The Preparedness for the Use of Information Communication Technology in Benishangul Gumuz Regional Health Bureau

BY

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Declaration

I, the undersigned, declared that this Thesis is my original work and hasn't been presented for a degree in my other University and that all source of the materials used for this Thesis have been appropriately acknowledged.

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This Thesis has been submitted for examined with my approval as a University advisor.

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List of Abbreviations

WHOWorld Health Organization
FMOHFederal Ministry of Health
BGBenishangul Gumuz
RHBRegional Health Bureau
ZHDZonal Health department
WoHOWoredaHealth Office
HCHealth Center
C/PCore Process
S/PSupport process
ICTInformation Communication Technology
HERElectronic Health record
EMRElectronic Medical Record
MRUMedical Record Unit
eHMISElectronic Health Management Information System
M-HealthMobile Health
eLMISElectronic Logistic Management Information System
eLISElectronic Laboratory Information System
eRISElectronic Regulatory Information System
ARTAnti-Retroviral Therapy
LANLocal Area Network
WANWide Area Network
VPNVirtual Private Network
CBAM-LoUConcerns Based Adoption Model Level of Use

Abstract

The research presents an investigation of the Preparedness and ICT policy of BGRHB to integrate ICT in to the health service process. The preparedness of administrative bodies and the ICT policy of the BGRHB to integrate ICT were investigated using interview and document analysis. Preparedness of the professionals and supportive staffs of RHB and ZHD in terms of ICT use, awareness of emerging ICTs, and attitude towards ICT in the use of emerging electronic health systems or applications were studied using questionnaires. The data obtained through interview and document analysis were analyzed qualitatively while the one obtained through the questionnaires analyzed using frequency tables. It was found that the ICT policy is currently non-existent at BGRHB. It was, however, found that the RHB was imminent of developing ICT policy. The findings also show that all professionals and supportive staffs were using Computers (100%) and internet 77.6% at office. Apart from these, among electronic health systems that are currently used by BGRHB, 60.8% of staffs were using or familiar with eHMIS. Professionals, supportive staffs and the management team were also found to have positive attitude towards ICT in health system. An investigation of infrastructure readiness revealed that there was a serious problem of access to ICT by staffs; i.e. the current infrastructures were only serving a few staffs and head of RHB. The ICT integration level at RHB was seen in light of a proposed ICT integration model. It was found that it was found that the characteristics of the RHB resemble a typical health sector at the first phase, Emerging phase, of the proposed ICT integration model. It was, so, recommended that the BG RHB needs to work hard to meaningfully integrate ICT into the health system so that the movement to the next phases, applying, integrating and transforming could be possible.

CHAPTER ONE

INTRODUCTION

1.1. Background of the study

BenishangulGumuz Regional Health Bureau is one of the nine RHBsestablished in 1994. The BGRHBhas three Zonal Health Departments, 19 Woreda Health Offices, one special Woreda Health Office, one Town Administration Health Office, more than 38 functional health centers and 489 Health Posts.

BGRHB is striving to make its services efficient and effective so as to meet customers' needs. This in turn requires utilizing the easiest ways to gather, process, store and exchange data and health information. So, installation, utilization and management and development of ICT are becoming one of the primary tasks of the BGRHB. ICT is the intersection of information science, computer science, information technology and health system and deals with the resources, devices, and methods required in optimizing the acquisition, storage, retrieval, and use of health information in health sector. This includes not only computers but also clinical guidelines, formal medical terminologies, and information and communication systems. Research and development efforts within the health system industry and the rapid advancement in ICT over the last decade have brought about significant advances in the region.

BGRHB has a vision to see the entire Zonal Health Departments, Woreda Health Offices and health centers connected with up-to-date ICT infrastructure that provides highly qualitative, reliable, and secure services at all its lower hierarchy's sites.

Developed countries are spending a lot of resources for the improvement of the health systems and their integration with information technology. Besides ICT becoming the catalyst for the performance growth, it serves as an essential medium of communication among administrative sites, medical teams, and administrative health professionals and supportive staffs at BGRHB.

Computer-Based Health Management Information System was developed to generate information on the status of ongoing health-related activities in order to facilitate evidence-based decision-making and effective management of health care systems at all levels. For the last two years, the need to develop and organize new ways of providing efficient health service has

corresponded with major advances in ICT resulting in a dramatic increase in the use of ICT applications in BGRHB, ZHDs, WoHOs and HCs. Today, the integration and assimilation of ICT into everyday life of health sector workers is becoming a reality in developed as well as developing countries.

Preparedness refers to the readiness of health sectors or communities for the anticipated change brought by programs related to ICT. As such, preparedness of BGRHB for the use of ICT is defined as the health sector's ability to promote and support the growth of ICTs, meaningfully integrate ICT in health system, including infrastructure, relevant electronic health systems or applications, and technical skills.

FMOH has showed great interest and recognition to promote, develop and use ICT (different electronic health systems) in recent times. In this respect, the FMOH has stated that it has a vision to see the entire health facilities connected with virtual private network. Accordingly, the purpose of this research is to investigate the preparedness of BGRHB for the use of ICT and to integrate ICT into the health system.

1.2. Statement of the problem

BGRHB hasdifferent difficulties that are related with the adoption of ICT and full integrate ICT in to the health service processes at all health sites level; that is, the adoption and the successful utilization of technology was not implemented to provide quality of health services at all its health facilities level. Apart from the financial constraints, the adoption process is mainly affected by human factors. The health professionals, some staffs that are working at health sector, the card room staffs, medical doctors, and nurses resist using the new technologies in health facilities due to the fact that they ignore the benefits of this technology. Moreover, training constitutes a major determinant of ICT adoption by health professionals and influences the integration of these technologies into every day clinical practices. According to Anderson, J.G., and Aydin, C. E. et al (1993), no matter how sophisticated and effective is the technology, effective implementation depends on whether the users have a positive attitude towards ICT. The aim of this study is to investigate preparedness level of BGRHB and ZHDs, demographic factors in relation with the attitudes of staffs in front of ICT and to identify any potential conflict.

The point here is that the preparedness level of BGRHB to integrate ICT into health system is not specified yet. The attitude towards the use of ICT, preparedness, the skill preparedness and ICT awareness of the health professionals and administrative bodies of BGRHB to successfully integrate ICT into the health system is not indicated. What is present and lacking is not researched out. Lack of ICT skill by staffs, some negative attitude towards the use of electronic health systems, and absence of adequately trained staffs with good technical skill in BGRHB and ZHDs seem like challenges to integrating ICT in to health system. Apart from the aforementioned problems, theBGRHB and ZHDs hadn't had the indication of its preparedness level with regard to the main components of ICT integration in health system; i.e. these were the main gab that needed to be researched out. Moreover, the situation of BGRHB and ZHDs with respect to ICT preparedness level, and lack of knowledge of what is existing and what lacking to successful integrate ICT in health service provision of the BGRHB are ZHDs are points which need attention.

Furthermore, securing appropriate infrastructure is also noteworthy for the implementation of the computer-based health system in BGRHB. What materials and technical resources i.e. electronic health system, internet connection, electronic health book references, web sites, and other interactive multimedia are available to make the computerized data processing (generation of health report and other related activities)? It seems also that all staffs have no or limited access to the infrastructures i.e. File server, computers, internet, and etc. So, investigating the preparedness of the concerned bodies and the availability of necessary resources to host the computer-based health system standard in to BGRHB is crucial for the practicality of the ICT integration into BGRHB and ZHDs. The researcher in this study, then, attempts to undertake the following purpose related with the above research gabs.

1.3.Objectives of the study

1.3.1. General Objective

The general objective of this study is to investigate and apprehend the preparedness of BGRHB for the use of ICTs to integrate ICT into the health system.

1.3.2. Specific Objectives

The following are thespecific objectives of the study:

- ✓ To asses the preparedness of administrative bodies and the ICT policy of the BGRHB to integrate ICT
- ✓ To assess staffs' attitude towards the use of ICT
- ✓ To investigate the infrastructure which is necessary to integrate ICT into the health system
- ✓ To understand the factors that might facilitate or hinder electronic health system implementation.
- ✓ To develop the necessary recommendation framework for the application of ICT for BGRHB and ZHDs
- ✓ To determine which ICT integration model best meet the system and BGRHB needs
- ✓ To evaluate systematically and coherently the impact of the use of ICTs on BGRHB and ZHDs

1.4.Basic Research Questions

Based on the statement of the problems, the research set the following research questions:

1. What does the preparedness level of BGRHBlook like with respect to awarenessto the emerging electronic health systems, attitudes towards the use of ICT, skills of the management team and staffs, and the ICT infrastructure?
2. What are the human and infrastructures resources available and lack in the BGRHB to make the health system ICT based?
3. How ready are staffs in the BGRHB to adopt electronic health systems?

1.5.Significance of the study

The researcher believes that the results of the study will help the BGRHB to evaluate the strengths and weaknesses of its ICT in the health system.

- ✓ To be aware of the level of BGRHB preparedness to integrate ICT and to indicate what more human and technical resources they need to integrate ICT in the health systems.
- ✓ To re-check its ICT infrastructure for successful implementation.
- ✓ Professional and supportive staffs in the BGRHBto raise their awareness of the role of ICT while in providing the health service.
- ✓ Planning and Programming Officer, planners and experts in their attempt to integrate ICT into the health system.
- ✓ Future researchers in the area of ICT in health system in BGRHB to have background information about the ICT in health policy.
- ✓ To measure the preparedness of BGRHBto provide the computer-based health service and to learn the indispensable infrastructure for the ICT integration; and to fill the gap that is created by the emerging ICTs.

1.6.Scope of the study

The research has demarcated the study in the following manner:

The place of the research is BGRHB. The research has not included the lower hierarch of BGRHB's health sites like Woreda Health Office, health facilities (hospital, health centers and health posts); so, the researches includeBGRHB and ZHD. ICT policy is treated in the BGRHB context because of its inclusiveness.

The variables to be included in the study are ICT policy of BGRHB, administrative preparedness, staffs preparedness (attitude towards the use of ICT, awareness to the emerging electronic health system, ICT skill, ICT integration, training, level of use of ICT in daily life and the ICT infrastructure of the BGRHB (computers, internet, bandwidth and network). Variables other than the aforementioned ones such as, the content aspects of the training staff, though very important in ICT integration are not treated in this study.

1.7. Limitation of the study

The researcher planned to distribute 165 questionnaires to the BGRHB and ZHDs staffs out of which 145 were successfully distributed. The other 20 questionnaires were not distributed at all because the staffs were not available; i.e. some were on annual and sick leave, some other were left for supportive site visit out of town, and few others were not willing to fill the questionnaire because they said busy in office work.

CHAPTER TWO

LITERATURE REVIEW

2.1.INTRODUCTION

The purpose of the section is to make an assessment of past studies in the integration of ICT in the provision of quality health service at different health sectors situation and to look into the possible gaps which need to be researched out to narrow the gaps. An attempt will also be made to discuss the different models of ICT integration into the health system investigations and the logical reason to choose one in BGRHB context.

2.2.Meaning of ICT

Different scholars have defined the concept ICT using different expression but almost carrying similar meanings. Accordingly, some of the phrases of ICT are:

- ✓ ICT is the catch-all phrase used to describe a range of technologies for gathering, storing, retrieving, processing, analyzing and transmitting information (http://WWW.smartstate.qld.gov.au/strategy/strategy05_15/glossary.shtm).
- ✓ ICT is the technology required for information processing. In particular the use of electronic computers and computer software to convert, store, protect, process, transmit, and retrieve information from anywhere and anytime. (http://en.wikipedia.org/wiki/information_and_communication_technology).
- ✓ Similarly, Ash, J. (1997). (2004) have defined ICT as an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and Tele medicine. They also add that ICTs are often spoken of in a particular context, such as ICTs in health sector.
- ✓ ICT is the generic term which stands for the use of the different technologies (computer and telecommunication technologies) to help us in gathering manipulating and processing, controlling, distributing and sharing, and using information and enhancing communication.

- ✓ It is the tools that facilitate communication, processing, transmission of information and the sharing of knowledge by electronic means. It encompasses the full range of electronic and digital information technology, from radio and television to telephone, computers, electronic media and internet (Adam, L. (1996). It is also important to notice that information communication technology is different from health information technology. The first one is utilized when the use of health information technology has a strong networking and communication component, while the latter term is used to describe the application of computers and technology in health sector.

