture of using computers are some of the limiting factors to use IT in pharmacy practice. If the professionals are motivated to take in-service training and some standards are set by government, the professionals will appreciate using IT.

Concerning Previous Courses of Computer Skill at College or university

As I understood from all the pharmacists and druggists who have been interviewed, they had an opinion that having computer skill and access to IT facilities will give

them feeling of competency in the pharmacy practice. To achieve this objective, almost all the professionals need to have computer literacy skills such as PDAs, internet browsing, pharmacy information system, and database management system techniques. Hence, the colleges and universities that teach pharmacy courses should introduce courses on pharmacy information system, PDAs, internet courses, and others that are specific to pharmacy practice besides basic computer skill courses.

One pharmacist stated that *he had not taken computer courses in his previous years in teaching centers, but by his personal effort he had basic computer training in private computer training center.*

Advantages of IT in pharmacy practice

Majority of the in-depth interviewed professionals stated the advantages of IT that it benefits both the pharmacy institutions as well as the patients. One respondent said that f*or the institution, it provides efficiency and effectiveness and for the patients, it helps them to get the right drug for the right patient and this in turn minimizes patient harm. Furthermore, inventory control, billing of medication and generation of timely drug reports is possible if IT, especially computers are used. During drug dispensing, personal errors by the professional can be minimized.*

6. Discussions

This study assessed the use of information technology by pharmacists and druggists in pharmacies and drug stores in Addis Ababa. It is mainly concerned with the self-reported assessment of the professionals.

During drug dispensing, as revealed in this study, about 93.0% of the professionals use paper-based (manual system) and only 7.0% use electronic (computer system). Therefore, the use of computer system in pharmacies and drug stores is not appreciable, because as compared to one study, about 72.0% pharmacists used computer for prescription processing on a daily basis. It is clear that IT is advancing and manual system (paper-based) is being shifted towards the conversion into electronic drug dispensing system. Nowadays, it is considered that use of information technology helps to improve efficiency and effectiveness in drug dispensing.

Internet access for the professionals in pharmacy/drug store was only 30(12.0%) and about 219(88.0%) did not have any access to internet in their pharmacy/drug store work areas. Thus, access to internet in Addis Ababa pharmacies and drug stores by pharmacists and druggists does not seem appreciable, because in one study (21), it had been shown that almost 66% of the pharmacists used internet in their pharmacy practice at a daily basis.

Only 69(27.5%) had visited the Drug Administration and Drug Control Authority of Ethiopia Webpage, the professionals did not exploit this Webpage, because this Webpage contains some important points related to drug information and guidelines.

As revealed in this study, using IT (like internet) to obtain drug information is not appreciable, because the most preferred source to obtain drug information in the pharmacies and drug stores was combination of printed sources and drug inserts (manual system) 169(68.1%). The internet and other electronic means of obtaining

drug information were only 2.4%. As it was indicated in a study (20), besides the traditional source (manual) of acquiring drug information, new technologies (like internet) are becoming more and more important tools in the daily pharmacy practice. In the same document, it has been stated that pharmacists need to adapt to those new methods to remain the primary specialists for providing drug information to consumers.

In this study, though about 95.7% of pharmacists and druggists understood the usefulness of internet in pharmacy practice, in one study it is revealed that 88.0% of community pharmacists had at least one personal computer connected to the internet and about 87.0% of the pharmacies assume that in the future the internet will be indispensable tool for a community pharmacy. It has been said that pharmacists need to adapt to those new methods (internet) to remain the primary specialists for providing drug information to consumers as well as to other health care professionals (20). Among the internet uses, 89.0% was for the purpose of acquiring drug information. In another study conducted in Nigerian hospitals, those pharmacists who work in these hospital pharmacies had 100% connectivity of computers to the internet (25).

About 15(6.0%) of pharmacies and drug stores had Fax and majority of the organizations 236(94.0% did not have it. Fifty five (21.5%) of the organizations had printer. The PDA was 19(7.9%) and e-mail was 26(10.2%) available in the organizations. PDA is nowadays becoming important because in addition to its other uses, it provides mobile access to pharmacy database.

Among 257 professionals, 188(73.2%) had taken computer training. Even though the number of professionals that had taken computer training was appreciable, this did not bring a change in the utilization of IT (e.g., computer and internet) in the practice of pharmacy.

The adequacy of the existing manual system to dispense drugs was disagreed by 200(78.8%) of the professionals. This was confirmed by the attitude of the professionals that was stated as 213(84.5%) agreed or strongly agreed to the

question 'need to use PIS in the future'. Then, this can be said that the professionals have indicated their preference of computer system in drug dispensing than manual system.

The question that says the use of IT 'does not improve efficiency and effectiveness' in pharmacy practice was answered by the professionals as 95(36.6%) strongly agreed or agreed. But, 145(56.4%) disagreed to this point, which means that IT improves the efficiency and effectiveness of pharmacy practice.

As stated above, though the professionals have a willingness to use computer system, the exploitation of IT in general seems low in pharmacy practice in Addis Ababa and this could be attributed to many constraining challenges (factors) as revealed in this study.

To see some of these constraining factors that had been revealed through this study for instance, lack or inadequacy of know-how/skill/training of the professionals, lack of finance, shortage of standard, technology transfer problem and lack of management commitment were some of the factors that affected the use of information technology by the professionals. In a study (26), among the main reasons for not using a pharmacy computer included cost/budgetary constraints.

The question that says the use of IT 'does not improve efficiency and effectiveness' in pharmacy practice was answered by the professionals as 95(36.6%) strongly agreed or agreed. But, 145(56.4%) strongly disagreed or disagreed to this point, which means that IT improves the efficiency and effectiveness of pharmacy practice.

