



JIMMA INSTITUTE OF TECHNOLOGY  
FACULTY OF COMPUTING AND INFORMATICS  
MSc. In Information Science(EDRM)

**The Role of Electronic Medical Record Implementation for Supporting  
Hospital Performance: A Comparative Investigation of Selected Public and  
Private Hospitals**

By:

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**December, 2021**

**Jimma, Ethiopia**

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A Thesis Submitted to Department of Information Science in Partial Fulfillment of the  
Requirements for Degree of Masters of Science in Information Science (EDRM)

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# APPROVAL SHEET

The research entitled “The Role of Electronic Medical Record Implementation for Supporting Hospital Performance: A Comparative Investigation of Selected Public and Private Hospitals” for partial fulfillment of the Degree of Master of Science in Information Science (EDRM) with our approvals as advisors.

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## **DEDICATION**

This thesis is dedicated to my wife Roman Asrat. No one is like her for everything she has done for me. This work is also dedicated to my family for their love and inspiration throughout this study.

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## LIST OF ACRONYMS

<b>EHR</b>	Electronic Health Records
<b>EMR</b>	Electronic Medical Record
<b>E-HMIS</b>	Electronic Health Management Information System
<b>FMoH</b>	Federal Ministry of Health.
<b>GIS</b>	Geographical Information Systems
<b>HMIS</b>	Health Management Information System
<b>ICT</b>	Information & Communication Technology
<b>IoM</b>	Institute of Medicine
<b>IoT</b>	Internet of Things
<b>IoMT</b>	Internet of Medical Things
<b>IT</b>	Information Technology
<b>MMC</b>	Myungsung Christian Medical Center
<b>WHO</b>	World Health Organization
<b>SMAC</b>	Social Media, Mobile Computing, Innovative Analytics, & Cloud Computing

## **ABSTRACT**

*This study titled “the role of electronic medical record implementation for supporting hospital performance: a comparative investigation of selected public and private hospitals” aimed to assess the availability, efficiency and extent of utilization; contributions for quality of health service; impact on the workflow; and challenges in the use of EMR system in public and private hospitals. The study followed descriptive and exploratory research design and mixed research approach. The study area was clustered both in the regional/ rural (Jimma) area of the country and the capital city/ urban (Addis Ababa) area of the country, these were Jimma University Medical Center (public, rural) and Oda Hulle Primary hospital (private, domestic), St. Paul Specialized hospital (public, urban) and MCM Korea Hospital (private, foreign) to enhance the representativeness of the result. The sample respondents of the study, which were selected using non-probability purposive sampling technique, were 151 health professionals, ICT technicians and managers among which 147 samples were participated in the data collection session. The data were collected using questionnaire and semi-structured interview methods. The quantitative data were analyzed using SPSS v.25 software package and the qualitative data were analyzed by thematic analysis technique. The result of this study revealed that private hospital health professionals are satisfied with the facilities in their hospital's electronic medical record better than the public hospital health professionals. Therefore, private hospital health professionals are better than public health professionals in terms of the use of private electronic medical record resources. On the other hand, higher percentage of the health professional's agreeing that electronic medical records resources utilization and availability of electronic medical records systems and adequate resources play an important role to achieve better performance in both private and public hospitals. The result of the study also revealed that the health professional's' performance of private hospitals is better than health professional's' performance of public hospitals because of electronic medical record system resource availability and effective utilization of resources available in their hospitals. Finally, the study forwarded the recommendations to government that developing effective electronic medical record system to minimize the gap between public and private hospitals resources and to improve the health service performance of the health professionals with respect to integrated electronic medical record system especially in public hospitals.*

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

Respectable health is not only significant for individuals, but also for governments because it plays a fundamental role in realizing supportable financial progress and development by way of fine as effective practice of capitals. World Health Organization (WHO, 2018) distinct e-Health or digital health as “use of Information & Communication Technology (ICT) to improve health” and emphasized its benefits “decrease healthcare budgets to families, advance reasonable access to quality facilities, efficiently connection health structures with social protection agendas, and increase responsibility and sustainability of health service delivery”(Oumer, 2018).

Today information technology (IT) has penetrated the health sector and it is now starting to have an increasing influence on both doctors and patients. More than a passing development, the health sector is going through a revolution that could change the way doctors and patients relate. While some companies may be adopting these changes for their benefit, the electronic digital revolution could be extremely helpful for all people (Loick et al, 2017).

Emerging technologies outside and within healthcare are converging, along with the two technologies of Artificial Intelligent, internet of medical things (IoMT) and Blockchain, that together are creating a significant impact on the healthcare industry in general. Needless to say, the state of healthcare by 2025 will be very different from the picture today and the focus then will be on the patient to get better outcomes at lower costs and with an improved patient experience(Dilawar et.al, 2019).

Health records are vital for respectable healthcare and good quality healthcare data play a dynamic role in the preparation, improvement, and preservation of the best healthcare (Adeleke, 2014). EMR reflects on the implementation of digital technologies in professional and society as healthy as the related changes in the connectivity of individuals, governments, and objects(Gimpel, 2018).

A EMR states that a collection of information on a patient including but not inadequate to history, report of the existing problem, analysis, and handling procedures. The total and main

of information accessibility to health professionals in patient care impact is the consequence and resolution of patient care. Moreover, medical information required for clinical result construction continues to grow, particularly in developing countries. But the organization and availability of medical information persist poorly, typically resulting in unfortunate decisions and medical errors (Raza, 2012).

The service of the Electronic Medical Record (EMR) construction ongoing the significant changeover in the health delivery structure from traditional paper-based medical archives to a digital form. EMR is a fundamental structure in any healthcare center as it integrates all the data of the patient, the health and medical history, and complete certification of each session. It affects all Healthworks related with providing health facilities, and the patient receiving the care. Patient archives play an important role in the exactness and superiority of the healthcare services as it is the primary system for storage and recording patient info, advances communication, and following up investigations. Patient satisfaction through the medical consultation and overall satisfaction by several Health services improved with the implementation of EMR (Wali et al, 2020).

The EMR for both public and private hospital is intended at overcoming service quality subjects and refining executive at managerial and clinical practices of the Ethiopian healthcare system. In addition, it will improve routine health service, handling, report generating from one station to another, communication, and use at all levels. The possible explanation could be having digitizing the health sectors minimize the Doctors, nurses, health professionals, and patient's money, time, and workload(Terefe, 2015).

Ethiopia is a country of more than 110 million people in northeast Africa. The government has set ambitious goals for development in all sectors, including health. The government's approach to health care is based on an emphasis on primary health care and expansion of rural health services. Ethiopia has many medical schools including Addis Ababa, Gondar, and Jimma.

One of the major initiatives taken by different hospitals in their digitization effort is implementing EMR systems. An EMR system is distinct as an automated record of health-related information on an individual that can be formed, collected, succeeded, and checked by authorized clinicians and staff within one health care institute. They have the potential to deliver considerable benefits to physicians, clinic practice, and health care organizations(Stanberry, 2011).

The Federal Ministry of Health (FMoH) of Ethiopia improves the health services facilities to be modernized through different types of technology. The ministry uses different types of health management software for different purposes. Formally the use of different types of software to digitizing the public health care facilities starting the Health Management Information System (HMIS) was modified in 2006 to make quality healthcare data and advance administrative at all levels (Tekelegiorgis, 2016).

FMoH of Ethiopia has recognized the benefits of ICT as a tool to support the health sector. Different ICT projects are implemented within the country to facilitate the health care system. Some of the projects which are implemented Geographic Information System (GIS), HMIS, and Smart Care as Hospital information system and Telemedicine (Mengesha T. , 2011). Automated health service is one of the key components of the HSDP of the FMoH. The FMoH adopted One Plan, One Report, One Budget policy to enhance the quality of management and resource use as e-Health is a core component of the policy (FMoHE., 2011).

Quality health service is essential for people live advancement in any country. Automated the health service are said to be the second service quality facilitates to health professionals because of the important role they play in enhancing the quality of health service. Health facilities are the paths for healthy people's health morals, the important facade for improving understudies' health quality and for effective facilities for developing special technical health sector increasing health value. The overall impression for EMR is to increase the quality of health service in hospitals through establishment of satisfactory facilities and right usage of EMR for better performance and hence lead to quality Health service.

Therefore, this study is initiated with the main objective to do the role of Electronic Medical Record implementations for hospital performance: A Comparative investigation of Selected Public and Private Hospitals in Ethiopia.

## **1.2 Statement of the Problem**

Europe and USA are progressively by means of an EMR to help advance healthcare quality. Inappropriately, maximum developing countries aspect several challenges reaching they too absence a robust healthcare infrastructure in the form of information technology to confirm continuity of patient health which many studies reflect a lifesaving resource. The probable of EMR structures to change health care exercise has been known over the previous years, including the improvement of healthcare delivery and enabling of decision-making processes.

About role of an EMR system contain exact medication lists, readable records and medicines and instantly presented charts. Most studies have publicized how achievable it might be through support since developed countries towards design and implement an EMR system that fits into this situation(Boren, 2014.).

Nevertheless, there is agreement that health information systems may have a pivotal role to play in improving quality and efficiency in all of these contexts, though the nature of such technological systems, as well as the roles and relative importance of their components and their sequence of emergence, will be conditioned by sociopolitical, historical, and geographical realities (Robel, 2013).

A central challenge in the implementation of EMR systems is partial use among healthcare providers. The problem is not unique to Developing Countries as previous studies from western countries also identified limited adoption and use of EMRs among health professionals. Thus, integrating the use of EMR systems within healthcare service provision is, in general, a challenging task. Such incomplete use is in part measured as one of the reasons why EMR systems have not been able to achieve some of the expected benefits. For instance, in the context of Developing Countries where providers with less training are providing services, researchers have argued that limited use of EMR systems hinders the realization of the positive impact that protocol guidance and decision support features can add to patient-level clinical care (Azliza et al, 2018).

The practice of medical record documentation in Ethiopia is putting all the data in a folder within one particular health care provider control. This, if best handled, will simply be kept in that health center. If a patient is stated to another health center, the referred center may be forced to take all the data again which was captured in the previous health center. This practice has created several problems. It requires incurring unnecessary costs and will waste time. In a situation where there is a need to identify directly a patient who is referred to another health center will be forced to face complicated health status because of being late giving a piece of repeated information to the preferred health center (Aklilu, 2012).

However, many of the impediments can be avoided by involving users in the system development process. Many healthcare organizations have disparate and incomplete systems and lack of integration is a common theme. This implies that how the development process explains is central in determining the growing use of EMR systems among healthcare



providers. In the case of Ethiopia, it needs research on the implementation of EMR in the public according to private health hospitals (Tezera, 2013).

This study was assessed to the role of EMR contributions hospital performance: A Comparative investigation of Selected Public and Private Hospitals that use EMR full and partial but what are the major challenges, opportunities, impact, contribution, availability, efficiency and to identify not to use the full package as the main gap.

### **1.3 Research Questions**

This research attempted to answer the following questions:

- How is the access, efficiency and extent of utilizing EMR in public and private hospitals?
- What are the contributions that EMR provide for the quality of health services in public and private hospitals?
- What is the impact of EMR on the workflow of public and private hospitals?
- What are the challenges faced in the use of EMR system in public and private hospitals?
- What are the criteria's metrics to develop the conceptual frame work effectively to use EMR public and private hospitals?

### **1.4 Objectives of the study**

#### **1.4.1 General Objective**

The objective of this study was to assess the status and the role of EMR contributions hospital performance: A Comparative investigation of Selected Public and Private Hospitals.

#### **1.4.2 Specific Objectives**

- i. To identify the accessibility, efficiency and extent of utilizing EMR in public and private hospitals.
- ii. To assess the contributions of EMR for quality of health services in public and private hospitals.
- iii. To evaluate the impact of EMR on the workflow of public and private hospitals.
- iv. To examine the challenges in the use of EMR system in public and private hospitals.

- v. To develop conceptual framework effectively to use EMR public and private hospitals

## **1.5 Scope of the Study**

The theoretical scope of this study was bounded to investigate the role of EMR implementation for quality of health services and evidence-based decision making; problems, challenges and opportunities of EMR implementation; and utilization of EMR systems. For public and private hospitals in Ethiopia.

## **1.6 Significance of the Study**

The results and recommendations of the study should be of importance to Ethiopian Hospitals service providers and other researchers of higher institutions health professionals on the use of EMR implementation to support patients and health professionals in health sectors. Also, the main findings can be concluded in two suggestions. First, having an agenda to analyze EMR implementations that link FMOH functionalities to the significant use standards can set a target for EHR investigation and assessment.

The study should be great importance to the program creators especially in the health sectors and also Ethiopian hospitals helping them to appreciate the usefulness of the effects system in health to come up with experience sharing that promotes EMR digitizing the health sectors. From the patient's viewpoint the profits of EMR package contain: Upgraded diagnosis and treatment, less errors create within individual health histories and Faster attention and decision-making replies from allocated health professionals

The researcher hopes that result of the study may be useful to future researchers with an interest in examining further the effects of EMR on hospitals staffs and patients. This should lead to the generation of new ideas for the better implementation of the EMR system into the health process. Then too, the implication of the study is expected that the conclusions and recommendations would lead to content EMR values in Ethiopian establishments; especially when the essential factors for digitization have been identified. This study was important since it was giving complete understanding and directions as to how organizations should approach their digitization initiatives, being helpful feedback to activities and projects carried out previously.

## **1.7 Limitation of the Study**

Which is understood to cover the approach and baseline information to additional interrelated researches? The difficulty of moving from place to place and also to get the respondents COVID-19 limits the communication of peoples through the world. The fundamental study is not working in the area especially comparatives study in the use of EMR how many in the public and also private is the limitations. This study is limited to public hospitals with the limitation to compare the scenario in private and nongovernmental facilities, Shortage of time and logistics, Covid-19 frustration is one problem to collect data from the respondents and the lack of previous similar studies in Africa and Ethiopia made it difficult to compare the achievements made in this research.

# CHAPTER TWO

## LITERATURE REVIEW

### 2.1 Historical Background of Electronic Medical Records

During saying the importance of utilization of EMR systems one question comes in mind the first EMR when developed? nowadays, the first EMR were established in 1972 by the Regenstreif Institute, research foundation in Indianapolis, Indiana. It was met as the main improvement in health services medical exercise(R. S. Dick and E. B. Steen, 2000). Due to the high costs, this EMR were broadly used as expected and remained mainly applied by public hospitals. Into the 1990s, personal computers were becoming additional inexpensive and the internet occurred. These inventions are acceptable for earlier, easier access to information and the overview of health information operational setting the period for worldwide web EMR (Herrick et al, 2010).

Currently, hardcopy medical records are used in fewer health service conveniences. The changeover to electronic health records is fine proceeding. In 1991, the Institute of Medicine (IoM) (a division of the National Academies of Sciences, Engineering, and Medicine) supported studies and shaped reports that directed the way toward the ideas we consume in place currently aimed at electronic health records. Initially, the IoM entitled them to computer-based patient records. Through their development, EHRs consume grateful several additional names, with electronic medical records, computerized medical records, longitudinal patient records, and electronic charts. All of these names stated to somewhat proposed to substitute the hard copy. In 2003, the IoM nominated the term EMR, or EHR, since “health” means “a state of well-being” and the goal of automating medical records is to advance the conveyance of safe, quality care focused on patients’ health(Dick et al, 1997).

#### 2.1.1 Definition of Electronic Medical Records

An EHR well-defined as a regular collection of electronic health data about personal patients or populations. It is a record in digital setup that is theoretically capable of being shared across different health service settings.

EHRs are patient-centered instant records that deliver fast and protected information’s to authorized users. EHRs naturally aspect medical histories, the patient identifies and treatments,

as healthy information on medications, allergies, injections, x-ray imaging, and laboratory results. Based on the countries health service survey define in different type. Electronic records (ERs) are furthermore instinctive digitally or renovated from hardcopy documents through the scanner. ERs that integration of textual, illustrations, facts, audio, illustrative, or other information representation in digital form that is shaped, studied, sustained, file away, repossessed or disseminated by a computer system (PAHO, 2016).

### **2.1.2 International Organization for Standard Definition**

Electronic Health Record (EMR) Electronic record of a distinct in a doctor's workplace or hospital which is typically in one location and is provider centrally.

Electronic Health Record (EHR) Longitudinal electronic record of a different that covers or practically interlines to data in several EMRs and Enterprise Resource Planning systems (ERPs), which is to remain joint and/or interoperable diagonal healthcare settings and is patient-centric. Patient-centric EHRs frequently capture data from various point-of-service structures and empower legal admission by many earners of attention to relevant patient data diagonally various service distribution settings or establishments to confirm at continuousness of attention aimed at the patient(Robinson, 2018 )

Electronic Health Record System (EHR-S) An EHR system will contain one or additional information sources, directory facilities entry human and extra resource beings, data facilities comprising terminological systems, keep ways, and roadmaps, end-user applications, reporting units, safety facilities, etc. The necessities for an EHR system relay carefully to the functionality that end-users will practice right and willpower replicate the professional procedures to be reinforced at the attention background in which the structure is installed(Marcolino et al, 2017).