2.3.Uses of ICT in health sector

ICT is profoundly affecting every aspect of human activity. From different studies, it is revealed that ICT can provide stakeholders and administrators with new tools for increased manipulation of health data, communication for management efficiencies, and health professionals and patients with improved service. Anderson, J and Aydin, C. E. (2005) stated that the following are the use of ICT in health sector:

- ✓ Electronic health system improves quality of health service, facilitates sharing of expertise and resources and reduces duplication and redundancy
- ✓ It also reduces travel requirements, waiting times, overall system management and patient costs, and improves the quality of information
- ✓ It permits the transfer of different kinds of health data and information management data, provision or confirmation of diagnosis, and epidemiological monitoring
- ✓ Empowering citizens, managers and other stakeholders by enabling online teamwork for increased participation, collaboration and information sharing through the use of email, the web and other remote collaboration tools
- ✓ Enabling the rapid creation and inexpensive distribution of health information and expertise around the world
- ✓ Encouraging professional development, in-service-training, remote support and mentoring for lifelong health service, and increasing motivation through the use of multimedia (sound, video, graphics, animation and text.)

- ✓ Allowing each health professional to upgrade at his/her level and speed thereby giving pupils greater control over his or her own learning, and, enhancing the development of the abilities of mentally and physically challenged professional.

Engaging professionals in research, data analysis and problem solving, thereby facilitating higher-order thinking processes such as synthesizing, interpreting and hypothesizing, and promoting active professionals (Egypt Ministry of Health, Youth and Culture (2005).

Many other scholars in health technology believe that technology could increase the exploratory behavior of professionals and claims that electronic health systems improvethe quality of health service. Similarly, different scholars holds that computer provide health professionals with mind tools i.e. computer applications such as electronic health management system, databases, spreadsheets, semantic networks, hypermedia, multimedia, micro worlds and etc., which require health professionals to think critically and in meaning full ways to use the applications to represent what they know.

2.4.Meaning of ICT integration

Miller, John.(1997) states that integrating the ICT in health sector means using the power and ability of the computer to aid to the provide quality of health service within the health facilities and administrative sites. Cruickshank, H. (1998) established that people's attitude towards computer and computerization becomes more favorable as their experience of computers and computer technologies increases. ICT integrationcomprisescomputing technology, the Internet and other accessories which enable users to access, store, transmit, and manipulate information. In line with this contention, fairly preached that the rapid advances in user friendly interfaces of the computer have lessened the need to know the details of how the machines work.

Defining ICT integration may be a difficult task. After reviewing a number of research papers to define ICT integration have noted the following:

- ✓ ICT integration can be seen that there are multiple and often conflicting definitions of ICT integration. It is, in one instance something which is non-existent and in another, so seamlessly embedded it is invisible. It is regarded as critical practice by some commentators and empty rhetoric by another. Integration can be a state, an outcome and also a process; and deciphering which may well be the key to developing effective measurement instruments.

- ✓ ICT integration into health sector shortly means the use of different technologies to aid the provide quality of health service.

2.5.ICT Integration in health sector

It is undeniable that the future of health service provision is hopefully going to be determined by the intervention of ICT. Successful Integration of ICTs in to ongoing health sector depends on the active involvement of management bodies, health professionals and supportive staffs and all stakeholders from the beginning in determining information needs, type of content and the most appropriate technology to use. Jennet , T. (2004) recommends that ICT be integrated into existing health systems in a policy, not just a practicable manner, and that this be achieved with a "global' perspective". It is evident that ICTs in health system are being used for manipulating health data, exchanging of information or report, delivering content and sharing content, communication among administrative sites and health facilities, health professionals and the outside world creating and delivery of presentations, research, and administrative support.

It further declares the health systems around the world are under increasing pressure to use the new ICTs to provide quality of health service and to provide training for health professionals and administrative bodies the knowledge and skills they need in the information age.

It is well recognized in the information revolution ICT-in-health system implementation strategy action plan of the ICTs play a key role in the provision of quality health service and widening access to health system to a wider section of the population.

Successful integration of ICT in health sector from the perspective in health system, as described by Milton, S. (2004). Would be demonstrated by: a culture of innovation, clearly defined health goals that include deeper understanding and problem solving, professionals and supportive staffs use technology as a tool for their own skill updating knowledge and monitoring their own progress.

2.6.Rationales for ICT integration in health sector

ICT have shown to have positive contribution in the provision of quality health service. WHO emphasized that the introduction of ICT in health system has brought about a more positive attitude to health sector among health sites.

The purpose of integrating ICT in to health system is to improve and increase the quality, accessibility and cost efficiency of the delivery of health service.MiressaNeme (2009) stated the following purpose:

- ✓ To support informed strategic decision-making by providing quality data which help managers and health workers at all levels of the health system in planning and managing the health services
- ✓ Monitoring disease trends and control epidemics; and providing periodic evaluation towards agreed targets
- ✓ To increase the quality of management of the health system hence the need to access the preparedness of BGRHB
- ✓ To determine end-user information needs at the various levels of the health system.
- ✓ To facilitate data collection, analysis, information generation and storage
- ✓ To facilitate information dissemination, feedback (horizontal and vertical) and use of information for evidence- based decision making.
- ✓ Increased interest in health service provision as a profession and practice.
- ✓ To provide a quality health service at all health sites
- ✓ Broadening of professional sources of knowledge and training and career horizons for professionals.
- ✓ Professionals' preferences for multiple technology utilization and increased administrator and health professionals' productivity.
- ✓ Rethinking and revision of health program and instructional strategies and interest in experimenting with emerging technology.
- ✓ A number of results have been proven attributable to the introduction of ICTs in health system:
- ✓ Computer use facilitates staffs collaboration on projects, and thus enhances the team work abilities that are indispensable in the work place.

2.7.Factors to be considered in ICT integration

There are different factors to consider in trying integrating ICT in the health sector. The major factors are comprehensive and working ICT policy, the preparedness of the implementing bodies with regards to awareness to the emerging electronic health system, attitude towards the use of ICT, skill, and the availability of the infrastructure.

Haddad ,D. (2006) argues that technologies have great potential for knowledge dissemination, effective and efficient in providing quality of health service. Health sector must have sufficient access to digital technologies and the Internet in their office, health facilities and health Sectors.

High quality, meaningful, and culturally responsive digital content must be available for health professionals and supportive staffs. Professionals must have the knowledge and skills to use the new digital tools and resources to help all costumers to achieve high health service standards.

In the same token, Naido ,V.(2003). three pre-conditions for a successful introduction of new IT into any health system:

- ✓ An appreciation by government of the financial, resource and operational requirements and the resulting consequences
- ✓ A commitment by government to give time and lake responsibility for decision-making and implementation health strategies plan
- ✓ A commitment to a policy of an integrated support service encompassing professionals and technical training, and assessment-together with software and hardware provision.

Accordingly, the following major factors; i.e. ICT policy, ICT integration, preparedness of the administrative, professionals and supportive staffs and infrastructure are identified solely in this research and dealt with in detail.

2.7.1. ICT Policy

An ICT policy has been identified as a necessary first step in the process of transforming the current health system in to an ICT enabled health delivery system that will improve the health outcomes of the professionals. BGRHB to incorporate the national policy into health sector specific ICT polices. ICT policy is increasingly at the core of strategies aimed at securing the

goals of sustainable development and stimulating economic growth in countries around the world. Among others, these technologies are shaping the way social interaction takes place and public services are delivered in some fundamental ways. It is precisely along these lines that the BGRHB has placed a great deal of importance on transformative potential of ICTs and positioning these technologies within the larger context of its far reaching developmental aspirations premised around health system as an overarching goal.

ICT Policy assumes particular significance in the light of fact that efficiency more than ever is now an indicator of competitiveness. As such, nations, health sector entities and people that find the means to become more efficient will advance and prosper.

Among others, ICT policy holds the potential to help create conditions for better management of health system, with more transparent and efficient bureaucracies. Similarly, ICT policy can help address structural problems in health systems enabling expanded access to health services as well as help bridge quality gaps in health. ICT policy can also significantly improve the health service by enabling better management and expanded outreach to health services and driving efficiency through the electronic health system.

2.7.2. Administrative Preparedness

Preparedness has been described as the degree to which users, healthcare organizations, and the health system itself are prepared to participate and succeed in ICT implementation (Alliance for Building Capacity Report, 2002). Preparedness, on the other hand can be defined as a state of readiness prior taking any action and applicable for implementing any ICT in health system. Once planners have decided that ICT can provide the best solution for a given problem (after a proper needs-assessment has been conducted), conducting ICT readiness assessment is the next important step in the planning process. This step facilitates the process of change and reduces the risk of failure. The assessment also helps to prevent losses in time, money, and effort, avoiding delays and disappointments among planners, staff, and users of services.

The other factor crucial considering in ICT integration is the readiness of staffs with regard to leadership, attitude, skill, and level of use ICT in the health environment, Hoffman, J. (2001). suggested that successful implementation of ICTs needs to address five interlocking frameworks

for change: infrastructure, attitude, staff development, support (technical and administrative) and also sustainability and transferability.

Health sector and individual readiness for the use of ICT is important for the success of ICT adoption and contributes to planning of such services. Two recent studies, Alliance for Building Capacity (2002) focused their work on defining readiness in organizations and communities and gathering evidence to support the development of measures of electronic health system readiness. Four types of readiness were described: "core readiness" where a need for change is identified; "engagement readiness" expressed by questioning and needs assessment; "structural readiness" where there is need for development of the human and technical infrastructure to operate the system; and "non-readiness" which means a lack of need or failure to recognize need. Jennet, T, et al. (2003) recommend that a readiness assessment should be conducted prior to implementation of any e-health application. They developed instruments to measure readiness for Tele health that would help researchers, decision makers, and stakeholders assess the situation in which Tele health introduction is most likely to succeed. In addition, they stressed the importance of input from all key stakeholders into policy development, and the importance of increased awareness and understanding of e-health opportunities among community stakeholders.

Diza, G., et al. (2002) noted that the commitment and the interest of the principal is the most critical factor for successful implementation of any health system innovation especially technology. And he claimed that officials of the local executing agency, including the policy experts, key administrators, and influential professionals must have a sound appreciation of the process and expected results and they must be personally convinced that the introduction of ICTs in the health sector needs to be well supported to ensure that the new technologies will not be used to simply extend or replicate a traditional working environment model, but rather to fundamentally change the instructional paradigm, with ICTs serving as levers for system-wide health service and change.

2.7.3. Staff Preparedness

ICT in health sector is not only hardware and software; it includes stakeholders, partnerships, polices, standards, health data, and processes that together make-up a technology environment Stakeholders' behavior towards health technology adoption thus contributes to their preparedness to accept and use the technology.

Many studies have described preparedness in the context of process of change both at the organizational and individual level Bridge, O. (2005). Models for examining preparedness for ICT found in the literature describe organizational change generally and organizational change due to technological innovation in particular.Bashshur, R. (2002)notes that health technology such as telemedicine is "a complex innovation bundle", which includes technical, organizational, and social innovations. Jennet, T, et al. (2003) perceived the introduction of electronic health system into health sector as a novel IT innovation, and one that has been met with many challenges, including staffing changes, changed mechanisms for coordination and communication, and changes in an organizations internal system.

The overview of ICT at health sector calls for a paradigm shift in any health system. The health professionals' roles have been changed by virtue of the ICT integration at health sector. Similarly, different scholars indicated that integration of ICT in providing of health service does not only deal with getting used to new materials hardware and software, but at the same time the professionals have to adopt new roles.

2.7.4. ICT awareness ofstaffs to the emerging electronic health systems

And attitude of staffs for the use of ICT

The ICT awareness and appreciation probably is the very element which drives the professionals and supportive staffsto put their highest energy into the integration process. Staffs must have good awareness, positive attitude and appreciation to the value of ICT in the health environment. Milton, S. (2004)strongly argue "it is assumed that the more aware a professional becomes of the transition towards a knowledge society and its implications, the more he/she may be willing to put in the efforts required to access and master the technical possibilities of the new technologies.

BectaEdward, et al. (2003) said about barriers to the use of ICT in health sector found out that negative attitude towards electronic health system in health environment in one of the key barriers to using ICT. BectaEdward.(2005) summarized the findings of various studies "there is a view that aspects of individual attitude and belief are the main factors influencing a professionals' use of ICT. Similarly, BectaEdward.(2005) also noted that:

- ✓ Professionals must believe that use of the technology can more effectively meet the provision of quality health service objectives or reach a higher level goal than could otherwise have been achieved.
- ✓ By using the ICT other goals perceived as more important are not removed.
- ✓ The professionals must feel she/he has the confidence, ability and access to necessary resources to apply the technology to her/his health situation.

2.7.5. Skill and professional development

Capacity development and training components need to be included in all ICT initiatives. Health Professionals should build on existing knowledge and help to strengthen the ICT skills in health system. Staffs need expressing skills in freely manipulation computers so that they can integrate technology into health system. According to different scholars, essential conditions to be met to effectively harness the power of the new information and communication technologies to improve health service, points out "health professionals must have the knowledge and skills to use the new digital tools and resources to help all costumers achieve high satisfaction standards. Rogers, D.L. (2000) noted thatto use a computer, one requires the knowledge and skills which are related to the hardware, the software, the information sources and the information itself.