About factors favoring PIS use by pharmacists and druggists in pharmacies and drug stores in Addis Ababa, by logistic regression analysis, except the age group 20-30 years, all the other variables did not bring a difference in the use of pharmacy information system. Regarding the factors that affect the information technology in pharmacy practice, there was no statistically significant difference in the use of IT

between the selected variables. This could be due to confounding factors; this may be because of either some variables that should have been added were not included or the sample size may be small. Therefore, to find the factors that influence the use of pharmacy information system, it needs further study.

Finally, even though the utilization of IT by pharmacists and druggists in pharmacies and drug stores in Addis Ababa was not appreciable, the professionals have an attitude of using IT.

7. Strength and Limitations of the Study

7.1 Strengths of the Study

- Combination of qualitative and quantitative study design to complement each other.
- It provides an exploratory baseline information for those interested individuals and institutions.

7.2 Limitations of the study

- To make comparative discussion, there was no similar studies found in Ethiopia.
- Since pharmacies and drug stores are distributed through out Addis Ababa subcities, reaching them all was not an easy task due to financial and time constraints.
- Since the study was self-reported or self administered, there were some missings (non-responses). This is also a study at a point of time.

8. Conclusions

The study indicated poor utilization status of IT for pharmacy practice service in Addis Ababa, Ethiopia. The findings indicated the need for computer training related to pharmacy profession and also setting standards for IT use in health care system, particularly in pharmacy practice. IT usage awareness creation among the professionals is needed to give them more skill oriented and formal in-service trainings for the professionals. Additional points are mentioned as follows:

- Professionals access to information technology was limited.
- Use of IT by the professionals in pharmacy/drug store was not appreciable.
- There are factors that affected the use of information technology at pharmacy/drug store level. Among them some are: lack of proper computer and software skill; lack of finance; shortage of standards; the competitive advantage of IT was not known among the professionals.

9. Recommendations

1. Pharmacists and druggists must have proper computer and software training related to the pharmacy profession. The current computer knowledge and utilization of pharmacy students should be revisited (for instance, pharmacy information system use) in terms of the new HMIS initiative requirements in order to create better balance in pharmacy profession with the other health professionals.
2. Since current means of giving service to customers is mainly manual, this trend should be changed towards the use of appropriately applicable computer system.
3. To exploit the potential of internet, pharmacies and drug stores must be connected to internet.
4. Pharmacy professionals must be made aware of the competitive advantages of IT in their practice.
5. It is recommended that the drug professional training centers should consider improving the IT facilities for pharmacists and druggists to achieve better universal access to IT and improve healthcare delivery system. FMOH and DACA should develop clear guideline and strategies on the need of IT in pharmacy practice.

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11. Annexes

Annex 1: Quantitative Questionnaire in English

Addis Ababa University
School of Graduate Studies
Medical Faculty (School of Public Health) and Faculty of Informatics,
Health Informatics Program

Hi! greetings, my name is _____. Today, I am here to get your consent in order to fill a questionnaire. The questionnaire will be filled for Ato Tadesse Gebre, a pharmacist. He is a postgraduate student in Health Informatics at Addis Ababa University in the Medical Faculty (School of Public Health) and Informatics Faculty. Nowadays, he is conducting his study on "**ASSESSMENT OF USE OF INFORMATION TECHNOLOGY IN PHARMACIES AND DRUG STORES IN ADDIS ABABA".** To conduct this research, a questionnaire will be filled by pharmacists and druggists working in pharmacies and drug stores in Addis Ababa. The objective of the research is to assess the use of information technology by pharmacists and druggists. Your co-operation is very helpful. Your name will **not be written on the questionnaire** and all the information you provide will be kept strictly confidential. You are also not obligate to answer any question you don't wish to answer. The information you provide us is extremely important and invaluable, as it will help institutions involved in improving the use of information technology for healthcare delivery services. To fill the questionnaire, 25-35 minutes will be required.

Once again, I would like to assure you that the information you provide me is completely confidential and will be used only for the research purpose. The information that you will provide is quite useful to achieve the objective of the study.

Can you fill the questionnaire, Yes ____ No_____

Name of data collector: _____signature_____Date_____

Name of Supervisor: _____signature_____Date_____

Part 1: SOCIO-DEMOGRAPHIC DETAILS OF STUDY SUBJECTS

Pease **circle** the number of your choice under the **Response Column**

No.	Question	Response	skip
201	Sex	1. Male 2. Female	
202	Age in years	----------	
203	What is your professional category?	1. Pharmacist 2. Druggist	
204	What is the type of Institution that you are currently working in?	1. Hospital (Government) 2. Hospital (private) 3. Private pharmacy 4. Kenema pharmacy 5. NGO pharmacy 6. Drug store 7. Others: Specify -----	
205	Please state the name of the sub city of the institution?	----------	
206	How many years have you served in the profession?	----------	

Part 2: Questions Related to information access behavior in pharmacy practice

No.	Question	Response	skip
301	How do you give your service to your customers currently?	1. Paper-based (Manually) 2. Electronically (computer)	
302	Which information source do you mostly use when needed?	1. pharmacopoeias & other books 2. Internet & other electronic resources 3. Drug inserts 4. All the above except No.2 5. I do not use	
303	How do you rate your service when you provide services to	1. Excellent 2. Very good	

	your clients manually?	3. Good 4. Fair 5. Bad 6. I do not know	
304	How would you rate your confidence when you exchange information with your client during drug dispensing when you lack up- to- date drug information?	1. Very confident 2. Confident 3. Not confident 4. Do not know	
305	If the pharmacy is in the hospital, is there electronic prescribing by physicians connected to the pharmacy?	1. Yes 2. No	