Electronic Health Record Architecture (EHRA) Formal explanation of a system of components and facilities for recording, repossessing and conduct evidence in electronic health records (Seebregts et.al, 2017).

## **2.2 Electronic Medical Record (EMR)**

The EMR system incorporates clinical data, patients' records, conclusion funding application databases, and deal progressions inside a hospital. Through this integration, the system has a prospective great influence on the hospital performance(Gastaldi et al, 2012). From a doctor's

point of view, EMR tolerates an enhanced approach to gather, collecting, regain and investigate medical evidence. The explored information can formerly be used to pursue the greatest action for a patient and in opportunity deliver superiority attention for the patient(Richards et al, 2012). Through representation relations and interdisciplinary acceptance, EMR execution will be able to deliver active and effective patient, doctor, and clinic administration as well as increasing respectable results.

The use of information communication technology fulfilled in EMR is nowadays broadly known in hospitals as well as clinics. This technology grounded advance is realized to create a good conversation of information and carry out supplementary active communication between doctors. The EMR also understood as an encouraging IT-based result in health repair quality improvement (Gastaldi et al, 2012). This is payable to the capability of the EMR system to switch the huge amount of information and records indoors the health system and later skillful of backup the diverse requirements of clinical, organizational, and management of health care (Reina et al, 2012).

Privacy poses a paramount significance and takes remained a great challenge in EMR operation. The right impasse leaves out not only affects patients in the EMR system the other hand also health care providers themselves. In exercise, doctors and all personnel that are elaborate in health care of a patient are essential to keep the patient's information. To ensure this only approved personnel can have access to the patient's data. Even so, numerous access facts in a vulnerable network of an EMR system supplement the opportunity of patient information interference. In an open network, a distinct doctor, for example, can find, entreaty, and acquire the medical information of patients. So, in this condition, there is a basic confirmation of information sharing requests to preserve data security (Stanberry, 2011). This step, however, delays decision-making as doctors or another person might need to wait to gain permission to access a patient's information should they require it(Currie & Finnegan, 2011). However, it is crucial in maintaining patient confidentiality.

According to (Thielst, 2007) information technology implementation in hospitals offers harmless, supplementary effective and efficient healthcare delivery systems that transform healthcare. Technology might be successfully used in the health care industry to increase techniques, mutual practice, guidelines, public values, and procedures to produce unlimited patient results and improved patient safety. It becomes a crucial driver of real professional and clinical initiatives.

### **2.3 Use of EMR in Developed Countries**

Fully EMR established countries such as the United States, United Kingdom, Germany, Sweden and Australia have established and progressive health service structures that accept considerable funding and care after their management. However significant dissatisfactions still happen but in this health service system, from the government big support and motivation to establishing the aim related to inclusive change fruitful electronic medical record structure (Young & Avison, 2007).

After EMR structures were announced first largely supposed their huge adoption led to main health service savings, decreases medication faults and upgrade the health. The United States tracks a sum of other states in the use of EMR systems only 15–20 percent of U.S. doctors' workplaces and 20–25 percent of health sector consume accepted such structures. And interruptions amongst pays to EMR system and which proceeds from them. In the United States of America according to 2003 data since the National Ambulatory Medical Care Survey, Burt and Sisk reported that usual of 17.6 % of doctors used EMRs in their working areas performs. The difference, additional countries, such as Australia and the United Kingdom, are approaching the general implementation of EMRs (Fonkych & Taylor, 2005)

According to (Simon et al, 2007) defined clinical nurses pushing to the computerized medical record structure for preparation health care; their struggle prepared non involve straight negotiation but remained in its place relatively understated. A benefit the using applications were practically using technology and the idea carried organized attention and successive documentation. This implies the use of the EMR system upgrade the functions import keep design producers (Taylor et al, 2005).

### **2.4 Use of EMR in Developing Countries.**

According to the developed countries in the Africa content by limitation of health structure establishment peoples die, Sub-Saharan in certain expressions slight Africa millions of people die every year, and Sub-Saharan Africa, in particular, expressions slight improvement toward achieving Millennium Development Goals (MDG) targets. The use of information technology tools needs to enable for follow up the health service progressions to achieve their goals. Most African countries today mainly used hard copy and are not happy to meet both patients and also to see the report. The other part parallels ICT suggests chance sufficiently to this challenge (WHO, 2013).

The greatest investigation of electronic medical records in resource-poor countries. Rare organizations understood their usage was representative and less still required to install such structures. The minority of plans that used an EMR structure clear-cut mostly into two clusters: individuals that used exclusive profitable software in professional projects private hospitals and those that established the application internally, generally to succeed a detailed disease (McGrath et al, 2004).

Then numerous effective electronic medical record systems have been established in developing countries and more commonly offered systems to underprivileged areas. The Health Information Technology system (HIT) Program gratitude the profit of EMRs cultivating the quality attentions in developing countries to manage TB and HIV(Luna et.al, 2013).

Less than six months from August 2005-January 2006 in two selected Rwandan health wards starting HIV-EMR that developed in Haiti. The system followed over 800 patients on Antiretroviral treatment. New features revision to home-grown wants with fast updating and progressions of health programs. EMR in Rwanda use to predict medication necessities and assist drugs in packing. Rwanda Ministry of health trained data encoder persons is essential to maintain the EMR system. The professionals also for four months' train in job train data entry technical encoders. Data encoders and ICT user support technicians are essentially available additionally care facilitators trained properly report variations in handling (Allen et al, 2013).

## **2.5 Overview and Conceptual Framework of EMR in Hospital**

The first thing that comes to our mind when we say healthcare digital transformation or a digital hospital is to go paperless. Having an integrated HIS and EMR alone does not qualify as a digital hospital. For a truly digital hospital, an integrated information system has to be the base for all systems and processes. Aim of the EMR digitization is to enhance access and improve conservation (Sabbagh et al, 2012).

Digitization is seen as the process of changing information or data into a digital format. It contains generating a digital version (using bits and bytes) of analogue physical sources such as documents, images, sounds and more. This creates a code, which can subsequently be used in the context of a process, product or service (European-Union, 2019). Digitization is quite basically the creation of a computerized demonstration of a printed analog. There are many methods of digitizing and diverse media to be digitized. Technically, the process of digitization involves converting an analog image into its corresponding numeric values. In this context,



some of the fundamental issues like, scanning and image capture, necessary hardware, and software selection that are crucial for the process of digitization are briefly discussed in the succeeding sections (Dillip & Kanhu , 2009).

EMR shows the potential impact on unemployment from the change in health services. The Internet and related digital technologies have produced a significant growth of information in healthcare. Evolving indication delivers support for some advantageous effects of interactive alphanumeric systems; although many challenges remain to understand approaches to methodology, implementation and evaluation. Health digital services are expected, as in the banking sector, to be an effective way to improve services. Digitalization is comparable to the advent of steam power and electrification, as examples of general-purpose technologies, i.e., technologies with broad application across an economy (Sabbagh et al, 2012).

## 2.6 Benefits of EMRs

EMR are the flow of the forthcoming. EMRs represent an attempt to transform information from paper records into an electronic setup. EMRs are predictable to deliver an extensive range of benefits to the healthcare industry. EMRs suggest various possible benefits over old-style paper-based records and it is the leading step to converted health care. By way of previously renowned, EMRs and additional decision care apparatuses similar to computerized physician order entry (CPOE) help to decrease medical mistakes(Ariffin et al, 2018).

This electronic medical record is very clear, thus reducing errors frequently made when recording hand-written information.

- **Access:** automated content provides the advantage of search over print media.
- **Preservation:** automated information can be copied and does not depend on having a permanent object and keeping under guard, but on the ability to make multiple copies, presuming at least one of them survives
- **Reduced costs of Handling:** Digitization decreases the costs of conduct, storing, and replicating paper documents and in some cases can copy the lost documents.

- **Organization and dissemination:** Electronic images can be indexed and stored in a file recovery arrangement (Sabbagh et al, 2012).

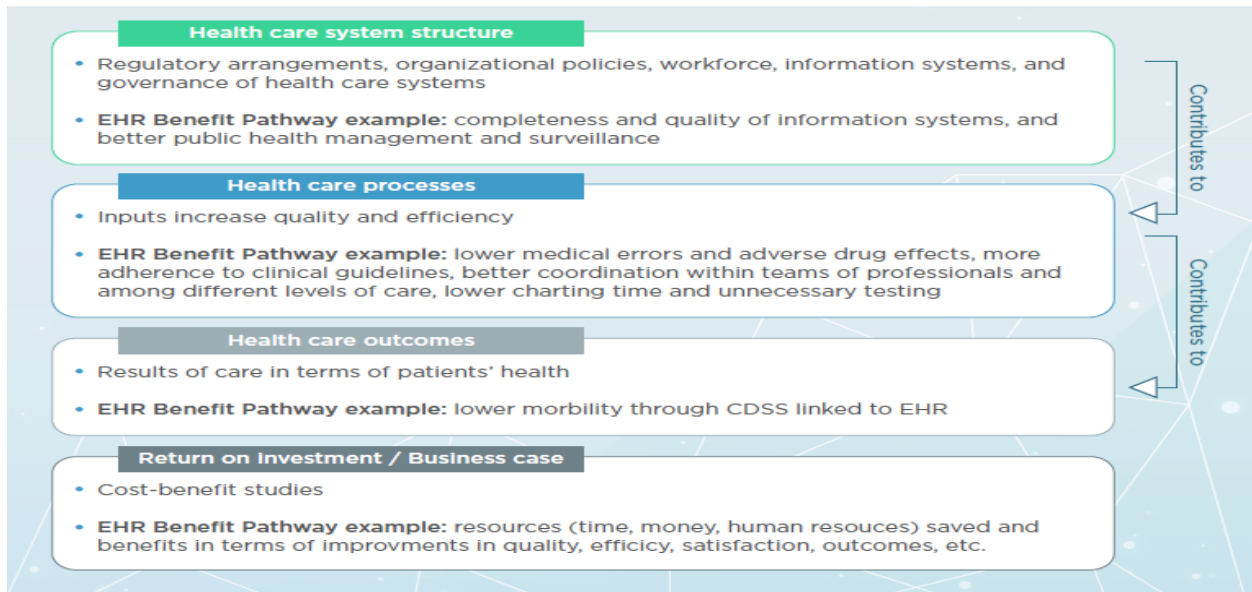


Figure 1: Elaboration based on the logic framework of (Hyppönen et al,2014)

## Digital Innovation

In overall setting, digital invention is defined by (Nambisana et al, 2019) as the formation of market offerings, commercial processes, or models that outcome from the practice of Information technology. Their meaning contains a range of innovation consequences, such as new products, platforms and services as well as new customer experiences and other value pathways; as long as these outcomes are made possible through the use of automated technologies and digitized processes.

The information technology used in innovation has been identified as Big Data, Internet of Things (IoT), Cloud Computing, improved and virtual reality, artificial intelligence and cyber-physical systems. To know the nature of automated innovation, suggest since how automated technology differs from earlier technologies, noting two unique characteristics: 1) The reprogram ability 2) The homogenization of data and 3) The self-referential nature of digital technology (Yoo et al, 2010).

## 2.7 EMRs for Health Services

According to World Health Organization, health services as the whole range of maintenance from advancement and prevention to diagnostic, reintegration, and palliative care, as well all levels of care including self-care, home care, community care, primary care, long-term care,

hospital care, to provide integrated health services throughout the life course. EMR health services are defined services that are in part or fully electronic based. Electronic health services include an all-encompassing array of facilities with different(overlapping) names, such as eHealth, mHealth, telemedicine, telecare, imaging, artificial intelligence and electronic health records(European-Union, 2019).

## **2.8 EMRs and Health**

Health technologies, in the broadest meaning of the word, have changed continuously ever since the early stages of medicine. Increasing knowledge and diagnostic, preventive, treatment and rehabilitation possibilities have altered the content of health care systems. In turn, health systems have also evolved into complex entities with changing roles and responsibilities for patients, health professionals, payers and regulators. The digital transformation of health services is seen as a significant and powerful process. That has already had a generous effect on current health care and health systems and is expected to have a further fundamental impact on health care and health care delivery in the future. Digitalization states that the use of digital technologies in the structure of the production and delivery of a product or service. Such digital technologies agree with health care services to be organized, produced and delivered in new ways. Digitalization is, therefore, less of a technical process (like digitization), it is also an organizational and cultural process(European-Union, 2019).

## **2.9 The Role of EMR in the Health Sector**

The automated health sector ranging from the use of computers and EMR to home monitoring of patients, electronic medical devices, the application of computer-aided visualization, decision support systems, has affected and is expected to affect many aspects of health care systems. In terms of structure, culture, professions, treatments and outcomes. The EMR transformation encompasses the instrumented effort to meaningfully introduce new information and communication technologies and corresponding new processes into the health service sector. Some of this EMR is health care specific; another part is a consequence of the broader digitalization trend in society. Both can lead to changes and innovations in health technologies and health care delivery processes, and thus impact health, health care, and health systems. Healthcare earners can force technologies to change attention delivery, operation management, and hospital strategy. Patients are now willing to get more understandings into

their treatment pathway and how they can speed up that procedure. The role of EMR is increasing the growing quality of patient care and treatment as well as the scale of potential cost savings in the long term. The latest developments in digital technologies demonstrate that the way healthcare is delivered will change radically (Bhavnani et al, 2016).

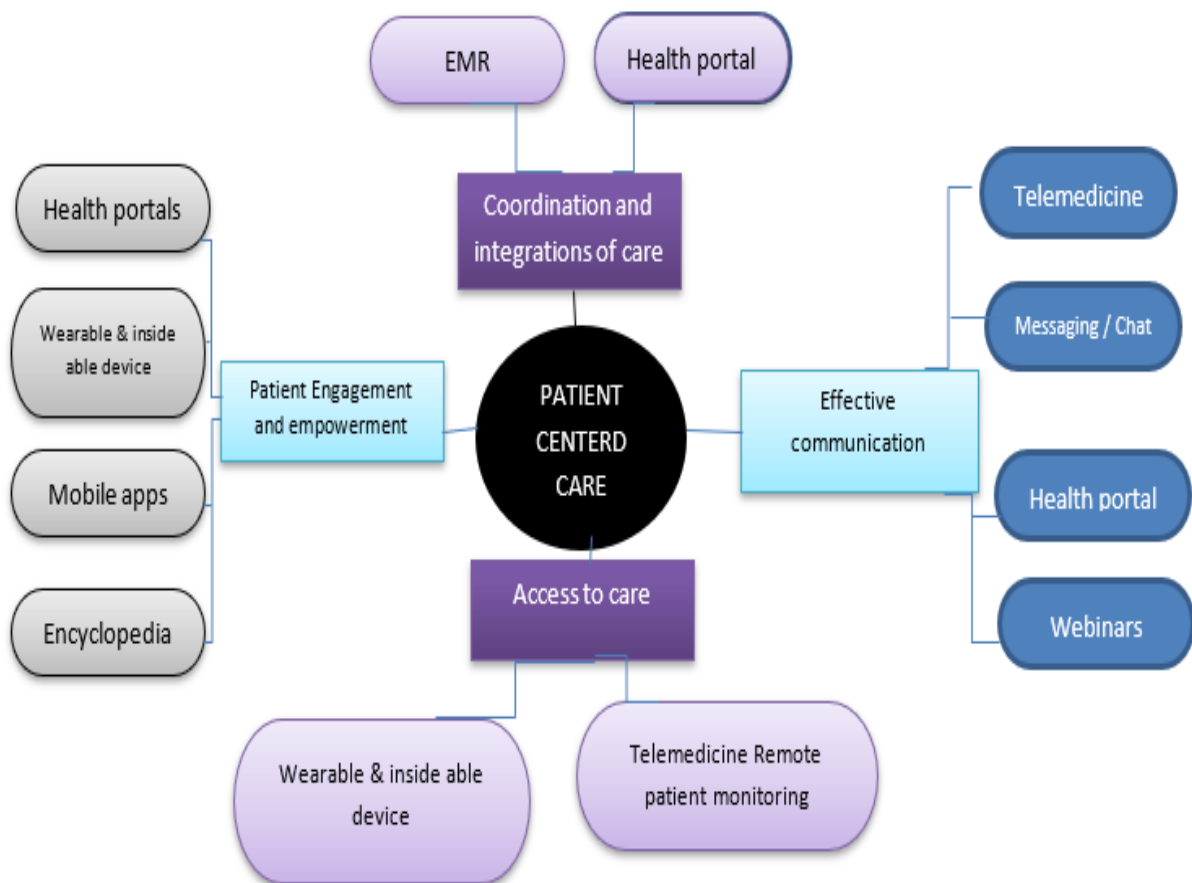


Figure 2: Paradigm Shift in Healthcare through Technology and Patient-Centeredness (Al Muammar et al, 2017)

## Future Trends in Healthcare Digital Transformation

Technology enables us all to lead wealthy and healthier lives. From robotic surgery to smart digital hospitals, digital transformation is revolutionizing healthcare for good. The digital revolution can save billions in spending in the industry, especially in the area of chronic diseases. Certainly, there is a trend set and the following are just a few ways that will shape the future of healthcare digital transformation.