He categorizes these skills as:

- ✓ Hardware or equipment-related knowledge and skills, including the ability to use different electronic applications
- ✓ System knowledge and skills, including knowledge of network procedures, and windows system interfaces.
- ✓ Application software knowledge and skills, including electronic health systems, e-mail and use of internet.

- ✓ Knowledge and skills associated with the use of the information system itself-storage and search procedures, as well as access techniques.
- ✓ Knowledge and skills associated with using the information that is contained in the source of service.

The professional readiness of the staffs is the key for successful integration of ICT at health environment, Milton, S. (2004) in his 'ten lessons for ICT and health in the developing world' strongly holds that the professional development of professionals sits at the heart of any successful technology and health program. He also strongly suggested that staff development is the single most frequently identified factor in successful ICT integration in health sector. "Spending scarce resources on informational technology hardware and software without financing health professionals' development as well is wasteful.

An exhaustively dealt with model for staff development is the approaches model for ICT development at health sector level (IFIP, 2000). There are four phases: the Emerging, Applying, Integrating and the Transforming phases. The summary of the staff development process in the approaches model is given in Appendix Al.

Rogers, D.L. (2000). forward the use of what they call "10 Tips to Make it Better" for technology and professional development as follows:

1. Offer Training
2. Gibe technology they can take home
3. Provide on-site technical support
4. Encourage collaboration with colleagues
5. Kernel professional to professional development discussions
6. Stretch the day
7. Encourage research
8. Provide online resources
9. Influence pre-service training
10. Celebrate success

The professional readiness of the staff makes the professionals to utilize ICT effectively. WHO notes that as health professionals continually develop their instructive use of ICTs to support the

endowment of health service, and including assessment of patients and the evaluation provided health service.

The implication is for BGRHB to prepare all health professionals and supportive staffs in this respect: training staffs in these very crucial ICT skills so that they can freely provide quality of health service, manipulate and effectively use the emerging ICTs in the health environment, providing technical support, and providing resources encouraging collaboration, etc.

2.8.Infrastructure development

ICT infrastructure is about the availability computers, hardware, software, server room, Internet, and network (LAN and WAN). There could be more ICT infrastructures but the focus of this research is on the aforementioned ones because of their importance to begin integrating ICT in health systems, anyways, which ICT infrastructure to use is determined by our purpose. BectaEdward, et al. (2003) claims that 'What do health we want to achieve?' and 'how can health we do this better?' are two questions that would help the health sector determine the most appropriate infrastructures.

Promising ICT infrastructure is the very factor to be considered in ICT integration. It is critical that health sectors have the necessary infrastructure available if ICT is to be integrated into the health environment. He also claimed that in order to have a quality health service provision or health system supported by technology, the availability of suitable infrastructure is essential.

However, research showed that possessing working ICT infrastructure is a problem in the work, especially in developing world. Different scholars also note that establishing a working computer lab and a reliable connection to the internet remains a dream for most health sectors around the world. He further points out that in a recent survey of professional in developing countries conducted by SRI international for world links, the majority of professionals in African and Latin American countries reported that the lack of adequate hardware and software as well as unreliable internet access were significant barriers to using ICTs in health system.

2.9.ICT integration model

A working model for ICT integration is required in an attempt to integrate ICT in the health sector. The researcher found that the approaches to ICT development at institutional level

developed by IFIP (2000) could be a working model for modeling ICT development at BGRHB and ZHDs. The details about the approach are given below:

2.9.1. Approaches to ICT development at health sector level

IFIP (2000) presented an approach which health sector could proceed in their attempt to adopt and use of ICT. The approach has four phases: Emerging, Applying, Integrating and Transforming phase. It is believed that the identified approaches and areas of development are in line with international trends of the use of ICT in health sector (IFIP, 2000). The summary of the phases is given in Appendix A.2.

According to the model, health sector can determine program in various areas of ICT development. The major ones identified are:quality of health service, development plans and policies, Vision, facilities and resources, professionaldevelopment for all staffs, community and assessment.

2.9.2. Rationale for using the approaches to ICT development model

The approach to ICT development model has the following imperative features for ICT integration at health system:

- ✓ It's appropriate with regard to the intended research variables identified such as ICT policy, preparedness of staff, and infrastructure requirement
- ✓ It's functional with regard to its advantage on considering the base line requirements to start ICT integration which is more related to the condition of BGRHB
- ✓ It's recently developed approach
- ✓ It's also the best model for health system
- ✓ It's synthesized from different international trends

2.10. Brief history of BGRHB's ICT

The introduction of information communication technology in BGRHB dated almost more than a decade. It was started with using basic computer applications and data processing center. The driving force the BGRHB to use ICT was increasing complexity of operations carried out by the BGRHB and ZHDs the subsequent increase in the number of lower administrative sites and health facilities. The objective of ICT case team was to perform preventive and corrective maintenance of both HW and SW, troubleshooting network, install network for BGRHB and lower level health sites, to develop different application software based on the request of BGRHB, manage health management information system and carry out different related activities.

In general the ICT officer is performing the following activities:

- ✓ Centralized business system and data processing service
- ✓ Health sector systems analysis
- ✓ Work simplification and measurement
- ✓ Office equipment and evaluation
- ✓ Preventive and corrective maintenance of HW and SW
- ✓ Forms and design control
- ✓ Managing domain controller server
- ✓ Computer hardware and software evaluation
- ✓ Programming, documentation and data control
- ✓ Training in electronic data processing systems
- ✓ Providing data processing and information services
- ✓ Supporting research activities by providing marching time actives and data processing assistance to staff members, graduates and under graduates
- ✓ Training staff members on different electronic health system, and Microsoft processing
- ✓ Installing applications software to various processes and maintaining upon request
- ✓ Assisting the finance division and the personal department by developing programs that support their activities even though it is not up to the expectation

It was reported that ICT case team has difficulties in providing even basic services for BGRHB due to the following major problem:

- ✓ The Case Team hasn't been full filled by sufficient manpower
- ✓ BGRHB is not providing appropriate training for staffs
- ✓ The installed LAN has no system documentation
- ✓ The configured DC-server doesn't have system documentation
- ✓ The installed anti-virus on all computers is a free version
- ✓ The operating system that the BGRHB and ZHDs are using is not licensed
- ✓ Lack of maintenance shop
- ✓ Most peripheral devices have a major maintenance problem because it is obsolete parts are no more available.

The researcher observed that certain developments have been detected in the widespread penetration of IT in the various Core and Support Processes, ZHDs, WoHO, and health facilities in BGRHB. A fairly large proportion of the introduced IT equipment, however, were used as standalone system to provide access to eHMIS, EMR-MRU, HRIS, EMR-ART/HIV Care Module and different applications, word processing applications and some other related office applications which necessitated large scale networking.

Moreover, through the development of large scale LAN (internet) it was believed that it could be possible to send and receive messages to and from users within or outside BGRHB.

It was also believed that the ICT case team would have broad duties and responsibilities as developing ICT strategic plan and overseeing its implementation with the following major activities:

- ✓ Developing short- and long-term ICT strategic plans to introduce and expand application of ICT at BGRHB
- ✓ Coordinating and overseeing the implementation of existing electronic health system at BGRHB's sites.
- ✓ Developing new applications in accordance with the ICT strategic plan and strategies of BGRHB

- ✓ Engaging and coordinating the fund raising activities to implement new and ongoing ICT projects at BGRHB
- ✓ Establishing linkages with potential donors, collaboration Sector and individuals, that could contribute positively to the success of ICT projects at BGRHB
- ✓ Serving as an information center on ICT-related visions, project and activities of BGRHB
- ✓ Identifying resources required to implement the projects and facilitating the acquisition of that (human resource, physical resource and infrastructure, and financial resource)

The researcher has also observed that the BGRHB has the following network facilities:

- ✓ More than 100 desktop computers
- ✓ 3Servers (Dell Power Edge)
- ✓ 1 data center or server room
- ✓ 5 Access points
- ✓ Class C IP address is using(192.168.1.0/24)
- ✓ 7 Network Switches
- ✓ Connected with the local telecom with fiber of 4MB for Woreda net
- ✓ Connected with the local telecom with copper of 2MB for Broad band internet

With these facilities, currently, the BGRHBstaffs are exploiting the potentials of ICT personally better than any other time in the history of BGRHB. The members of the professionals and administrative staffs are using ICT facilities such as eHMIS, HRIS, EMR-MRU, office computers for different office purposes and internet facilities. The BGRHB, ZHDs, WoHOs and HCs are also seen to exploit the different ICTs in different ways than never before. The professionals and the supportive staffs are using the different ICT facilities for different purposes. The researcher has also recognized that as there is no coordinated effort from the management team and all staffs to meaningfully incorporate these ICTs into the learning process. As such, the question ‘to what extent are all professionals and supportive staffs and management team are ready to integrate ICT in to the provision of health’ is not known yet.

CHAPTER THREE

METHODS OF THE STUDY

3.1. Introduction

The purpose of this study was to investigate the preparedness ofBGRHB and ZHDs to integrate ICT into the health system and to make analysis of the infrastructure that are indispensable to integrate ICT in the BGRHB, ZHDs, WoHOs and health facilities. To achieve these purposes the researcher designed the study in the following ways.

Depending on the problem of the research, a mixed research method was believed to be appropriate method of research i.e. the use of both quantitative and qualitative methods.

A quantitative research method, descriptive survey research, was believed to be crucial to make a survey of the preparednessas well asprofessionals and supportive staffs with regard to their awareness to the emerging ICTs, attitude towards the use of ICT and skills to integrate ICT into the health system. On the other hand, qualitative research was used in this research because it enable the researcher to disclose the situation of BGRHB with regard to the status of ICT use, the ICT policy and to evaluate the general setting of the BGRHB to incorporate ICT in the health system.

3.2.Participants of the study

The target populations from which the major data gathered were the health professionals and some supportive staffs, ICT officer, and the management team of BGRHBand ZHDs. The researcher demarcated the research to BGRHB and ZHDs; because the BGRHB and ZHDs are very reachable which could be typical example for need of improvement in the RHB for ICT integration into the health system.

3.3.Sampling Technique

Representatives of the target population were drawn for inclusion in the research as follows. There are 270 health professionals and 50 supportive staffs who are permanently employed in the BGRHB and ZHDs.

Using simple random sampling the sample populations of 245 staffs were drawn to distribute the questionnaires.A simple random sampling technique method was believed that the technique would enable the researcher to include all information rich samples regarding the health system of the BGRHB.

The following were the participants: head of BGRHB, D/Head of BGRHB, all Core Process Owners (Three), all Support Process Owners (five), all ZHDs heads (3), health professionals from BGRHB, and health professionals from each ZHD. Theresearcher attempted to interview the head of BGRHB but failed. The ICT officer was purposely selected for inclusion in the study because it was believed that he was resourceful in providing the situation of ICT.

Appropriate sampling technique was also employed to gather data from the staffs. It was possible to learn from BGRHB and ZHDs that there are more than 170 and 120 health professionals and supportive staffs permanently employed in the BGRHB and ZHDs. The researcher planned to distributequestionnaires papers to the management team members (Process Owners), professionals, ICT officer and Supportive staffs. 125 questionnaires filled properly and returned on time. Some of the questionnaires that were distributed to Core Process Owners (two) and to ZHDs professionals didn't returned the questionnaire papers on time. Some professionals were not included in the research because they were either on annual leave, or were out of town for site support supervision, very few of the professionals were reluctant to fill in the questionnaire because they were busy on some other jobs or tired off filling in every questionnaire which they are requested to do frequently.

3.4.Instruments

The required data was collected from the target population through interview and questionnaire (attitude scaling). Document analysis was employed to investigate the use of ICT inBGRHB and ZHDs, the ICT policy and the infrastructure facilities.

There were two interview instrumentsone for the ICT officer and the other for the management team of BGRHB and ZHDs. The interview schedules were fairly formal and semi-structures. The major purposes of the interview schedules were to gather information regarding the awareness, attitude and motivation towards the use of ICT in BGRHB and ZHDs.

The questionnaires were validated with respect of its contents, criteria related to validity, and construct validityto make sure that it accurately measures what it aims to do, regardless of the respondents and helps to collect better quality data with high comparability which reduces the effort and increase the credibility of data. Itadapted from different sample of questionnaires like from Gilmore (1998). And the adapted questionnaire was named BGRHB attitudes towards the Use of ICT (BGRHBATICT). BGRHBATICT helped the researcher to look into the attitude of the all processes owners, professionals and supportive staffs towards the use of ICT.

The questionnaire had such sections as the background sectionwhich focused on the demographic, health background and ICT use information of all staffs and the attitude section which focuses on the attitude of professionals towards the use of ICT in health system. The adapted questionnaire had 17 items. The researcher in this study checked for the internal reliability because the study was taking place in a totally different environment and there were some changes on the instruments so that it could meet the need of the research.

