ADDIS ABABA UNIVERSITY POST GRADUATE STUDIES SCHOOL OF PUBLIC HEALTH AND INFORMATION SCIENCE DEPARTMENT OF HEALTH INFORMATICS

INFORMATION NEEDS AND SEEKING BEHAVIOR AMONG HEALTH PROFESSIONALS WORKING AT GOVERNMENTAL HOSPITAL AND HEALTH CENTERS IN BAHIR DAR TOWN, AMHARA REGION, ETHIOPIA.

BY

MULUSEW ANDUALEM (BSc)

A THESIS SUBMITTED TO SCHOOL OF GRADUATE STUDIES OF ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF SCIENCE IN HEALTH INFORMATICS.

ADDIS ABABA, ETHIOPIA

JUNE, 2012

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Information Needs and Seeking Behavior among Health Professionals Working at Governmental Hospital and Health Centers in Bahir Dar Town, Amhara Region, Ethiopia.

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ACKNOWLEDGEMENTS

First, I would like to thank Almighty God for reasons too numerous to mention. Next I am very much grateful to my advisors Dr. Abera Kumie and Dr. Gashaw Kebede for their unreserved guidance and constructive suggestions and comments throughout the process.

I would like to extend my heart-felt thanks to Dr. Alemayehu W., Dr. Wakgarri D, and Dr. Nigussie D. for their great help in data management and analysis of my thesis. I would also like to extend my heart-felt thanks to heads of all health centers, Dr. Muluneh Atinafu, chief clinical officer of Feleg Hiwot referral hospital, Workineh Ayalew, all respondents and all data collectors for their willingness and continuous supports during data collection period.

I also extend my great thanks to Addis Ababa University, School of Public Health and information science for coordinating as well as granting a fund to the project and my colleagues /friends, for their constructive comments and discussions concerning all steps of my thesis. Last, but not least my special thanks goes to all my family members, my uncle and all his family members who scarified all the possibilities to me from the beginning to the end.

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II. LIST OF ABBREVIATIONS AND ACRONOMY

AFI: Acute Febrile Illness

ART: Anti Retro Viral Therapy

CD-ROM: Compact Disc Read Only Memory

CSA: Central Statistical Agency

EPI INFO: Soft Ware for Expanded program on immunization information.

FMOH: Federal Ministry of Health

GPs: General Practitioners (GPs)

HI: Health Information

HIT: Health Information Technology

HIS: Health Information System

HIRs: Health Information Resources

HIV/AIDS: Human Immune Deficiency Virus /Acquired Immune Deficiency Syndrome

HO: Health Officer

ICTs: Information Communication Technologies

MDGs: Millennium Development Goals

MSc: Master of Science

MDR: Multi-Drug Resistance

NGOs: None Governmental Organizations

OPD: Out Patient Diagnosis

PHC: Primary Health Care

PMTCT: Prevention of Mather to Child Transmission

PLWHA: People Living With HIV/AIDS.

TB: Tubercle Bacillus

SPSS: Soft Ware Package for Social Science

UK: United Kingdom

VCT: Voluntary counseling and testing

WHO: World Health Organization

ABSTRACT

Background: Universal access to information for health professionals is a pre requisite for meeting the MDGs and achieving health for all strategy. In developing countries, a large proportion of the population, including health professionals have no or only poor access to health information resources due to poor infrastructures, economic related, poor attention, etc

Objective: The purpose of this study is to assess information needs and seeking behavior of health professionals working at Governmental Hospitals and Health Centers in Bahir Dar town, Amhara Region, Ethiopia.

Methods: A cross sectional study design using quantitative and qualitative approaches was carried out to achieve the research objectives using 350 study participants. Self-administered questionnaire and observation checklist were instruments to collect the required data. Manually edited data were entered in to computer using Epi-info version 3.5.1; further cleaned and exported to SPSS statistics version19; then cleaned again and analyzed as needed. Frequencies, cross tabulation, chi-square, Odds ratio with 95%CI, and Binary logistic regression analysis were done to describe and assess associations among variables of interest.

Results: Nearly all (97.3%) of respondents reported that they need health information to update themselves and support daily activities. More than half (54%) encountered problems on their daily activities due to information limitation. Major barriers to access information were geographical, organizational, personal, economic related, educational status and time. Only 145 (42.8%) respondents have access to internet at different places with various frequencies and have shown statistically significant association ($p < 0.05$) with age, sex, monthly income, computer literacy and access, patient seen per day, working experience, and working site. Majority of study participants have too much limited access to different information resources, especially library and internet. More than half (57.7%) respondents seek information by consulting their hard copies when there is a need. About 151(44.5%) respondents prefer to access on job trainings and soft copies next to hardcopies.

Conclusions and recommendations: Almost all respondents need to access health information and more than 80% of study areas have no library, internet and computer services. Therefore, great attentions and efforts must be done to help those starved health professionals working at those areas.

1. INTRODUCTION

1.1. BACKGROUND INFORMATION

Qualified health professionals are nuclei in achieving the goals of health policy of a given country (1-2). Continuous updating of knowledge and staying informed of timely, up-to-date, adequate information and recent findings concerning health are vital for health professionals in order to deliver quality, adequate and sustainable health care services for consumers and achieving MDGs of a country (1-3,). This is possible when there is continuous and adequate access of health information resources (HIRs) throughout the health care service providing facilities (4-5).

Health professionals use HIRs to update their knowledge, to use new technologies, to know the recent findings on health, to make evidence based decisions, to improve data handling and reporting system, to have better communication and common under standings among themselves, etc (3-5).

Information need - is a-recognition that the knowledge is inadequate to satisfy a goal that someone needs to achieve (6).

Information Seeking Behavior is the purposive seeking for information as a consequence of a need to satisfy some goals. In the seeking process, health professionals may interact with two basic HIRs: formal (hard and soft copies) and informal (human resources e.g. Key informants) HIRs (7-9). Information needs and seeking behaviors vary among health professionals working in rural and urban areas due to various reasons (7, 10). The means to distribute HIRs can be the Internet, library, persons, trainings, audios and videos displays, (4, 11).

ICT has become an important element in the working life of any health care professional, and enabled large amounts of information to be circulated with higher speed but a lower cost (9, 12). The information needs of the public health workforce have become all the more urgent and mandatory due to the emergence of new infectious diseases such as severe acute respiratory syndrome (SARS), Asian bird flu, HIV/AIDS epidemic, malaria, tuberculosis and

other communicable diseases as well as the increasing concern about acts of bioterrorism, such as spreading anthrax spores via the US Postal Service in 2001(2, 13-14).

1.2. RATIONALE OF THE STUDY

The developing world currently faces a series of health crises that threaten the lives of millions of people due to lack of resources and full-bodied healthcare infrastructures (15). Different studies at different times showed that access to HIRs in the world is greatly varied especially in developing countries for several reasons (14, 16-17).

Lack of access to information remains a major barrier to knowledge-based health care services in developing countries including Ethiopia for rural primary health care in particular (18-20).

Lack of communication creates situations for medical errors, which are common in today's health care organizations and have the potential to cause miss-diagnosis, wrong treatment, increase multi drug resistance, severe injury or unexpected patient death (5). Health information seeking behavior of health professionals in developing countries is highly affected by several factors such as infrastructure, HIRs performance, socio-demographic factors, cultural- influences, poor initiation of users, geographical locations and others (22-24).

A study from Addis Ababa (18) on related topic among 169 health professionals showed that, 146(94.6%) seek information when a need arises (18). There is no other research done on this topic among health professionals in Ethiopia and there is no/limited means to access HIRs in the study areas.

This study will serve as a base to fill and show research gaps, evidence for administrators, policy makers, health workers, NGOs, and others to plan and take action to improve the access and achieving their stated goals. It may also be used as a base line study for the coming researchers who are interested in this topic. In short, findings of this study will create awareness among health professionals and enable them to update their knowledge and then achieving their goals as needed. Therefore, organizations are primarily benefited ones from these study findings by achieving their stated goals.

As many health related studies in developing countries showed that, accessing relevant HIRs for all is mandatory for developing countries due to the presence of life threatening infectious diseases and poor trend / access of recent HIRs among health professionals (14, 18, 25).

2. RESEARCH QUESTIONS

1. What health information resources are currently available in the study area?
2. What are the health information needs and seeking behaviors of health professionals and factors affecting the seeking process in the study area?
3. How do health workers solve problems related to limitation of health information?

3. LITERATURE REVIEW

3.1. Information needs and seeking behaviors of health professionals

A survey under taken in UK for the assessment of internet use among nurses showed that there was a varying access to the internet; 13(48%) of the 27 interviewed nurses had access to internet at both work and home; only 6(22%) had access at work places; while seven(26%) had access only at home (26).

According to the study done in Washington DC, there is a critical need for comprehensive, coordinated, and accessible information to meet the needs of the public health workforce with the major barriers of time, resource reliability, trustworthiness/credibility of information, and information overload (10, 12).

Based on a study conducted by Alghanim A in Saudi Arabia among 177 primary care physicians (23), the most frequently used HIRs were:

1. Printed sources: medical journals 119 (67.2%), medical books 99(55.9%), clinical manuals 99(55.9%) and other sources 76(42.9%).
2. Electronic sources: online data base 126(71.2%), internet general web sites 149(84.2%), and other sources (CD-ROM, computer, etc.) 87(49.2%).
3. Human sources: specialist consultation 143(80.8%), GP consultation 115(65.0%) and other colleagues' consultation 139(78.5%).

Another study conducted in, Nigeria (27), to assess HI access among physicians also revealed that, only 7% of respondents were computer illiterate for various reasons. Some of their reasons were had no time to learn (33.3%), had no access to computer (33.3%) and had no interest (8.4%). Of the computer literate (93%), 98% had used the internet and only 36% were having personal internet access than the rest 64%. This study also showed that 57.6% of 172 respondents had their own personal computer. The main reasons for using internet were e-mail (62.2%), research (12.2%), health information (14%), patient care (5.2%), others (1.7%) and 4.7% had no response.

According to a study conducted by Andrews et al(28), on Information-seeking behaviors of practitioners in a primary care practice-based research network, clinicians were asked how often they sought information from colleagues, print resources, or online resources (excluding drug dosing or drug interactions information) to care for their patients. Fifty-eight percent stated they did this several times per week, 18% daily, 22% rarely, and 2% never.

The same study also showed that approximately 48% of practitioners had access to a small medical library, 46% to a hospital library, 21% to a university medical library and about 14% had no immediate medical library access. More than 55% stated they could access a library via the Internet; 57% of respondents reported having access to 2 or more types of medical libraries; and 29% had access to just 1 type. They were also asked how often they used library and 33% said they used the library sometimes, 28% frequently, 21% rarely, and 7% never (28).

Ahimmed S (29) stated the overall top sources of information for urban doctors were: books 128 (59.5%), general medical websites 31 (14.4%), personal contacts 29 (13.5%), experts' websites 12 (5.6%), journal articles 9 (4.2%), professional medical websites 6 (2.8%), audio visual materials 2 (0.9%), CD databases 2 (0.9%), online databases 1(0.5%), proceedings 1 (0.5%), and professional newsletters 1 (0.5%).