- i. **Telemedicine:** a lot of work has already gone into telemedicine and a lot more to do. Patient care is not limited by geographic location, even patients in rural areas can receive a decent quality of care via internet-enabled devices or even with basic

SMS. There are Mobile applications based on Artificial intelligence through which patients can input their condition, and the app makes the preliminary diagnosis with the help of machine learning and connects with an appropriate doctor for further advice.

- ii. **Big Data, Artificial Intelligence, and Connected Devices:** These are buzzwords in most industries and healthcare is no exception. Solutions like International Business Machines (IBM's) Watson are a testimony of how digital technology can assist doctors to provide, predictable and evidence-based medical care confidently. Even more interesting, is the rise of connected healthcare devices and wearable's that are always adding data into the pool to create a holistic health information database. This data is not only useful for patients but can also be used to gain insights and predict trends on a global scale.
- iii. **Cloud access and Mobility:** Data is of less importance if it cannot be accessed in real-time. With digitization the quantity of data captured is enormous and the dependency on this data is high too. Mobility and Cloud access makes data storage and access very efficient. Doctors and patients are becoming more and more comfortable in accessing healthcare information on mobile devices. Paper charts and document rooms will soon be history. Patients, Hospitals and Insurance companies are now storing medical records in the cloud, with the ability to access data online 24/7.

## 2.10 E-health in Ethiopia

The FMoH developed HSDP (Health Service Development Project) as a single plan (one plan, one budget, one report) which serves as a guideline for the development of sub-national plans. One of the pivotal components of HSDP is E-health (Robel, 2013). The FMoH is recognized E-health as a tool to support health care services. The FMoH and its partners have developed and implemented different ICT projects. E-HMIS in Ethiopia FMoH and USAID implements e-HMIS as part of paper-based HMIS as a pilot project in Southern Nations, Nationalities and People 's Region(SNNPR). It is composed of a set of interrelated components and procedures. It is designed to enter, store, analyze, aggregate, and evaluate health and health-related data from facility to central level(Robel, 2013).

According to (FMoH E. , 2010)

- a) **Health System Reference Database (HSRD)Module:** it provides a population denominator for various catchment areas to calculate HMIS indicators. Information for

the entire SNNPR consumes remained arrived into the system and is readily accessible for updating and use. One important utility of HSRD is that it provides the necessary data on various denominators for the calculation of HMIS indicators.

- b) **Data Entry Module:** it is made up of two sub-components; manual entry and scanning. This solution is expected to shift this current clerical task to more advanced roles such as analyzing data for decision making and working on improving data quality.
- c) **Aggregation Module:** it is used to aggregates data entered via the data entry module which provides woreda, zonal and regional aggregation for the month, quarter, and year. The aggregation software is adding significant time savings and improvement to quality by reducing the time it takes to aggregate reports to a matter of seconds and virtually eliminating calculation errors that might occur if the task was to be done manually.
- d) **Decision Support System (DSS) Module:** it is an ultimate output of every e-HMIS tool to provide access to data collected and that can be analyzed for decision-making. The DSS is the dashboard that provides decision-makers access to data collection that can be easily analyzed for effective and timely decision-making. The DSS employs simple and yet powerful charting tools such as line, bar, and maps to communicate information in a way that makes the thousands and millions of records in the database represented in simple user-friendly charts. In addition to the desktop DSS application, top-level management can benefit highly from the Mobile Executive Decision Support System (MEDSS).

### **2.10.1 Smart Care in Ethiopia.**

The FMoH of Ethiopia is emerging the Smart Care software in corporation with CDC and TUTAPE (Tulane University 's Technical Assistance Program for Ethiopia). Smart Care is a universally disseminated EMR tool that was established by the government of Zambia. It is currently widely used in Zambia, Ethiopia, and South Africa. Smart Care gained recognition as the Electronic Health System Application for Ethiopia following a presentation and live demo of the customized Smart Care EMR. The presentation was to the FMoH officials including Ministers, State ministers, Department Agency Heads, Regional Health Bureau Heads, and other relevant stakeholders. The Conceptual Framework of Smart Care draws the connection between the correct implementation of the Smart Care system and the improved health status of Ethiopians. This portable electronic patient health record is designed to allow service providers to access historical patient data regardless of health facilities used in the past or types of services sought. Smart Care implementation is limited to few hospitals around Addis

Ababa and Dire Dawa and the FMoH is facing numerous challenges to scale up the system nationwide. The deployment of Smart Care includes building strengthening ICT infrastructure (Hardware, Software, & Networking components) and the Installation and Training of Smart Care software application at the Health Facilities(FMoHE., 2011).

To make data available in real-time to all points of service within the Health Facility, Smart Care is installed in a centralized mode (client server). This model operates on an online communication infrastructure within the Health Facility. The Wireless Local Area Network (WLAN) was demonstrated as the appropriate technology for building the online communications infrastructure. The major advantage of WLAN includes easy, fast, and affordable networking solutions for Health Facilities. Smart Care is installed and introduced in phases. The initial installation introduction phase starts at the hospital level in the medical record Room and the triage room where the bulk of data encoding takes place followed by other clinics including outpatient, inpatient, laboratory, pharmacy, ART, VCT, and TB. Smart Care is used by Clinicians, the Health Facility Heads, Data Entry Clerks, & the HMIS officers. Patient information is encoded in Smart Care by either Clinicians or Data Entry Clerks depending on their allowed role security which defines the module, they get access to. Data could be encoded and/or viewed either while the patient is within the health facility or after the patient has left(FMoHE., 2011).

### **2.10.2 M-Health in Ethiopia**

FMoH and its partners have developed m-Health to support Maternal, Neonatal, and Child Health care (MNCH). FMoH identified m-Health as a key enabler to improve the MNCH services and to reduce child and maternal mortality rates (MDG 4 and 5).The m-Health project focused on Health Extension Workers (HEWs) and MDG 4 and 5. It is implemented as a pilot project in 5 health posts in SNNPR. The m-Health facilitates effective communication between HEWs and pregnant mothers and between HEWs and Health posts. The vital wave consulting 2011 report on m-health in Ethiopia identified five information and communication need of HEWs that could be addressed by mobile technologies: referral, data exchange, supply chain management, training and educations, and consulting. Other than the m-Health project which is implemented by FMoH and its partner, there are also m-Health projects which are developed by NGOs like WHO and Clinton Foundation. These projects were also developed to support the MNCH services focusing on HEWs and MDG 4 and 5. M-Health in Ethiopia is now facing two major challenges: fragmentation and duplication of projects(FMoH, 2012).

## 2.11 Advantages of Hospital EMR Transformation

Clinical results comprise improvements in the quality of care, a reduction in medical errors, and other enlargements in patient-level measures that describe the appropriateness of care. Organizational outcomes, on the other hand, have included such items as financial and operational performance, as well as satisfaction among patients and clinicians who use EHRs. Lastly, societal outcomes include being better able to conduct research and achieving improved population health. EHRs and the ability to exchange health information electronically can help you provide higher quality and safer care for patients while creating tangible enhancements for your organization. EHRs help providers better manage care for patients and provide better health care by: Providing accurate, up-to-date, and complete information about patients at the point of care, Enabling quick access to patient records for more coordinated, efficient care, Securely sharing electronic information with patients and other clinicians, Helping providers more effectively diagnose patients, reduce medical errors, and provide safer care, Improving patient and provider interaction and communication, as well as health care convenience, Enabling safer, more reliable prescribing, Helping promote legible, complete documentation and accurate, streamlined coding and billing, Enhancing privacy and security of patient data, Helping providers improve productivity and work-life balance, Enabling providers to improve efficiency and meet their business goals, Reducing costs through decreased paperwork, improved safety, reduced duplication of testing, and improved health(Nir & Taleah, 2011).

As with any change management, digital transformation has its own set of challenges. It would be categorized into two areas, technology, operations, and cost.

- **Technology:** Integrating with multiple IT systems, finding a qualified implementation partner, legacy issues, very few single platform solutions in the market.
- **Operations:** cultural change, especially with senior doctors, ground staff, and as an irony the IT department who have to drive this initiative, have a tough time in subscribing to this concept.
- **Cost:** Digital Transformation is cost-intensive and has to be considered as an expense towards digital infrastructure to develop, maintain and upgrade.



## **2.12 Challenges Implementation EMR in the Health Sectors**

Lastly, it is value stating the outcomes of a review on the main challenges related to the implementation of information technology tools in the health sector, mainly in low- and middle-income countries. This review confirmed that mutually the main and human-related barricades were stated before taking an outcome. According to Luna et al. (2014), the highest significant barricades are resource and infrastructure restrictions, the absenteeism of countrywide automated health outlines, doubt round integrities and lawful considerations (e.g., respect to privacy and security of the information), an absence of observance towards mutual interoperability values, the incomplete incidence of staff skilled in health informatics, and poor regional partnership(Mayan et al, 2014).

## **2.13 Contribution of EMR**

EMR are mostly considered to supporting medical care, billing, and progressively other purposes such as upgrading of the value of life. The use of EMR is countable to facilitate the health service through the time of being because during use EMR the patients are properly using their time and also get rest. For example, in the ophthalmology service unit, the EMR tool to use the type that is fast receipt is medical modernization built on the set of observable characteristics information. The information is provided by electronic health records similarly on future new therapeutics aimed at patients with the occasional disease(Dominique et al, 2015).

The contribution of the EMR system for all health facilities to exchange different patients result for example laboratory results, x-ray images, Ultrasound results and consult results, CT-scan, and so on results to send and receives. The other thing to the administration is which health worker is properly working which department is fully using its effort manpower on which need additional manpower and how many days working the worker that employee in the hospital. For finance to follow income and payments. According to this the use of EMR on both sides is very important the medical and Administration part.

## **2.14 Impact of EMR**

It is increasing the output of the health service workers and the hospitals. This was carried around by several aspects. Primary there was a decline in the reverse time in the administration of patients. This advance admission to new, recently kept, and file away information and condensed transfer time. Although healthcare workers informed that increase in the

contribution of patient information as related to the routine of paper, they did settle that general, there was a decrease in the time consumed in the administration of patients. Utmost health professionals believed the EMR has upgraded the superiority of time through their patients and the value of documentation in the records(Chen Hsi et al, 2020).

An alternative aspect remained that here was the ease of access to patient data and archives. This was remaining to the decrease in the searching time for records and graphs as compared to the use of hard copy. Information that takes several minutes to hours to admittance was available in an extent of numerous moments. This assisted to decrease the improvement time and rise patient fulfillment as they consumed less time in reception care. Similarly, there was a drop in the cost or malposition of patient data as all information is kept in a server and backup drives in the health service ICT data centers(Mikael et al, 2012).

The EMR allows that report to process in different types of formats the ministry of health and the health service provider (hospitals) increase the services in the sector. The EMR generates a report from an hour, daily, monthly, and also yearly doing works in less time. To do manually killing many days. And also used to control the hospital patient's flow and what the health professionals doing is very important. EMR empowers automated data storage that employs unchanging information values that were allowed(Waithera et.al, 2017).

EMR systems are feasible and important in developing countries despite some challenges. Some immediate benefits of care delivery development are as follows: Patient care An EMR promotes effective and appropriate management of cases leading to quicker recovery without undue hospitalization. The economic impact can be seen in terms of speedy storage and retrieval of patient records thus reducing unnecessary costs of repeating diagnostic examinations over and over (Miller RH and Sim I., 2004).

Planning and management Incomplete and incorrect information is leading to defective health planning and management in most developing countries. Healthcare programs are failing because inaccurate data is used for planning. Access to accurate, correct, and timely information could be a good source of data to plan and prepare for epidemics or disasters to prevent undue loss of life(Sridhar GR et al, 2009),

Research an effective HIS is indispensable in furthering medical research. Availability of quality data enhances identification of problems in treatment and finds solutions to prevent

extra costs due to ineffective treatment, thus making care delivery less expensive(Moodley et al, 2005).

## **2.15 Effectiveness of EMR Systems**

EMR systems in healthcare permit the capture and distribution of data to decision-makers aimed at good synchronization of health care at equally the difference specific and population levels (LeRouge et al, 2007)). The study shows that data withdrawal and verdict funding abilities can recognize possible opposing proceedings for a different patient at the same time as similarly causative to the population's health by providing visions into the reasons for illness problems(Nkanata et al, 2018).

In the study of the employment of a telemedicine line in themes through type I diabetes prepared by an insulin drive and immediate blood sugar control. Such plans offer the excessive potential to advance patient admittance to health care services. Decrease portable time, the price for patients, and decrease the load on a previously strained health system. The great puddle of the possible aids of evidence structures in healthcare is controlled in the effort of (Bakhtiyari et al, 2011).

In the study, the writers assumed a total profit investigation relative to the application of an electronic medical record (EMR) system aimed at a six-year passé, and start obtainable the clear benefit to be in the variety of half-million dollars(US).

## 2.16 Related works

Table 1: Related works

Author	Title	Problem objective	Method	Result
<b>Oluoch et al. January 2012.</b>	Effectiveness of combined EMR with Clinical Decision Support Systems tools on quality of HIV care and treatment in resource-constrained settings.	Identify original studies on EMR-based clinical decision support systems (CDSS) describing process and outcome measures as well as reported barriers to their implementation in resource-constrained settings.	Two reviewers independently assessed original articles from a search of the MEDLINE, EMBASE, CINAHL and Global Health Library databases until	Practical set-up difficulties such as variable electric power and unreliable Internet connectivity, clinicians' imperfect computer skills and failure by workers to comply with the reminders are key impairments to the implementation and active use of CDSS.
<b>Morrato, EH, et al August 2019</b>	Applying a Commercialization-Readiness Framework to Optimize Value for Achieving Sustainability of an Electronic Health Data Research Network and Its Data Capabilities.	Sustaining electronic health data networks and maximizing return on federal investment in their development is essential for achieving national data insight goals for transforming health care. However, crossing the business model chasm from grant funding to self-sustaining viability is challenging	Gap analysis of alternative data sources, Threat (SWOT) analysis of the context of competing alternatives and discovery process involving approximately	The essential high-level invention needs were like between the three primary client sections: credible data, efficient and easy to use, and relevance to their daily work to be done'. However, how these benefits needed to be minimally demonstrated varied by customer such that different supporting evidences are required.
<b>Getachew et al 2010</b>	The effort to analyze the status of the digitization process in selected institutions of Addis Ababa city, Ethiopia.	In the process of identifying the status, progress, prospects, and challenges to the digitization and form the basis of providing a future roadmap to the successful execution of digitization projects, the result of the survey uncovered that	Using questionnaire and literature study digitization of records or archival materials in Ethiopian organizations.	Identify the scope, current practices, development endeavors, and future considerations of digitization of records or archival materials in Ethiopian organizations
<b>Tizita Gizaw February 2018</b>	Evaluation Of the HER System in Mariestopes International Ethiopia Maternal and Child Health Centers	Assess the implementation, Evaluation, availability, Usefulness and effectiveness of the installed EHR system at Adama, Bahir Dar and Gotera MCH centers. Users' Satisfaction with usefulness of the EHR system	Data to collect using structured, self-administered questionnaire. To analyze the data use SPSS version 20.	Over all implementation effectiveness of the system is measured using the average score of availability, usefulness and satisfaction dimensions. It is judged to be very good.