Part 3: Information technology access

401	Do you have your own personal computer?	1. Yes 2. NO	skip
402	If yes to Q401, what type of computer do you have?	1. Desktop 2. Laptop 3. Palmtop 4. Personal digital assistance (PDA)	
403	Do you have computer in your organization?	1.Yes 2. NO	
404	Is there FAX in the pharmacy/drug store?	1. Yes 2. NO	
405	Is there printer in the organization?	1. Yes 2. NO	
406	Do you have access to Internet in the pharmacy/drug store?	1. Yes 2. NO	
407	Do you use personal digital assistance (PDA) in the organization)?	1. Yes 2. NO	
408	Do you use an e-mail in the organization?	1. Yes 2. NO	

Part 4: COMPUTER EXPERIENCE/SKILLS AND SOFTWARE USE

No.	Question	Response	skip
501	Have you taken computer training?	1. Yes 2. NO	
502	If yes to 501, where have you taken training?	1. At pharmacy training school 2.At pharmacy college or university 3. Self-taught 4. At private training Centre	
503	If Q501 is NO, why?	1. Lack of time to learn 2. Lack of money 3. Old age 4. Lack of computer 5. Lack of interest	
504	Are you interested working on a computer?	1. Yes 2. No	
505	How often do you use a computer?	1. Almost daily 2. Once a week 3. Once in 2 weeks 4. Once in a month 5. do not use	
506	What type of software skill do you have?	1.Database management 2. word processing 3. Spreadsheet/Excel 4. Graphics 5. Internet navigation 6. Some of the above 7. All of them 8. No skill	
507	If Q506 is NO skill, do you want to take software training?	1. Yes 2. NO	
508	If yes to Q506, what type of software training do you want to take?	1. Word processing 2. Spreadsheet/Excel 3. Internet 4. Graphics 5. Database management 6. All of them	
509	Do you think that the use of information technology will improve efficiency and	1. Yes 2. NO	

	effectiveness of your work?		
510	Do you use electronic pharmacy information system in your organization?	1. Yes 2. NO	
511	Do you use computer for prescription processing?	1. Yes 2. NO	

Part 5: Questions Related to Internet Use

No.	Question	Resource	skip
601	Do you use Internet drug resources to get drug information to support your work?	1. Yes 2. NO	
602	Is your Institution connected to Internet?	1. Yes 2. No	
603	If yes to Q602, how often do you use Internet?	1. Occasionally 2. Daily 3. 2-4 times a week 4. More than four times a week	
604	Which of the following do you prefer the most to obtain drug information?	1. Printed sources 2. Internet and electronic resources 3. Drug inserts 4. All of the above except No.2 5. I do not use	
605	If you access Internet, for what purpose do you use it mostly?	1. To get drug information 2. To purchase drug 3. For chat 4. E-mail 5. Sport 6. News/Films	
606	Where do you use Internet commonly?	1. In pharmacy/drug store 2. At home 3. At Internet Café 4. Public library 5. NO where	
607	What is the extent that you are satisfied with the Internet in your organization?	1. Fully satisfied 2. Partially satisfied 3. Least satisfied 4. NO satisfaction	

		5. No comment	
608	Did you come across any difficulty when you search information from Internet?	1. Yes 2. No	
609	If yes to Q608, what major problem you have faced when trying to use Internet?	1. Cost is expensive 2. Slow Internet connection 3. Too much information 4. Do not know where to find relevant drug information 5. No problem 6. Others: Specify ----------	
610	Do you use World Health Organization (WHO) Webpage?	1. Yes 2. NO	
611	Do you visit Drug Administration and Control Authority Webpage?	1. Yes 2. NO	
612	Do you visit the Ethiopian Ministry of Health Webpage?	1. Yes 2. No	
613	How would you rate the usefulness of Internet in pharmacy /drug store practice?	1. Extremely useful 2. Very useful 3. Useful 4. Slightly Useful 5. Not useful 6. NO comment	

Part 6: Factors affecting use of information technology

In the following there are 15 points listed. These points are factors that are expected to affect the introduction of information technology in pharmacies or drug stores. Options are provided for the factors. Among the options provided, please select one that you prefer the most and circle your choice that corresponds to the given factor.

1 = Strongly disgree; 2 = Disagree ;3 = I am not sure;
4 = Agree; 5 = Strongly agree

	Strongly disgree	Disagree	I am Not sure	Agree	Strongly sgree
1. Lack or inadequacy of know-how/Skill/Training	1	2	3	4	5
2. Lack of finance	1	2	3	4	5
3. Lack of manpower	1	2	3	4	5
4. Lack of interest	1	2	3	4	5
5. Lack of policy	1	2	3	4	5
6. Change management problem	1	2	3	4	5
7. Technology transfer problem	1	2	3	4	5
8. Lack of management commitment	1	2	3	4	5
9. Not knowing the competitive advantage of IT	1	2	3	4	5
10. Lack of incentive to use information technology	1	2	3	4	5
11. Lack of Standards	1	2	3	4	5
13. No culture of using IT	1	2	3	4	5
14. Computer Phobia	1	2	3	4	5
15. Do not improve efficiency and effectiveness	1	2	3	4	5

Part 7: QUESTIONS RELATED TO PHARMACY INFORMATION SYSTEM (PIS) USE

Pharmacy information system performs the following functions: Medication dispensing, inventory control, billing, drug information, and interactions.
This is to get your viewpoint on potential barriers to the introduction of pharmacy information system in pharmacy/drug store operations. You are requested to respond to all the items. The information required is purely for research purpose.