A study conducted at Obafemi Awolowo University hospital, Nigeria, showed that the preferences of HIRs among physicians were medical textbooks (85.8%); journal publications (79.5%); personal contact with colleagues (72.4%); Internet search/midline (66.9%); and seminars/conferences (58.9%). Only 18% of the respondents used source information from library resources (22). The information needs and priorities of doctors in the above hospital were reported as follows: of a total of 160 doctors, all (100%) need information on updating/ specialization, drug information (74.6%), routine patient care (65.3%), and government regulations & laws relating to health care (54.6%) (22). It has been noted that the ease of information retrieval, time, cost, quality of contents, availability and evidence of information were some factors affecting information seeking behavior of doctors in Nigeria hospitals (22).

As different studies and reports showed, health sectors of sub-Saharan African countries are still known habitats for various infectious diseases such as HIV/AIDS, Malaria, Tuberculosis and Diarrheal diseases due to: qualified human resource shortage, poor health workers motivation, lack of equipments and resources, shortage of supplies, poor access to HIRs and poor planning (14, 28).

According to Rajan S, et.al (29) in India, many clinicians used textbooks, drug indexes and less use of journals and internet for information seeking. Another study conducted in another district India also showed there is a direct relationship between information resources and work places. It also showed that awareness creation about information resources and how to use them among health professionals is necessary in the study area (30).

A study conducted in Iran among 140 nurses, 32 interns and 38 residents showed 78.4% study participants used human resources, 56.8% used printed sources and 37.4% used electronic sources for clinical decisions. Some of the reported barriers by this study for not using electronic resources among professionals were no need to additional data (interns and residents), time limitation, poor access to computer, lack of skills, lack of familiarity with HIS and using printed sources (31)

Based on Economic Commission (ECA) report, majority of health workers are working in Primary health care; which is the most challenging area in Africa since over 90% of the population lives in the rural and peri-urban areas and needs close attention (18, 31-33).

A multicenter survey (China, Egypt, Kenya, India, Thailand) of hospital doctors showed textbooks remain the most commonly used HIRs for hospital doctors, but journals and computer searching were less popular (34).

The editor of British Medical Journal (BMJ) noted that "if one is forced to work in the rural areas in developing countries without considering HIRs, this might result in: Being isolated professionally and physically, Starvation of up-to-date information, Medical ignorance in areas with high prevalence of diseases, loss of moral, poor performance, Unhealthy behavior and poor social interaction" (35).

A study conducted in Uganda (36) to assess the access and use of HIRs among health practitioners and planners revealed various types of information sources such as discussions with colleagues (89%), comments from doctors (85%), text books (77%) and internet and libraries (29%).

According to FMOH, WHO, CSA report, Government of Ethiopia has recently given emphasis on a project to network all regions, zones and woredas using a combination of fiber, microwave, wireless & satellite technologies, and the mobile network (20).

A study conducted in Addis Ababa public health centers (18) showed 146(94.6%) respondents seek information when a need arises. Only 71(46.7%) were computer literate. Regarding HIRs access, 102(66.2%) used protocol manual, 96(64.9%) used books, 78(52.7%) had in service trainings and only 26(17.6%) used electronic resources as HIRs to support their work. Majority of them (103(69.1%)) preferred on job trainings HIR, and 91(60.7%) preferred paper based reference.

There was a study conducted in Addis Ababa on physicians' on line information usage culture in 2009 by Etsub. Based on this study, 88% were using internet: to check e-mails (42%), to search for the News (20%), for entertainment reasons (18%) and for Browsing medical journals or clinical updates constituted 13%. Their major internet sources were Internet cafes (42%), in their working areas 34%, at home 23% and 1% at different places. Eighty percent of them used the internet 1-7 hrs per week and the rest used eight or more hours a week. Major barriers for not using internet were lack of computer access, lack of knowledge to use internet, lack of time, and slow internet connection (37). Thirty six percent used information for patient treatment, 33% for patient diagnosis, 20% to inform patient prognosis decisions and 11% for research purposes (37).

3.2. Factors affecting health information seeking behavior of health professionals

As it is stated by various studies, Health information seeking behavior of health professionals is affected by several factors such as age, ,economic related, cultural background, HIRs performance (sustainability, relevance, reliability, completeness and timeliness), poor information culture, organizational, poor motivation of staffs, educational status, political instability, policy related, computer access and literacy, working environment/location (prevalence of disease, time shortage,…) (14, 17, 20, 22- 24, 28,30,33).

A study from Saudi Arabia (23) showed some of the reported barriers that hinder accessing of HIRs to rural and urban PHC physicians were lack of library in the PHC centers, lack of training on the use of information, lack of inter-library loan services, lack of uniform data standards, lack of up-to-date medical books, lack of access to medical databases.

Andrew et.al (28) tried to assess major barriers which can hinder health information seeking behavior of health professionals and the responses were: lack of time (76%); the top three other common barriers were cost (33%), format of information sources (22%), and 25% of respondents were faced to information-seeking skills.

A study conducted by Anwar F, Shamim A highlighted six major barriers in the adoption of health information technology in under developed counties (17):

1. Barriers Related To Infrastructure: Poor or Inadequate Infrastructure, Provision of Computer Hardware and Software, Poor Internet Availability, Lack of Professional Human Resource Workforce nd Lack of Trainings to produce this Workforce, etc.
2. Cost and Time Barriers: they are basic hindering factors in developing countries where there is poor resource and time management.
3. National Policies towards HIT: Efficient, effective and secure national policy can address the local health needs according to the changing environment is needed. If national policies are weak in designing/adoption and implementation of HIS, it becomes bottle neck in information dissemination process for a given country.

4. Social and Cultural Barriers: These barriers include lack of stakeholder's interest, less motivation, anxiety to adapt and use new technology. One system becomes strong if customers become active, continual users and feedback providers.
5. Educational Barriers: Transformation of our existing paper based health system into computerized information system is not possible without providing the basic IT knowledge to health professionals.
6. Organizational Barriers: Organizations and people play a very critical role in implementing and transformation of an information system.

A study finding from Nigerian doctors showed about two-thirds (62%) of the respondents were encountered problems while searching internet. Of the respondents, 44% were faced slow Internet connection, 26% lack of information searching skills, 14% information overload and 16% faced high cost for internet (27). Major challenges of access to the internet in study from Addis Ababa were: lack of budget line, low initiatives particularly from the administrative bodies, Shortage of computers and adequate space were found to be serious problems in the studied institutions (18).

3.3. Conceptual frame work

There are several reasons why health workers need to access HIRs in their life (13-14). Broadly, factors can be grouped in to two: external and internal/self needs. They can access information from different sources for their use or to answer their needs (4, 9). During searching information, there may be several factors that will hinder their searching processes (22-24). Due to the presence of such hindering factors, they may not be satisfied with their searching processes and may remain under information needs. Due to the presence of such factors, innovation of new findings, environmental competitions, performance of existing HIS etc, the process become cyclic. Relevant, reliable and valid information will be used by health professionals for their needs and may also be shared to others. This process may have a great role on achieving their goals, updating themselves and becoming good competent in the given environment. The overall process is shown briefly by the following diagram.

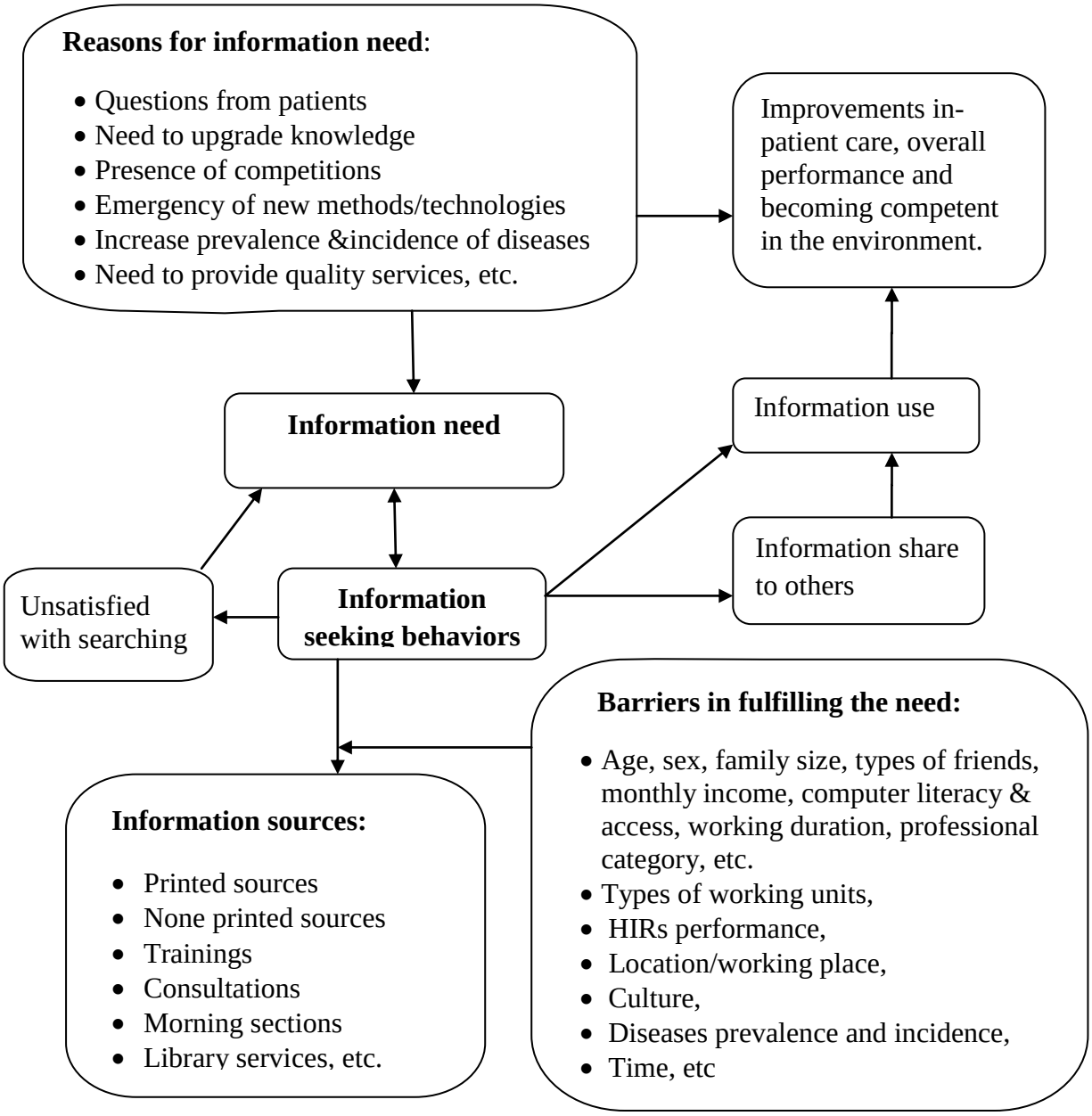

Figure I. Conceptual frame work showing the relationships among information needs, information seeking behaviors, reasons for need, and barriers affecting these processes.

4. OBJECTIVE OF THE STUDY

4.1. GENERAL OBJECTIVE

The purpose of this study is to assess information needs and seeking behaviors of health workers in the study area.