It was used for indicating all staffs' progress along a technology integration continuum.It was targeted toward describing behavior of innovation users through various stages from orienting to managing, and finally to integrating use of the technology. It did not focus on attitudinal, motivational, or other affective aspects of the user. The instrument was used to have a fast look at the level of staff with respect to the technology use and integration. The instrument was based on the eight levels of use defined in the levels of use chart (knezek and Christensen, 2000). The levels of use were (0) Non-Use, (I) orientation, (II) preparation, (III) Mechanical Use, (IVA) Routine, (IVB) Improvement, (V) Integration, and (VI) Renewal (Knezed& Christensen, 2000). The data gathered from this procedure strengthen the reliability of the data which was gathered through the attitude and skill questionnaires.

The questionnaire and the interview instruments were presented to monitoring and evaluation specialists in the area for evaluation of the quality of the items and the content validity of the instruments before researcher was used for gathering data. The researcher had received comments on wording of the items, redundancy of items, number of items, and relevance of items. The researcher had included the comments of the different personalities for perfecting the instruments.

3.5.Data Gathering Procedure

The questionnaires were handed to all participants. Researcher informedthe participating personnel that their participation was completely voluntaryand their responses would be treated strictly confidentially. And the researcher managed distributing the questionnaire papers by using the following mechanisms. Firstly, the researcher identified contact persons from the majority of the Processes who can manage distributing the questionnaires to their own Processes members. Secondly, the researcher distributed the questionnaires through the secretaries (very few of them were met by this method). Thirdly, the researcher himself distributed some of the questionnaires to some of the processes owners and staffs.
Knowing that some staffs were busy on some other tasks, the researcher informed staffs that they could fill in the questioner papers and return them back in 15 days.

For the interview schedule, the researcher first wrote letter of request briefing the purpose of the interview with some possible interview questions indicating the areas on which the researcher needs information and handed them onto the interviews week before the interview schedule. Together with the letter of request and possible interview questions the researcher had listed down possible interview schedules and handed them onto the interviewees so that they could choose comforTable schedule according to their free time. This first contact had helped the researcher to create personal relationship with the interviewees.

According to the agreed upon schedule the researcher made everything ready i.e. prepared every questions on single papers for easy note taking, and took with himself mobile recorder according to agreement made during the first contact. The interview was so smooth because the personal relationship was already built.

3.6.Data Analysis

The data gathered though the different instruments were analyzed by using different data analysis techniques.

The data gathered through the interview techniques were analyzed by reviewing the notes taken by hand writing and sound recorded by mobile, narrating, conceptualizing, interpreting and reflecting on key point related to the objective of the research. Data from the document analysis was analyzed by making meaning out of the document and by reflecting on related issues.

The questionnaire data was analyzed as follows: at the beginning, the questionnaire was coded and raw data were entered into epidata3.0 and SPSS21 (Statistical Package for Social Sciences). The raw data then was analyzed using frequency Tables, charts and means.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

The purpose of the study was to investigate the ICT policy of BGRHB, the Preparedness (readiness) of BGRHBfor the use of ICT and to integrate the emerging ICT into the health system and to make analysis of the infrastructure that are crucial to implement the computer based health service. Accordingly, different instruments such as interview, questioner, and checklist and document analysis were employed to gather relevant data from research participants.

4.1.Characteristics of Population

There were three groups of research participants from whom the data was collected these were: the ICT officer, the management team, Professionals and supportive staffs of BGRHB and ZHDs. An interview was conducted with one ICT officer and 4 management team members (both from Core and Support Processes), and with the top management of BGRHB. From 145 questionnaires distributed to selected staffs, 125 papers (86.2%) were filled in and returned. The characteristics of the sample population are depicted below.

The ICT officer was a Bachelor's holder in computer science. He has been working at the BGRHB as a Senior ICT Officer for the last 4 years. He also reported that he had worked in Capacity Building Bureau as a junior ICT officer before he came to the current job position in BGRHB. This showed that the ICT officer has got a good exposure and work experience on ICT areas.

TABLE 1: CHARACTERISTICS OF THE TOP MANAGEMENT AND MANAGEMENT TEAM MEMBERS

Sex	**Qualification**	**Current Job**	**Experience**
Male	BSc	Head, BGRHB	8 years
Male	BSc	D/Head, BGRHB	More than 10 years
Male	MSc	PPD S/P Owner	12 years
Male	BSc	Health and Health Related Issues C/P Owner	13 years
Male	BSc	Curative and Rehabilitative C/ P	20 years
Male	BSc	Human Resources Development S/P Owner	11 years
Male	BSc	Health Promotion and Development C/P Owner	14 years

Table 1 Shows that the two interviewed top management and 4 process owners were males. Among the Process Owners only Head of BGRHB and PPD S/P owner have MSc but the other both C/Process and S/P owners including D/Head are holders of BSc. And the Head of BGRHB is going to acquire MSc very soon. It was believed that all the management team was provided the necessary information that helps our study successfully; this because of that they do have adequate experience in health sector and know the detail situation of RHB's ICT situation. However, we also found that some management team members don't have any clue about electronic health system (HRIS, ART/HIV Care Module and HER-MRU) that implemented in the region. Apart from this, during the interview session with Health and Health Related Issues C/P Owner requested the researchera question that not included in our study us to provide some refresher training on human resources information system license module as the researcher by itself working on this project and implement the human resources information system license module as the regulatory team case was suffering from manual system to manage and provide licenses to customers.

TABLE 2: CHARACTERISTICS OF PROFESSIONALS AND SUPPORTIVE STAFFS

Characteristics			**%**
Sex	Male	117	93.6
	Female	7	6.4
	Total	125	100
Age	25-29 Years	7	13.6
	30 – 35 years	27	21.6
	36 – 40 years	43	34.4
	41 – 45 years	24	19.2
	46 – 50 years	11	8.8
	51 – 55 years	13	10.4
	55+ years	0	0
	Total	125	100
Education Level	Bachelor degree	109	87.2
	Master Degree	16	12.8
	Total	125	100
Process	Planning and Programing S/P	9	7.2
	Curative and Rehabilitative C/ P	9	7.2
	Health Promotion and Development C/P	14	11.2
	Health and health related issues C/P	6	4
	Human Resources Development S/P	7	5.6
	Public Relation S/P	4	3.2
	Finance S/P	7	4.8
	Procurement and Property Administration S/P	7	4.8
	Internal Audit S/P	2	1.6
	BGRHB, Head	1	0.8
	BGRHB, D/Head	1	0.8
	ZHDs (From Three Zones)	39	31.2
Other	NGO	19	15.2
	Total	125	100

As Table 2 shows there were more male professionals (93.6%) than female (6.4%) which is an indication for low female participation in BGRHB and ZHDs. Age wise, it is well illustrated above that 13.6% of the sample were aged between 25 – 29 years, and 21.6%, 34.4% , 19.2%, 8.8%, 10.4% and 0% aged between 30 – 35 years, 36– 40 years and 41 – 45 years, 46-50 years, 51-55 yearsand 55+ respectively. From these observations, it can be derived that more than 67% of the sample were aged between 30 – 45 years.

As a result, this demographic result revealed that more respondents had enough experience to respondwith respect to our variables that researched out.

The education level of most of the professionals and supportive staffs of the BGRHB and ZHDs was Bachelor Degree (87.2%) where as only 12.8 % were at Master Degree level.

Pertaining to the education of staffs, during the document analysis the researcher observed that more staffs were applied sponsorship application letter to human resource support process for MSc program and detected that some of them were also attending their MSc program during the summery season and sandwich program.

TABLE 3: EXPERIENCES OF STAFFS IN HEALTH SECTOR

Years of Experience	**No. of Respondents**	**%**
Under 5 years	8	6.4
6-10 years	21	16.8
11-15 years	40	32
16-20 years	36	28.8
21-25 years	13	10.4
26-30 years	7	5.6
30+ years	0	0
Total	125	100

The staffs' health sector experience of the samples was found to be varying from less than one year of health experience to 30 years. The mean of the health experience was calculated to be

15.5 years. As shown in the above Table 3 around 6.4% of the samples have experience at health sector under 5 years where as 16.8%, 32%, 28.8%, 10.4%, 5.6% and 0% 6-10 years, 11-15 years, 16-20 years, 21-25 years, 26-30 years and 30+ years respectively.

From this analysis, we can deduce that the majority of staffs (83.4%) of both professionals and supportive staffs have more than 10 years work experience in health sector at different site level. And we gratified with theirdetail information of BGRHB that provided to us during the data collection through questionnaires. That is, more staffs had a good understanding of ICTs and all electronic health applications that were implemented at RHB and ZHD.

4.2.The Relationship between the research questions and the proposed ICT integration model

From the assessment that we conducted in our research , the proposed ICT integration model considers the development of ICTs at BGRHB from the following points of view: vision, quality health service, development plans and policies, facilities and resources, professionals development, whereas the major variables of the research are awareness to the emerging ICTs, attitude towards the use of ICT, ICT policy (related to development plans and policies of the integration model), preparedness of the implementing bodies (related with the professional development of the integration model), infrastructure development (related with facilities and resources of the integration model). As such, we realized that the proposed ICT integration model associated with our basic research questions. More relationship between the research questions and major areas of ICT development indicated in the proposed ICT integration model can be shown as inAppendix A.3.

4.3.ICT policy of BGRHB

In relation to one of the purpose of this study the researcher has tried to look into the current ICT of BGRHB by interviewing different resourceful persons and by analyzing documents. It was possible to learn that there is no currently developed ICT policy document in BGRHB; it was also found that there were contradicting views about the need for ICT policy among the interviews.

The researcher presented to all interviewees the following questions:

- ✓ Is the use of ICT in BGRHB supported by policy?
- ✓ Do you believe that supporting ICT use with policy will help the improvement of use of ICT?

The interview session with the ICT officer revealed that there was no working ICT policy developed for BGRHB, only that BGRHB was on the ways of developing the ICT policy. From a document the ICT officer gave the researcher it was found that one of the mine areas of activity identified by ICT officer.

Supporting the above positive reaction to the importance of ICT policy, the Head of BGRHB after disclosing the absence of institutional documented ICT policy in the BGRHB argued that the BGRHB should have institutionalICT Policy document.

4.4.ICT Infrastructure

Looking into the infrastructure preparedness of BGRHB and ZHDs was one of the purposes of this research. The researcher raised the following question to the ICT officer of the BGRHB and the management team of the BGRHB for acquiring relevant information with regard to the above purpose:

- ✓ What ICT infrastructures are available for exploiting ICT‘s potential in the BGRHB?
- ✓ What infrastructure investigations are you encountering?

The following information had been found from the interviewees.

4.4.1. Computers

The ICT officer said that the BGRHB has lot of computers at hand and planning to deploy more infrastructures with funds obtained from external organizations. The researcher raised the following question for the ICT Officer: Do you believe the available computers at BGRHB can be enough for all staffs? And he responded that more than 90% staffs have laptop and 10% desktop computers. The management team also made clear that there were enough computers for staffs at BGRHB level. But there are scarcitiesof computer at ZHD level to deploy different applications.

Many processes owner revealed that both preventive and corrective maintenance of computers hasn't been performed regularly. Even, all interviewed management team disclosed that corrective maintenance (software, hard ware and peripheral devices maintenance) by itself couldn't carry out upon request due to the absent of sufficient human resources (IT officer) in both RHB and ZHDs. It was also found that there were many malfunctioned computers that had been located in the BGRHB's warehouse due to the lack of maintenance.

4.4.2. Network and Band Width

It was found from the interview and the researcher observed that as there is problem of network access in BGRHB to all staffs. It was also found that the current level of network access is limited virtue different reasons. That are, there was shortage of access to all professionals and supportive staffs due to the current bandwidth is insufficient to all staffs to send the reports and other related documents to the stake holders and higher hierarch sites. The bandwidth issue was a frontline goal. It was reported by the ICT officer that there was a plan that address to upgrade the connectivity issue: one with using CISCO devices and upgrading the band width itself from 2MB to 4MB at BGRHB and from 512KB/s to 1MB for all ZHDs.

4.4.3. Infrastructures problems

The interviewees identified the following as major problems of the BGRHB and ZHDs with rose to ICT infrastructure:

- ✓ Less developed ICT infrastructure such as computers and Internet
- ✓ Unbalance number of computers with the number of users at ZHDs level
- ✓ Available CISCO switch hasn't been used in the installed LAN at BGRHB
- ✓ Installed Network at ZHD has been deteriorated
- ✓ No LAN has been installed at all ZHDs
- ✓ Poor electricity or interrupted power supply in some block of BGRHB
- ✓ Untimely corrective maintenance
- ✓ Absence of preventive maintenance
- ✓ Lack of Web sites

In general, from the response the researcher found from the interview session were ambitious for use and deployment of more ICT infrastructure. All the interviewed management team disclosed that paramount longing to integrate ICT in health system for optimal utilization of the ICT infrastructure. On the other hand the reflection of the interviewees on the currently available development in ICT use and deployment of ICT infrastructure in BGRHB revealed their satisfaction.