Please **circle** one of the numbers corresponding to the questions as follows: 1= Strongly disgree; 2= disgree; 3= I am Not sure ; 4= Agree; 5= strongly agree

DESCRIPTIONS	Strongly disgree	disgree	I am Not sure	Agree	Strongly Agree
1. I need to use pharmacy information system	1	2	3	4	5
3. There is lack of skilled personnel to use Pharmacy information system	1	2	3	4	5
3. The existing manual system is adequate	1	2	3	4	5
4. Shortage of finance to use pharmacy information system	1	2	3	4	5
5. Pharmacy information system is expensive	1	2	3	4	5
6. Know how to use pharmacy information system	1	2	3	4	5
7. I have interest to take Pharmacy information system training	1	2	3	4	5
8. Pharmacy information sytem will increase unemployment among Pharmacists and druggists	1	2	3	4	5
9. In the future we will use PIS	1	2	3	4	5

	Strongly disgree	disgree	I am Not sure	sagree	Strong agree
10. Administrators of the institution support the use of PIS	1	2	3	4	5
11. Pharmacy information system saves dispensing time	1	2	3	4	5
12. Pharmacy information system is suitable for Addis Ababa condition	1	2	3	4	5
13. Pharmacy information system minimizes medication errors	1	2	3	4	5
14. Not knowing from where to purchase the pharmacy information system	1	2	3	4	5
15. I feel apprehensive/phobic about using PIS	1	2	3	4	5
16. PIS is too complicated for me to use	1	2	3	4	5

Annex 2: In-depth interview guide (Qualitative) in English

In-depth interview guide for pharmacists and druggists

Main topic:

1. What is your opinion on the role of Information Technology on pharmacy practice? How do you apply it to improve the health care provision or drug dispensing process?
2. How do you describe the accessibility of computer or internet for the drug professionals working in this organization?
3. How does health information technology improve efficiency and effectiveness in pharmacy practice?
4. How does not having proper computer and internet training affect the use of information technology in pharmacy practice? If there is problem, what do you recommend to fill this gap?
5. What kind of drug information source do you use during drug dispensing and why?
6. How does using information technology reduce medication errors?
7. In your assumption what are the main challenges of the pharmacists and druggists that hinder them not to use computers?
8 What are the opportunities to implement Information Technology in the drug retail outlets?
9. What are the advantages of information technology for patients, pharmacy/drug store, in general for pharmacy practice?
10. How would you see the use of information technology in Addis Ababa? Do you think that it is practicable? If not, why?

- Any other points and recommendations

Thank You!

Annex 3 (አባሪ 4): Quantitative Questionnaire in Amharic (መጠይቅ በአማርኛ)

አዲስ አበባ ዩኒቨርስቲ
ድህረምረቃ ትምህርት ቤት
ፓብሊክ ሔልዝ ትምህርት ቤትና ኢንፎርማቲክስ ፋካሊት
ሔልዝ ኢንፎርማቲክስ መርሐ ግብር

በመድሐኒት ቤቶችና መድሃኒት መደብሮች ውስጥ የኤንፎርሜሽን ቴክኖሎጂ አጠቃቀምን በተመለከተ በአዲስ አበባ የሚደረግ ጥናት

እንደምን ሰነበታችሁ? እኔ ---------- እባላለሁ። ዛሬ እዚህ የመጣሁኝ የእናንተን ፈቃድ በማግኘት ለጥናት የሚሆን መጠይቅ ለመሙላት ነው ። መጠይቁ የሚሞላው አቶ ታደሰ ገብሬ ለተባሉት ፋርማስሲት ነው። እርሳቸውም በአዲስ አበባ ዩኒቨርሲቲ ውስጥ በፓብሊክ ሔልዝ ትምህርት ቤትና ኢንፎርማቲክስ ፋኩሊቲ ስር በሚገኘዉ ሄልዝ ኢንፎርማቲክስ መርሐ ግብር ውስጥ የድህረ ምረቃ ተማሪ ናቸው። በአሁኑ ወቂት ለድህረ ምረቃ በማስተርስ መመረቂያ የጥናት ፅሁፍ ለማዘጋጀት "አዲስ አበባ ውስጥ ባሉ ፋርማሲዎችና መድሃኒት መደብሮች ውስጥ የመረጃ ቴክኖሎጂ (Information Technology) አጠቃቀም ላይ አሰሳ" በሚል ርእስ እየተሠራ ነዉ። ይህን ጉዳይ ለማሳካት በፋርማስሲቶችና ድራጊስቶች በግል የሚመለሱ መጠይቆች ተዘጋጅተዋል። የምርምሩ አላማ ፋርማስሲቶችና ድራጊስቶች በአሁኑ ወቂት የመረጃ ቴክኖሎጂን በመድሃኒት ቤቶችና መድሃኒት መደብሮች ዉስጥ በምን ዐይነትና በምን ሁኔታ እየተጠቀሙ እንደሚገኑ መረጃ ለማግኘት ነዉ። የጥናቱ ውጤት መድሀኒት ቤቶችንና መደብረችን የሚጠቅም ከመሆኑም በተጨማሪ ጤና ጥበቃ ሚኒስቴርም የህብረተሰቡን ጤና ለማሻሻል ለሚያደርገው ጥረት ይጠቅመዋል። መጠይቆቹን ለመመሙላት የእናንተን ፍቃድ ማግኘት በጣም ጠቃሚ ነዉ። ለዚህ መጠይቅ የሚሰጡት መልስ ሚስጥራዊነቱ ፍፁም የተጠበቀ ነዉ። ጥያቄዎቹን በሚመልሱበተ ጊዜ ስምዎን መጻፍ አያስፈልግም:: ያልተረዱትን ጥያቄ በክፍል ወይም በሙሉ ላለመመለስ መብትዎ የተጠበቀ ነው። በተቻለ መጠን ጊዜ ላለመዉሰድ እሞክራለሁ። ጥያቄዉን ለመሙላት በግምት ከ25 እስከ 35 ደቂቃዎች ብቻ ይወስዳል።
በድጋሚ ላረጋገጥልዎ የምፈልገው፣ የሚሰጠኝ መልስ ሚስጥራዊነቱ የተጠበቀ ነው።