<b>Yosef G/Egziabher September 2013</b>	Challenges Associated with Physicians' Acceptance and Usage of EMR in Public Hospitals of Addis Ababa	Assess challenges associated with physicians' acceptance and usage of EMR in public hospitals of Addis Ababa.	A cross-sectional study design with quantitative method and also use data analysis software Epi info & SPSS	Time required entering data to the system. lack of technical training and support. EMR increase in physicians work load and Poor typing ability as major factors affecting acceptance.
<b>Yoseph Dirirsa June, 2010</b>	Assessing Factors That Affect the Implementation of EMR System in Government Owned Hospitals in Addis Ababa	The general objective of the study was to assess factors that affect implementation of EMR in government owned hospitals in Addis Ababa.	A cross-sectional study, questionnaire and interview, A Simple random sampling and Data analysis was done using chi-square test, mean, t-test and odds ratio.	Lack of budget, employees' attitude, commitment, technology and lack of trained manpower were not found to be significant factor to affect implementation of EMR in government hospitals. If budget is secured it is possible to implement EMR in government hospitals.
<b>Hagel C, Paton C, Mbevi G 2020</b>	Data for tracking Sustainable Development Goals: challenges in capturing neonatal data from hospitals in Kenya	To address the gap, investigated implementation experiences of DHIS2 in LMICs and mapped the information flow relevant for neonatal data reporting in Kenyan hospitals.	A review literature and policy documents. Two use cases explore how newborn data collection and reporting happen in hospitals. The results were validated, adjusted and system challenges identified	DHIS2 is a useful tool with strong technical capabilities, challenges can emerge with the implementation. Visualizations of information flow highlight how a complex, people-based and paper-based subsystem for inpatient information capture precedes digitization. Use cases point to major challenges in these subsystems in accurately identifying newborn deaths and appropriate data for the calculation of mortality even in hospitals.
<b>Mercy Gacheri Nkanata December 2018</b>	Comparative Analysis of Hospital Information Management Systems Among Healthcare Workers in Two Selected Hospitals in Kenya	To examine the use of hospital information management systems among healthcare workers in two public and private hospitals in Kenya. Find out possible solutions to improve the use of the hospital information management system in both hospitals.	The cross sectional Semi structured questionnaire and self-administered questionnaires.	Public hospital needs review of the software in use currently and should strive to have a more integrated system covering hospital for effective and efficient management of the hospital resources. Need ICT staff computes for effective utilization of the system and improved quality of service and continuous training.
<b>Anteneh Aklilu July, 2012.</b>	Need Assessment Framework for EHR Management System in Ethiopia	Investigate the actual practice of patient's health record handling throughout the health institutions in Ethiopia and see the gap between the paper based medical record and HER&	Questionnaire and interview.	The result all health institutions are exercising paper-based health record handling and extremely few institutions are using technological devices to handle some part of their records, like patient registration, together with paper based patient medical record which

		developing architectural framework for EHR.		is highly subject to be misplaced, time taking and the like.
<b>Kamil Shamil June 2013</b>	Practices And Barriers on Deployment of EMR (Smart Care) In Addis Ababa City Administration Hospitals, Addis Ababa, Ethiopia	To assess the practices and in five hospitals Practices such as utilization, perception, confidentiality and privacy and barriers during implementation are necessary to assess the deployment barriers on deployment of electronic medical record (smart care) in Addis Ababa regional hospitals.	Using self-administered questionnaires interviews. Random sampling method for quantitative and by purposive sampling for interviews.	The users had good perception to use and the overall utilization of Smart Care was not good. Because the implementation practice was not similar in all hospitals means two of them interconnected and others used now for data entry
<b>Hanan Mussa Ahmed July 2020</b>	The Implementation of Change Management of “MEDAXS”: the case of Ethio-Tebib General Hospital, Addis Ababa	To analyze the process and challenges of change management in Ethio-tebib General Hospital regarding health management system “MEDAXS”.	The qualitative research method the interviews and focus group discussions were carried out via telephone Office documents of the Hospital also were used	A system can be functional in two ways web based and desktop based. The system of Hospital is desktop based, instead of desk top based web based would have been better. The problem on the system like miss-match in market and system recorded prices, lack of full commitment in some staff members.
<b>Dilarg Alemayehu June, 2015</b>	Investigating EMR (Smart Care SW) Implementation in A Health Care Facility: A Guiding Framework for Adama Hospital Medical College	The aim of this project is to investigate EMR (smart care software) implementation in a health care facility a guiding framework for Adama Hospital medical college.	Cross sectional study qualitative, quantitative Personal observation interview and questionnaires were used as data collection tools.	The system quality, user involvement, human resources, integration, capacity building, perceived usefulness ,incentive, perceived easy for use, technical support, monitoring &evaluation, user promotion interoperability, innovative leadership, and website. Overall, this guiding framework is expected to bridge the existing gap in implementation at Adama hospital
<b>Gurman et al. 2012</b>	Effectiveness of mHealth behavior change communication interventions in developing countries: a systematic review of the literature	The purpose of this study was to conduct a systematic review of the literature to determine how much evidence currently exists for mHealth behavior change communication (BCC) interventions. In addition to analyzing available research for methodological rigor and strength of evidence, the authors assessed interventions for quality.	Review different types of articles	Studies did not consistently demonstrate significant effects of exposure to BCC mHealth interventions on the intended audience. Although mHealth is viewed as a promising tool with the ability to foster behavior change, more evaluations of current interventions need to be conducted to establish stronger evidence.
<b>Sosena Mitiku June, 2017</b>	Design EMR Management System for Neonatal	To design an EMR management system and to develop prototype of an EMR	Interview, document analysis and observation	Generally, designed NICU EMR Management System accessibility of data or patient

	Intensive Care Unit of Yekatit 12 Hospital Medical College	management system for Neonatal Intensive Care Unit of Yekatit 12 Hospital Medical College.		information with the reduction of the unnecessary time wasted to search patient information to compile reports, and it makes timely use of information by decision makers, which improves the current service.
<b>Kumudini Sarathchandra July 082019</b>	Implementation challenges and Research Gaps of EMR in Public Sector Hospitals of Sri Lanka	The main focus of this paper is to investigate the research gaps in national EMR implementation for systematic empirical study in order to substantiate future doctoral studies	Paper review	The current status and research gaps of EMR implementation in Sri Lankan public sector hospitals in relation to progress, benefits and challenges.

There are several studies that have explained on the use of EMR and came up with their findings that show the numerous challenges facing hospital health professions in utilizing the EMR during to give the service.

## 2.17 Research gap

Most of the research papers are study in the implementation of EMR in different country the efficiency and availability. During this study that refer the related works study were done on the single part of the EMR functionality, but in different hospitals specially that compare which institution properly use the full parts of EMR was limited study. Generally different types of researchers are study in the specific area and also in specific case and also in specific organizations.

The survey paper done by (Getachew et al 2010) made an effort to analyze the status of the digitization process in selected institutions of Addis Ababa city, Ethiopia. The focal objective of the survey was to identify the scope, current practices, development activities, and future considerations of digitization of records or archival materials in Ethiopian organizations. Data was collected from selected 27 (90%) institutions and analyzed. The study applied a survey method using instruments like questionnaires and literature studies. In the process of identifying the status, progress, prospects, and challenges to the digitization and form the basis of providing a future roadmap to the successful execution of digitization projects, the result of the survey uncovered that gap are contributing to cooperated digitization activities, questioning its future.

It has also confirmed findings that uncertain needs, lack of awareness, unproved project executions, resistance to transition from traditional systems, intellectual property issues, the impact of organizational dynamics, the failure of organizations to gear up digitization projects, resources inadequacy, poor long-term planning, the need for management systems, unanticipated costs of technology resources, difficulties in moving into an international field, lack of clarity in interpreting the digital world and the like are factors affecting the digitization issues in the country.

According to (Hamer, 2019)In business planning, the product gap (also called a segment or positioning gap) is the part of the market that is not currently being optimally served. The gap represents a competitive opportunity for new market entrants. We considered alternative products to be other electronic health networks and data sources that provided access to clinical data and claims data available at the time of our business analysis (2013–2015). Electronic health data products were categorized based on their characterizing patient populations and type of electronic health data. Safety-net populations include uninsured Americans and those



who are Medicaid beneficiaries; therefore, patient populations were defined by insurance coverage. The types of electronic health research data were sub-divided into national survey and panel data, administrative claims data, data, and linked administrative and EHR data. As a result, the health services researchers interviewed mentioned several public data sources they routinely used, but that they found lacking for comparative effectiveness research in uninsured safety-net populations.

Implementation of EMR has been very challenging and many barriers have been identified in developed and developing countries: Holistic approach, Aversion to change, legal complication, privacy concerns, Security issues, technical barriers, inter-operability, Leadership, Coordination among stakeholders, resistance to use, incentives and knowledge of Information Technology(Rebekah et.al, 2018).

This paper highlights the current status and research gaps of EMR implementation in Sri Lankan public sector hospitals in relation to progress, benefits and challenges. Absence of empirical evidence of systematic investigation on EMR project progress and national plan for implementation concludes with recommendations for future researches. The gaps also Limited scientific research on EMR, National policy to implement EMR in all departments of hospitals and national Integrated EMR, Data Ownership, Data security and Privacy, Data analytics and decision making(Sarathchandra, 2019.).

According to (Getachew et al 2010), the number and diversity of issues that affect digitization and jeopardize the future can be warranted by a coordinated and consensus-driven approach to the problem, that is, through a National Standard built on past concepts and experiences in implementation, guidelines and emerging standards for metadata in support of record and archive management activities. The survey has identified several key stakeholders who generate, maintain, and preserve a huge amount of data in various formats and store it on various media digital or non-digital. The researchers recommended that any digitization activities and attempts by the institution have to start right and first from national standard, but it should be supplemented with national strategy, organizations should establish digitization alliances so that information can be shared, digitization issues discussed, expertise group developed, best practices explored, joint licensing of digitization software or hardware investigated and implemented, joint funding agreed, and interests represented. The study didn't achieve the challenges and opportunities of digitizing the health sector. So, the researcher identified it as a gap and initiated to conduct the study on the area.

## 2.18 Conceptual Framework

This thesis investigates the concept of development based on the premise that the supposed the role of EMR investigations compare in selected private, public hospitals. And also, the gap between the two health sectors to use the systems what are the challenges, contributions and opportunities that get from the systems. According to the research questions and also their beneficiaries of interventions over the past years or so rarely asked their views on the meanings of health service development for automated through country.

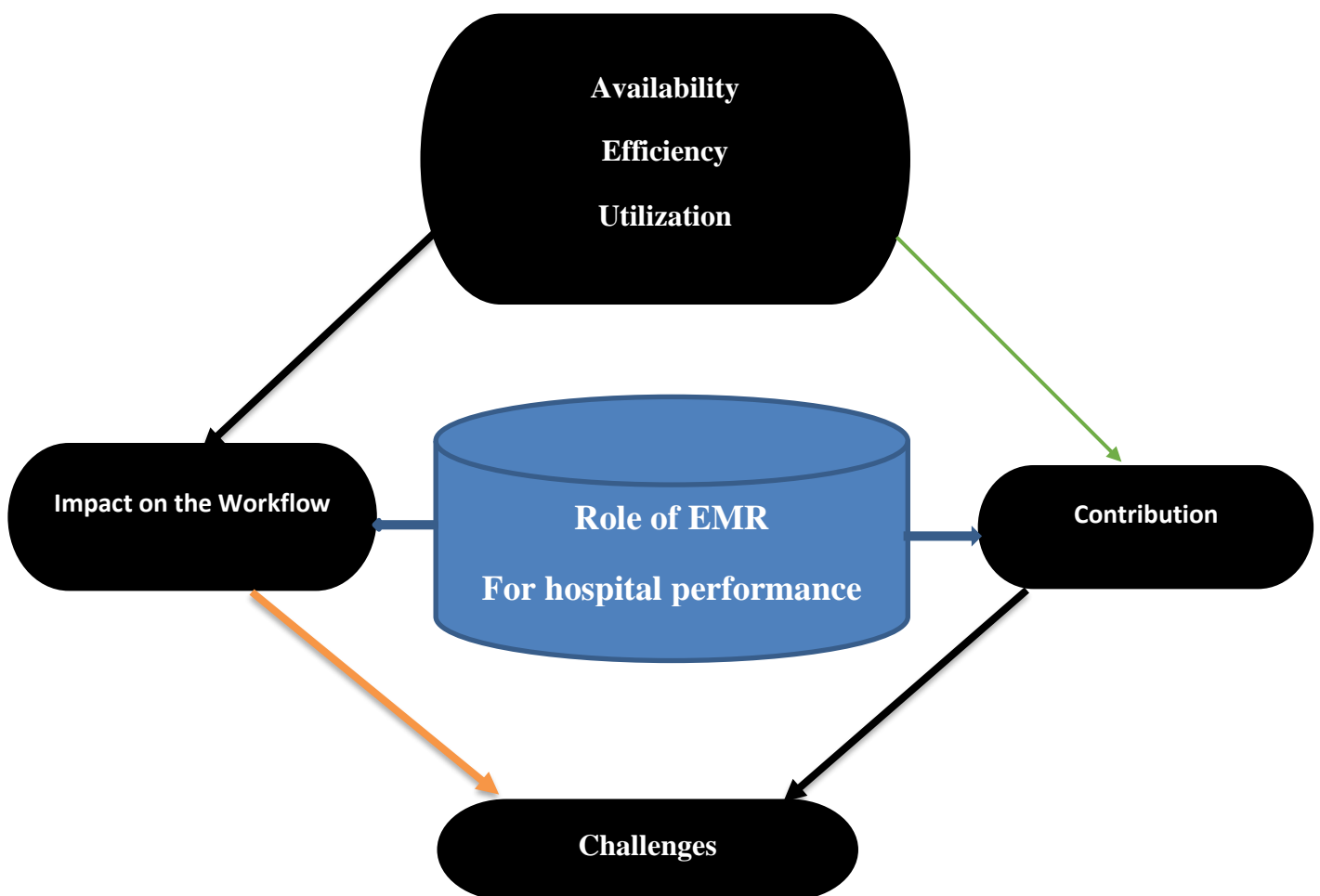


Figure 3: EMR Implementation Framework (Mikael et al, 2012)

## 2.19 Hypothesis On the Use of EMR Between Private and Public

Table 2: Hypothesis on use of EMR

No	variables	Private hospital	Public hospitals
1	availability, efficiency and utilizing EMR in public and private hospitals	Greater than the private hospital	Less than the public hospital
2	The contributions of EMR for quality of healthcare services.	Greater than the private hospital	Less than the public hospital
3	The impact of EMR on the workflow of the hospitals.	Greater than the private hospital	Equal to the public hospital.
4	Challenges in the use of EMR system	Greater than the private hospital	Less than the public hospital

## CHAPTER THREE

### RESEARCH METHODOLOGY

#### 3.1 The Study Area

This study was conducted in two particular clusters of study area in Ethiopia. The first cluster was located in Jimma town i.e., Jimma University Medical Center/ JUMC (public) and Oda Hulle primary Hospital/ OHPH (private) whereas the second cluster located in Addis Ababa i.e., St. Paul Hospital SPH (public) and Myungsung Christian Medical Center (MCM) or Korea hospital (private). These hospitals were selected that use EMR full package and partial use from different parts of the country, two from capital city of the country and the other two from Oromia region - Jimma town, to increase the representativeness of the study through covering both urban and rural regions of the country.



Figure 4: Clusters of Study Area, Jimma and Addis Ababa

Since the objective of the study is to compare the role of EMR implementation for supporting hospital performance in private versus public hospitals in Ethiopia, private and public hospitals selected from each cluster study area. Although the number of hospitals limited only to four due to the scope of the study, it is found to be sufficient to get indicative result in comparison of the status and practice of the private and public hospitals in EMR implementation.

**Table 3: Description of the Study Area**

SN	Selected Hospitals	Ownership	Bed Capacity	Catchment Population (million)	Location & Region	Cluster
1	Jimma University Medical Center (JUMC)	Public	800	15	Jimma Town (353 Km far by road southwest of Addis Ababa), Oromia Regional State	1
2	Oda Hulle primary Hospital (OHPH)	Private (Domestic)	60	1		
3	St. Paul Hospital (SPH)	Public	700	5	Addis Ababa City, Addis Ababa City Administration	2
4	Myungsung Christian Medical Center (MCM)	Private (Foreign)	248	2.5		

### 3.2 Research Design

In this research, cross-sectional survey was used. A survey research design was used to get a representative data in line to the scope of the study. The reason to select cross-sectional survey because the study depends on short period of time, budget cost, to finish in short time and also consider the scope of the study.

Likewise, mixed research approach was used to gather data that answers the research to get adequate information in depth about the implementations and use of EMR understanding of a complex phenomenon by exploiting on the strengths of the two methods.

### 3.3 Study Population

The study respondents were selected based on their knowledge of the phenomenon being studied. The study population was 200 health professionals, ICT user support technicians working with health service providers from two government hospitals and the two non-government hospitals in Jimma and Addis Ababa respectively. The total population of the study is demonstrated in the table below.

**Table 4: The total population of study**

Ownership	Selected Hospitals	Population Type	Sub-Total	Total
		Health Professional		
Public	Jimma University Medical Center (JUMC)	62	62	119
	St. Paul Hospital (SPH)	57	57	
Private	Oda Hulle primary Hospital (OHPH)	38	38	81
	MyungsungChristian Medical Center (MCM)	43	43	
	<b>Total</b>	<b>110</b>	<b>200</b>	<b>200</b>

### 3.4 Sampling Method

Purposive sampling was used for this study because it is one of the most common sampling techniques in qualitative research in which participant's groups are decided to pre-selected criteria relevant to a particular research question. Researchers use purposive sampling when they want to access a particular subset of people, as all participants of a survey are selected because they fit a particular profile. It helps the researcher to use different characteristics to select the subject of the study(Campbell, et al., 2020). Purposive sampling is also good for exploratory and qualitative research approach(Moazzam, 2014).