3.4. SPECIFIC OBJECTIVES

1. To assess information needs of health professionals in their daily activities in the study area.

2. To assess information seeking behaviors of health professionals and factors affecting the process in the study area.

3. To assess how health professionals solve problems related to information limitation and their attempts to make them available.

5. METHODOLOGY OF THE STUDY

5.1. STUDY AREA

Bahir Dar town is a capital city of Amhara Regional state and it is found in the North West Ethiopia, which is 565 Kms far away from Addis Ababa, a capital city of Ethiopia. The town has one governmental referral hospital, one private hospital, four health centers, more than 20 higher private clinics, 25 medium clinics, more than 15 diagnostic laboratories and 30 drug distributing pharmacies (38). Its climate is woina-dega and has many attractive tourism areas such as Lake Tana, Tis Abay/blue Nile falls, Lake Tana Island Ethiopian orthodox churches, and others. It also has attractive standardized hotels with swimming pools. Within the town, there are many health and other private and governmental colleagues in addition to Bahir Dar University. The town is distinctly known for its wide streets lined with palm trees and a variety of colorful flowers. There is no any research conducted before related to this topic in the study area.

STUDY DESIGN AND DURATION

A cross sectional study design using quantitative and qualitative approaches was used from Feburary26 to June 5/2012 to assess information needs and seeking behaviors of health professionals working at governmental hospital and health centers in Bahir Dar town. The reason for using the two methods together is to fill gaps shown on quantitative method and to increase the data quality & the research out comes. Self-administered questionnaire and observation checklist were used to collect the required data from participants.

5.2. SOURCE POPULATION

All health professionals working at one Governmental Hospital and four Health Centers during the study period in Bahir Dar town were considered as source population for this study.

5.3. STUDY POPULATION

All health professionals who fulfill the inclusion criterias were considered as study population for this study.

5.3.1. INCLUSION CRITERIA

- Health professionals who were currently working at the selected hospital and health centers at the time of data collection period (Feb 26 -March11).

5.3.2. EXCLUSION CRITERIA

Health professionals who were absent from work at the time of study period were excluded.

5.4. SAMPLE SIZE DETERMINATION

There are two research papers done only on family planning and hospital physicians in Addis Ababa in 2009. Because of on limited departments and professional category, it was difficult to take information need and seeking proportions of these studies as a base to calculate sample size to my research. There were also few studies outside Ethiopia; Nigeria, Uganda, Libya and also outside Africa. Due to the presence of socio-cultural, economical and over all setup differences to Ethiopia, an investigator also decided not to use information need and seeking proportions of those studies as a base to calculate sample size for this study.

Due to the above reasons, the investigator decided to take the proportion of information needs and seeking behavior among health professional as 50% to calculate sample size for this study. Then sample size of the study was determined using an equation with a single proportion by assuming the population is large enough as follows:

Z ά/2 (95% Confidence corresponding a significant level of p=0.05) = which have 1.96 value.

P (Proportion of HIRs need and seeking behavior) =50%

d (Margin of error tolerated or precision) = 5% (maximum tolerated error is ± 5%)

q (Proportion of no need and seeking behavior) =1-P, it is complimentary of p, and

Maximum none response rate and recording errors = 10%,

$$n = \frac{Z\,\dot{\alpha}/2\,pq}{d^2} = \frac{(1.96)^2 \times 0.5 \times (1-0.5)}{(0.05)^2} = 384,$$

Then "n" was the sum of 384 and 10% of 384 that is 384 + 38.4 = 422

Unfortunately, the actual population size of study areas was found to be 350. By using a correction formula for the given population, the sample size was 183 + 10% contingency, 183+18= 201. Doing decision based on small sample size with the presence of some procedural and other errors is not advisable. Therefore, to have better evidence for doing decision or generalization with relatively larger sample size, an investigator decided to include all and the sample size became **350**.

5.5. SAMPLING METHODS

All health professionals fulfilling the inclusion criteria were included in the study. In the study area, there are four governmental health centers and one referral hospital. Health professionals in the study areas who satisfied inclusion criterias were found to be **350;** 270 from Feleg Hiwot Referral hospital, 23 each from Bahir Dar health center and Han health center, 18 from Shimbit health center and 17 from Abay health center (**270 + 23 + 23 + 18 + 17 = 350**).

5.6. DATA COLLECTION TOOLS AND PROCEDURES

5.6.1. QUANTITATIVE METHODS

Pretested structured self-administered questionnaire was used to collect data from study participants. Questionnaires were collected from different papers: inside and outside Ethiopia to keep quality of data and also due to time shortage to conduct pretest (it is adopted from different papers). Quantitative method was comprised of; questions assessing socio-demographic characteristics, HI seeking behavior, HIRs access and questions assessing the needs [**Annex III**].

Training for data collectors (one BSc nurse and one BSc environmental health officer) and supervisor (one MSc) was given for one day before data collection date. Questionnaires were coded and distributed to the participants through data collectors with some advices/orientations and polite approaches. While distributing questionnaires, respondents were told how the questionnaires would be filled out and when it would be returned.

5.6.2. QUALITATIVE METHOD

The Purpose of using this method was to collect data which can fill gaps on quantitative methods. For the above reason, it was done after collecting data using quantitative methods. Overall HIRs access and information seeking behavior of health professionals in the study area were assessed by using this method. Observation checklist was used to collect the required data from study participants. It was designed by the investigator to collect supportive data based on objectives and research questions of the study. It is in a table format having 4 columns and 17 rows. All required data were recorded according to the prepared checklist (**annex IV**).

5.7. STUDY VARIABLES

5.7. 1. DEPENDENT VARIABLES:

- Information needs,
- Information seeking behavior of health workers in the study area.

5.7.2. INDEPENDENT VARIABLES

The following are study variables:

- Socio-demographic variables: (Age, Sex , Monthly income, Years of experience, Professional category, family size, types of friends, computer literacy, computer access,)
- Types of working units,
- HIRs performance,
- Location/working place,
- Culture (information use habit of customers, reading habit, attitude towards ICTs, etc)
- Diseases prevalence and incidence,
- Time availability, etc.

5.8. OPERATIONAL DEFINITIONS

1. **Health Information Resources:** are ways/means by which health professionals get any information that they need for their day to day activities (7).

2. **Health professionals:** all health personnel from different categories working at the selected health institutes.

3. **Information need**: is a recognition that the knowledge is inadequate to satisfy a goal (9).

4. **Information seeking behavior:** is a conscious effort to acquire information in response to a need or gap in someone's knowledge (10).

5. **Health Information Access:** access to HIRs for improving information based decision making in the health care practice;

   - Satisfactory access – a respondent who has access to at least to three or more HIRs.
   - Unsatisfactory access - a respondent who has access to two or less number of HIR (18).

6. **Health Information Resources performance**: The access, quality and sustainability of HIRs in the study area.

7. **Computer literate:** one who can work on basic office applications and browse the Internet (18).

5.9. DATA MANAGEMENT

The collected data were checked daily by supervisor and the investigator for its consistency and completeness. Data collected from each study subject were tallied, cleaned, organized, edited, and coded manually. There was a backup system such as storing data in different places and duplicating hard and soft copies of data to prevent data lose. There were too few (1.5%) missing data and were treated by recoding as follows: imputing zero as value for quantitative missed data and label as none response since it is non-significant number (39). Data entry template was prepared by an investigator for entering all data properly. Twenty percent of data was double entered by the investigator for cross checking consistency and completeness of data.

First, manually edited data were entered in to computer through Epi Info version 3.5.1 and clearing, editing, organizing, and checking missing values & consistency of data was made. Then the edited data was exported from Epi Info version3.5.1 to SPSS statistics version 19 software data base package for further cleaning, checking missing values and analysis.

Qualitative data which were gathered using prepared checklist were edited, completed, abbreviations and phrases were converted in to complete and meaningful sentences.

5.10. DATA ANALYSIS

Imported Data were further cleaned and recoded using SPSS version 19. Then the edited data were analyzed and interpreted using the following parameters: frequencies, cross tabulation, chi-square test, Odds Ratio (OR) and Binary logistic regression. Significant association among study variables and interpretation of data was done using 95% confidence interval and at p-value <0.05. Content analysis or narration was used to analyze qualitative data according to the objective of the study. Study findings of this study were represented using words or explanations, tables and bar graphs as necessary.

5.11. DATA QUALITY ASSURANCE

All steps in data collection method were followed carefully. Pretested questionnaire was used to collect data from study participants. Data collecting material was checked for free of spelling errors and its completeness and coded before actual data collecting date.

Two data collectors and one supervisor were trained for one day before participating in the process. Awareness creation among respondents about the purpose of study, their rights, confidentiality, nothing to harm them, etc was done by an investigator and data collectors before and during data collection date. Adequate time (up to two days) was given to respondents for reading and filling materials carefully. Continuous /daily supervision was done up to the end of data collection date to be ready and take measures if problem arises. Data were cleaned, edited and checked for its consistency, Completeness, free of out- layers and missing values during data collection, before and during analysis by supervisor and investigator.

5.12. ETHICAL CONSIDERATION

Ethical clearance is needed for the following points: to be accountable/legal for the collected data, to assured respondents for the confidentiality of data, to be accountable for sensitive issues related to security, reliability, etc, and any benefits from the study. It is also one formal way or means to conduct data for such and other concerns.

Ethical clearance for this study was obtained from Addis Ababa University Medical Faculty Review Committee before starting the actual work. Letter of support was obtained from Amhara Regional Health Bureau and concerned Bahir Dar town Woreda/Zone Health Bureaus. Informed verbal consent from heads of each study facilities was taken after conducting clear explanation about the purpose, duration, required samples, and data collection methods of the study to them. The study subjects were assured for the confidentiality of their responses, nothing to harm them, are beneficial from the study, no any secret idea behind it, are secured from anything regarding to the study, and no any special payment due to participating. They were given full privacies in the process and full rights no to be forced to participate in the study if they were not interested. They were participating in the study voluntarily; even they were able to stop in the middle of the day after they start participating.

5.13. DISSEMINATION OF RESULTS

Study findings will be submitted to Addis Ababa University, School of Public Health and Information Science for partial fulfillment of masters of Science in health informatics. It will also be sent to Amhara Regional Health Bureau, concerned Bahir Dar Zone health bureaus, and to each participated health care providing facilities to create awareness, to show the gaps and take possible actions. All attempts will be made for presenting it on large conferences as well as to be published and easily accessed by users.

6. RESULTS

6.1. QUANTITATIVE RESULTS

Three hundred fifty self-administered questionnaires were distributed across five governmental health care providing facilities (one referral hospital and four health centers) in Bahir Dar town, a capital city of Amhara Regional state, Ethiopia. Of those questionnaires, 339 were completed, returned back and analyzed with a response rate of 96.9%. The rest 11(3.1%) were non responses for the mentioned reasons of lack of time on the respondents side, unavailability after receiving the questionnaire for long time and lack of interest after taking the questionnaire. Up to 5% none response rates were planned to be tolerated by this study, so 3.1% is acceptable.