ስለዚህ ጥያቄዎቼን እንድጀምር ይፍቀዱልኝ።
በዚህ ጥናት ለመሳተፍ ፍቃደኛ ነዎት? 1. አዎን 2. የለም

የመረጃ ሰቢሳቢዉ ስም_____ፊርማ_____ቀን_____
የሱፐርቫይዘር ስም_____ፊርማ_____ቀን_____

ክፍል አንድ፡ ማህበራዊና ዴሞግራፊያዊ ጥያቄዎች
በኮዶችና የአማራጮች ዝርዝር ሥር ከሚገኙት መካከል አንዱን ቁጥር ያክብቡ

የጥያቄ ቁጥር	ጥያቄዎች	ኮዶችና የአማራጮች ዝርዝር	የይለፍ ትዕዛዝ
201	ፆታ	1. ወንድ 2. ሴት	
202	ዕድሜዎ ስንት ነው?	---------- በወሮት	
203	የሙያ ምድብዎ ምንድነው ?	1. ፋርማስሲት 2 ድራጊስት	
204	አሁን የሚሰሩበት ተቋም ዐይነት ምንድነው ?	1. ሆስፒታል (የመንግስት) 2. ሆስፒታል (የግል) 3. የግል ፋርማሲ 4. ከነማ ፋርማሲ 5. መያድ (NGO) ፋርማሲ 6. መድሃኒት መደብር 7. ሌሎች ----------	
205	እባክዎን ድርጅቱ የሚገኝበትን ክፍለ ከተማ ይጥቀሱ?	----------	
206	በሙያዎ ምን ያህል ዓመት አገልግለዋል?	---------- በወሮት	

ክፍል ሁለት፡ ከመረጃ ግኝት (Information access) ባህሪ ጋር የተያያዙ ጥያቄዎች

የጥያቄ ቁጥር	ጥያቄዎች	ኮዶችና የአማራጮች ዝርዝር	የይለፍ ትዕዛዝ
301	በአሁኑ ጊዜ ለደንበኞችዎ እንዴት አገልግሎት ይሰጣሉ?	1. በወረቀት ወይም በእጅ በመታገዝ (Manual) 2 በኤሌክትሮኒክስ (በኮምፒተር በመታገዝ) መሳሪያ	
302	በመድሃኒት አሰጣጥ ጊዜ የትኛውን የመረጃ ምንጭ ይበልጥ ይጠቀማሉ?	1. ፋርማኮፒያዎችና ሌሎችመጻህፍት 2. ከኢንተርኔትና በሌሎች ኤሌክትሮኒክ ምንጮች በመታገዝ 3. በመድሃኒት መግለጫ ወረቀት 4. ሁሉንም ከ2 በስተቀር 5. አልጠቀምም	
303	ለደንበኞችዎ በእጅ (manual)	1. እጅግ በጣም ጥሩ	

	አገልግሎት ሲሰጡ አገልግሎትዎን እንዴት ይገመግማሉ?	2. በጣም ጥሩ 3. ጥሩ 4. በቂ 5. መጥፎ 6. አላዉቅም	
304	መድሃኒት ሲሸጡ ወቂታዊ የሆነ የመድሃኒት መረጃ (drug information) ከሌሎች በራስ መተማመኑን እንዴት ያዩታል?	1. በጣም እተማመናለሁ 2. እተማመናለሁ 3. አልተማመንም 4. አላዉቅም	
305	መድሃኒት ቤቱ በሆስፒታል ውስጥ የሚገኝ ከሆነ መድሃኒት ከሚያዙ ሐኪሞች ጋር (electronic prescribing) ይገናኛል ወይ?	1. አዎን 2. አይደለም	

ክፍል ሶስት፡ የመረጃ ቴክኖሎጂ(Information Technology access) መኖር ጋር የተያያዙ ጥያቄዎች

የጥያቄ ቁጥር	ጥያቄዎች	ኮዶችና የአማራጮች ዝርዝር	የይለፍ ትዕዛዝ
401	የግል ኮምፒቴር አለዎት?	1. አዎን 2. የለም	
402	ለጥያቄ 401 መልስዎ አዎን ከሆነ ምን ዐይነት ኮምፒቴር አለዎት?	1. ዴስክቶፕ 2. ላፕቶፕ 3. ፓልምቶፕ 4. የግል ዲጅታል እገዛ (Personal Digital Assistance-PDA)	
403	ኮምፒቴር በድርጅቱ ውስጥ አለ?	1. አዎን 2. የለም	
404	በፋርማሲው/መድሃኒት መደብሩ ውስጥ ፋክስ አለ?	1. አዎን 2. የለም	
405	በፋርማሲው/መድሃኒት መደብሩ ውስጥ ፕርንተር አለ?	1. አዎን 2. የለም	
406	በፋርማሲው/መድሃኒት መደብሩ ውስጥ ኢንተርኔት አለ?	1. አዎን 2. የለም	
407	የግል ዲጅታል እገዛ(PDA) ይጠቀማሉ	1. አዎን 2. አይደለም	
408	ኢሜል በድርጅቱ ውስጥ ይጠቀማሉ?	1. አዎን 2. አይደለም	