Therefore, Purposive sampling assists to select a sample that can help to identify the comparative study of EMR using in the health sector from the health professional and ICT user support. Based on this sampling technique, respondents were selected from two public and two private institutions in Jimma and Addis Ababa directly connected or engaged in digitization or automation or related activities in filling the questionnaire.

### 3.5 Sample Size Determination

In purposive sampling, the sample size can be adjusted during the assessment. For example, if it becomes apparent that all locations within a group are very similar, the number of locations to be visited can be reduced to few clusters instead of visiting many locations in wide area. The sample size determination in non-probability purposive sampling is based on the judgment of the researcher aiming to get sufficient amount of data that could produce representative result for the study(Julius, 2013). Incidentally, the sample size of this study determined by the

researcher of the study treating all clusters and hospitals of the study area as shown in the table below.

**Table 5: Sample Size of the Study**

<b>Ownership</b>	<b>Selected Hospitals</b>	<b>Target Population (N)</b>	<b>Sample Size (n)</b>	<b>Total</b>
Public	Jimma University Medical Center (JUMC)	62	40	80
	St. Paul Hospital (SPH)	57	40	
Private	Oda Hulle primary Hospital (OHPH)	38	35	71
	Myungsung Christian Medical Center (MCM)	43	36	
<b>Total</b>		<b>200</b>	<b>151</b>	<b>151</b>

### **3.5.1 Response Rate of the Study**

Total response rate is the number of sample respondents who answered the questionnaire divided by the total number of people in the sample. It is usually expressed in the form of a percentage. A low response rate can give rise to sampling bias. Evans SJ. Good surveys guide 1991 stated that getting a high response rate above 80% from a small, random sample or judgmental sample is considered preferable to a low response rate from a large sample(Choung, et al., 2013). If a questionnaire achieves only a 25% response rate, the study suffers from a nonresponse bias of 75%. One way of dealing with lack of representativeness is to weight the study sample segments to reflect the greater population attributes(Fincham, 2008).

In this study, the data were collected from 147 respondents among which 139 and 8 respondents participated in questionnaire and interview respectively. And also, In the qualitative survey the study used two for each hospital totally using eight participants from the total survey. Therefore, the response rate of this study computed for both the total sample respondents (147) and for planned sample size (151).

From the planned sample size of 151, the data were collected from 147 respondents in two major clusters of study area, these are Jimma University Medical Center (JUMC) and Oda Hulle primary Hospital (OHPH) in Jimma town whereas St. Paul Hospital (SPH) and Myungsung Christian Medical Center (MCM) in Addis Ababa city. Total response of the study was 97.4%, which is very favorable to consider that there is no sample bias in the study. Using the Response rate formula (Choung, et al., 2013) the computation can be shown below.

Response Rate = (Responses Returned) / (Surveys Sent Out) \* 100

$$RR = \frac{147}{151} * 100\%$$

RR = 97.4%

Since response rate of 80% is considered as a high, response rate of this study is very significant.

**Table 6: Response Rate of the Study**

Ownership	Hospitals in Clusters of Study Area	Sample Size (n)			Total RR
		Surveys Sent Out	Responses Returned	Response Rate (RR)	
		A	B	(B/A)*100	
Public	Jimma University Medical Center (JUMC)	40	40	100%	97.5%
	St. Paul Hospital (SPH)	40	38	95%	
Privat	Oda Hulle primary Hospital (OHPH)	35	33	94.3%	97.2%
	Myungsung Christian Medical Center (MCM)	36	36	100%	
<b>Total</b>		151	147	97.4%	97.4%

### 3.6 Data Collection Methods

This study employed two data collection techniques, these are questionnaires and semi-structured interviews to collect information about comparative study of EMR used in health care services.

#### 3.6.1 Questionnaire

Questionnaire is one of the best data collection methods in mixed research approach that can produce both qualitative and quantitative information depending on how they are structured and analyzed. Many of the considerations for a questionnaire in a qualitative survey are the same as for a quantitative survey, however a questionnaire is a one where less statistical rigor is required, where sample sizes are not as large. In collecting rich data, the most effective method would be via face to face, administered questionnaire, as the researcher would be able to use prompts to encourage the respondents to give more detailed answers (MacDonald & Nicola, 2015).



This study employed face to face administered questionnaire for selected respondents in study area. Most of the questions in the questionnaire were close ended while some questions in the questionnaire were open-ended to generate more detailed answers and gather information to provide greater freedom of expression, avoid bias due to limited response ranges in the case of closed-ended questions, and grant respondents to be able to qualify and re-qualify their answers.

The questionnaire of this study organized with five sections totally contains 45 questions in total, of which 10 are open-ended including the sociodemographic questions. The first section contains 5 sociodemographic questions. Section two, three, four, and five encompasses questions on the challenges of using EMR in the hospitals, the extent of utilizing EMR in public hospitals, the contributions of EMR for the quality of health services, and the impact of EMR on the workflow of the hospitals respectively. These sections averagely contain 9 questions of 5-point Likert's scale questions along with one or two additional open-ended questions (See Appendix A).

### **3.6.2 Semi-Structured Interview**

One of the most popular and frequently used methods of gathering information from people about anything is by interviewing them. Interviews are a qualitative method of research often used to obtain the interviewees' perceptions and attitudes to the issues. Semi-structured interview is a more commonly used interview technique that follows a framework in order to address key themes rather than specific questions. At the same time, it allows a certain degree of flexibility for the researcher to respond to the answers of the interviewee and therefore develop the themes and issues as they arise (MacDonald & Nicola, 2015).

This study employed 11 interview questions prepared for 8 EMR experts (2 respondents from each hospital or 4 interviewees from private and 4 interviewees from public hospitals) that will be administered in one hour allocated time for each interviewee (See Appendix B).

## **3.7 Data Collection Procedure**

This study employed questionnaire and interview methods to collect data from the samples. The questions for the questionnaire and the interview were designed in line with the research question of the study and by referring related papers. These questions were pretested with pilot study and approved by the advisors of the study before administering to samples on the study

area. The researcher has issued the official letter that was provided by the Jimma Institute of Technology Faculty of Computing and Informatics for the hospital authorities in the study area to get permission to conduct the data collection. Then and there, the researcher supervised and collected the data with collaborating to the data collectors in both clusters and 4 hospitals.

### **3.8 Data Quality Control**

The data collectors of the study provided with organized short training on the collection of the data beforehand. This helped to increase the reliability of the data. Then after, the collected data was checked for completeness, consistency, and neatness before the analysis to increase the validity of the data. Ambiguous and vague responses and returned questionnaire papers were discarded before analysis.

### **3.9 Data Analysis, Presentation and Interpretation**

The data were categorized, organized, and coded before the analysis. Quantitative data was analyzed by SPSS 25 software to get descriptive statistical values of the data. Qualitative data were also analyzed by thematic analysis method. Then, the results and findings of the data were presented using appropriate graphs, tables, and charts. The findings were interpreted in line with the specific objectives of the study.

### **3.10 Ethical Considerations**

Ethics are a set of moral principles that are widely accepted, which guide the researcher in observing the rules. Ethical considerations are required special attention during the study. Throughout the study period, the researcher and research assistants were stand by a code of ethics. The research objectives were explained to the local authorities in the target communities and permission to conduct research was granted. The researcher was present documentation about himself and the research before data collection in the field. The data were collected in full consent of the respondents through protecting their privacy and confidentiality.

## CHAPTER FOUR

### RESULTS AND DISCUSSIONS

#### 4.1 Demographic Characteristics of the Respondents

In this study, an attempt is made to assess challenges associated with physicians' acceptance and usage implementations of EMR two public and two private hospitals, such as Jimma University specialized Hospital, St. Paul Millennium Hospital, Oda Hulle primary Hospital, and MCM Korea General Hospital.

Here the assessment result is presented with detailed analysis and interpretation. The total samples of health professionals and admin staffs(finance, human resources and quality officers) were 151 respectively, but due to pandemic of coronaviruses from the total samples the questionnaire was distributed to 143 health professionals and admin staffs; among these 143 respondents 139of them returned the questionnaire, Also, from each hospital 2 respondents (totally 8)took part in interview session.

**Table 7: Description of the data response**

Ownership	Name of Hospital	Questionnaire		interview		Total	
		f	%	f	%	f	%
Public	JUMC	38	27.3	2	25	40	.2
	St. Paul	36	25.9	2	25	38	25.9
	<b>Sub-Total</b>	<b>74</b>	<b>53.2</b>	<b>4</b>	<b>50</b>	<b>78</b>	<b>53.1</b>
Private	ODA Hulle	31	22.3	2	25	33	22.4
	MCM	34	24.5	2	25	36	24.5
	<b>Sub-Total</b>	<b>65</b>	<b>46.8</b>	<b>4</b>	<b>50</b>	<b>69</b>	<b>46.9</b>
<b>TOTAL</b>		<b>139</b>	<b>100.0</b>	<b>8</b>	<b>100.0</b>	<b>147</b>	<b>100.0</b>

Therefore, totally 147 respondents participated in data collection of this study out of the total sample size of the study i.e., 151.

The distribution of total data response proportion, in all public and private hospitals illustrated in the figure below.

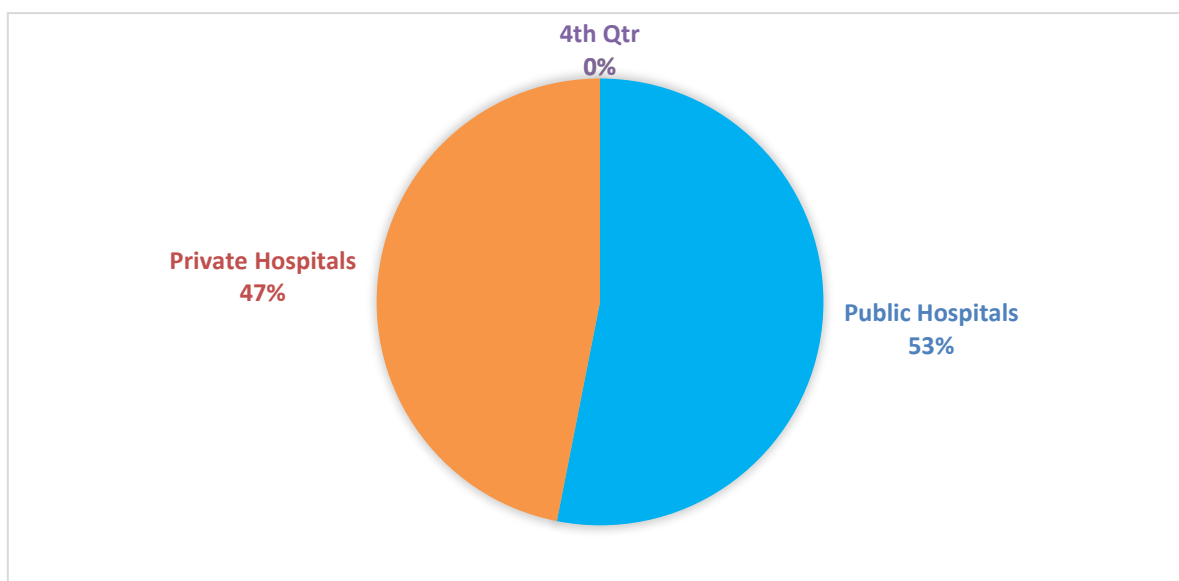


Figure 5: Distribution of response proportion in public and private hospitals

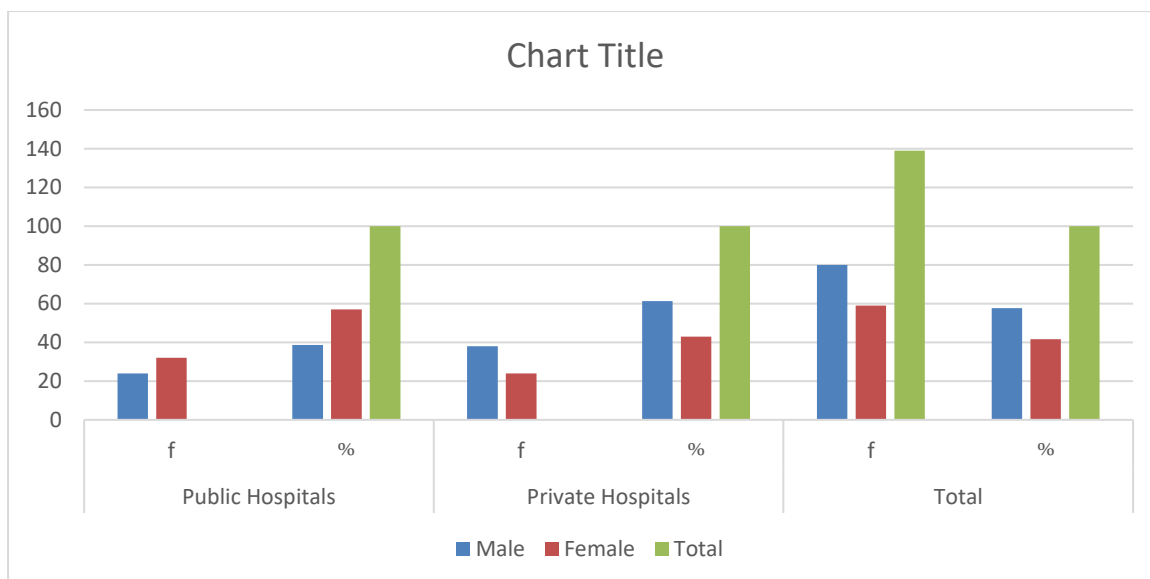
Table 8: Educational status of respondents of the questionnaire

Current Education status	Public Hospitals		Private Hospitals		Total	
	f	%	F	%	f	%
Diploma	8	10.8	6	9.2	14	10.1
BSc	26	35.1	7	10.8	33	23.7
MSc	21	28.4	17	26.2	38	27.3
Specialized Doctors	19	25.7	35	53.8	54	38.8
Total	74	100.0	65	100.0	139	100.0

Concerning the educational status of respondents of the questionnaire, totally 14(10.1%) of them had Diploma, 33(23.8%) of them had Degree, 38(27.3%) of them had MSc and 54(38.8%) of them had specialization in certain type of sub discipline. The proportion of BSc holders that practice EMR system in public hospitals (26 or 35.1%) were above 3 fold of that of private hospitals (7 or 10.8%); whereas the proportion of specialized doctors that practice EMR system in public hospitals (19 or 25.7%) were much less than that of private hospitals (35 or 53.8%).

Table 9: Gender of respondents of the questionnaire

Gender	Public Hospitals		Private Hospitals		Total	
	f	%	F	%	f	%
Male	24	38.7	38	61.3	80	57.6
Female	32	57.1	24	42.9	59	41.7
Total		100.0		100.0	139	100.0



**Figure 6: Gender of respondents of the questionnaire**

As shown above in the table, 80(57.6%) of the hospital respondents were male and 59(41.7%) of them were female from total respondents which indicates that EMR practice in hospitals are generally dominated by male practitioners. When comparing public and private hospitals in this regard, better proportion of female EMR practitioners were observed in public hospitals.

## 4.2 The Availability, Efficiency and Extent of Utilizing Electronic Medical Records

### 4.2.1 Availability Evaluation

**Table 10: Availability evaluations**

No.	Item	Availability					
		Public hospital			Private hospital		
		Always	Some times	Not Used	Always	Some times	Not Used
1	Recording patient history and demographic information?	24 68.6%	38 41.8%	9 90.0%	11 31.4%	53 58.2%	1 10.0%
2	Recording patient problem list?	33 35.9%	27 87.1%	9 81.8%	59 64.1%	4 12.9%	2 18.2%
3	Recording and charting vital signs?	40 40.0%	12 85.7%	22 88.0%	60 60.0%	2 14.3%	3 12.0%

4	Ordering radiology tests?	18 45.0%	16 28.6%	40 93.0%	22 55.0%	40 71.4%	3 7.0%
5	Viewing imaging results?	13 46.4%	19 29.2%	39 90.7%	15 53.6%	46 70.8%	4 9.3%
6	Recording patient's medications and history?	20 28.2%	29 74.4%	20 83.3%	51 71.8%	10 25.6%	4 16.7%
7	Reconciling lists of patient medications to identify the most accurate list?	15 27.3%	37 68.5%	18 69.2%	40 72.7%	17 31.5%	8 30.8%
8	Providing reminders for guideline-based interventions or screening tests?	15 28.3%	23 57.5%	31 75.6%	38 71.7%	17 42.5%	10 24.4%
9	The ability for patients to electronically send their online medical record to a third party (e.g., another provider, Personal Health Records)?	5 45.5%	8 47.1%	54 51.9%	6 54.5%	9 52.9%	50 48.1%

As presented in Availability table 6 item 1, Recording patient history and demographic information? regarding this 11(31.4%) private and 24(68.6%) always, 53(58.2%) private and 38(41.8%) public some times, 1(10%) private and 9(90.0%) public not used, the result shows that Recording patient history and demographic information? in a private hospital is the highest stage.