4.5.Use of ICT by the professionals and Supportive Staffs

The other purpose of this research was to look into the preparedness of the professionals' utilization of ICT infrastructures Table 4 shows the frequency distribution of the professionals' report on their use gathered through questionnaire. From the result, it was found that all respondents (100%) used computers to carry out their daily activities.

TABLE 4: PLACES WHERE THE PROFESSIONALS AND SUPPORTIVE STAFFS USE COMPUTER

Place of use	**Responses**	**No. of Respondents**	**%**
Use at office	Yes	125	100
	No	0	0
	Total	125	100
Use at home	Yes	94	75.2
	No	31	24.8
	Total	125	100
Use at private Internet Cafe	Yes	24	19.2
	No	101	80.8
	Total	94	100
Other places	Yes	5	4
	No	120	96
	Total	125	100

Table 4 showed that those who are using computers are found to be using at different places but the majority at offices and home (100% and 75.2% respectively). Very few 4% were found to be

using computers at other places; i.e. at friends' office as specified by the respondents. 100% of the respondents indicated that they were using computers at office. This shows that significant percentage of the professionals and supportive staffs use computers formanipulating health data and assisting their report preparations; i.e. using computers for presenting their training materials, creating environment where costumers could served by using computers, and etc. On the other hand it was found that the majority of the staffs were using computers for organizing their office work (Table 8).

TABLE 5: FREQUENCY OF USE COMPUTER BY THE PROFESSIONALS AND SUPPORTIVE STAFFS

Options	**Frequency**	**%**
Daily	117	93.6
Once a week	0	0
Other	8	6.4
Total	125	100.0

The majority 93.6%) of the professionals were found to be using computers daily (Table 6) this shows that the majority of the staffs were not only using computers but also using frequently and that using ICT is becoming the culture of the professionals. On the other hand, insignificant number (6.4%) of the respondents indicated that they were using computer only twice a week. Some others not indicated the frequency at which they were using computers.

TABLE 6: FREQUENCY OF THOSE WHO OWN COMPUTERS AT HOME AND OFFICE

Place of use	**Responses**	**No. of Respondents**	**%**
Use at home	Yes	45	36
	No	80	64
	Total	125	100
Use at office	Yes	125	100
	No	0	0
	Total	125	100

As shown in Table 6 it was found that 36% of the respondents owned laptops at home where as the majority (64%) said that they owned computers at their office. This was an indication for the wide distribution of information technology particularly computers among the professionals.

The respondents were found to be using computers for different purposes. Table 7 shows that frequency of the purposes for which the professionals uses computers.

TABLE 7: PURPOSES OF USING COMPUTERS BY STAFFS

Use computer for	**Responses**	**No. of Respondents**	**%**
Organizing materials for my profession	Yes	107	85.6
	No	18	14.4
	Total	125	100
daily activities /Office work	Yes	125	100
	No	0	0
	Total	94	100
E-mailing and Chatting	Yes	75	60
	No	50	40
	Total	94	100
Reach purpose	Yes	105	84
	No	20	16
	Total	125	100
Others	Yes	8	6.4
	No	117	93.6
	Total	125	100

As shown in Table 7, the majority were using computers for organizing their material to develop the profession career (85.6%), daily activities (100), e-mailing (60%), reach purpose (84%) and others. Some of the respondents (6.4%) reported that they were using computers for music, browsing international news and playing computer games.

TABLE 8: FREQUENCY OF INTERNET USE BY THE PROFESSIONALS AND SUPPORTIVE STAFFS

Options	No. of Respondents	%
Yes	117	93.6
No	8	6.4
Total	125	100

From the date gathered through questionnaire it was found that the majority (93.6%) of the respondents were using internet. Only 6.4% of the staffs were not using internet because their tasks are not related with internet and some of them revealed that as they did not have access to the internet at their offices. That is, the installed LAN at RHB didn't consider the future expansion or there are not sufficient wall outlets (where node with crimped cable plugged in) in the office room at all processes.

TABLE 9: FREQUENCY OF PROFESSIONALS AND SUPPORTIVE STAFFS' PLACE OF USE INTERNET

Use Internet at	Responses	No. of Respondents	%
Home	Yes	35	28
	No	90	72
	Total	125	100
Office	Yes	97	77.6
	No	28	22.4
	Total	125	100
Internet Café	Yes	55	44
	No	70	56
	Total	125	100
Other places	Yes	41	32.8
	No	84	67.2
	Total	125	100

As shown in Table9 the majority of the respondents were using internet at their offices (77.6%). Some others indicated that they were using Internet at other places such as private internet cafe (44%), and home (28%). As shown in Table 6 ,36% of the respondents had shown they were owning computers at home but from Table 9 it is indicated that only 28% of the respondents were using internet at home which was an indication for though a good percentage of professionals have computers/laptop at home they were not connected to internet.

TABLE 10: PURPOSES FOR WHICH THE PROFESSIONALS AND SUPPORTIVE STAFFS USES INTERNET

Use Internet for	**Responses**	**No. of Respondents**	**%**
E-milling/sending and receiving report	Yes	98	89.1
	No	12	10.9
	Total	110	100
Internet browsing	Yes	101	92.8
	No	9	7.2
	Total	110	100
Downloading different materials and applications	Yes	78	70.1
	No	32	29.9
	Total	110	100
For social media	Yes	87	79.1
	No	23	30.9
	Total	89	100
Other purpose	Yes	27	24.5
	No	83	75.5
	Total	110	100

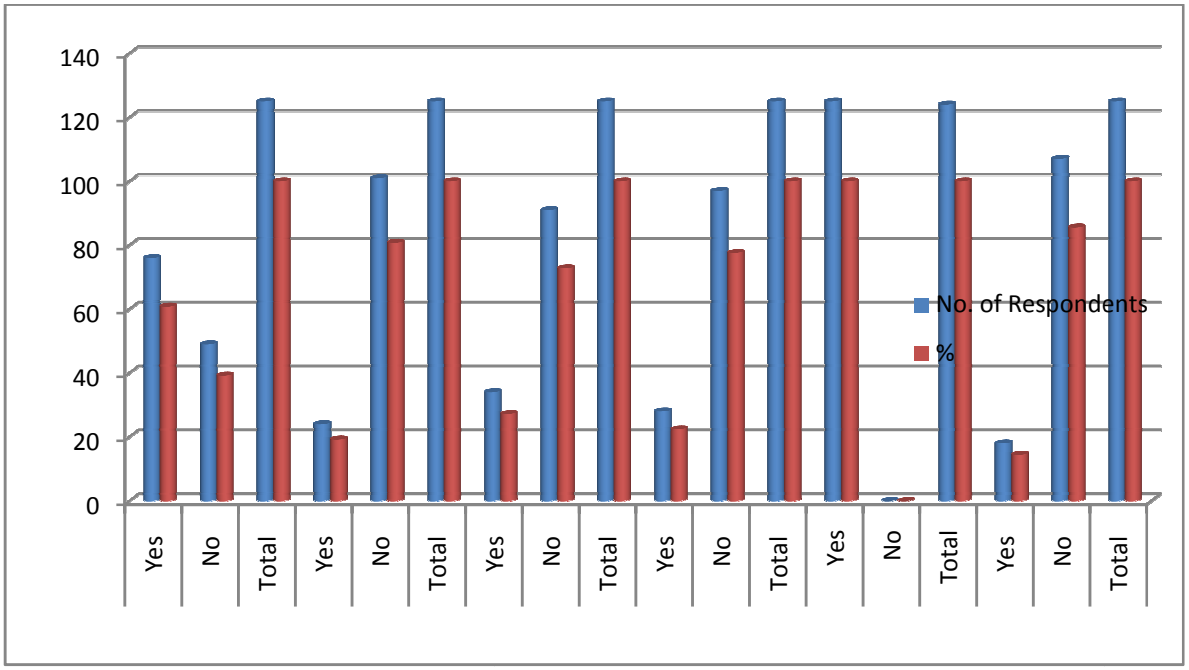
TABLE 11: PROFESSIONALS FAMILIARITY WITH COMPUTER APPLICATIONS ANDELECTRONIC HEALTH SYSTEMS

Electronic Health Systems	Responses	No. of Respondents	%
eHMIS	Yes	76	60.8
	No	49	39.2
	Total	125	100
EMR-MRU	Yes	24	19.2
	No	101	80.8
	Total	125	100
HRIS	Yes	34	27.2
	No	91	72.8
	Total	125	100
Smart Care-ART/HIV Care Module	Yes	28	22.4
	No	97	77.6
	Total	125	100
Computer Applications(Microsoft)	Yes	125	100
	No	0	0
	Total	125	100
Other applications	Yes	18	14.4
	No	107	85.6
	Total	125	100

The professionals were asked to report on their familiarity with computer applications and electronic health systems to which the following response (Table 11) was obtained. As can be seen from the Table 11, more than 60% of respondents were familiar with eHMIS. As EMR-MRU is a part of module for Smart Care application that was used for managing patient registration was not as such familiar to those professionals who were working in administrative sites like BGRHB and ZHDs as the application is used at health facilities level (hospital and health centers). So, we can comprehend that only 19.2% staffs were accustomed with this module. Pertaining to HRIS, only those staffs that are working in HRD S/P, ZHDs HR officers and few staffs among the respondents (27.2%) were familiar with this

application. And as the age of the implementation of Smart Care-ART/HIV Care Module in BGRHB is not more than a year no significant respondents (22.4%) were familiar with this module.

As can be seen from the Table 11, all of the respondents (100%) reported that they were familiar with Microsoft applications. Few (19%) of the respondents responded that they were familiar with one or more of the following electronic health systems: eHMIS, EMR-MRU, EMR-ART/HIV Care Module, HRIS, and other applications.



GRAPH1: PROFESSIONALS FAMILIARITY WITH COMPUTER APPLICATIONS AND ELECTRONIC HEALTH SYSTEMS

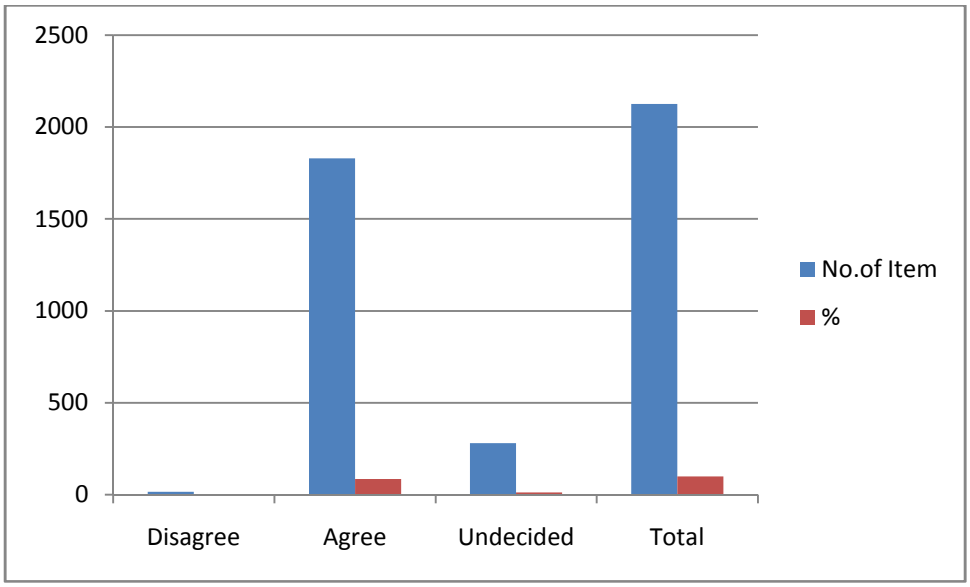
Generally, the majority of the staffs were not found to be using electronic health systems**.** It was also found that the large parts of the professionals were using electronic health management system. Because this application is implemented at all administrative sites (RHB, ZHDs and WoHOs) and health facilities(hospitals and health centers) and more staffs have taken the training of this application. On the top of every thing, all health sites are using only this application to enter health data, manipulating or analyzing the entered health data based on the selected indicators, generate the required report (weekly, monthly, quarterly and annually) and send the generated report to the higher hierarchical site.