ክፍል አራት፡ የኮምፒተር ልምድ/ክህሎት እና ሶፍትዌር አጠቃቀምን የተመለከቱ ጥያቄዎች

የጥያቄ ቁጥር	ጥያቄዎች	ኮዶችና የአማራጮች ዝርዝር	የይለፍ ትዕዛዝ
501	የኮምፒውተር ስልጠና ወስደዋል?	1. አዎን 2. የለም	
502	ለጥያቄ 501 መልስዎ አዎን ከሆነ የት ስልጠና ወሰዱ?	1. ፋርማሲ ትምህርት ቤት 2. ኮሌጅ/ዩኒቨርስቲ 3. በራሴ ጥረት ተማርኩ 4. በግል ስልጠና ማዕከል	
503	ለጥያቄ 501 መልስዎ የለም ከሆነ ለምን ስልጠና አልወሰዱም?	1. ጊዜ ስለአጣሁ 2. ገንዘብ ስለአጣሁ 3. በእርጅና ምክንያት 4. የኮምፒተር አለመኖር 5. ፍላጎት አለመኖር	
504	በኮምፒውተር መስራት ያስደስትዎታል?	1. አዎን 2. አይደለም	
505	ለምን ያህል ጊዜ ኮምፒተር ይጠቀማሉ?	1. በየቀኑ 2. በሳምንት አንዴ 3. በሁለት ሳምንት አንዴ 4. በወር አንዴ 5. አልጠቀምም	
506	ምን ዐይነት የሶፍትዌር ክህሎት አለዎት?	1. መረጃ ማቀነባበሪያ (database management) 2. ዎርድ ፕሮሰሰንግ 3. ስፕርድሸት/ኤክሴል 4. ግራፍክስ 5. ኢንተርኔት 6. ከላይ ከተጠቀሱት ጥቂቶቹን 7. ሁሉም 8. ክህሎት የለኝም	
507	ለጥያቄ 506 መልስዎ ክህሎት የለኝም ከሆነ የሶፍትዌር ስልጠና መውሰድ ይፈልጋሉ?	1. አዎን 2. የለም	
508	ለጥያቄ 507 መልስዎ አዎን ከሆነ ምን ዐይነት የሶፍትዌር ስልጠና መውሰድ ይፈልጋሉ?	1. ዎርድ ፕሮሰሰንግ 2. ስፕርድሸት/ኤክሴል 3. ኢንተርኔት 4. ግራፍክስ 5. መረጃ ማቀነባበሪያ (database management) 6. ሁሉንም	
509	የመረጃ ቴክኖሎጂ (Information Technology)	1. አዎን 2. አይደለም	

	መጠቀም የስራዎን ትልጥፍና እና ብቃት ያሻሽላል ብለው ያምናሉ?		
510	በድርጅትዎ ውስጥ የፋርማሲ መረጃ ስርዓት (computerized pharmacy information system) ይጠቀማሉ?	1. አዎን 2. አይደለም	
511	የመድሃኒት ትዕዛዝ ለማከናወን (prescription processing) ኮምፒውተር ይጠቀማሉ?	1. አዎን 2. አይደለም	

ክፍል አምስት፡ ኢንተርኔት አጠቃቀም ጋር የተያያዙ ጥያቄዎች

የጥያቄ ቁጥር	ጥያቄዎች	ኮዶችና የአማራጮች ዝርዝር	የይለፍ ትዕዛዝ
601	የመድሃኒት መረጃ ለማግኘት ኢንተርኔት ይጠቀማሉ?	1. አዎን 2. አይደለም	
602	የተቋምዎ ኮምፒተር ከኢንተርኔት ጋር ተገናኝተዋል?	1. አዎን 2. አይደለም	
603	ለጥያቄ 602 መለሰዎ አዎን ከሆነ ለምን ያህል ጊዜ ኢንተርኔት ይጠቀማሉ?	1. አልፎ አልፎ 2. በየቀኑ 3. በሳምንት ከሁለት እስከ አራት ጊዜ 4. በሳምንት ከአራት ጊዜ በላይ	
604	የመድሃኒት መረጃ ለማግኘት የተን ምንጭ ይበልጥ ይጠቀማሉ?	1. የታተሙ ጽሑፎች 2. ኢንተርኔትና የኤሌክትሮኒክስ ምንጮች 3. የመድሃኒት መግለጫ ወረቀት 4. ሁሉንም ከ2 በስተቀር 5. አልጠቀምም	
605	ኢንተርኔት ከተጠቀሙ በአብዛኛው ለምን ዓላማ ይጠቀማሉ?	1. የመድሃኒት መረጃ ለማግኘት 2. መድሃኒት ለመግዛት 3. ለጭውውት 4. ኢሜል 5. ስፖርት 6. ዜና/ፊልሞች	
606	በተለምዶ ኢንተርኔት የት ይጠቀማሉኝ	1. በፋርማሲ/መድሃኒት መደብር ውስጥ 2. በመኖርያ ቤት 3. ኢንተርኔት ካፌ 4. ማህበራዊ ቤተመጻሕፍት	