6.1.1. Socio-demographic characteristics of the study subjects

Three hundred thirty nine health professionals in different categories from one governmental referral hospital and four health centers in Bahir Dar town participated in the study. Of those respondents, 222(65.5%) were females. The mean (SD) age of participants was 31±5 standard deviations with minimum 21 and maximum 50 years. Majority of the respondents were within the age group of 26-30; 153(45.1%) followed by 31-35; 96(28.3%). Of all participants, 258 (76.1%) were from "Felege Hiot Referral Hospital" and the rest 81(23.9%) that is 23, 23, 18 and 17 were from Bahir Dar town health center, Han health center, Shimbit health center and Abay health center respectively. Among study participants, 151(44.5%) were nurses, 38(11.2%) were laboratory personnel, 34(10.0%) pharmacy personnel, 27(8.0%) mid wives, 21(6.2%) General Practitioner, 18(5.0%) Health officer and 50(14.7%) other categories which are ex-ray, dentists, ophthalmic, anesthesia, physiotherapists, environmental health officers, & assistants. The reason for having other category is due to small in number for each department as compared to others mentioned in the above. Minimum qualification of participants was diploma and maximum was specialist/second degree, but for this study an investigator excluded specialists purposively, because they are mainly staffs of Bahir Dar town and Gondar Universities.

One hundred forty six (43.1%) of the respondents had a monthly income within the range of 1001-1500 followed by 64(18.9%) under the range of 2001-2500 and 45(13.3%) within the

range of 1501-2000 Ethiopian birr. Only 43 (12.7%) earned more than 3000 birr as monthly income. More than half, 185 (54.6%), of the respondents had a working experience of <6 years. Majority 258 (76.2%) had family member ≤ 4 (**Table 1**).

Table1: Socio demographic characteristics of health workers working at governmental hospital and health centers in Bahir Dar town, Amhara Region, Ethiopia, 2012 (**n= 339**).

Characteristics/variables		**Number**	**percent (%)**
Age:	21-25 years	32	9.5
	26-30 years	153	45.1
	31-35 years	96	28.3
	36-40 years	37	10.9
	41-45 ears	19	5.6
	>46+	2	0.6
Sex :	Male	117	34.5
	Female	222	65.5
Health professionals:			
	General Practitioner	21	6.2
	Health Officer	18	5.3
	Medical lab. personnel	38	11.2
	Nurse	151	44.5
	Pharmacy personnel	34	10.0
	Mid wives	27	8.0
	Others	50	14.7
Rear of experience :	≤ 6 years	185	54.6
	> 6 years	154	45.4
Monthly income:	500-1000	4	1.2
	1001-1500	146	43.1
	1501-2000	45	13.3
	2001-2500	64	18.9
	2501-3000	37	10.9
	>3000	43	12.7
Family size :	≤ 4 members	258	76.1
	>4 members	81	23.9

Of the respondents, only 113 (33.3%) were computer literate, but not the rest 226(66.7%) for various reasons; 135(59.7%) no access to computer system, 51(22.6%) didn't have time to learn, 38(16.8%) both time shortage and no access to computer system and only 2 (0.9%) were not interested to learn it (Table 2).

Among the total study participants, nearly one-third (36.6%) had access to computer at different areas; 26 (7.7%) at working area, 8 (2.4%) at home and 15 (4.4%) at both work area and home. Those who had access to computer were using their computers for several purposes such as 80 (64.5%) were using it for reading, keeping files and using internet, and 29 (23.5%) for report writing, reading, keeping files and using internet (Table2).

From all study participants, only 101(29.8%) have additional work in addition to their regular job. Those who had no other means of income, 238 (70.2%), spent their time in various ways: 85 (25.1%) of them spent their time through reading, 65 (19.2%) with their boy/girlfriend, 42 (12.1%) by visiting their socials, 16 (4.7%) at church and the same figure 15 (4.4%) respondents replied that they spent their extra time with recreational areas and other purposes respectively (Table2).

Table2: Computer access and literacy among health professionals working at governmental hospital and health centers in Bahir Dar town, Amhara Region, Ethiopia, 2012.

Variable		Number	percent (%)
Computer access (n= 339)?			
yes	At home	34	10.0
	At office	62	18.3
	At both	28	8.3
No / don't have/		215	63.4
Computer use (n=124)			
Report writing		1	0.8
Reading		5	4.0
Keeping files		4	3.2
Using internet		5	4.0
2, 3, and 4		80	64.5
All		29	23.5
Computer literacy (n=339)?			
Yes		113	33.3
No		226	66.7
Reasons for computer illiteracy (n= 226)			
Don't have time to learn it		51	22.6
Had no access to computer system		135	59.7
I am not interested		2	0.9
1 and 2		38	16.8
Other means of income (n=339):			
Yes		101	29.8
No		238	70.2
Time spent after regular work (n= 238)			
With my boy/girlfriend		65	27.3
Visiting my socials		42	17.7
Through reading		85	35.7
Church		16	6.7
Recreational areas		15	6.3
Others		15	6.3

6.1.2. Information needs of health professionals

Three hundred thirty (97.3%) respondents need information to support their daily activities (Table3). Almost all 335 (98.8%) study participants prefer to use formal HIRs than informal ones (Table 3).

Major reported reasons for seeking HI were both self-needs and question from patients190 (56%), only self-needs 87 (25.7%) followed by 21 (6.2%) only questions from patients and 5(1.4%) was environmental competitions. Only 145(42.8%) respondents had access to internet/ searching on Google engine/ at different places with various frequencies (Table 3).

There were nine (2 male & 7 female) respondents (2.7%) who did not need additional information to support their work. The most frequently mentioned reasons among these participants for not seeking HI were unavailability of information source (4 female respondents), because there is no difficult cases (3 respondents), I don't have interest in my work (1 respondent), followed by one respondent who felt to have adequate knowledge to support his work (not tabulated).

Table3. Health Information needs and access among health workers at governmental health facilities in Bahir Dar town, Amhara Regional State, Ethiopia, 2012**(n=339).**

Variables	Number	(%)
Health information needs		
Yes	330	97.3
No	9	2.7
Reasons for health information needs		
My own needs	87	25.7
Questions from patients	21	6.2
Competitions from environment	5	1.4
Emergency of new cases	6	1.7
1, 2 and 4	31	9.1
1, and 2	190	56.0
HIRs accessed (n=339)		
Formal **(**books, internet, trainings, etc**)**	315	92.9
Informal HIRs (key informants, colleagues, etc)	24	7.1
Information source preference(n=339)		
Formal HIRs (books, internet, trainings, etc)	335	98.8
Informal HIRs (key informants, colleagues, etc)	4	1.2
Access to internet (n=339)		
Yes	145	42.8
No	194	57.2

6.1.3. HEALTH INFORMATION RESOURCES ACCESS AND SEEKING BEHAVIOR

As can be seen in the figure below, 115(39.3%) respondents accessed books, library, protocol manual and in-service training together to get HI; 84(24.8%) used books; 45(13.3%) had access to protocol manual, 21(6.2%) who were accessing books, protocol manuals & in-service trainings followed by 15(4.4%) who used their senior staffs as information source (Figure1).

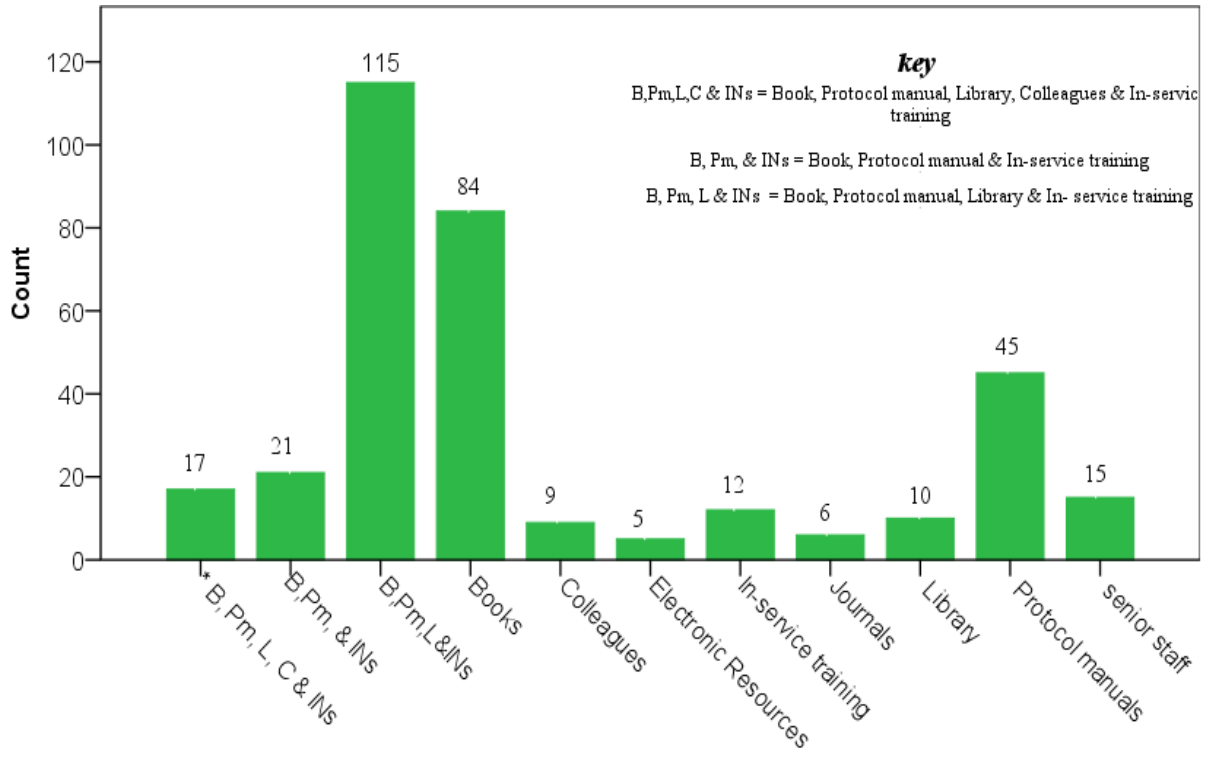

Figure 1: Information resources accessed by health professionals working at governmental hospital and health centers in Bahir Dar town, Amhara Region, Ethiopia, 2012.

Based on information obtained from participants, they were accessing internet from the following areas: 36(24.8%) at home, internet café & at work area; 30(20.7%) at home & work area; 25 (17.2%) at internet café, 21(14.5%) at home, followed by 16 (11.0%) at working area and 15 (10.3%) at internet café and work area (Figure 2). The most frequently used internet site by those who had access to internet (42.8%) in the study areas was Google enjoin/search.