4.5. Staffs Attitude towards the Use of ICT

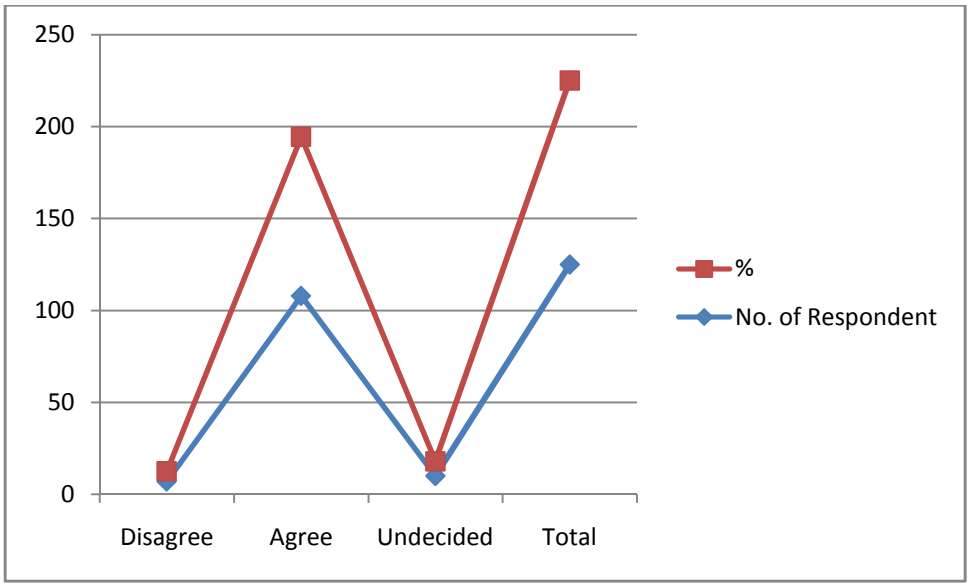
One of the major purposes of this research was to investigate the attitude of the professionals towards the use of ICT or preparedness of the professionals with regard to attitude towards the use of ICT. To achieve this purpose, the researcher used an attitude questionnaire which was prepared to measure attitude on three point scale (2=Agree, 3=undecided, 1=disagree). The questionnaire contained 17 items. Table 13 shows the frequency of the sum of the scores of the respondents on the 17 items.

The survey revealed that there was awareness of ICT in BGRHB. However, some respondents were uncertain of potential ICT benefits provided to their daily activities. 54.3%% of respondents thought a minority of staffs would receive the benefits of ICT use. The respondents revealed that several themes regarding the attitude towards the use of ICT in BGRHB. Positive attitude to ICT included themes of saving and time, easier health data access, cost saving, and improved communications.

GRAPH 2: ATTITUDE SCALE Vs. NO. OF SELECTED ITEMS



GRAPH 3: ATTITUDE SCALE Vs. NO. OF RESPONDENTS



As the graph 2 shows that from the total of 2125 agreeof attitude scale to be selected by all respondents (125), 1830 (86.12%) agree have been selected. 280 (13.1%) undecided and 15 (.7%) disagree attitude of scale were selected. The majority of the respondents to every attitude item agree. And it showed that total of each attitude scale (2125) who selected agree to every attitude item is large.

Graph 3 shows that total of the respondents who selected agree at least once to every attitude item is 108 (86.4%). 10 (8%) of respondents selected undecided and only 7 (5.6%) of respondents selected disagree.Subsequently, this result revealed that more respondents have selected agree or more agree has been selected by large number of respondents. So, the above graphs are an evident to conclude that the professionals and supportive staffs had a positive attitude towards the use of ICTs.

Level of Use of ICT

The level of use of ICT by the BGRHB and ZHDs staffs was investigated by the use of CBAM-LoU. As the concept of ICT is a new innovation, the instrument was used to have a fast observation in to how the staffs rate their level of Use of ICT as an innovation. The levels of Use were: Non-Use (0). Orientations (1), Preparation (2), Mechanical Use (3), Routine(4), Improvement (5), Integration (6) and Renewal (7).

Further definition for the different levels where given as follows:

Level 0: Non-Use

I have little or no knowledge of information technology in health, no involvement of it, and I am doing nothing toward becoming involved

Level 1: Orientation

I am seeking or acquiring information about information technology in health sector.

Level 2: Preparation

I am preparing for the first use of information technology in health sector

Level 3: Mechanical use

I focus most effort on the short-term day-to-day use of information technology with little time for reflection. My effort is primarily directed toward mastering tasks required to use the information technology.

Level 4A: Routine

I feel comforTable using information technology in health or its consequences.

Level 4B: Improvements

I vary the use of information technology in health to increase the expected benefits within the office I am working on using information technology to maximize the effects with my staffs.

Level 5: Integration

I am combining my own efforts with related activities of other staffs and colleagues to achieve impact in the office.

Level 6: Renewal

I reexamine the quality of use of information technology in health sector, seek modification to present innovation to achieve increased impact, observe new developments in the field, and explore new goals for myself and my health sector.

TABLE 12: LEVEL OF USE OF ICT BY THE PROFESSIONALS AND SUPPORTIVE STAFFS

Level of Use of ICT	**No. of Respondents**	**%**
Non use	13	7.4
Orientation	19	17.0
Preparation	7	7.4
Mechanical use	14	20.2
Routine	53	31.9
Improvement	6	1.1
Integration	7	7.4
Renewal	6	7.4
Total	125	100.0

As shown in Table 12, the professionals were varying found in different level of use. A good percentage of the professionals leveled themselves using ICT routinely (31.9%), some (20.2%) of the professionals were found at the mechanical use level. The others were distributed almost similarly across the levels of non use (7.4 %.),integration (7.4%) and renewal (7.4%) stated in a different way, 84.1% of the professionals where found at levels of Non use to Routine use.

4.6.Training of Staffs on electronic health system (applications)

An attempt was made to investigate the health staffs received any training on ICT application and electronic health system from the BGRHB and ZHDs. The researcher presented the following questions to the interviewees:

Are the health staffs given any training on ICT?

What skills and ICT preparedness do you think the professionals own?

The information from the ICT officer and the management team showed that the professionals were given no adequate on electronic health systems training except that a very few professionals

from the Health Development and Promotion C/P, Health and Health Related C/P, PPD S/P and HRDS/P frequently took electronic health system training. The researcher also observed that months before the BGRHB has no training center. However, the part of the questioner presented to staffs to clarify whether they did get training or need more training on the following electronic health systems. And the following result was found from the process (Table 15).

TABLE 13: PROFESSIONALS' TRAINING ON ELECTRONIC HEALTH SYSTEMS

Electronic Health Systems	**Responses**	**No. of Respondents**	**%**
eHMIS	Yes	75	75
	No	55	25
	Total	125	100
EMR-MRU	Yes	35	28
	No	90	72
	Total	125	100
HRIS	Yes	20	16
	No	105	84
	Total	125	100
Smart Care-ART/HIV Care Module	Yes	14	11.2
	No	111	89.8
	Total	125	100
Other Applications	Yes	30	24
	No	95	76
	Total	125	100

Table 13 shows that, 75% of the respondents took training of eHMIS. This is because of that all BGRHB's processes and ZHDs are using this application. That is, this application was already implemented in all ZHDs, WoHOs and 38 HCs. And 28% EMR-MRU, 16% HRIS, 11.2% Smart Care-ART/HIV Care Module and 24% other applications like Enat plus System was taken.As a result of the professionals were given no adequate training on electronic health systems, the time taken to fix the problem of the listed applications at zonal health departments, woreda health offices and health facilities

was too long (untimely corrective maintenance or repair) as the structure of ICTs is only constrained at RHB. That is, there is no ICT officer at the aforementioned health sites.

TABLE 14: PROFESSIONALS WHO NEED MORE TRAINING ON ELECTRONIC HEALTH SYSTEMS

Electronic Health Systems	**Responses**	**Frequency**	**%**
eHMIS	Yes	85	68
	No	40	32
	Total	125	100
EMR-MRU	Yes	113	90.4
	No	12	9.6
	Total	125	100
HRIS	Yes	91	72.8
	No	34	27.2
	Total	125	100
Smart Care-ART/HIV Care Module	Yes	103	82.4
	No	22	17.6
	Total	125	100
Other Applications	Yes	60	48
	No	65	52
	Total	125	100

In general, the investigation into the training of the professionals revealed that there was no meaningful and adequate training given to professionals and supportive staffs. It was also found that the majority of professionals and supportive staffs indicated that they need more training on electronic health systems. Moreover, the IT officer disclosed that there was no training provided on server configuration (DC, DHCP, fileserver, ISA and etc), CCNA, CCNP, and data base. As a result he revealed that he confronted problems to manage the available infrastructures.

CHAPTER FIVE

DISCUSSION

The major goal of this research was to investigate the preparedness of BGRHB to integrate ICT into health system and to make the analysis of the infrastructure that is essential to implement the computer based health services. In this section a discussion on the main objective of this research will be made based on the results and the review of the literature. The level of every components of ICT integration at BGRHB and ZHDs will be dealt with in relation to the proposed ICT integration model.

5.1. ICT Policy of BGRHB

It was documented in the literature review that ICT policy is unavoidable component of ICT integration at RHB. Successful introduction of any technology or any innovative way of doing things better in the health system depends to large extent on an enabling policy environment coupled with a well structured and logical implementing of framework. However, the results of the interview with different management bodies, ICT officer, and the result from the document analysis showed that BGRHB has no developed and documented ICT policy. This result was consistent with Dawit(2006) who indicated that one of the factors that affected the use of ICT in the health sector was the absence of ICT policy documented. Though there was no ICT policy documented in the BGRHB and ZHDs, a couple of the major elements that ICT in health policy should address as proposed by Naido (2003) such as procuring and installing the technology , and staffs to use ICT were practiced to some extent in the BGRHB.

Pertaining to the future plan of BGRHBICT policy document was concerned, it was possible to learn that one of the main activities scheduled for 2016/2017 by the ICT Team case was developing ICT policy document. It was noted on the action plan as below: ICT team case has been looking at a number of ICT policies from various sources upon which to model its own.

5.2. ICT Policy of BGRHB in light of the proposed integration model

In the proposed ICT integration model it was documented that the development plans and policies referee to the detailed steps of how the vision and philosophies are carried out.

Plan, goals and objectives are further defined provide temporary long term targets. Polices are set, budget is allocated, facilities are dedicated, roles are defined, tasks are delegated, and an evaluation plan is produced to define the direction ICT development will take. It was also indicated in the document that the BGRHB at the beginning stage of ICT development, emerging phase has no policies or has restrictive policies (Appendix A.4). Depending on the findings of the case of BGRHB was that ICT policy document was non-existent. So it could be concluded based on this result that BGRHB was found at the first level of the proposed ICT integration model, the emerging phase

5.3. Preparedness of BGRHB and ZHDs to integrate ICT

It is not controversial that when there is no an innovation, prepared bodies are required for implementation of the innovation. As ICT is an innovation, it requires some level of preparedness/readiness from the implementing bodies. A survey of different literatures show that the implementing bodies need to be ready in terms of awareness, attitude, skill, and the availability of the crucial infrastructure to integrate ICT into the health system. Related with this, successful implementation of ICTs needs to address five interlocking frameworks for change. The infrastructure, attitude, staffs development, support(technical and administrative) and also sustainability and transferability.

5.3.1. Administrative Preparedness of BGRHB and ZHDs

A look into the readiness of the administrative bodies of BGRHB revealed that they had a positive attitude towards ICT, all of them sought to exploit the potentials of ICT in their offices as well as in the health system. What was observed during the interview session with the different management bodies at BGRHB was that almost all of them had a strong exclusion to see ICT fully integrated into the health system. This finding showed that though ICT is not fully integrated into the health system of BGRHB and ZHDs; but there is a fertile ground from the administrative bodies to welcome ICT into the health system. This in turn requires that one of the most critical factor for successful implementation in any health sector. It is not actually a worry in the BGRHB and ZHDs as the administrative were very welcoming to the ICTs.

5.3.2. Preparedness of Staffs for the use of ICT in BGRHB and ZHDs

The researcher has also found out that the health professionals of BGRHB and ZHDs have positive attitude towards ICT in health system .The professionals are the main implementing bodies of any innovation, in this case regard to awareness, attitude and skill to integrate ICT in the health system. The results of this showed that the professionals had some level of readiness with regard to the main components of ICT integration in health system. A look into perception of the BGRHB staffs towards their skills in different computer applications revealed that they had a promising level of understanding. As the preparedness of staffs can be articulated in the use of ICT; that is, currently a number of professionals have been using electronic health systems for their daily activities to be carried out like to generate report and analysis of the report for the decision making based on the analysis.

5.3.3. Infrastructure Preparedness

It is unarguable that BGRHB need to deploy appropriate number of ICT infrastructures to exploit the potentials of ICT. Accordingly, the findings from the interview with the different management bodies revealed that currently there were enough computers for all professionals and there is no suiTable design and installed of local area network in RHB and ZHDs. Even though there is a ground fertile to the emerging ICTs, there was no plan to upgrade the installed network or reinstall the network at RHB. And the researcher observed that there was no installed network at all ZHDs.