		5. የትም አልጠቀምም	
607	በድርጅቱ ውስጥ ባለው ኢንተርኔት ምን ያህል ረክተዋል?	1. ሙሉ በሙሉ ረክቻለሁ 2. በከፊል ረክቻለሁ 3. በትንሹ ረክቻለሁ 4. አልረካሁም 5. አስተያየት አልሰጥም	
608	ከኢንተርኔት መረጃ ሲፈልጉ ችግር ገጥሞዎታል?	1. አዎን 2. አይደለም	
609	ለጥያቄ 608 መልስዎ አዎን ከሆነ ኢንተርኔት ሲጠቀሙ ያጋጠመዎት ዋና ችግር የቱ ነው?	1. ዋጋው ውድ ነው 2. የኢንተርኔት ግንኙነት ማዝገም 3. የሚገኘው መረጃ መብዛት 4. የመድሃኒት መረጃ የት እንደሚገኝ ያለማወቅ 5. ችግር የለም 6. ሌሎች ----------	
610	የዓለም ጤና ጥበቃ ድርጅት (WHO) ድረገጽ ይጠቀማሉ?	1. አዎን 2. አይደለም	
611	የመድሃኒት አስተዳደርና ቁጥጥር ባለሥልጣን ድረገጽ ይጎበኛሉ?	1. አዎን 2. አይደለም	
612	የኢትዮጵያ ጤና ጥበቃ ሚኒስቴር ድረገጽ ይጎበኛሉ?	1. አዎን 2. አይደለም	
613	ለፋርማሲ/መድሃኒት መደብር አገልግሎት የኢንተርኔትን ጠቃሚነት እንዴት ያዩታል?	1. እጅግ በጣም ጠቃሚ 2. በጣም ጠቃሚ 3. ጠቃሚ 4. በመጠኑ ጠቃሚ 5. ጠቃሚ አይደለም 6. አስተያየት የለኝም	

ክፍል ስድስት፡ በመድሃኒት ቤቶችና መደብሮች ውስጥ በመረጃ ቴክኖሎጂ(Information Technology) አጠቃቀም ላይ ተጽዕኖ የሚያደርጉ ነገሮችን የተመለከቱ ጥያቄዎች

ከዚህ በታች ፋርማስሲቶችና ድራጊስቶች በመድሃኒት ቤቶችና መድሃኒት መደብሮች ውስጥ የመረጃ ቴክኖሎጂ /information technology/ አጠቃቀም ጉዳይ ላይ አሉታዊ ተጽዕኖ ሊያሳድሩ ይችሉ ይሆናል ተብለው የሚገመቱ ነጥቦች ተገልጸዋል። ለእነዚህም አማራጮች ተሰጥተዋል። ከተሰጡት አማራጮች መካከል አንዱን ብቻ በመምረጥ በነጥቦቹ ትይዩ ያክብቡ። እነዚህም አማርጮች፣

1 = ጠንከር ባለሁኔታ አልስማማም፣ 2 = አልስማማም፣ 3 = እርግጠኛ አይደለሁም
4 = ጠንከር ባለሁኔታ እስማማለሁ፣ 5 = ጠንከር ባለሁኔታ እስማማለሁ

	ጠንከር ባለሁኔታ አልስማማም.	አልስማማም	እርግጠኛ አይደለሁም	እስማማለሁ	ጠንከር ባለሁኔታ እስማማለሁ.
1. የማወቅ/ክህሎት ስልጠና እጥረት ወይም በቂ አለመሆን	1	2	3	4	5
2. የገንዘብ እጥረት አለ	1	2	3	4	5
3. የተማረ የሰው ኃይል እጥረት በመኖሩ	1	2	3	4	5
4. ፍላጎት ማጣት	1	2	3	4	5
5. የፖሊሲ እጥረት	1	2	3	4	5
6. የሠራተኞች ቴክኖሎጂውን የመቀበል ችግር	1	2	3	4	5
7. የቴክኖሎጂ ዝውውር ችግር በመኖሩ	1	2	3	4	5
8. የአስተዳደር ቁርጠኝነት ችግር	1	2	3	4	5
9. የመረጃ ቴክኖሎጂው የሚያስገኘውን ጥቅም አለመረዳት	1	2	3	4	5
10. ቴክኖሎጂውን ለመጠቀም ማበረታቻ አለመኖር	1	2	3	4	5
11. የመለኪያ ደረጃዎች(standard) እጥረት	1	2	3	4	5
13. ቴክኖሎጂውን የመጠቀም ባህል አለመኖር	1	2	3	4	5
14. የኮምፒውተርና ኢንተርኔት ጥላቻ(ፎቢያ)	1	2	3	4	5
15. የመረጃ ቴክኖሎጂው ቅልጥፍና እና ብቃት ስለማያሻሽል	1	2	3	4	5

ክፍል ሰባት፡ የፋርማሲ መረጃ ስርዓት(computerized pharmacy information system) አጠቃቀም ጋር የተያያዙ ጥያቄዎች