As presented in Availability table 6 item 2, Recording patient problem list? regarding this 59(64.1%) private and 33(35.9%) always, 4(12.9%) private and 27(87.1%) sometimes public and 2(18.2%) private and 9(81.8) not used public the result show that Recording patient problem list? in a private hospital is the highest stage.

As presented in Availability table 6 item 3, Recording and charting vital signs? regarding this 60(60.0%) private and 40(40.0%) always, 2(14.3%) private and 12(85.7%) sometimes and 3(12.0%) private and 22(88.0%) not used public the result show that Recording patient problem list? in a private hospital is the highest stage.

As presented in Availability table 6 item 4, Ordering radiology tests? regarding this 22(55.0%) private and 18(45.0%) always, 40(71.4%) private and 16(28.6%) sometimes and 3(7.0%) private and 40(93.0%) not used public the result show that Ordering radiology tests? in a private hospital is the highest stage.

As presented in Availability table 6 item 5, Viewing imaging results? regarding this 15(53.6%) private and 13(46.4%) always, 40(71.4%) private and 16(28.6%) sometimes and 3(7.0%) private and 39(90.7%) not used public the result show Viewing imaging results? in a private hospital is the highest stage.

As presented in Availability table 6 item 6, Recording patient's medications and history? regarding this 51(71.8%) private and 20(28.2%) always, 10(25.6%) private and 29(74.4%) sometimes and 4(16.7%) private and 20(83.3%) not used public the result show that Recording patient's medications and history? in a private hospital is the highest stage.

As presented in Availability table 6 item 7, Reconciling lists of patient medications to identify the most accurate list? regarding this 40(72.7%) private and 15(27.3%) always, 17(31.5%) private and 37(68.5%) sometimes and 8(30.8%) private and 18(69.2%) not used public the result show that Reconciling lists of patient medications to identify the most accurate list? in a private hospital is the highest stage.

As presented in Availability table 6 item 8, Providing reminders for guideline-based interventions or screening tests? regarding this 38(71.7%) private and 15(28.3%) always, 17(42.5%) private and 23(57.5%) sometimes and 10(24.4%) private and 31(75.6%) not used public the result show that Providing reminders for guideline-based interventions or screening tests? in a private hospital is the highest stage

As presented in Availability table 6 item 9, Ability for patients to electronically send their online medical records to a third party (e.g., another provider, Personal Health Records)? regarding this 6(54.5%) private and 5(45.5%) always, 9(52.9%) private and 8(47.1%) sometimes, 50(48.1%) private and 54(51.9%) not used public the result show that Ability for patients to electronically send their online medical record to a third party (e.g., another provider, Personal Health Records)? in a private hospital is the highest stage.

## 4.2.2 Efficiency Evaluation

Table 11: Efficiency evaluations

No.	Item	Efficiency					
		Public hospital			Private hospital		
		Always	Some times	Not Used	Always	Some times	Not Used
1	Recording patient history and demographic information?	25 71.4%	42 44.7%	7 70.0%	10 28.6%	52 55.3%	3 30.0%
2	Recording patient problem list?	35 37.2%	25 86.2%	9 81.8%	59 62.8%	4 13.8%	2 18.2%
3	Recording and charting vital signs?	40 40.0%	12 85.7%	21 87.5%	60 60.0%	2 14.3%	3 12.5%
4	Ordering radiology tests?	20 48.8%	12 22.6%	42 93.3%	21 51.2%	41 77.4%	3 6.7%
5	Viewing imaging results?	14 48.3%	16 25.8%	44 91.7%	15 51.7%	46 74.2%	4 8.3%
6	Recording patient's medications and history?	24 31.6%	30 76.9%	20 83.3%	52 68.4%	9 23.1%	4 16.7%
7	Reconciling lists of patient medications to identify the most accurate list?	18 40.0%	33 53.2%	23 71.9%	27 60.0%	29 46.8%	9 28.1%
8	Providing reminders for guideline-based interventions or screening tests?	15 38.5%	23 41.8%	36 80.0%	24 61.5%	32 58.2%	9 20.0%
9	The ability for patients to electronically send their online medical record to a third party (e.g., another provider, Personal Health Records)?	6 54.5%	7 63.6%	61 52.1%	5 45.5%	4 36.4%	56 47.9%



As presented in Efficiency table 7 item 1, Recording patient history and demographic information? regarding 10(28.6%) private and 25(71.4%) always, 52(55.3%) private and 42(44.7%) sometimes and 3(30.0%) private and 7(70.0%) not used public the result show that Recording patient history and demographic information? in a private hospital is the highest stage.

As presented in Efficiency table 7 item 2, Recording patient problem list? regarding this 59(62.8%) private and 35(37.2%) always, 4(13.8%) private and 25(86.2%) sometimes and 2(18.2%) private and 9(81.8%) used public the result show that Recording patient problem list? in a private hospital is the highest stage.

As presented in Efficiency table 7 item 3, Recording and charting vital signs? regarding this 60(60.0%) private and 40(40.0%) always, 2(14.3%) private and 12(85.7%) sometimes and 3(12.5%) private and 21(87.5%) not used public the result show that Recording and charting vital signs? in a private hospital is the highest stage.

As presented in Efficiency table 7 item 4, Recording and charting vital signs? regarding this 21(51.2%) private and 20(48.8%) always, 41(77.4%) private and 12(22.6%) sometimes and 3(6.7%) private and 42(93.3%) used public the result shows that Recording and charting vital signs? in a private hospital is the highest stage.

As presented in Efficiency table 7 item 5, Viewing imaging results? regarding this 15(51.7%) private and 14(48.3%) always, 46(74.2%) private and 16(25.8%) sometimes and 4(8.3%) private and 44(91.7%) not used public the result show that Viewing imaging results? in a private hospital is the highest stage.

As presented in Efficiency table 7 item 6, Recording patient's medications and history? regarding this 52(68.4%) private and 24(31.6%) always, 9(23.1%) private and 30(76.9%) sometimes and 4(16.7%) private and 20(83.3%) not used public the result show that Recording patient's medications and history? in a private hospital is the highest stage.

As presented in Efficiency table 7 item 7, Reconciling lists of patient medications to identify the most accurate list? regarding this 27(60.0%) private and 18(40.0%) always, 29(46.8%) private and 33(53.2%) sometimes and 9(28.1%) private and 23(71.9%) not used public the result show that Providing reminders for guideline-based interventions or screening tests? in a private hospital is the highest stage

As presented in Efficiency table 7 item 8, Providing reminders for guideline-based interventions or screening tests? regarding this 24(61.5%) private and 15(38.5%) always, 32(58.1%) private and 23(41.8%) sometimes and 9(20.0%) private and 36(80.0%) used public the result show that Reconciling lists of patient medications to identify the most accurate list? in a private hospital is the highest stage.

As presented in Efficiency table 7 item 9, Ability for patients to electronically send their online medical records to a third party (e.g., another provider, Personal Health Records)? regarding this 5(45.5%) private and 6(54.5%) always, 4(36.4%) private and 7(63.6%) sometimes, 56(47.9%) private and 61(52.1%) not used public the result show that Ability for patients to electronically send their online medical record to a third party (e.g., another provider, Personal Health Records)? in a private hospital is the highest stage.

### 4.2.3 The Extent of Utilizing EMRs

This was the second specific objective of this study, which required to compare the extent of utilizing EMR in public hospitals. In this specific objective, subjects related to EMR is fully functional in your hospital, Enough staff is there in the office for monitoring and evaluation, Most of the time for the system workers acquire training, The hospital patients and health professionals are benefited from the output of EMR in your hospital, The flexibility of the system allows the users to make changes that address their specific requirements by improving usability and relevance data, EMR enables your hospital to service facilitates without paper sending and receiving the report and use data regularly, EMR is searchable and easy to get the patients by different types of mechanisms, there is lack of well-skilled manpower to utilize the system effectively in your hospital. The responses are presented below.

**Table 12: The extent of utilizing EMR**

No	Item	Options	Public hospitals	Private hospitals
1	Electronic Medical Records is fully functional in your hospital	Strongly disagree	35(94.6%)	2(5.4%)
		Disagree	18(85.7%)	3(14.3%)
		Neither agree nor disagree	7(87.5%)	1(12.5%)
		Agree	8(15.4%)	44(84.6%)
		Strongly agree	6(28.6%)	15(71.4%)
2	Most of the time for Electronic Medical Records workers acquire training	Strongly disagree	9(90.0%)	1(10.0%)
		Disagree	12(85.7%)	2(14.3%)
		Neither agree nor disagree	29(82.9%)	6(17.1%)
		Agree	18(27.7%)	47(72.3%)
		Strongly agree	6(40.0%)	9(60.0%)
3	Enough staff is there in the office for monitoring and evaluation.	Strongly disagree	16(88.9%)	2(11.1%)
		Disagree	19(86.4%)	3(13.6%)

		Neither agree nor disagree	19(82.6%)	4(17.4%)
		Agree	10(17.5%)	47(82.5%)
		Strongly agree	10(52.6%)	9(47.4%)
4	There is a lack of well-skilled manpower to utilize EMR effectively in your hospital.	Strongly disagree	7(77.8%)	2(22.2%)
		Disagree	8(80.0%)	2(20.0%)
		Neither agree nor disagree	18(69.2%)	8(30.8%)
		Agree	25(40.3%)	37(59.7%)
		Strongly agree	16(50.0%)	16(50.0%)
5	The hospital patients and health professionals are benefited from the output of EMR in your hospital.	Strongly disagree	20(90.9%)	2(9.1%)
		Disagree	18(94.7%)	1(5.3%)
		Neither agree nor disagree	15(93.8%)	1(6.3%)
		Agree	15(39.5%)	23(60.5%)
		Strongly agree	6(13.6%)	38(86.4%)
6	EMR have been used to registers, result send receiving and process complete data within a short period.	Strongly disagree	13(100.0%)	0(0.0%)
		Disagree	9(75.0%)	3(25.0%)
		Neither agree nor disagree	14(77.8%)	4(22.2%)
		Agree	22(36.1%)	39(63.9%)
		Strongly agree	16(45.7%)	19(54.3%)
7	The flexibility of the system allows the users to make changes that address their specific requirements by improving usability and relevance data.	Strongly disagree	11(91.7%)	1(8.3%)
		Disagree	4(66.7%)	2(33.3%)
		Neither agree nor disagree	10(90.9%)	1(9.1%)
		Agree	28(40.0%)	42(60.0%)
		Strongly agree	21(52.5%)	19(47.5%)
8	EMR enables your hospital to service facilitates without paper sending and receiving the report and use data regularly.	Strongly disagree	11(91.7%)	1(8.3%)
		Disagree	10(76.9%)	3(23.1%)
		Neither agree nor disagree	12(23.1%)	40(76.9%)
		Agree	23(63.9%)	13(36.1%)
		Strongly agree	18(69.2%)	8(30.8%)
9	Electronic Medical Records is searchable and easy to get the patients by different types of mechanisms for example by first name father name phone number kebele worda, etc.	Strongly disagree	2(66.7%)	1(33.3%)
		Disagree	4(66.7%)	2(33.3%)
		Neither agree nor disagree	11(91.7%)	1(8.3%)
		Agree	29(74.4%)	10(25.6%)
		Strongly agree	28(35.4%)	51(64.6%)

The findings in Table 8, in item 1, The respondents were asked whether Electronic Medical Records is fully functional in their hospital or not, concerning this 15(71.4%) of private and 6(28.6%) of public hospital strongly agree, 44(84.6%) of private and 8(15.4%) of public hospital agree, 1(12.5%) of private and 7(87.5%) of public hospital neither agree nor disagree, 3(14.3%) of private and 18(85.7%) of public hospital disagree and strongly disagree. 2(5.4%) of private and 35(94.6%) of public hospital. accordingly, most of private hospital users strongly agree to use EMR acquire training than public.

The findings in Table 8, in item 2 asked the respondents for whether they use most of the time for EMR to acquire training. Concerning this 9(60.0%) of private and 6(40.0%) of public hospital strongly agree, 47(72.3%) of private and 118(27.7%) of public hospital agree, 6(17.1%) of private and 29(82.9%) of public hospital neither agree nor disagree, 2(14.3%) of private and 12(85.7%) of public hospital disagree and strongly disagree 1(10.0%) of private and 9(90.0%) of public hospital. according to this most of private hospital users strongly agree to use EMR acquire training than public.

The findings in Table 8 in item 3, enough staff in the office for monitoring and evaluation. About this 9(47.4%) private and 10(52.6%) strongly agree, 47(82.5%) private and 10(17.5%) agree, 4(14.4%) private and 19(82.6%) neither agree nor disagree, 3(13.6%) private and 19(86.4%) disagree and strongly disagree 2(11.1%) private and 16(88.9%) public. The result indicates that to evaluate and monitoring needs enough staffs strongly agree equally both private and public hospitals.

The result in table 8, in item 4, lack of well-skilled manpower to utilize Electronic Medical Records effectively in your hospital. Around this the result indicates 16(50.0%) private and 16(50.0%) strongly agree, 37(59.7%) private and 25(40.3%) agree, 8(30.8%) private and 18(69.2%) neither agree nor disagree, 2(20.0%) private and 8(80.0%) disagree and strongly disagree 2(22.2%) private and 7(77.8%) public. The skilled manpower to utilized EMR effectively in a private hospital is greater than the public one.

The result in table 8, in item 5, The hospital patients and health professionals are benefited from the output of EMR in your hospital. Around this, the result indicates 38(86.4%) private and 6(13.6%) strongly agree, 23(60.5%) private and 15(39.5%) agree, 1(6.3%) private and 15(93.8%) neither agree nor disagree, 1(5.3%) private and 18(94.7%) disagree and strongly disagree 2(9.1%) private and 20(90.9%) public. Patients and workers are benefited from the output of the EMR system private hospitals are greater than public on.

The result in table 8, in item 6, Electronic Medical Records have been used to registers, result send receiving and process complete data within a short period. Around this the result indicates 19(54.3%) private and 16(45.7%) strongly agree, 39(63.9%) private and 22(36.1%) agree, 4(22.2%) private and 14(77.8%) neither agree nor disagree, 3(25.0%) private and 9(75.0%) disagree and strongly disagree 0(0%) private and 13(100%) public. The use of EMR to registers, result send receiving and process complete data within a short period as a result indicates that strongly use private than the public one.

The result in table 8, in item 7, The flexibility of the system allows the users to make changes that address their specific requirements by improving usability and relevant data. Around this the result indicates 19(47.5%) private and 21(52.5%) strongly agree, 42(60.0%) private and 28(40.0%) agree, 1(9.1%) private and 10(90.9%) neither agree nor disagree, 2(33.3%) private and 4(66.7%) disagree and strongly disagree 1(8.3%) private and 11(91.7%) public. The flexibility of the system allows the users to make changes that address their specific requirements by improving usability and relevance data, as a result, indicates that strongly use private than the public one.

The result in table 8, in item 8, EMR enables your hospital to service facilitates without paper sending and receiving the report and use data regularly. Around this the result indicates 8(30.8%) private and 18(69.2%) strongly agree, 13(36.1%) private and 23(63.9%) agree, 40(76.9%) private and 12(23.1%) neither agree nor disagree, 3(23.1%) private and 10(76.9%) disagree and strongly disagree 1(8.3%) private and 11(91.7%) public. EMR enables your hospital to service facilitates without paper sending and receiving the report and use data regularly the result indicates that strongly use private than the public one.

The result in table 8, in item 9, EMR is searchable and easy to get the patients by different types of mechanisms for example by first name father name phone number kebele worda. Around this the result indicates 51(64.6%) private and 28(35.4%) strongly agree, 10(25.6%) private and 29(74.4%) agree, 1(8.3%) private and 11(91.7%) neither agree nor disagree, 2(33.3%) private and 4(66.7%) disagree and strongly disagree 1(33.3%) private and 2(66.7%) public. EMR is searchable and easy to get the patients by different types of mechanisms for example by first name father name phone number kebele worda the result indicates that strongly use private than the public one.

### **4.3 The Contributions of EMRs for Quality of Health Services**

This was the third specific objective which required me to compare the role EMR contributes between private and public hospitals. In this specific objective concerns related to worker's help from the EMR system, for improving the health service performance, EMR Utilization plays a very important role. Availability of electronic medical record service resources, help health professionals to do their works properly, Electronic medical record resources utilization improves health professional's service performance, using electronic medical record resources do not have a significant positive impact on health service performance, the hospital does not

have enough EMR materials (Computers & network etc.) for patients and health professional's thus is contributing to poor health service performance, the Hospital has got enough EMR materials (Computers & network etc.) for patients and health professional's is contributing positively for health service performance. EMR resources, financial and human resources to support the health service processing the information systems. Effective systems can ensure the availability and use of health information to strengthen and support their health systems.