From the researcher observation and interview with the ICT officer showed that the current infrastructure of the BGRHB was only serving the professionals and supportive staffs and some few NGO staffs. The majority were using these ICTs only for e-mail and internets. The network and band width facilities that currently own by BGRHB were found to be very limited (2MB for broad Band and 4MB for Woreda Net). Interview with ICT officer and document analysis of action plan of ICT team case showed that the current level of access was limited to a few staffs. This was an indication for the presence of shortage of wall outlets in each office room. That is, the installed LAN that connected with external network (WAN of ethio Telecom) didn't contemplate the future expansion. It was also found that the following were the major infrastructure constraints predominant to BGRHB:

- ✓ Less developed ICT infrastructure such as installed LAN
- ✓ No developed system documentation for the installed LAN and configured server; as a result it lets complex to maintain it.
- ✓ Frequent failure of switches and Wi-Fi devices
- ✓ Network problem (low bandwidth for Woreda Net and Broad band Internet)
- ✓ Frequent interruption of internet
- ✓ Poor electricity in some building block absence of maintenance
- ✓ Absence of support system

5.4. Preparedness of BGRHB and ZHDs in relation to the proposed ICT

Integration model

The proposed ICT integration model makes clear that administrator and staffs at the beginning of ICT development, emerging phase, are just starting to explore possibilities and consequences of using ICT for BGRHBmanagement and adding ICT to the health system. It is also characterized by staffs' use of different electronic health systems, locating information on the internet, communicating with different sector, stakeholders, friends and family by e-mails. Findings from current survey of the situation of BGRHB and ZHDs resembled the characteristics of a typical health sector at the emerging phase of ICT development. All staffs had reported that they were using computers and internet for different purposes. Such as, for organizing materials that will help for the development of their career (85.6%), daily activities /office work (100%), E-mailing and Chatting (60%), Reach purpose (84%) and others (6.4%). This indicates that the BGRHB and ZHDs staffs were exploring ICT by trying to develop ICT applications. These observed that the objectives of staffs look like the behavior of staffs at the emerging phase of the proposed ICT integration model.

Findings from the Concerns Based Adoption Model–Level of use (CBAM-LoU) of the innovation showed that some 20.2% of the staffs were at the level of mechanical use and routine (31.9%) use which indicates focusing most effort on the short term, day-to-day, use of ICT with little time for reflection, and effort. The characteristics of BGRHB and ZHDs' use of ICT resemble staffs at the emerging phase of the proposed ICT integration model (Appendix A.1, 2, 3).

It was also apparent from CBAM-LoU that the majority of staffs were found at the first five levels, Non-Use to Routine Use, of the adoption level which shows the staffs were only trying to personally explore the different ICT apart from use in the office. And very few professionals were found at a different level of the proposed ICT integration model, applying or less probably transforming.

The proposed integration model shows that health sector at the beginning of ICT integration, emerging phase, begin to purchase or have had donated some equipment for both professionals and supportive staffs own a few isolated stand-alone computers and printers in the BGRHB office and the current situation of BGRHB and ZHDs of health system seem to resemble the above sector characteristics. It deployed some computers for the staffs and administrative use.

One of the components of integration model the professional component of BGRHB staffs, suggest that BGRHB at the emerging phase of integration model have the following characteristics:

- ✓ Health service provision and ICT training will emphasis the need to acquire a limited range of electronic health applications/software to provide health service and for administrative purpose. Individual members of staff will identify their training needs, generally, restricted to technical training. The ICT development plan will identify training separately from other health sector and professional development.

The above description of typical health sector at the emerging phase of the proposed ICT integration model seems to be similar to the situation of the BGRHB in that the professional development of the BGRHB staffs were given training or acquired training on only in some of electronic health applications such as eHMIS, HER/EMR, HRIS, Smart Care –ART/HIV Care Module, Microsoft and etc.

More illustration of the comparison between the proposed integration models and the current situation of BGRHB is given in Table 17.

TABLE 17: COMPARISON OF BGRHB WITH THE ICT INTEGRATION MODEL

Phase	Proposed Integration Model	BGRHB
Emerging	✓ Health sector begin to purchase , have had donated , some computing equipment and software	✓ BGRHB is purchasing and has been donated computers staffs, administrative offices, and for other programs
	✓ Involves staffs own personal use of ICT, such as using Microsoft to prepare worksheet electronic health systems to manipulate health data and generate report. Finding resources external storage or media or on the internet, communicating with family and friends by e-mail	✓ The majority of the staffs have found to be using Microsoft and some electronic health systems, e-mail and internet.
	✓ Health facilities are still firmly grounded in traditional, manual system	✓ The current health service provision at all health sites is manual system.
	✓ Patients doesn't access their history at health facilities or only through the MRU staffs	✓ Customers' access to ICT of BGRHB is limited except for some stakeholders
Applying	✓ A new understanding of the contribution of ICT for the learning has developed	✓ A very routine and mechanical
	✓ Administrators and staffs use ICT for tasks already carried out in health sector management.	✓ The administrative office are using ICT for administrative purpose, the majority of staffs are using computers for organizing their materials, research, and communication.
	✓ Staffs access to technology or internet is mainly through own computers	✓ Access is very limited to some staffs
Integrating	✓ Range of technology in health sites and	✓ It is not as such applicable to

	administrative offices ✓ Total access to staffs so that they can choose research areas and ICT tools to simplify the complex manual tasks and demonstrate their health knowledge	BGRHB
Transforming	✓ Health sector use ICT to rethink and renew their organization in creative ways ✓ ICT becomes an integral though invisible part of daily personal productivity and professional practice ✓ Staffs' access to technology is broad and unrestricted	✓ This phase is also not applicable to BGRHB

In general, the survey of the different characteristics of BGRHB with regard to the different components of ICT integration according to proposed integration model exemplify characteristics of typical health sector found at the beginning phase of ICT integration model , Emerging phase which looks for further commitment from the BGRHB (Management team and both professionals and supportive staffs) to focus and coordinate their energy institutionally to meaningfully integrate ICT into the health system of the region.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

The purpose of this research was to investigate the ICT policy and preparedness of BGRHB in terms of attitude towards the use of ICT, awareness to the emerging electronic health systems, skill and infrastructure to integrate ICT into the health system of BGRHB. To achieve this purpose, the following guiding questions were raised at the beginning of the study:

1. What does the preparedness level of BGRHB look like with respect to awareness to the emerging electronic health systems, attitudes towards the use of ICT, skills of the management team and staffs, and the ICT infrastructure?
2. What are the human and infrastructures resources available and lack in the BGRHB to make the health system ICT based?
3. How ready are staffs in the BGRHB to adopt electronic health systems?

To answer these basic questions an attempt was made to investigate what research says about the objectives in point. It was found from different studies that ICT integration at health Sectors require development of comprehensive ICT policy, preparedness of the implementing bodies in terms of their attitude towards the use of ICT, awareness to emerging ICTs, and skill in the use of ICT applications and together with other. It was also found from the previous studies that development of various emerging ICT infrastructures at the health sectors for use by administrative workers, and professionals is an integral part to the ICT integration at health sector.

6.1. ICT Policy of BGRHB

It was found that the BGRHB has no institutionally developed ICT Policy document. The researcher observed that one of the main activities scheduled for 2016/2017 by ICT Officer was developing ICT policy for BGRHB. The absence of ICT Policy in BGRHB seems to reach a meaning fully use of ICT in the health service provision.

6.2. The preparedness of BGRHB to integrate ICT in to health system

The following were findings associated with the preparedness of the BGRHB:

- ✓ It was found that though the ICT was not currently successfully integrated into health system of BGRHB, there was a fruitful ground from the administrative bodies to welcome ICT into the health system.
- ✓ The researcher observed that the management team has a positive attitude towards ICT.
- ✓ Both professionals and supportive (100%) staffs were using computers and internet(91%). It was also found that the majority of the professionals use the ICT facilities at offices. About 52.2% the respondents had computers at home whereas the majority (89.5%) had at offices. the majority (93.4%) of the professionals were found to be using commuters daily (Table 6).
- ✓ The majority of the professionals said that they were using computers for organizing their health materials (85.6%), daily activities /office work (100%), research purpose (84%), e-mailing (60%).
- ✓ All of the professionals who reported that they use computers for different electronic health systems were also familiar with Microsoft processing. The majority said that they were good or very good or excellent in electronic health system (Table 13).
- ✓ A good percentage of the professionals said they were very good at electronic health system and Microsoft package. Some of the professionals were reported to have no exposure to electronic system.
- ✓ About 60.8% of the professionals said they were good at eHMIS.
- ✓ Almost half of the professionals were reported to be never used the electronic system like HRIS and Electronic Medical Record (EMR) system.

6.3. ICT infrastructure of BGRHB and ZHDs

It was found that the current ICT infrastructures were only serving the professionals, administrative offices and some NGO staffs. Access to ICT infrastructure by the staffs was found to be a serious problem. It was found that there were plans to deploy more ICT infrastructures by availing a number of computers in the BGRHB and ZHDs so that staffs could access them easily.

The following were found to be infrastructure related problems in the BGRHB and ZHDs:

- Less developed ICT infrastructure such as computers and internet
- Unbalanced number of computers with the number of users
- Installed LAN of BGRHB is deteriorated; because the network materials that were used during the installation are as follows:
  - ✓ UTP cable with Cat-5 and half cooper
  - ✓ Manageable switch wasn't used
  - ✓ Active directory domain controller is not functioning and has no UPS
  - ✓ Data center/server room hasn't been well organized and has no AC
- Network problem (low bandwidth)
- Active directory domain controller and file server become idle
- Poor electricity in some buildings
- Absence of timely corrective maintenance
- Absence of support system

6.4. Training on electronic health systems

It was reported by the management that there were no meaningful training provided for all staffs on all electronic health applications. On the other hand, the information from professionals revealed that only 60.4% of them received training on eHMIS. In general, the researcher identified that the provision of training on the available electronic health system is very crucial as it is a very important part for the integration of ICT in health system.

6.5. BGRHB and ZHDs and ICT integration model

A look into major variables of this research, i.e. ICT policy, Preparedness of professionals with respect to their awareness, skill use and attitude, and the development of ICT infrastructure in relation to the proposed ICT integration model show that the BGRHBwas found to be exhibiting typical characteristics of health sector at the emerging phase of the ICT integration model both as a sector and staff.

6.6. Conclusion

The survey of the Preparedness of the professionals and supportive staffs revealed that the majority of professionals and supportive staffs were using computers and internet and a few professionals were also using electronic health system. These findings show that the using ICT is becoming the culture of health professionals and supportive staffs in BGRHB. In addition to this, the positive attitude of administrative bodies and staffs towards ICT established during the study suggest that there is a fertile ground for ICT integration at the BGRHB.

The promising usage of eHMIs, HRIS, Smart Care-ART/HIV Care Module, Electronic Health Record-Medical Record and other electronic health applications, e-mailing and browsing internet suggest that professionals and supportive staffs are somehow aware of the basic ICT and it seems that they are ready to use these ICTs (eHMIS, EMR, Smart Care-ART Module, HRIS and other electronic health applications) in health environment or in the learning area. It should be clear that, however, that these findings are not a guarantee to conclude that BGRHB's staffs are ready to successfully integrate ICT in to the health system as the whole business of successfully integrate ICT integration goes beyond these i.e. staffs need to have skills and confidence in more advanced ICT applications such as electronic health applications, Tele medicine, Tele education, full electronic health record , Electronic Community Health Information System , Mobile Health ,Electronic Logistic Management Information System,Electronic Laboratory Information System , Electronic Regulatory Information System , and much more new emerging ICTs as ICTs are emerging all the time.

The lack of access ICT infrastructure to the majority of the BGRHB staffs has hindered ICT integration at the BGRHB. This suggest that the deployment and development of more ICT infrastructure at the BGRHB. Moreover, the current under modified LAN and low band width facilities propose the need for upgrading the network and band width facilities.

This suggests that the use of emerging ICT at the BGRHB was guided by undocumented intention, actions, and individual interest rather than organizational policy document. On the other hand, the fact that, the BGRHB was planning to develop ICT policy propose the BGRHB's initiation a meaningful use of ICT in BGRHB and needs to be strengthened.

The finding that indicated the BGRHB at the emerging phase of the proposed ICT integration model suggests that the BGRHB needs to perform hard to meaningfully integrate ICT into

health system so that the transition to the next phases: applying, integrating, and transforming phases would be facilitated.

6.7. Recommendations

The current practice of the administrative and professionals of BGRHB and ZHDs of health in ICT use should be encouraged and maintained with increasing intensity in addition.