የፋርማሲ መረጃ ስርዓት የሚከተሉትን ሥራዎች ያጠቃልላል፡ መድሃኒት ለህሙማን ለመስጠት እገዛ ያደርጋል፣ የመድሃኒት አሻሻጭ የገንዘብ ስነስርዓት(Billing) ለመከታተል ይረዳል፣ ለመድሃኒት ቆጠራ (Inventory) ይረዳል፣ ስለመድሃኒት አጠቃቀምና የሚያስከትሉ ጉዳቶችን የሚገልጹ ጽሑፎች የያዘ ነው።
የፋርማሲ መረጃ ስርዓት በፋርማሲ/መድሃኒት መደብር ውስጥ አጠቃቀምን አስመልክቶ ያለዎትን አመለካከት ለማወቅ ነው ። ሁሉንም እንዲመልሱ ይጠየቃሉ።
በሰንጠረዥ ሥር ካሉት አንዱን ቁጥር ብቻ ያክብቡ።
1 = ጠንከር ባለ ሁኔታ አልስማማም፣ 2 = አልስማማም፣ 3 = እርግጠኛ አይደለሁም፣ 4 = እስማማለሁ፣ 5 = ጠንከር ባለሁኔታ እስማማለሁ

	ጠንከር ባለሁኔታ አልስማማም	አልስማማም	እርግጠኛ አይደለሁም	እስማማለሁ	ጠንከር ባለሁኔታ እስማማለሁ
1. የፋርማሲ መረጃ ስርዓት ያስፈልጋል	1	2	3	4	5
2. የመረጃ ስርዓቱን ለመጠቀም የሰለጠነ ሰው እጥረት አለ	1	2	3	4	5
3. አሁን ያለው በእጅ የመስራት ስርዓት በቂ ነው	1	2	3	4	5
4. ስርዓቱን ለማስገባት የገንዘብ እጥረት አለ	1	2	3	4	5
5. የፋርማሲ መረጃ ስርዓት ውድ ነው	1	2	3	4	5
6. የፋርማሲ መረጃ ስርዓት መጠቀም አውቃለሁ	1	2	3	4	5
7. ስልጠና ለመውሰድ ፍላጎት አለኝ	1	2	3	4	5
8. የፋርማሲ መረጃ ስርዓት መጠቀም የፋርማሲስቶችና ድራጊስቶች ስራ አጥነት ከፍ ያደርጋል	1	2	3	4	5
9. ወደፊት የፋርማሲ መረጃ ስርዓት እጠቀማለሁ	1	2	3	4	5
10. የድርጅቱ አስተዳዳሪዎች የመረጃ ስርዓቱን ይደግፋሉ	1	2	3	4	5
11. የፋርማሲ መረጃ ስርዓት ጊዜ ይቆጥባል	1	2	3	4	5
12. ስርዓቱ ለአዲስ አበባ ሁኔታ አመቺ ነው	1	2	3	4	5
13. የፋርማሲ መረጃ ስርአት የመድሃኒት አሰጣጥ ስዕተቶችን ይቀንሳል	1	2	3	4	5
14. የፋርማሲ መረጃ ስርዓት ከየት እንደሚገዛ ያለማወቅ 1 2 3 4 5					
15. ስርዓቱን ለመጠቀም የጥላቻ(ፎቢያ) ስሜት አለኝ	1	2	3	4	5
16. የመረጃ ስርዓቱን ለመጠቀም የተወሳሰበ ነው	1	2	3	4	5

Annex 4: In-depth interview guide (Qualitative) in Amharic

ክፍል ስምንት: ቃለመጠይቅ በአማርኛ

የቃለመጠይቅ ጥያቄዎች ዋና ሐሳቦች

1. የመረጃ ቴክኖሎጂ (Information Technology) በፋርማሲ ሙያ ላይ ያለውን ጠቀሜታ የራስዎን አስተያየት ቢሰጡኝ? የህብረተሰቡን ጤና እንዴት ያሻሽላል ብለው ይገምታሉኝ?
2. የኮምፒተርና ኢንቴርኔት አገልግሎት ለመድሃኒት ባለሙያውች መኖር እንዴት ይመለከቱታል?
3. የመረጃ ቴክኖሎጂ(Information Technology) አገልግሎት በፋርማሲ ሙያ ላይ ጥራትና ብቃት ያሻሽላል ብለው ያስባሉ?
4. በመድሃኒት ሙያ ላይ ሆነው የመረጃ ቴክኖሎጂ ለመጠቀም ተገቢው የኮምፒቴርና ኢንቴርኔት ሰልጠና ያለመውሰድ እንቅፋት ይፈጥራል ብለው የሚገምቱት ካለ? ችግሩን ለማስወገድ ምን መደረግ አለበት ይላሉ?
5. በመድሃኒት አሰጣጥ ጊዜ ምን ዐይነት የመረጃ ምንጭ ይጠቀማሉ? ለምን?
6. የመረጃ ቴክኖሎጂ(Information Technology መጠቀም በምን ሁኔታ ስዕተቶች ይቀንሳል ብለው ይገምታሉ?

7. ፋርማስሲቶችና ድራጊስቶች ኮምፒተር እንዳይጠቀሙ እንቅፋት ይፈጥርባቸዋል ብለው የሚያስቡት ካለ ቢነግሩኝ?
8. የመረጃ ቴክኖሎጂ ለመጠቀም የሚያስችል ጥሩ አጋጣሚ አለ ብለው የምገምቱት ምንድነው?
9. የመረጃ ቴክኖሎጂ ለበሽኞችና ለመድሃኒት ደርጅቶች ምን ዐይነት ጥቅም ይሰጣል ብለው ይገምታሉ?
10. አዲስ አበባ ከተማ ደረጃ የመረጃ ቴክኖሎጂ አገልግሎትን በመድሃኒት ሙያ ላይ እንዴት ያዩታል?

የምጨምሩበት ወይም ይህ ቢሆን ይሻላል የሚሉት ካለ?

በጥናቱ ስለተሳተፉ ምስጋናዬ የላቀ ነው።

Declaration

I, the 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.

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This thesis has been submitted for examination with my approval as the university advisor.

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