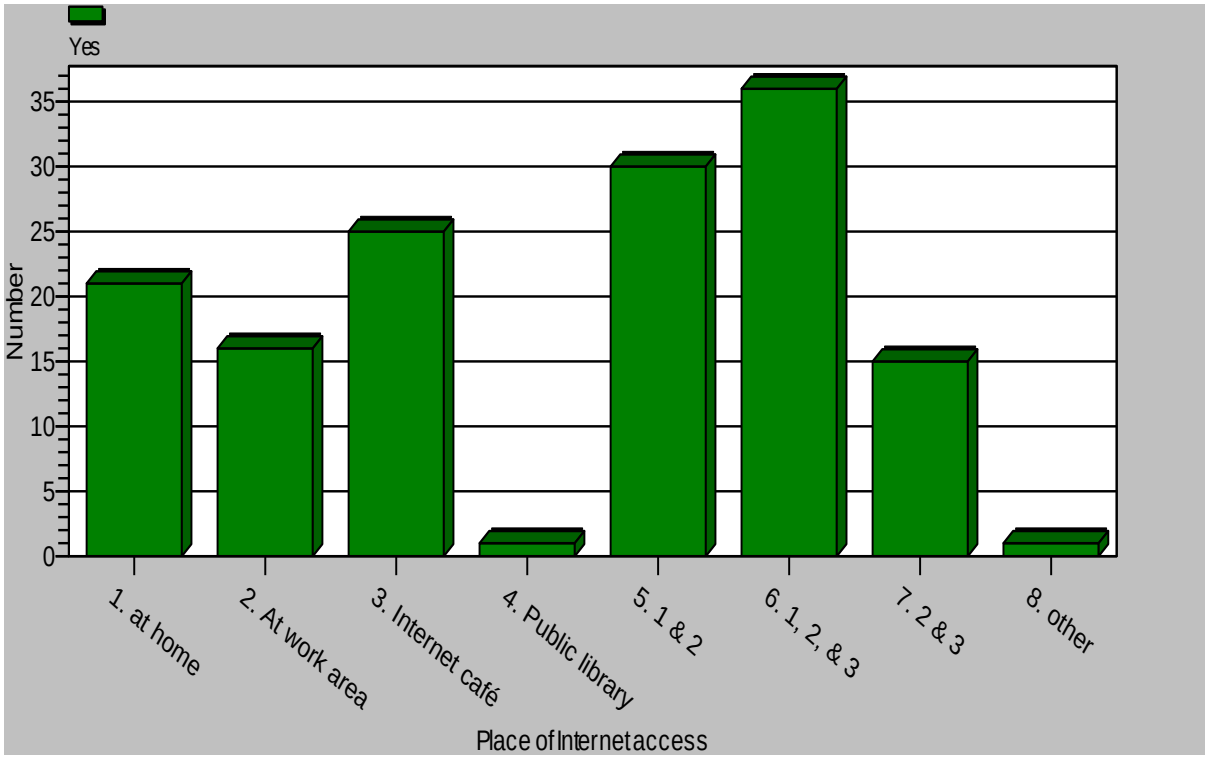

Figure 2: Over all internet access among health professionals working at governmental hospital and health centers in Bahir Dar town, Amhara Region, Ethiopia, 2012.

According to this study, the most frequent reasons for using internet among participants were for e-mail, drug information and patient care information collectively 60 (41.4%); for e-mail, research, drug information and patient care information 37 (25.5%); for only e-mail purpose 30 (20.7%,) and for other purposes10.4%. There were only3 (2.0%) participants who used internet for research and business activities (not tabulated).

One hundred twelve (57.7%) respondents accessed information by consulting their books, protocol manuals, handouts, senior staffs, etc; 65(35.5%) used library, books, protocol manuals, senior staffs, etc;13(6.7%%) used only library. The least HI seeking behaviors were borrowing (1.5%) and down loading 1(0.01%) from other places while travelling for other purposes (Figure 3).

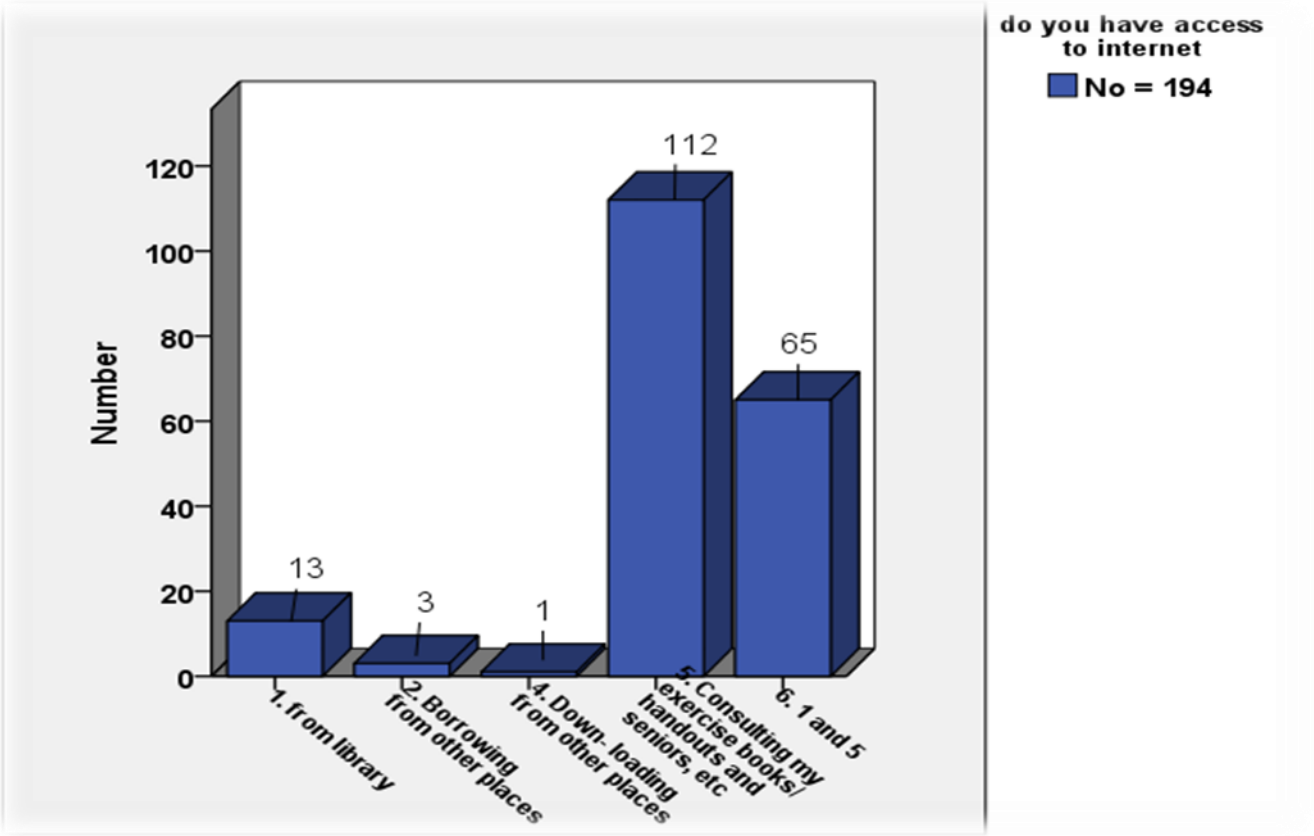

Figure 3: Health Information seeking behaviors of health professionals working at governmental hospital and health centers in Bahir Dar town, Ethiopia, 2012(n=194).

Regarding library access, only professionals from referral hospital (74.3%) reported as they have mini-library within their working environment. Based on information contained in table 6, 120 (35.4%) reported as partially satisfied, 86 (25.4%) were least satisfied, and 25 (7.4%) had no access to it. Only 7 (5.0%) respondents said that they are fully satisfied with the service provided by that mini library (Table 4).

They were also asked about the efforts they made to have library and to improve the quality of their library and the responses were: 193 (56.9%) respondents reported to have done nothing regarding the issue, 63 (18.6%) discussed with their staffs, 41 (12.1%) discuss with their manager and 34 (10.0%) did the first and the second together (Table 4).

Of the total participants, only 31 (9.1%) reported that their organization subscribed HIRs such as books, journals, etc. Concerning being up to dateness and usefulness of those available resources, 17 (54.8%) participants said that their sources are partially useful, 6 (19.4%) as least useful and only three participants reported as fully useful (Table 4).

Regarding HIRs available at participants' home, 276 (81.1%) of them said they have HIRs in varying ranges at their home. Of those owned HIRs, 214 (77.8%) reported that HIRs at their home were up to date and relevant for using when a need arises. One hundred seventy three (63.0%) respondents reported as they are using those sources when there is a need followed by 55 (20.0%) who use daily and 47 (17.0%) that utilize their resources 1-2 days per week (Table4).

Table4: Availability of library services and satisfaction among health professionals working at governmental hospital and health centers in Bahir Dar town, Ethiopia, 2012.

Variable	Number	Percent (%)
Library service at working area?(n=339)		
Yes	252	74.3
No	87	25.7
Satisfaction with library services (n=339)		
Fully	17	5.0
Partially	120	35.4
least satisfied	86	25.4
No access to it	25	7.4
No comment	4	1.2
Attempts to access library service at working area (n=339)		
Nothing done	193	56.9
Comments to manager	41	12.1
Discussing with my staffs	63	18.6
1 and 2	34	10.0
Other	8	2.4
Accessibility of books, journals, etc at working area (n=339)		
Yes	31	9.1
No	308	90.9
Updated and usefulness of above HIRs (n=31)		
Useful	3	9.7
Partially useful	17	54.8
Least useful	6	19.4
I don't refer them	5	16.1
Books, journals, etc at participants' home (n=339)		
Yes	275	81.1
No	64	18.9
Usefulness of HIRs which are at home (n=275)		
Yes	214	77.8
No	61	22.2
Frequency of HIRs use which are at home (n= 275)		
Daily	55	20.0
When there is a need	173	63.0
One-two days/week	47	17.0

One hundred eighty three (54.0%) study participants responded that they encountered to problems on their work due to the presence of information gaps. They were using different mechanisms to solve encountered problems: out of 183 participants, who had faced problem on their work, nearly equal number of participants, 58 (31.7%) and 57 (31.1%) conducting discussion among their staffs and consulting their senior staffs respectively (Table 5).

Two hundred eleven (62.2%) respondents reported as they had access to in service trainings in the past. Almost all (96.0%) of respondents were in need of further training in various areas (Table 5).

Concerning number of patients visited per day, 209 (61.7%) respondents said that they visited more than 30 patients per day and the rest 130 (38.3%) reported as they visited ≤ 30 patients per day. In range, it was 8-220, and on average 31. Concerning the time required for giving services, majority (97.3%) took ≤ 30 minutes per patient followed by 2.7% respondents who consumed >30 minutes per patient (Table5) with Minimum 3 and Maximum of 60 minutes and average 17 minutes per individual. Among study participants, 133 (39.2%) reported that they were encountered new cases every day. Of these participants, 110 (82.7%) replied that they encountered <5 new cases every week followed by 22 (16.5%) who faced 5-10 new cases per week (Table5). In general, respondents encountered new cases within the range of 1-10 and on average 4 new cases per week.

Table 5: Average Number of patients seen, encountered new cases, and training access by health professionals working at governmental hospital and health centers in Bahir Dar town, 2012.