**Table 13: Role and Contributions EMR For Service Performance**

No	Impact of Electronic Medical Records on health care service performance	types of hospital	strongly disagree	Disagree	neither agree nor disagree	agree	Strongly agree
1	For improving the health service performance, EMR management Utilization plays a very important role.	Private Hospital	14 28.6%	14 58.3%	6 37.5%	17 77.3%	23 82.1%
		Public Hospital	35 71.4%	10 41.7%	10 62.5%	5 22.7%	5 17.9%
2	Availability of electronic medical record service resources, helps health professionals to do their works properly.	Private Hospital	15 29.4%	12 38.7%	3 100.0%	17 77.3%	27 84.4%
		Public Hospital	36 70.6%	19 61.3%	0 0.0%	5 22.7%	5 15.6%
3	The absence of EMR use and health service in a hospital can led to health professional's poor performance in their services	Private Hospital	15 29.4%	14 40.0%	7 63.6%	23 92.0%	15 88.2%
		Public Hospital	36 70.6%	21 60.0%	4 36.4%	2 8.0%	2 11.8%
4	EMR resources utilization improves health professional's service performance	Private Hospital	8 18.2%	22 56.4%	4 66.7%	18 72.0%	22 88.0%
		Public Hospital	36 81.8%	17 43.6%	2 33.3%	7 28.0%	3 12.0%
5	Using electronic medical record resources do not have a significant positive impact on health service performance	Private Hospital	17 31.5%	15 44.1%	12 70.6%	21 87.5%	9 90.0%
		Public Hospital	37 68.5%	19 55.9%	5 29.4%	3 12.5%	1 10.0%
6	The hospital has got enough EMR materials (Computers & networks etc) for patients and health professional's is contributing positively to health service performance	Private Hospital	14 77.8%	16 66.7%	18 90.0%	8 30.8%	18 35.3%
		Public Hospital	4 22.2%	8 33.3%	2 10.0%	18 69.2%	33 64.7%
7	The hospital does not have enough EMR materials (Computers & networks etc) for	Private Hospital	13 72.2%	6 85.7%	17 89.5%	20 58.8%	18 29.5%

	patients and health professional's thus is contributing to poor health service performance	Public Hospital	5 27.8%	1 14.3%	2 10.5%	14 41.2%	43 70.5%
8	EMR resources, financial and human resources to support the health service processing the information systems	Private Hospital	11 37.9%	17 32.1%	10 71.4%	19 79.2%	17 89.5%
		Public Hospital	18 62.1%	36 67.9%	4 28.6%	5 20.8%	2 10.5%
9	Effective systems can ensure the availability and use of health information to strengthen and support their health systems	Private Hospital	14 41.2%	18 35.3%	8 72.7%	17 77.3%	17 81.0%
		Public Hospital	20 58.8%	33 64.7%	3 27.3%	5 22.7%	4 19.0%

The result in table 9, in item 1, For improving the health service performance, EMR management Utilization play a very important role. Around this the result indicates 5(17.9%) public and private 23(82.1%) strongly agree, 5(22.7%) public and private 17(77.3%) agree, 10(62.5%) public and private 6(37.5%) neither agree nor disagree, 10(41.7%) public and private 14(58.3%) disagree and strongly disagree 35(71.4%) public and private 14(28.6%) public. For improving the health service performance, EMR management Utilization plays a very important role. the result indicates that strongly use private than the public one.

The result in table 9, in item 2, Availability of electronic medical record service resources, help health professionals to do their works properly. Around this the result indicates 5(15.6%) public and private 27(84.4%) strongly agree, 5(22.7%) public and private 17(77.3%) agree, 0(0.0%) public and private 3(100%) neither agree nor disagree, 19(61.3%) public and private 12(38.7%) disagree and strongly disagree 36(70.6%) public and private 15(29.4%). Availability of electronic medical record service resources, helps health professionals to do their works properly. the result indicates that strongly use private than the public one.

The result in table 9, in item 3, Absence of EMR use and health service in a hospital can facilitate health worker's poor performance in their services. Around this the result indicates 2(11.8%) public and private 15(88.2%) strongly agree, 2(8.0%) public and private 23(92.0%) agree, 4(36.4%) public and private 7(63.6%) neither agree nor disagree, 21(60.0%) public and private 14(40.0%) disagree and strongly disagree 36(70.6%) public and private 15(29.4%). The absence of EMR use and health service in a hospital can facilitate health worker's poor performance in their services. the result indicates that strongly use private than the public one.

The result in table 9, in item 4, Electronic medical record resources utilization improves health professional's service performance. Around this the result indicates 3(12.0%) public and private 22(88.0%) strongly agree, 7(28.0%) public and private 18(72.0%) agree, 2(33.3%) public and private 4(66.7%) neither agree nor disagree, 17(43.6%) public and private 22(56.4%) disagree and strongly disagree 36(81.8%) public and private 8(18.2%). Electronic medical record resources utilization improves health professional's service performance. the result indicates that strongly use private than the public one.

The result in table 9, in item 5, Using electronic medical record resources do not have a significant positive impact on health service performance. Around this the result indicates 1(10.0%) public and private 9(90.0%) strongly agree, 3(12.5%) public and private 21(87.5%) agree, 5(29.4%) public and private 12(70.6%) neither agree nor disagree, 19(55.9%) public and private 15(44.1%) disagree and strongly disagree 37(68.5%) public and 17(31.5%) private. Using electronic medical record resources does not have a significant positive impact on health service performance. the result indicates that strongly use private than the public one.

The result in table 9, in item 6, the Hospital has got enough EMR materials (Computers & network etc) for patients and health professional's is contributing positively to health service performance. Around this the result indicates 33(64.7%) public and private 18(35.3%) strongly agree, 18(69.2%) public and private 8(30.8%) agree, 2(10.0%) public and private 18(90.0%) neither agree nor disagree, 8(33.3%) public and private 16(66.7%) disagree and strongly disagree 4(22.2%) public and private 14(77.8%). The hospital has got enough EMR materials (Computers & networks etc) for patients and health professional's is contributing positively to health service performance. the result indicates that strongly use private than the public one.

The result in table 9, in item 7, The hospital does not have enough EMR materials (Computers & network, etc.) for patients and health professionals thus are contributing to poor health service performance. Around this the result indicates 43(66.2%) public and private 15(25.9%) strongly agree, 14(21.5%) public and private 14(24.1%) agree, 2(3.1%) public and private 16(27.6%) neither agree nor disagree, 1(1.5%) public and private 6(10.3%) disagree and strongly disagree 5(7.7%) public and private 7(12.1%). The hospital does not have enough EMR materials (Computers & networks etc.) for patients and health professionals thus are contributing to poor health service performance. the result indicates that strongly use private than the public one



The result in table 9, in item 8, is EMR resources, financial and human resources to support the health service processing the information systems. Around this the result indicates 2(10.5%) public and private 17(89.5%) strongly agree, 5(20.8%) public and private 19(79.2%) agree, 4(28.6%) public and private 10(71.4%) neither agree nor disagree, 36(67.9%) public and private 17(32.1%) disagree and strongly disagree 18(62.1%) public and private 11(37.9%) public. EMR resources, financial and human resources to support the health service processing the information systems. the result indicates that strongly use private than the public one

The result in table 9, in item 9, Effective systems can ensure the availability and use of health information to strengthen and support their health systems. Around this the result indicates 4(19.0%) public and private 17(81.0%) strongly agree, 5(22.7%) public and private 17(77.3%) agree, 3(27.3%) public and private 8(72.7%) neither agree nor disagree, 33(64.7%) public and private 18(35.3%) disagree and strongly disagree 20(58.8%) public and private 14(41.2%). Effective systems can ensure the availability and use of health information to strengthen and support their health systems. the result indicates that strongly use private than the public one.

#### **4.4 The Impact of EMRs on the Workflow of the Hospitals**

This was the fourth specific objective of this study, which required to compare the impact of electronic medical record resources usage on the health performance of private and public hospitals in selected private and public hospitals. In this specific objective, Electronic medical record resource utilization play important role to improve health services performances, availability of hospitals service and enough resources help health professionals to perform their health facilities, absence of electronic medical record resource use and this service in a hospitals can lead to health professional's poor performance in their service, Electronic medical records resources utilization improves plays an important role in health service performance, Using EMR resources do not have significant positive impact on health service performance The Hospital has got enough electronic medical record materials (Computers & network etc.) for patients and health professional's is contributing positively for health service performance, The hospital does not have enough electronic medical record materials (Computers & network etc.) for patients and health professional's thus is contributing to poor health service performance, EMR resources, financial and human resources to support the health service processing the information systems and Effective systems can ensure availability and use of health information to strengthen and support their health systems. The

purpose of this questions was to decide how EMR utilization helped hospitals towards improving performance in health service when they utilized it. The findings are presented in.

**Table 14: The impact of EMR to work flow**

No	Item	Option	Public	Private
1	Data accessed through the EMR enable the local and the outside referral hospitals level to monitor implementation of the health services strategies and programs and their impact on overall the country hospital policy goals and health outcomes.	Strongly disagree	9(81.8%)	2(18.2%)
		Disagree	18(85.7%)	3(14.3%)
		Neither agree nor disagree,	11(18.6%)	48(81.4%)
		Agree	19(73.1%)	7(26.9%)
		Strongly agree	17(77.3%)	5(22.7%)
2	EMR enables health professionals to have easy access to patient data	Strongly disagree	14(93.3%)	1(6.7%)
		Disagree	13(92.9%)	1(7.1%)
		Neither agree nor disagree,	4(100.0%)	0(0.0%)
		Agree	21(31.8%)	45(68.2%)
		Strongly agree	22(55.0%)	18(45.0%)
3	EMR increases data security & retrieve-ability	Strongly disagree	13(92.9%)	1(7.1%)
		Disagree	11(91.7%)	1(8.3%)
		Neither agree nor disagree,	9(100.0%)	0(0.0%)
		Agree	16(28.1%)	41(71.9%)
		Strongly agree	25(53.2%)	22(46.8%)
4	EMR improves operational effectiveness	Strongly disagree	15(93.8%)	1(6.3%)
		Disagree	15(93.8%)	1(6.3%)
		Neither agree nor disagree,	10(90.9%)	1(9.1%)
		Agree	17(27.0%)	46(73.0%)
		Strongly agree	17(51.5%)	16(48.5%)
5	EMR enables the health institutes to get appropriate feedback	Strongly disagree	13(92.9%)	1(7.1%)
		Disagree	11(84.6%)	2(15.4%)
		Neither agree nor disagree,	7(100.0%)	0(0.0%)
		Agree	20(33.9%)	39(66.1%)
		Strongly agree	23(50.0%)	23(50.0%)
6	EMR brings improvements in the completeness and quality of data	Strongly disagree	11(84.6%)	2(15.4%)
		Disagree	12(100.0%)	0(0.0%)
		Neither agree nor disagree,	15(93.8%)	1(6.3%)
		Agree	17(53.1%)	15(46.9%)
		Strongly agree	19(28.8%)	47(71.2%)
7	Improves the practice's quality of care.	Strongly disagree	15(93.8%)	1(6.3%)
		Disagree	14(93.3%)	1(6.7%)

		Neither agree nor disagree,	5(83.3%)	1(16.7%)
		Agree	21(55.3%)	17(44.7%)
		Strongly agree	19(29.7%)	45(70.3%)
8	Increases the practice's efficiency.	Strongly disagree	13(86.7%)	2(13.3%)
		Disagree	12(100.0%)	0(0.0%)
		Neither agree nor disagree,	7(100.0%)	0(0.0%)
		Agree	19(54.3%)	16(45.7%)
		Strongly agree	19(28.8%)	47(71.2%)
9	Reduces duplicate test ordering.	Strongly disagree	6(75.0%)	2(25.0%)
		Disagree	9(100.0%)	0(0.0%)
		Neither agree nor dis Agree	11(100.0%)	0(0.0%)
		Strongly agree	17(54.8%)	14(45.2%)
		Strongly disagree	31(38.8%)	49(61.3%)

The result in table 10 in item 1, Data accessed through the EMR enable the local and the outside referral hospitals level to monitor implementation of the health services strategies and programs and their impact on overall the country hospital policy goals and health outcomes. Around this the result indicates 5(27.8%) private and 13(72.2%) strongly agree, 7(31.7%) private and 15(68.2%) agree, 48(84.2%) private and 9(15.8%) neither agree nor disagree, 3(15.8%) private and 16(84.2%) disagree and strongly disagree 2(28.6%) private and 5(71.4%) public. Data accessed through the EMR enable the local and the outside referral hospitals level to monitor implementation of the health services strategies and programs and their impact on overall the country hospital policy goals and health outcomes. the result indicates that strongly use private than the public one.

The result in table 10, in item 2, EMR enables health professionals to have easy access to patient data. Around this the result indicates 18(45.0%) private and 22(55.0%) strongly agree, 45(68.2%) private and 21(31.8%) agree, 0(0.0%) private and 4(100%) neither agree nor disagree, 1(7.1%) private and 13(92.9%) disagree and strongly disagree 1(6.7%) private and 14(93.3%) public. EMR enables health professionals to have easy access to patient data. the result indicates that strongly use private than the public one.

The result in table 10, in item 3, EMR increases data security & retrieve-ability. Around this the result indicates 22(46.8%) private and 25(53.2%) strongly agree, 41(71.9%) private and 16(28.1%) agree, 1(9.1%) private and 10(90.9%) neither agree nor disagree, 1(6.3%) private and 15(93.8%) disagree and strongly disagree 1(7.1%) private and 13(92.9%) public. EMR

increases data security & retrieve-ability. the result indicates that strongly use private than the public one.

The result in table 10, in item 4, EMR improves operational effectiveness. Around this, the result indicates 16(48.5%) private and 17(51.5%) strongly agree, 46(73.0%) private and 17(27.0%) agree, 65(52.8%) private and 58(47.2%) neither agree nor disagree, 1(7.1%) private and 13(92.9%) disagree and strongly disagree 1(6.3%) private and 15(93.8%) public. EMR improves operational effectiveness. the result indicates that strongly use private than the public one.

The result in table 10, in item 5, EMR enables the health institutes to get appropriate feedback. Around this the result indicates 23(50.0%) private and 23(50.0%) strongly agree, 39(66.1%) private and 20(33.9%) agree, 0(0.0%) private and 7(100.0%) neither agree nor disagree, 2(15.4%) private and 11(84.6%) disagree and strongly disagree 1(7.1%) private and 13(92.9%) public. EMR enables the health institutes to get appropriate feedback. the result indicates that strongly use private than the public one.

The result in table 10, in item 6, EMR brings improvements in the completeness and quality of data. Around this the result indicates 47(71.2%) private and 19(28.8%) strongly agree, 15(49.9%) private and 17(53.1%) agree, 1(6.3%) private and 15(93.8%) neither agree nor disagree, 0(0.0%) private and 12(100.0%) disagree and strongly disagree 2(15.4%) private and 11(84.6%) public. EMR brings improvements in the completeness and quality of data. the result indicates that strongly use private than the public one.

The result in table 10, in item 7, Improves the practice's quality of care. Around this the result indicates 45(70.3%) private and 19(29.7%) strongly agree, 17(44.7%) private and 21(55.3%) agree, 1(16.7%) private and 5(83.3%) neither agree nor disagree, 1(6.7%) private and 14(93.3%) disagree and strongly disagree 1(6.3%) private and 15(93.8%) public. Improves the practice's quality of care. the result indicates that strongly use private than the public one.

The result in table 10, in item 8, Increases the practice's efficiency. Around this the result indicates 47(71.0%) private and 19(28.8%) strongly agree, 16(45.7%) private and 19(54.3%) agree, 0(0.0%) private and 7(100.0%) neither agree nor disagree, 0(0.0%) private and 12(100.0%) disagree and 2(13.3%) private and 13(86.7%) strongly disagree) public. Increases the practice's efficiency. the result indicates that strongly use private than the public one.

The result in table 10, in item 9, Reduces duplicate test ordering. Around this the result indicates 49(61.3%) private and 31(38.8%) strongly agree, 14(45.2%) private and 17(54.8%) agree, 0(0.0%) private and 11(100.0%) neither agree nor disagree, 0(0.0%) private and 9(100.0%) disagree and strongly disagree 2(25.0%) private and 6(75.0%) public. Reduces duplicate test ordering. the result indicates that strongly use private than the public one.

#### 4.5 Challenges in the Use of Electronic Medical Record System

This were the first specific objective of this study, which required to compare challenges in the use of EMR systems. resources are utilized in selected public and private hospitals. In this specific objective, subjects related to EMR developed and efficient system, the utilization of EMR to collect and analyze to decision, the infrastructure of internet connection unreal able, the monitoring and supervision are hamper the key factor of utilization, The user support is insufficient, and poor central coordination, The short and long-term training affects the utilization of on EMR system, In suitable health services are seriously hampering, human, social and economic development, Access to information should be improved by linking the various patient-based information systems with the EMR has been discussed. The responses are presented below.