- ✓ Based on analysis that we made for the data gathered through the interview techniques by reviewing the notes taken by hand writing and sound recorded, narrating, conceptualizing, interpreting and reflecting on key points that related to the objective of the research, the BGRHB and ZHDs should build up the awareness to the emerging ICTs or electronic health systems by setting up different ongoing and extensive training. It needs to provide hands on practice and training to the professionals on more advanced and new emerging ICTs such as eHMIS, HRIS, HER/EMR, Tele medicine, Tele education, full electronic health record, Electronic Community Health Information System, Mobile health, Electronic Logistic Management Information System,Electronic Laboratory Information System, Electronic Regulatory Information System and new emerging ICTs as new ICTs are emerging every time.
- ✓ The BGRHB and ZHDsshould deploy more ICT infrastructure if it needs to make ICT an integral part of the health system. It should also upgrade the network and bandwidth facility which needs more budgetary commitment, if ICT is to be successfully integrated into the health system. It should also be clear that deployment of the different ICT infrastructures without taking into consideration the staff development to use these infrastructures means simply wastage of resources. So, it is mandatory to train the professionals across with deploying the ICT infrastructures and training staffs are non-stop processes as new ICT are always emerging.
- ✓ The BGRHB should develop working ICTpolicy document which guides the meaningful and planned use of ICT at the BGRHB.
- ✓ The professionals should also continue using and exploring the emerging ICTs or electronic health systems and be ready to upgrade themselves with regard to ICT capability. They should also accept ICT as an innovation if ICT is going to be parts and packages of the training.

- ✓ The BGRHBis recommended to use the proposed ICT integration model which depicted in Appendix A.1 to A.3 for regularly checking and determining the stage of ICT development in varies areas such as provision of health service, vision, training provision, development plans and policies and resources, understanding involvement and assessment.
- ✓ Based on the results of this study, we also recommended that the BGRHB and ZHDs must work within the context of its own system to fit choices to what best suits its own health system unique situation and processes.

Lastly, more studies need to be conducted in ICT integration at the BGRHB and ZHDs incorporatingmore factors in ICT integration such as electronic health applications integration, staffs' readiness, support system, and ICT content development, self-efficacy in the use of ICT, the role of ICT in automating all health facilities' manual systemand the role of ICT in administrative health sites.

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Appendices

Appendix A: Tables

APPENDIX A.1: SUMMARY OF APPROACHES MODELS FOR PROFESSIONALS DEVELOPMENT

Phase	Staff Development
Emerging Phase	✓ The focus is on to technical functions and use of ICT and on the need for some knowledge and representation of the impact of ICT systems as a whole ✓ Involves staffs own personal use of ICT, such as, the use of electronic health systems to encode health to the system, manipulate this data and analysis and finally generate the required reports for the decision making.; finding health resources on the internet, communicating with friends and family by e-mail ✓ Staffs are developing their ICT knowledge, learning how to apply ICT to range personal and professional tasks. The emphasis on training to a range of tools and applications and increasing their awareness of the opportunity for applying ICT to their professionals in the future.
Applying Phase	✓ The staffs use ICT for professional purpose, focused on improving health service to become able to enrich their own ways of providing health service with a range of ICT applications ✓ Involves the staffs integrating the ICT to each health department , using ICT to support their own training and professional development ✓ Staffs have confidence in a number of common and particular tools that can be applied to the health system. The opportunity to apply ICT in all provision of health services is often limited by the lack of ready access to ICT facilities and resources, hence it is not fully integrated in to all departments of health sites
Integrating Phase	✓ ICT integrates in all aspects of professionals life to improve the quality of health service and managing of health service endowment ✓ Integrated ICT supports active and creates staffs , able to propose and manage the provision of health service ✓ Staffs are fully integrating ICT in all aspects of their professionals life to improve their own learning ✓ ICT is not a problem, it is an opportunity.

	✓ Support/resources persons are very important
Transforming Phase	✓ Staffs need not to be convinced of the value of ICT personally and professionally. Staffs will expect continuously changing to provide health services that were designed to meet the quality of health service objectives.

APPENDIX A, 2: SUMMARY OF APPROACHES TO ICT DEVELOPMENT

Emerging stage	• The beginning stages of ICT development • Institution begin to purchase , or have had donated some computing equipment and software • Administrators and staffs are just starting to explore the possibilities and consequences using ICT for health sector management and adding ICT to the health system. • Health sectors are still firmly grounded in traditional professionals-centered-health service provision • Health sector provides discrete time period for each health department
Applying stage	• A new understanding of the contribution of ICT to health sector has developed • Administrators and professionals use ICT for tasks already carried out in health sector management • Professionals largely dominate the health environment • Health sector adapt the program in order to increase the use of ICT in various health areas with specific tools and software
Integrating Stage	• Health sector now has a range of technologies both in OPD, IPD, laboratories ,and administrative offices • The health sector staff explores new ways in which ICT changes their personal productivity and professional practice • Professionals access to technology enables them to choose projects and ICT tools to learn and demonstrate their knowledge across subject areas
Transforming Stage	• Health sector use ICT to rethink and renew organization in creative ways • ICT becomes an integral though invisible part of daily personal productivity and professional practice • ICT is taught as indispensible in health sector at the professional level and is incorporated into all health areas

APPENDIX A.3: RELATIONSHIP BETWEEN THE RESEARCH QUESTIONS AND THE PROPOSED ICTINTEGRATION MODEL

Research Question	**Areas of ICT development**	**Applications**
What does the preparedness level of BGRHB look like with respect to awareness to the emerging electronic health systems, attitudes towards the use of ICT, skills of the management team and staffs, and the ICT infrastructure?	• Professional development of BGRHB and ZHDs staff • Attitude of staffs to provide health service • Facilities and resources in BGRHB • Assessment	• Emerging • Applying • Integrating • Transforming
What are the human and infrastructure resources available in the BGRHB to make the health system ICT based?	• Professional development of BGRHB and ZHDs staff • Attitude of staffs to provide health service • Facilities and resources in BGRHB • Assessment	• Emerging • Applying • Integrating • Transforming
How ready are staffs in the BG BGRHB to adopt electronic health system?	• Professional development of BGRHB and ZHDs staff • Attitude of staffs to provide health service • Facilities and resources in BGRHB • Assessment	• Emerging • Applying • Integrating • Transforming

Appendix C: Interview Questions for the ICT Officer

1. Please briefly describe your background and current job?
2. Do you believe ICT will be an enabler in the BGRHB? And why?
3. What is the major goal of your office with regard to ICT?
4. How do you think ICT will help in the learning process of the BGRHB?
5. What are you past achievements with regard to the use of ICT in BGRHB?
6. Do you have any policy support for the use of ICT in the BGRHB? Do you believe policy will help the betterment of the use of ICT in BGRHB?
7. Does the BGRHB have ICT Policy? If yes, what are the strengths and weakness of the policy?
8. What deliverables are available for enhancing ICT use in the BGRHB?
9. How many computers do the BGRHB own?
10. How you judge the connectivity level of the BGRHB? What is the size of band width?
11. How many of the computers are connected to the internet?
12. Do you believe the current available infrastructure is enough to make the whole BGRHB computer based?
13. What infrastructural problems are your offices encountering?
14. Do you have enough support funds from the BGRHB or NGO?
15. Other comments?

Appendix D: Interview Questions for Management Team

1. Please briefly describe your current background and job?
2. Pertaining to the ICT, what are the major goals of your Office?
3. How are you planning to achieve the ICT goals? Do you incorporate in BGRHBannual action plan?
4. Do you believe ICT will help in achieving BGRHB goals?
5. How do you think ICT will help BGRHBto provide quality health service?
6. What are the most important contributions of ICT in BGRHB and ZHDs?
7. What are the available infrastructures of ICT in BGRHB?
8. What other ICT infrastructures do you believe you lack and need to deploy in the future?
9. Is the ICT use in BGRHB and ZHDs in health system supported by policy?
10. Do you believe that that supporting ICT use with policy will help better use of ICT?
11. Are health professionals given training on the available electronic health systems?
12. Do you believe that the professionals are aware of the role of ICT in health system?
13. What skill preparedness do you think your staffs own?
14. What are the Past achievements with regard to the use of ICT in health system of the BGRHB?
15. What are the future plans of BGRHB with regard to the integration of ICT in health system?

BGRHB and ZHDs Attitude towards the use of ICT Questionnaires

The purpose of this survey is to gather general information concerning knowledge of skill and attitudes toward the use of ICT especially in the health service delivery environment of the staffs of BGRHB and ZHDs.

NOTE: ICTs stands for any of the emerging technologies such as electronic health systems or applications, computers, internet, peripheral devices, networks, and etc.

Direction: The Questionnaire has the following major sections:

1. Background Information
2. ICT use and Skills
3. Attitude towards the use of ICT
4. Technology adoption level

Please respond by putting **(x)** mark or by writing your responses on the space provided where applicable.

SECTION ONE: BACKGROUND INFORMATION

1. Age:25-29___30- 35___31-35____36-40___41-45___46-50__50+_____
2. Education level: Diploma___ Bachelors Degree ___Masters Degree_____
3. Gender : Male ____ Female _____
4. Process:_____
5. Work experience in health sector:_____

SECTION Two: ICT Use and Skills

6. Do you use electronic health system/applications? ___yes____ No
7. If answer to item no.6 is No, why?

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8. If your answer to item no .6 is yes, where do you use health system/applications?
   Home _____ office _____ other (specify)_____
9. How often do you use computer?

_____daily _____ once a week _____once a moth _____ other (specify)

10. Do you own a computer at home yes ___ No___

    At office ____ yes ___No

11. What do you use computer for? I use computer for

    ___Organizing materials for my profession ___ daily activities /Office work _____E-mailing and Chatting

    ____ Reach purpose____ E-Mailing, others (specify) _____

12. Which of the following electronic health system are you familiar with?

    ____eHMIS___EMR-MRU ____HRIS ____ Smart Care-ART/HIV Care Module_____ other (Specify all that you are familiar with)

13. Do you use internet? ____ Yes __No

14. If your to item no 13 is no, why? (specify_____

15. If your answer to item no 13 is yes, where do you use internet?

16. If your answer to item no 13 is yes for what purpose do you use internet? (Check all that apply) ___E-milling/sending and receiving report ____ Internet browsing ____Downloading different materials and applications _____For social media ___research purpose, other (specify) _____

17. Have you ever received training on the following electronic health systems? (Check all that apply)

Type of electronic health systems	**Yes**	**no**	**Need more training**
eHMIS			
EMR-MRU/EHR			
HRIS			
Smart Care-ART/HIV Care Module			
Other Application			

Section Three: Attitude towards ICT

Circle the Number

D=disagree U= undecided A=Agree

	A	D	U
1. Using computer for daily activity in BGRHB is interesting to me	1	2	3
2. I like performing tasks using computer	1	2	3
3. Computers are not exciting.	1	2	3
4. Working with electronic health system makes me feel comforTable.	1	2	3
5. Electronic health system frustrate me	1	2	3
6. Electronic health system could enhance quality health service	1	2	3
7. Computers would motivate professionals	1	2	3
8. Computers would significantly improve the overall quality of Health Service	1	2	3
9. Computers would stimulate creativity in professionals	1	2	3
10. Computers would help me organize my work	1	2	3
11. Computers would increase my productivity	1	2	3
12. I see the computer as something I will rarely use	1	2	3
In my daily use as an adult			
13. The use of internet makes the professionals feel more involved	1	2	3
14. The use internet helps provide a better leading experience	1	2	3
15. The use of internet helps the staffs to learn more about health	1	2	3

16. Internet provides better access to the administrative sites 1 2 3

17. Internet is an effective means of disseminating

Health information and reports1 2 3

Section Four: Concerns-based adoption model (CBAM)

Levels of Use (LoU) of ICTs

Instructions: Please read the description of each of the eight levels related to adoption of technology. Then complete the statement at the bottom of the page

Level 0: Non-use
I have little or no knowledge of ICT in health, no involvement with it and I am doing nothing toward becoming involved
Level 1: Orientation
I am seeking or acquiring information about information technology in education
Level 2: preparation
I am preparing for the first use of information technology in health sector
Level 3: Mechanical use
I focus most effort on the short –term, day –to-day use of information technology with little time for reflection. My effort is primarily directed toward mastering tasks required to use the information technology.
Level 4A: Routine
I feel comforTable using information technology in health or its consequences.
Level 4 B: Improvement
I vary the use of information technology in education to increase the expected benefits within the office. I am working on using information technology to maximize the effects with my students.
Level 5: Integration
I am combining my own efforts with related activities of other staffs and colleagues to achieve impact in the office
Level 6: Renewal
I reevaluate the quality of use of information technology in health, seek major modification of present innovation to achieve increased impact, examine new developments in the field, and explore new goals new goals for myself and my office.