Variable	Number	Percent (%)
Problems encountered due to information limitation (n= 339)?		
Yes	183	54.0
No	156	46.0
Solving mechanisms to problem (n=183)?		
1. Consulting	57	31.1
2. Discussion with staffs	58	31.7
3. Referring patients	6	3.3
4. 1 and 2	34	18.6
5. 2 and 3	1	0.6
6. 2, 3 and 4	22	12.0
7. All	5	2.7
Something learnt from the encountered problems (n= 183)?		
1. Importance of updated information	21	11.5
2. Importance of pre readiness	4	2.2
3. Importance of communication	6	3.3
4. Importance of being well informed	3	1.6
5. All	143	78.0
6. Others	6	3.4
In service training access (n=339)?		
Yes	211	62.2
No	128	37.8
Further in service training needs (n=339)		
Yes	325	96.0
No	14	4.0
Patient number visited per day (n=339)?		
≤ 30 patients	130	38.3
>30 patients	209	61.7
Presence of new cases (n=339)?		
Yes	133	39.2
No	206	60.8
Number of new cases per day (n=133)?		
<5	110	82.7
5-10	22	16.5
>10	1	0.8

Association between internet access and majority of other independent variables was observed (Table 6). In the crude analysis, respondents with age group < 30 years of age have higher likely hood of accessing internet than to those workers who have age ≥30 years, OR=3.7, 95% CI [1.81, 7.63].

Access to internet was higher among health professionals with work experience ≤ 6 years compared to those with work experience of >6 years, OR =3, 95% [1.91, 4.86] and Internet access was also higher for those who were computer literate and those who have computer access than to those who were illiterate and do not have computer, OR=3.93, 95% CI (2.26, 6.82), and OR =4.2, 95% CI (2.63, 6.71), respectively.

Similarly, male were found to have higher internet access than females, OR = 2, 95% CI (1.3, 3.14). In addition, hospital site and those who visited ≤ 30 patients per day showed slightly higher access than those who are at health centers, and those who visited >30 patients per day, OR = 2.64, 95% CI (1.5, 4.8) and OR= 2, 95%CI (1.3, 3.3) respectively. To the reverse, those who have monthly income of < 2000 birr have less internet access than those who have monthly income ≥2000 birr (OR=0.38, 95% CI (0.22, 0.68)). However educational category, working unit, and family size found not to be statistically significant/ associated with access to internet by correlation, binary logistic regression, and cross tabulation or 2x2 table (**Table 6**).

Table 6: Association of internet access with independent variables among health professionals working at governmental hospitals and health centers in Bahir Dar town, Ethiopia, 2012.

Variables		Internet access		COR(95%CI)	AOR(95% CI)
		Yes (%)	No (%)		
Age:	<30 years	100 (29.5%)	85 (25.1%)	**3.7[1.81, 7.63]***	**2.63[1.4, 5.1]**
	≥30years	14 (4.1%)	44 (13.0%)	1.0	1.0
Sex:					
Male		63 (18.6%)	54 (15.9%)	**2[1.3, 3.14] ***	**1.91[1.1, 3.4]**
Female		82 (24.2%)	140 (41.3%)	1.0	1.0
Educational category:					
MD		20(5.9%)	1(0.3%)	31[4.1, 233]	4.43[0.51, 38.5]
Others		125(36.9%)	193(56.9%)	1.0	1.0
Working unit:					
OPD & inpatient		32 (9.4%)	33 (9.7%)	1.38[0.80, 2.4]	1.31[0.64, 2.66]
Others		113 (33.3%)	161 (47.5%)	1.0	1.0
Monthly income:					
<2000		58 (17.1%)	137(40.4%)	**0.3[0.18, 0.44]**	**0.38[0.22, 0.68]***
≥2000		87 (25.7%)	57 (16.8%)	1.0	1.0
Working experience:					
≤6 years		101 (29.8%)	84 (24.8%)	**3[1.9, 4.86]***	**2.0 [1.1, 3.87]**
>6 years		44 (13.0%)	110 (32.4%)	1.0	1.0
Family size:	< 4	117(34.5%)	141(41.6%)	1.6[0.91, 2.73]	0.77[0.39, 1.5]
	≥ 4	28(8.3%)	53(15.6%)	1.0	1.0
Computer access:					
Yes		80 (23.6%)	44 (13.0%)	**4.2[2.6, 6.9] ***	**2.42[1.35, 4.35]**
No		65 (19.2%)	150 (44.2%)	1.0	1.0
Patient number per day					
≤ 30		88 (26.0%)	42(24.4%)	**2[1.3, 3.30]**	**1.8[1.03, 3.10]**
>30		106 (31.3%)	103 (30.4%)	1.0	1.0
Computer literacy:					
Yes		72 (21.2%)	41 (12.1%)	**3.7[2.23, 6.1]**	**3.93[2.26, 6.82]***
No		73 (21.5%)	153 (45.1%)	1.0	1.0
Facility:					
Hospital		124 (36.6%)	134 (39.5%)	**2.64[1.5, 4.8] ***	**2.59[1.33,5. 0]**
Health centers		21 (6.2%)	60 (17.7%)	1.0	1.0

*** Significant at p<0.05.**

6.1.4. FACTORS AFFECTING HEALTH INFORMATION SEEKING BEHAVIOR

The most frequently mentioned factors that can hinder accessing HIRs among health professionals were listed as follows based on their priority as reported by the study participants:

1. Geographical, organizational, economic related, educational status, poor personal initiation, time shortage, low prevalence of diseases and new cases which was reported by 103 (30.4%) study participants.
2. Cultural, economical, Family size, reported by 65 (19.2%) study participants.
3. Organizational, economic related, educational status, time shortage that was replied by 58(17.1%) respondents.
4. Economic related time shortage by 41 (12.1%) participants.
5. Organizational, economic related, governmental related by 36 (10.6%) respondents.
6. Time shortage, by 25 (7.4%) respondents and,
7. Organizational which was reported by 11 (3.2%) participants **(Table 7).**

Thirty percent of participants reported that the most predominant factors which can affect health information seeking behavior of health professionals in the study area are Geographical, organizational, economic related, educational status, poor personal initiation, time shortage and low prevalence of diseases and new cases followed by sixty five (19.2%) respondents who ranked major factors as cultural, economic related, family size and fifty eight (17.1%) study participants who replied that organizational, economic related, educational status, and time shortage are major factors that can hinder accessing of HIRs for health professionals in the study area (Table 7).

Table 7: Factors affecting health information seeking behavior of health workers working at governmental hospital and health centers in Bahir Dar town, Ethiopia, 2012.

Factors that can affect accessing of HIRs to you?	Number (%)	95% CI
1. Geographical, organizational, economic related, educational status, poor personal initiation, time shortage, low prevalence of diseases and new cases	103 (30.4%)	25.6%-35.6%
2. Cultural , economical, Family size	65 (19.2%)	15.2%-23.9%
3. Organizational, economic related , educational status, time shortage	58 (17.1%)	13.3%-21.6%
4. Economic related, time shortage	41 (12.1%)	8.9%-16.2%
5. Organizational, economic related, governmental related	36 (10.6%)	7.6%-14.5%
6. Time shortage	25 (7.4%)	4.9%-10.8%
7. Organizational	11 (3.2%)	1.7%-5.9%

6.2. QUALITATIVE ANALYSIS RESULTS

In this part direct observation method was used to gather data to strength data collected using questionnaire and also to see the variation between the reality and participants' answer. It was done among five governmental health care providing facilities (one referral hospital and four health centers) in Bahir Dar town, Amhara Region. By this method, an investigator tried to collect data related to overall situation of HIRs; libraries, books, training, journals, any case definitions, any used standards, group /colleagues' discussion, information users, patient interaction with professionals/questioning &answering, consultation habit, etc.

It was done after collecting data using questionnaire method. The reason why it was done next to questionnaire method was just to fill the gaps seen on the former method and to cross check the closeness or variations between reality and given answers. To do this, data collector used tested and revised observation checklist and all required data were recorded according to the prepared checklist (**annex IV**).

6.2.1. Accessibility of health information resources in the study areas

Inside the hospital, there was a mini library which is approximately 4x4 meter area and overcrowded by its contents. Within that library, too old and improperly handled books, few copies of some books and too few old journals, and eight (six functional and two nonfunctional) desk top computers with wireless internet connection were observed.

Manuals and standard guide lines were present in few wards and few health professionals were observed while using standard guide lines, especially national treatment guide lines. More manuals and procedure guide lines were seen in ART laboratory room. This is also true for VCT, ART, and TB-HIV clinics. Outside each OPDs, some banners and case definitions for few cases such as measles, polio, acute diarrhea, TB, STIs, malaria, etc were posted, but none inside many OPDs. In this hospital, there is no separated computer room but few desk tops were observed in mini library, Laboratory, pharmacy, ART clinic, TB clinic, and VCT rooms. Within the hospital, there was morning sessions or cases presentation program once a week, consulting of specialists and senior staffs in few OPDs, five-four personal computers and few soft copy materials among GPs , but no peer/colleagues discussion observed in the study areas.

On the other hand, there was no library, internet service, journals, books, computer and computer rooms, research papers, soft copy materials, peer /group discussion, in side/off side training during observation period in all health centers. At each health center; few handouts, training manuals, and few standard guide lines were observed among few health professionals, especially those who are on education to update them-selves. There was consultation practice and one Ethiopian TV service almost in all health centers and one morning session only at Abay health center during data collection period.

6.2.2. Utilization of available information resources

As it was observed, majority of health professionals in all health facilities were not using HIRs frequently. Only few, those who are students were observed while using their handouts rarely in all facilities. In all study areas including hospital, health professionals spend their extra time simply by talking in groups and moving around.

In hospital, three-four health professionals were observed while using internet and books in the library. Two-third of them were using internet for e-mail and chatting purpose. Too few were coming to their working area with their own handouts to read for their classes and for doing assignments. Most health professionals have mobile with internet and were using it for e-mail chatting purposes. In all areas, there is nothing observed on peer group discussion/peer learning practices among health professionals.

Personal initiations for accessing HIRs in the study area were poor. Books in side mini library were old as well as small in number and with unfair distribution /one or two department concern/, so that users were unable to read them by taking them to their home as they need. Internet connection was too slow to down load large sized HIRs as well as it was used by health professionals within a specified time limit that is 30 minutes per individual per computer.

Most frequently used HIR in all study areas while facing to problems was consulting senior staffs followed by a national standard treatment guide line. When we see the overall access of HIRs in the study areas, it is too much below the expected level in all sites.

7. DISCUSSION

Findings of this study showed that almost all study participants (97.3%) reported as they seek information when a need arises. This finding is consistent with related study conducted in Addis Ababa (18); in which overall information needs was 94.8%. Almost all studies conducted regarding health information needs and seeking behaviors showed that near all health professionals need to have access to HIRs in varying degrees for delivering quality and adequate health care services to their clients (11, 18, 22, 23, 28).

However, there is poor personal initiation, poor HI seeking and utilization practice from health professionals as results from our observation and questionnaire method showed. More than half of the respondents 193 (56.9%) were doing nothing to have library service at their working areas. It is supported by related study conducted in one of the district in India (30) which recommended that awareness creation about HIRs, how to access and use them among health professionals is necessary. Unavailability of HIRs was mentioned to be the most important reasons for the observed poor HI seeking behaviour among health professionals in this study, which is in line with study findings from Addis Ababa (18, 36).

Protocol manuals, books and in-service trainings all together were reported to be the most frequently 115(39.3%) used HI sources followed by books 84(24.8%), whereas electronic sources were the least used sources 5(1.5%) in this study. This finding was almost similar with a related study done in Addis Ababa except first choice, which was protocol manual in case of Addis Ababa (18). This result is found to be different from another study conducted in Nigeria (22) where the frequently used HIRs were medical textbooks, journals, discussion with colleagues and internet searching. It is also different from study findings from Uganda where frequently accessed HIRs were discussions with colleagues (89%), textbooks (77%) and (29%) both internet and libraries (11, 31, 36).

In our study, discussion with Colleagues was poorly practiced, 9(2.7%), in contrast to the above study in Uganda and other similar studies for un known reason, but might be due to poor reading culture (pre readiness for discussion), giving less attention for it, lack of openness

among groups/staffs, fear of criticism, giving priorities for other talks/issues than profession concerns, and others.

Similarly using electronic resources, research/report papers and journals as HI sources among health professionals in the study areas was too poor and it is similar with findings from China, Egypt, Kenya, India, and Thailand hospital doctors which clearly showed that textbooks were most commonly used source of information, but journals and computer searching were uncommon (33). However, the above result is different from study finding in Addis Ababa (37), where major preferred areas among GPs were 29% printed journals and 22% electronic resources, CD-ROMS, etc (37).

In the current study, the reason to be poor in using the above HIRs are due to the absence of library access, poor initiations from health professionals, no research activities among staffs (100%), no feedback or copies of research papers from different investigators who conduct researches within these organizations (100%), no computer and internet access at all health centers (80%) and others. These reasons were similar with a study conducted in Addis Ababa (18) where there was budget scarcity, time shortage, computer and place/room shortage. These are also slightly supported by a research conducted in Iran (31); identified barriers for not using electronic resources among professionals were time limitation, poor access to computer, lack of skills/lack of familiarity with HIS.

Now a days, the most important components of ICTs; E-mail, mobile phones and Internet are playing immeasurable role in effective information dissemination among health professionals located in different parts of the world within fraction of seconds with minimum cost (4-5, 14-15). Results of this study indicated that only 113 (33.3%) are computer literate. This finding is much lower as compared with a study finding among physicians in Ibadan, Nigeria (27) where 93% of them were computer literate. It is also slightly lower as compared with the study conducted in Addis Ababa hospitals and health centers (18, 37) where 46.7% of respondents were computer literate.

The most frequent reasons for being computer illiterate of 226 (66.7%) respondents were: no access to computer system 136 (60.2%) and no time to learn 51(22.6%). These figures are greatly larger than study findings from Nigeria (27) where there were only 7% computer

illiterates with similar reasons as our study. It is also quite different from study finding in Addis Ababa (18), where computer illiteracy rate was 53.3% with the same reasons.

Internet is the most cost effective, user-friendly, fastest and richest communicating medium throughout the world (3, 4). In this study, only 145 (42.8 %%) study participants had internet access at one or more areas; only 21 (14.5%) at home and 16 (11.0%) at working areas. The above finding is lower by half from study findings in UK (26) among 27 nurses; where 7(26%) had access at home and 6(22%) at work places. It is also lower than study findings from Addis Ababa (37) where major internet sources were (42%) internet cafe, 34% at working areas and 23 % at home.

Based on evidence from observation and respondents' answer, low access to internet in this study was mainly due to the absence of internet services in all health centers and poor in the hospital; absence of computer in each study sites; low computer literacy rate; poor personal initiation and high cost for internet among health professionals. Most of these reasons were supported by study findings from hospitals and health centers in Addis Ababa (18, 37)

Regarding information seeking behavior of respondents in the study area, 145 (42.8%) were using internet for searching HI and 112 (57.7%) were accessing information by consulting their books, protocol manuals, handouts, senior staffs, etc. followed by 65(35.5%) who used library, books, protocol manuals, and senior staffs. This finding is supported by different studies which indicated that most of them had a habit of using printed resources as a first choice than others (11,18,22, 23 , 28,).

Even though 74.3% of respondents had access to mini- library, only 17 (5.0%) were fully satisfied. This finding clearly showed that almost there is no library service in the study areas. The above study findings are different from Andrew, et.al (28), where more than 57% of health workers had access to library from two or more types of medical libraries; and 29% had access to just one library.

This study also tried to assess factors affecting HIRs among health care providing institutions in the study area. Top major identified hindering factors 103 (30.3%), 95% CI [25.6%-35.6%] were: Geographical, organizational, economic related, educational status, poor personal initiation, time shortage, low prevalence of diseases and new cases (Table 7).

This is in line with a study conducted by Anwar F. & Shamim A (17). on assessing hindering factors of HIT in under developed countries, where major identified barriers were barriers related to infrastructure, cost and time barriers, national policies towards HIT, social and cultural barriers, educational barriers, and organizational barriers (17-18, 23, 25, 34).

It was found that more than half; 183 (54%) respondents encountered problems while working due to information limitation in the study areas. This large figure showed that there are larger information gaps among health professionals and needs great attention in the future. It is supported by different studies done in related topics among health care facilities in developing countries and reports from WHO (2, 5, 15, 18, 21-22).

Most health professionals were using informal HIRs to solve problems that they faced such as 58 (31.7%) respondents used discussion among staffs and 57 (3.1%) were consulting specialists and seniors. Counseling is the most frequently used HIR in developing countries where there is poor formal information access among health care service providing facilities due to several reasons such as poor infrastructures, poor personal initiations, economic related, policy related, etc. This was supported by a study from Uganda, Addis Ababa, Iran and others (18, 31, 36).

Majority of health professionals in the study areas got their training based on concern and through discussion. This is a good trend seen from that area and be practiced in other areas. This result is different from training trends of health centers in Addis Ababa where the process is unfair and raised complains from competitors.

8. STRENGTHS AND LIMITATIONS OF THE STUDY

8.1. STRENGTHS OF THE STUDY

Study strengthens can increase the trustworthiness of findings of any research activities. This can be achieved by following appropriate methodological approaches and reviewing necessary literatures. This study considered and applied all necessary activities to minimize errors that can compromise study findings. Some of the strengths of the current study are:

- The study is the first attempt in the area so that the upcoming researchers and other concerning bodies might use the results as a base line data.
- The study used both qualitative and quantitative approaches to triangulate quantitative findings with qualitative findings.
- The study used "Include all strategy" so that sampling bias was minimized at most.
- It also used already pretested questionnaires through some modifications from another related studies conducted outside/inside Ethiopia.
- The study has high (96.9%) response rate so possible to make good generalization.

8.2. LIMITATION OF THE STUDY

There are several conditions which can compromise quality of research activities and result in lack of trust worthiness of study findings. Some of the limitations for the current are:

- The study was limited only to governmental health care service providing facilities due to resource and time limitation.
- The study was cross sectional survey, which is unable to show cause and effect associations among variables of interest.
- Limited recent literatures related to the method of this research, that is absence of research papers done by either interviewing or questionnaire methods directly from the study participants. Most literatures were old and done based on reviewing existing papers and other resources related to the topic.
- Small Sample size that is the proposed sample was 422, but due to the presence of small number of health in the study areas, it was minimized to 350 using include all strategy.
- There may be Social desirability bias; respondents may not fill questionnaires alone (there may be interference of their socials) so may reduce its representativeness.

9. CONCLUSIONS AND RECOMMENDATIONS

9.1. CONCLUSIONS

Health information resources are basic for health professionals to update themselves, to be competitive and to do evidence based decisions for their clients. However, access to these resources is limited in developing countries due to several reasons such as poor infrastructures, poor personal initiations, policy related, economical related, and others. Findings of this study also showed/supported the above-mentioned facts that were raised by various studies.

- Almost all study participants (97.3%) have a need to have access to HIRs to support their day to day activities.
- Most study subjects in general have limited or no access to many of the HIRs, especially on formal information resources like internet, journals, library service, and in-service training.
- Majority of health workers in the studied facilities were doing their activities based on their school trainings and some rare on job trainings.
- The major possible identified factors for the presence of poor HIRs access in the study areas were poor personal initiations, organizational, economic related, poor information culture among participants, poor information accessing skills, educational status, unavailability of information sources, and to some extent time limitation.
- The most frequently used information source in almost all study sites was consultation and then on job trainings to some extent.
- More than half (54%) of respondents encountered problems on their work due to information limitation and tried to solve them using consultation of seniors.
- Only 145 (42.8%) had access to internet in the study areas.

9.2. RECOMMENDATIONS

Since the period is globalization or era of competition, it is necessary for health professionals to have access to up-to-date HIRs to be informed of and use new technologies and findings for achieving their goals through delivering evidence based and acceptable services to their customers. Results of this study also highlighted that there is a need to give attention for accessing HIRs among health professionals in the study area.

- HIRs should be remembered and implemented as one major component when health care service providing facilities are established.
- Ministry of health should give attention for accessing health information resources towards health professionals who are working at lower extremities.
- Bahir Dar town regional health bureau, Bahir Dar town administrative bureau, collaborating NGO's and each health facilities should give attention for this issue and work in parallel with their recent programs in order to have enduring type of HI infrastructure e.g. ICT based infrastructure and capacity building on their utilization.
- There should be strong initiation or awareness creation among all concerned bodies, especially from health professionals and organizational administrators.
- It is also better if one common medical library at the center place is established with the collaboration of regional health bureau, Bahir Dar town administrators, health facilities and other concerned bodies and institutions.
- Further research on this topic is needed by including private health care providing facilities in the study area and on other regions to assess the situation and identify factors as well as to take action as a higher level collaboratively.
- Further study is also recommended on methods of accessing HIRs among health professionals who are working at health care service providing facilities.

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11. ANNEXES

ANNEX I: INFORMATION SHEET

1.1. PARTICIPANT INFORMATION SHEET

School of Public health and Information science, department of health informatics, Addis Ababa University, Addis Ababa, Ethiopia

Title: Information needs and seeking behavior among health professionals working at governmental hospital and health centers: The case of Bahir Dar, Amhara Region, Ethiopia.

First of all we would like to thank you in advance for your cooperation and consent in participation in this study. Please read about the general information of the study. If you have any question regarding the study please ask freely.

1.2. BACKGROUND INFORMATION

Background: Health professionals are nuclei for delivering adequate and quality health care services to the community in both treatment and preventive aspects. This is possible if and only if there is continuous updating of knowledge and using new technologies among health professionals. It will be true if there is adequate, timely, authoritative and consistent health information resource access to each health care service providing facilities. Health information resources are basically two in types: formal (hard and soft copies including internet) and informal (human resources e.g. consulting key informants, etc). Information limitation can cause serious medical errors which can result in MDRs and deaths.

1.3. AIM OF THE STUDY

The purpose of this study is to assess information needs and seeking behaviors of health professionals working at governmental hospitals and health centers in Bahir Dar, Amhara Region, Ethiopia.

1.4. BENEFITS FOR PARTICIPANTS

Study participants will not have any financial incentives or other inducements from participating on this study. However, participation of health professionals in this study with honest response to the questions is crucial to improve accessing the health information resources to the participants and their staffs.

1.5. RISKS AND COMPLICATION

There is no any risk and secret idea on the study subjects due to participating in the study. No one other than the investigator and responsible advisors can access collected data from study participants or study area. No need of writing participants' name to secure the confidentiality of data or study participants. It also gets ethical acceptance/clearance from Addis Ababa university medical faculty research ethical reviewing board (RIRB).

1.6. ASSURANCE OF PRINCIPAL INVESTIGATOR

I put my signature below to confirm you that I take over the responsibility for the scientific ethical and technical conduct of the research project and for provision of progress reports for all stakeholders of the research project.

Mulusew Andualem (PI)

Signature: _____ Date: _____

Note: If you have any questions about this study, you should feel free to ask now or anytime throughout the study by contacting:

PI Address: Mulusew Andualem: Addis Ababa University School public health and information science, department of health informatics, Addis Ababa, Ethiopia.

E-mail: muler.hi@gmail.com or _yoniadane93@gmail.com

Tel.: +251913814608

ANNEX II: CONSENT FORM

I am Mulusew andualem from Addis Ababa university health informatics master program. Now I am conducting a research entitled "Health information needs and seeking behaviors among health professionals working at governmental hospitals and health centers: In case of Bahirdar, capital city of Amhara Regional state, Ethiopia." The purpose of the study is to assess information needs and seeking behaviors of health professionals working at governmental hospitals and health centers in the study area. As you know, we are living in the globalization period which needs quality and recent information to be good competent in the market. So health professionals should have access to relevant and recent information to be competent and deliver quality services to their clients. The evidence on your hand is very essential to achieve this goal.

I am going to ask you some very personal questions that some people find difficult to answer. Questions are prepared in simple English. Your participation in this research is entirely voluntary. If you do not wish to answer any of the questions included in the survey, you may skip them and move on to the next question. Your answers will be kept private. Your name will not be written on this form. There is no any special payment to you due to your participation in this process, except great thanks and solving our problems in common. However, your participation and honest response to the questions is crucial to improve accessing the health information resources to you and your staffs. It will take about 20-25 minutes to answer the questions. I would greatly appreciate your help in responding to this survey. Are you interested to participate in the study?

1. Yes, I am interested to participate.
2. No, I am not interested to participate.

NB. If your answer is **yes,** just start answering the questions on the next pages.

ANNEX III: QUESTIONNAIRE (QUANTITATIVE)

Addis Ababa University School of Public Health and Information Science Department Health Informatics

Questionnaire for Health Professionals Working at Governmental Hospitals and Health Centers in Bahir Dar, Amhara Region, Ethiopia.

Facility name _____ code _____. Participant code _____.

Data collector name_____date_____signature_____.

No.	Questions	Responses	Skip
I.	**Socio- Demographic Characteristics of the Study Subject.**		
11	Your sex.	1. Male 2. Female	
12	Age in year	1. ≤ 20 2. 21-25 3. 26-30 4. 31-35 5.36-40 6. 41-45 7. >46+	
13.	Your professional category	1. MD 2. Health officer 3. Nurse 4. Medical lab. 5. pharmacy 6. Other----------	
14.	Working unit	1.TB-HIV 2. Family planning 3. Under five 4. Inpatient 5. OPD 6. ART 7.Other _____	
15	Monthly income	1. 500-1000 2. 1001-1500 3. 1501-2000 4. 2001-2500 5. 2501-3000 6. >3000	

16	Work duration	**1**. < 2 years **2**. 2-4 years **3**. 5-7years **4**. 8-10 years **5**.>10 years	
17	Do you have sons and daughters?	1. Yes 2. No	
18.	If your answer is **yes** for **17**, how many?	1. One 2. Two 3. Three 4. Four 5. ≥ Five	
19	How many family members do you have with you currently?	1. Alone 2. One 3. Two 4. Three 5. Four 6. > Four.	
20	How many of your family have their own income?	1. None 2. Only one 3. Two 4. Three	
21	Do you have other means of income/work in addition to your work?	1. Yes 2. No	
22	If your answer is **no** for **21**, how do you spent your time after your regular work?	1. With my boy/ girlfriend 2. Visiting my socials 3. Through reading 4. Church 5. Library 6.Recreational areas 7. Internet café 8. Others----------	
23	Do you save some money from your monthly income?	1. Yes 2. No	
24	If your answer is **no** for **23**, what was the cause for not saving? (**There may be more than one)**	1. Having large family 2. Using for learning 3. Due to low salary 4. Using internet 5. Having high socials 6. Other_____	
25	What types of friends do you have? (**You can choose more than one**)	1. Students (**college-university**) 2. Library consumers 3. Internet lovers 4. Readers 5. Merchants 6. Others_____	

26	How much time did you spend with them for your choice on question no. **26**?	1. One hour / day 2. Two hours / day 3. 2-3 hours /week 4. 3-4 hours /week 5. 5-6 hours /week	
II.	**Questions related to information needs**		
27	Do you need health information to support your work?	1. Yes 2. No	If **yes** skip to **29**
28	If your answer **is No** for **27**, what is your reason for not seeking?	1. Because I have adequate knowledge for my work. 2. because there is no source 3. Because I don't have interest in my work 4. Because there is no more difficult cases 5. No reason	
29	What are the causes for you that forced you to seek information? (**You can choose more than one**)	1. My own needs 2. Questions from patients 3. Environmental competitions 4. Emergency of new cases 5. To update myself 6. Other----------	
30	How many patients per day do you visit/ serve?	----------	
31	How many hours do you spend per patient?	----------	
32	Did you encounter for new cases every day?	1. Yes 2. No	
33	If **yes** for **32**, how many times per week?	----------	
III.	**Questions related to health information seeking behavior and access**		
34	Are you computer literate?	1. Yes 2. No	
35	If **No**, for que **34**, why are you not computer literate?	1. I don't have the time. 2. I have no access to a computer system 3. I'm not interested	

		4. It is not useful to me 5. Others----------	
36	Do you have computer?	1. At home 2. At work 3. At both 4. I hav't	
37	If your answer is "**yes**" for the above question, for what purpose do you use it? (**You can choose more than one).**	1. Report writing 2. Listening music 3. Reading 4. Keeping files 5. Using internet 6. Other----------	
38	Which of the following do you access to get Health Information to support your work? (**You can choose more than one).**	1. Books 2. Journals 3. Protocol manuals 4. Library 5. Colleagues 6.senior staff 7. In-service training 8. Electronic Resources	
39	Which of the information sources (media) is /are available at your home for use? **(Circle all possible answers)**	1. Radio 2. TV 3. Computer without Internet connection 4. Journals 5. Mobile with Radio/TV 6. Books 7. Others ----------	
40	Which of the following do you prefer to use to get Health Information? (**You can choose more than one)**	1. Paper (e.g. Books and Journals, etc) 2. Computer (Internet and electronic journals, etc) 3. In-service training 4. On job training 5. Collogues 6. Senior staff 7. No preference	

41	Do you have access to internet?	1. Yes 2. No	
42	If your answer is **no** for **41**, please specify how do you access information? (**You can choose more than one).**	1. From library 2. Borrowing from other places 3. Internet café 4. Down- loading from other places while travelling for other purposes 5. Consulting my exercise books/ handouts and seniors 6. Other ----------	
43	If your answer is **yes** for the above question **41**, please indicate where.	1. at home 2. At work area 3. Internet café 4. Public library 5. 1 & 2 6. 1, 2, 3	
44	How often do you use an internet to get Health Information to support your work?	1. Daily 2. Two times a week 3. Two- three time a month 4. Once a month 5. Don't know	
45	For what purpose do use the internet? (**You can choose more than one**)	1. E-mail 2. Research 3. Drug information 4.Patient care information 5. Business	
46	Up to what extent are you satisfied with the internet facilities provided in your organization?	1. Fully 2. Partially 3. Least satisfied 4. I have no access 5. No comments	
47	Did you encounter any problem in searching for information on the internet?	1. Yes 2. No	
48	If **yes** for **47**, what major problem did you encounter during searching information? (**You can choose all possible).**	1. Poor internet connection 2. Too much information 3. High Cost of internet	

		4. Don't know where to find information 5. Other----------	
49	What attempts did you do to improve the quality?	1. Reporting to the mentors 2. Leaving it as it is 3. Using another computer 4. Returning another day	
50	Do you have library services in your work area?	1. Yes 2. No	
51	If your answer is **yes** for **50**, are you satisfied by the collections in your library related to your work?	1. Fully 2. Partially 3. Least satisfied 4. I have no access to it 5.No comments	
52	If your answer is **no** for **51**, what did you do to have library?	1. Comments to manager 2. Discuss with my staffs 3. Other----------	
53	Does your organization subscribe journals, books, research papers and others related to your work (Local/International)?	1. Yes 2. No	
54	If **yes** for **53**, are these materials up to date and useful?	1. fully useful 2. Partially useful 3. Least useful 4. Not useful 5. I do not refer them	
55	Do you have follow up (an ongoing) in service training in the past?	1. Yes 2. No	
56	If **yes** for **55**, when did you have the last training?	1. within last 12 months 2.Within last 6 months 3. Within last 3 months 4.More than 12 months 5. Don't remember	
57	How training is assigned to health professionals in your organization? (**You can choose more than one answer**)	1. Orderly 2. Randomly 3. Based on concern 4. Based on head selection 5. through discussion	
58	Do you think you need further training?	1. Yes 2. No	
59	Do you have your own books, research papers, handouts, soft copy documents, etc in your home?	1. Yes 2. No	

60	If **yes** for **59**, are they updated and relevance to your daily work?	1. Yes 2. Not	
61	If **yes** for **59**, how often do you use them?	1. Daily 2. When there is a need 3. One- two days/ week. 4. I do not use them totally	
62	What factors do you think will affect accessing of information to you? (***You can choose all if you think they are all important factors)***	1. Cultural 2. Geographical/location 3. Organizational 4. Economic related 5. Family size 6. Educational status 7. Poor Personal initiation 8. Time shortage 9. Low prevalence of diseases and new cases	
63	Do you have encountered to problems on your work due to information limitation?	1. Yes 2. No	
64	If **yes** for **63**, how do you solve it? (**You can select more than one**)	1. Consulting 2. Discussion with staffs 3. Referring patient 4. Appointing patient	
65	What do you learn from that encountered problem?	1. Importance of updated information 2. Importance of pre readiness 3. Importance of communication 4. Importance of being well informed 5. All	

NB: ***Sources for questionnaire*** [**18, 40-43**].

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ANNEX IV*:* OBSERVATION CHECKLIST

Addis Ababa University School of Public Health and Information Science Department of Health Informatics.

Site name/code _____ Observer _____Date _____ Time _____

No.	Information resources	1.Yes 2. No	Recommendations
1	Library services		
2	Journals		
3	Research papers		
4	Books		
5	Hand outs		
6	Manuals and standard guide lines		
7	Computer rooms		
8	Internet services		
9	Computer with each working rooms		
10	Consultation		
11	Training		
12	Peer/colleagues discussion		
13	Morning sessions & case presentation		
14	Soft copy sources		
15	Report papers		
16	Questioning and answering between patients and professionals		
17	Observing professionals while using any information source		

Figure4: Checklist table showing observation checklist for gathering data from governmental hospitals and health centers in Bahir Dar town, 2012.

DECLARATION

I the undersigned, declare that this thesis is my own original work, has never been presented in this or any other University, and that all the resources and materials used for the thesis, have been properly acknowledged.

Investigator's Name:

Mulusew Andualem: Signature _____Date _____

This thesis has been submitted for examination with my approval as a University advisor.

Advisors' Name:

Abera Kumie (MD, MSc, PhD): Signature _____ Date _____

Gashaw Kebede (BSc, MSc, PhD): Signature _____ Date _____