**Table 15: Challenge in use EMRS**

No	Item	Public					Private				
		Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	The utilization of EMR to collect, analyze and use data supports decision making	5 71.4%	8 (100%)	4 100.0%	30 60.0%	27 38.6%	2 28.6%	0 (0.0%)	0 (0.0%)	20 40.0%	43 61.4%
2	EMR developed has an efficient health information system.	5 83.3%	10 90.9%	11 91.7%	29 74.4%	19 26.8%	1 16.7%	1 9.1%	1 8.3%	10 25.6%	52 73.2%

3	IT infrastructure is inadequate, and the internet connectivity unreliable	10 40.0%	11 29.7%	26 70.3%	21 84.0%	14 60.9%	15 60.0%	26 89.7%	11 29.7%	4 16.0%	9 39.1%
4	The user support is inadequate, and the central coordination is poor.	13 34.2%	17 37.8%	10 76.9%	19 79.2%	15 78.9%	25 65.8%	28 62.2%	3 23.1%	5 20.8%	4 21.1%
5	Monitoring and supervision are key factors to hamper the utilization of EMR.	6 85.7%	8 66.7%	17 94.4%	24 38.7%	19 50.0%	1 14.3%	4 33.3%	1 5.6%	38 61.3%	19 50.0%
6	The inadequacy of short- and long-term training affects the utilization of EMR	13 100.0%	9 90.0%	3 75.0%	35 42.7%	1 14.3%	0 0.0%	1 10.0%	1 25.0%	47 57.3%	16 53.3%
7	In adequate health services seriously hampering, human, social and economic development.	6 85.7%	2 66.7%	4 100.0%	45 70.3%	17 27.9%	1 14.3%	1 33.3%	4 100.0%	19 29.7%	44 72.1%
8	Access to information should be improved by linking the various patient-based information systems with the EMR.	5 71.4%	5 100.0%	14 100.0%	23 34.8%	27 57.4%	2 28.6%	0 0.0%	0 0.0%	43 65.2%	20 42.6%

As presented in table 11 item 1, Respondents were asked whether the utilization of EMR to collect, analyze and use data supports decision making or not. 43(61.4%) of private hospital

and 27(38.6%) of public hospital strongly agree, 20(40.0%) of private hospital and 30(60.0%) of public hospital agree, 0(0%) of private and 4(100%) of public hospital neither agree nor disagree, 0(0%) of private and 8(100%) of public hospital disagree. 2(28.6%) of private and 5(71.4%) of public hospital strongly disagree. The result shows that Utilization of EMR for decision making and analyze benefit Private sector than public one.

As presented in table 11 item 2, Respondents were asked if EMR developed has an efficient health information system or not. regarding this 52(73.2%) of private and 19(26.8%) of public hospital strongly agree, 10(25.6%) of private and 29(74.4%) of public hospital agree, 1(8.3%) of private and 11(91.7%) of public hospital neither agree nor disagree, 1(9.1%) of private and 10(83.3%) of public hospital disagree and strongly disagree 1(16.7%) of private and 5(83.3%) of public hospital replied that EMR developed has an efficient health information system in a private hospital than public.

As presented in table 11 item 3, the respondents were asked whether the IT infrastructure is inadequate, and the internet connectivity is unreliable. 9(39.1%) of private and 14(60.9%) of public hospital strongly agree, 4(16.0%) of private and 21(84.0%) of public hospital agree, 11(29.7%) of private and 26(70.3%) of public hospital neither agree nor disagree, 26(89.7%) of private and 11(29.7%) of public hospital disagree. 15(60%) of private and 10(40%) of public hospital strongly disagree. The result shows that, the IT infrastructure is inadequate, and the internet connectivity unreliable in a private hospital than public hospital.

As presented in table 11 item 4, The user support is inadequate, and the central coordination is poor regarding this 4(21.1%) private and 15(78.9%) strongly agree, 5(20.8%) private and 19(79.2%) agree, 3(23.1%) private and 10(76.9%) neither agree nor disagree, 28(62.2%) private and 17(37.8%) disagree and strongly disagree 25(65.8%) private and 13(34.2%) public the result show that the user support is inadequate, and the central coordination is poor in a public hospital is the highest stage.

As presented in table 11 item 5, Monitoring and supervision are key factors to hamper the utilization of EMR. regarding this 19(50.0%) private and 19(50.0%) strongly agree, 38(61.3%) private and 24(38.7%) agree, 1(5.6%) private and 17(94.4%) neither agree nor disagree, 4(33.3%) private and 8(66.7%) disagree and strongly disagree 1(14.3%) private and 6(85.7%) public the result show that Monitoring and supervision are key factors to hamper the utilization of EMR in a private hospital is the highest stage.

As presented in table 11 item 6, The inadequacy of short- and long-term training affects the utilization of EMR. regarding this 16(52.3%) private and 1(14.3%) strongly agree, 47(57.3%) private and 35(42.7%) agree, 1(25%) private and 3(75%) neither agree nor disagree, 1(10.0%) private and 9(90.0%) disagree and strongly disagree 0(0%) private and 13(100%) public the result shows that the inadequacy of short and long-term training affects the utilization of on EMR in a private hospital is the highest stage.

As presented in table 11 item 7, Inadequate health services are seriously hampering, human, social, and economic development. regarding this 44(72.1%) private and 17(27.9%) strongly agree, 19(29.7%) private and 45(70.3%) agree, 4(0%) private and 4(100%) neither agree nor disagree, 1(33.3%) private and 2(66.7%) disagree and strongly disagree 1(14.3%) private and 6(85.7%) public the result show inadequate health services are seriously hampering human, social and economic development. in a private hospital is the highest stage.

As presented in table 11 item 8, Access to information should be improved by linking the various patient-based information systems with the EMR. regarding this 20(42.6%) private and 27(57.4%) strongly agree, 43(65.2%) private and 23(34.8%) agree, 0(0%) private and 14(100%) neither agree nor disagree, 0(0%) private and 5(100%) disagree and strongly disagree 2(28.6%) private and 5(71.4%) public the result show that Access to information should be improved by linking the various patient-based information systems with the EMR. in a private hospital is the highest stage.

#### **4.6 Qualitative Data Result**

All interviewed that in the follow up each EMR health service day to day activity and admin issues responsible person of from the selected private hospital and public hospital replied that since the success of the health service delivery well established EMR systems, Internet connectivity, trained staff to use the system, and enough resources to facilitates the use of EMR. Also, EMR facilitates and provides essential things that going to input for better health professional performances of our hospital. Improve the hospital working environments less time to treat patients safely and minimize the worker's load.

As stated by hospital administration staff to improve the hospital service for health performance our workers our hospital the main contributions the implementing EMR system helps our workers easily to do their work and get the needed information through second with the service time 24 hours. In Oda Hulle private primary hospital one of the responsibilities of the hospital



administration motivating and confirming to pay attention to fulfilling their responsibilities. Especially on providing health service quality using the EMR system is mandatory and follow up remotely and also physically with creating awareness to new staffs also.

The Oda Hulle primary private hospital using different types of EMRs for different types of services DHIS2 use to report the activities of health in the hospital for example TB HIV Chronic diseases and also the new Prime care EMR implement used to the whole hospital delivery service from receptions to treatments to discharging also refer. The system is easy to use for the workers the results display in the needed format to each health service worker. The administration and finance staffs easily follow and control the service. Become this from other hospitals our hospital is selective.

According to MCM general hospital, their workers easily give service by using the EMR system one of the parts of worker's motivations and also the satisfaction of patients during treatment. Then it has its ICT department to solve any problems that connect with EMR usability and also in the ICT department contains its own EMR team and workers.

MCM Korean General hospital EMR department head said that: our hospital uses different types of EMR systems DHIS2 using for sending reports to the FMOH, smart care use for follow up the ART patients that for follow up their treatments in our hospital, and Order Communication System (OCS) EMR system using for the whole activities in day-to-day activities. The OCS EMR system contains all packages from registration to sending and receiving different types of results for example laboratory, x-ray and ultrasound, and CT-scan, etc. Finally using the system our workers satisfied during give the service, patients less their time and load. From this most patients are select our hospital and service to use than public hospitals.

Finally, most private hospital health professionals say the EMR implementation in our hospital decreases the workload than using the manual one. Also, the system was modified with the considerations the workers daily using and easily accessible.

According to St. Paul Millennium hospital their workers using specific parts of EMR for different purposes the DHIS2 for reporting to the FMOH pandemic diseases, Smart care for follow up of the ART patients, and also to report FMOH the patient's status. For follow up Covid-19 use small applications for report purpose.

But to follow the whole activities in different time implementing different types of EMR systems but it is not continuing in different reason. Finally, the use the full package of EMR is very important and the first chose to moderate the health service also all patients to get the service on time. The responsible bodies especially the FMOH by preparing the same full and Integrated EMR, guideline to the implementations and plan to investigate through the country especially in public hospitals.

According to Jimma University medical center, the patient flow is very high because the southwestern people are using this hospital. In different times to improve the health service facility implement different types of EMR system but not continue the too long period the resources useful for another purpose according to the different department heads saying.

At the different times established different types of EMR systems for different purposes but now it working DHIS2 and Smart care only for report purposes. Before one year the Open clinic EMR implementing but without reason, they can stop and return to the hard copy. Lastly from the respondent that uses properly for few months the department of chronic and illness department head the use of this EMR system less so many lads to our patient and our staffs because it has so many benefits everything finishing through this system. But no one follows by taking the responsibility the concerned body especially in the public hospitals pay attention to use EMR system in its plan. Because it is very important and also mandatory.

As all interviewed the selected private and government hospitals responsible bodies replied regarding what should be done to transform EMR system to transform hospital service from bad status to effective hospital service FMOH, the hospital administration, health professional's like as a private sector to improve the health service it needs making policy and also guidelines to satisfy the patients.

#### **4.7 T-test for the result of EMR utilizations private and public**

To test whether there is a significant difference between the performances of health professionals studied at different Hospitals, we use a t-test. A secondary data of results of health professionals recorded from both private and public Hospitals tested by statistical t-test. The statistical t-test used to test the hypothesis:

*H<sub>0</sub>: There is no difference between the means of results of health professionals 'in*

Private and public Hospitals ( $\mu_1 - \mu_2 = 0$ )

*H<sub>1</sub>: There is a difference between means of results of professionals in*

Private and public hospital ( $\mu_1 - \mu_2 \neq 0$ )

Under  $H_0$  is true, by assuming that populations have the same variance,

*Test Statistics:*

$$t_{cal} = \frac{\bar{x}_1 - \bar{x}_2}{sp \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

Where,  $sp = \sqrt{\frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1+n_2-2}}$

Where  $\bar{x}_1$  and  $\bar{x}_2$  are sample means,  $S_1^2$  and  $S_2^2$  are sample variances of score of private and public hospitals, respectively.

At 5% level of significance, we reject  $H_0$  if  $T_{cal}$  is not exceeds the critical value  $t^{n_1 n_2}_{\alpha/2}$  or equivalently, if p-value is less than 5%.

**Table 16: T-test for comparison of results of private and public hospital**

No	Hospital type	Sample size	Mean EMR	SD	SE Mean	T value	Sig.	95% CI	
								lower	Upper
1	private	65	.47	.501	.043	10.93	.000	.393	.562
2	Public	74	1.12	1.213	.142	7.89	.000	.351	.846

From the above table, researcher was identified mean of score of health professionals effectively use EMR at private hospital make different from public hospital health professional and supportive staff (*p-value*= 0.00, which is less than 5% for each). Since the calculated T-value is positive for each health service level, it means that the average results of score of health professionals and their supportive staffs at private Hospital is significantly higher than those who working at public hospital.

#### 4.8 T-test for comparison of results of private and public hospitals

As a general, the results scored by private hospital health professionals are greater than that of public hospital health professionals. This is arising due to the following reasons.

From the analysis of table 8 on item 1, 95% of private hospital health professionals and 58.8% of public hospital health professionals are satisfied with EMR resources available in their hospital. Thus, there are enough materials in private hospital EMR and health service material were appeared in public hospital that hinder EMR resources utilization for hospital health

professionals' performance improvement. This finding agrees with the study of (Oumer, Abdu, 2020)

Again, from table 10 on item 3, 65% of private hospital and 30.6% of public hospital health professionals agreed that their EMR resources have a conducive environment for hospital health professionals' initiatives. This shows that private hospital was better than public Hospitals in creating favorable environment for hospital health professionals that contribute to better health service achievement. Thus, conduciveness of the private hospital EMR made health professionals to achieve better. Hence, this result supports the study of (Joy M et al, 2017), which identifies positive impact of EMR on the hospital health professionals' performance.

From table 11 on item 2 results, 85.4% of private hospital and 11.5% of public hospital health professionals were provide that enforce them to use EMR resources materials in hospital. A very small percentage of public hospitals health professionals make less to use EMR.

Here in this study in order to achieve the specific objectives and to answers the research questions the researcher was used different data collection methods to acquire reliable and adequate information from the respondents.

## **4.9 Discussion**

### **4.9.1 The Extent of Utilizing EMR in Public Hospitals**

Based on analysis and explanation of collected data of respondents, it is clear that almost all of the private hospital's workers deliver their work that needs electronic medical records systems and half of the public hospitals provide that needs for the specific purpose to report for FMOH to use the electronic medical record. Most public hospitals use the system one up to two times per week while more than half of private hospitals workers use the system seven days per week. According to as electronic medical record usage is disturbed, the finding discovered that private hospital workers who more frequently use EMR are performed high in their health service while that of public hospitals workers who did not frequently use EMR are performed less in their service providing.

The finding implies that effective EMR usage impacts health worker's health service performance. The finding is in agreement with health serviced (Alwan K et al, 2015). Who established that health professionals who utilize EMR frequently get better services, deliver on their hospital? Regarding what purpose workers use the EMR, most private hospital workers

use EMR to ready to use the system themselves for patient treatments while most public hospitals use EMR to doing work.

Therefore, from the finding, the researcher can conclude that private hospitals professionals are better than government hospital health professionals by using EMR to easily do and support their patients.

#### **4.9.2 The Contributions of EMR for Quality of Health Services**

According to (Bisrat et al, 2021)the contributions of EMR for the quality of healthcare service deliver several rewards concerning medical care, plus reduced paperwork, better-quality organizational effectiveness, a decrease of stretch consuming medical record data assembly, and reduced information processing problem.

Information about sickness, reply to handling, laboratory test radiology result, and data are composed throughout the patient's lifetime. The combination of this information can permit more sample scopes for confident occasional illnesses and is mainly beneficial for patients with a rare disease (Schopf et al, 2019).

The contributions of EMR in private hospitals are great than the public ones. Because in the result of the study most of the services from reception to discharging the health service are use the EMR system but the public hospitals using EMR in percent low than the private.

#### **4.9.3 The Impact of EMR on the Workflow of Hospital Performance**

The study found that the availability of EMR system service and full properties, that support health professionals to achieve their work properly in their hospital. The research result indicated that both private and public hospitals do not have enough feelings to use EMR resources to the patient satisfaction and also the workers contributive to underprivileged health service performance, this is in agreement with the study of (Waithera et al, 2017).

Thus, it is possible to say public hospitals workers had not similar ideas to use EMR in their hospitals by using different reasons than the health professionals contributing to poor health service performance than the private one.

Therefore, the study discovered that the absence of using EMR system resources in a public hospital can principals to unfortunate health service performance of the workers. This outcome is in agreement with (Jawhari et al, 2016)

From the finding, it is shown that a greater majority of both private and public hospitals workers and also, patients are well-disposed that the absence of EMR resources the service in hospital can lead to workers poor performance in their health delivery. This outcome is agreeing with those of (Rajput NA et al, 2011).

From this investigation at least 82% of both private and public hospitals health professionals agree that the availability of an EMR system and enough resources, help health professionals to achieve their work and satisfy patients during their treatment. This analysis supports the idea of (Solumis, 2016).

Regarding using EMR resources do not have a significant positive impact on health service performance, the response of health professionals and admin staff tells that utilizing EMR resources does not have a significant positive impact on health service performance. This result faces the findings of (Kisii, 2015).

This may be because of lack of awareness creation for both private and public hospitals regarding EMR system resources had significant impacts on their health service performances if they were using those EMR system resources effectively.

#### **4.9.4 Factors Hindering EMRSystem Resources Utilization**

The hindering factors are related to human and non-human resources. The study revealed that in both public and private hospitals, there is a lack of EMR resources and ability to give followers the greatest chance to accomplish and flourish and this sources unfortunate health professional's service performance. From the result, it is shown that in pay attention to use the service EMR investing to the system and using properly but it has small challenges but public hospitals not install the system and when they installing not use properly to allow many health professionals to use the EMR system at once, Lack of professional trained EMR system experts, lack of enough support guidelines from FMOH, unsuitable attention of public hospitals, need infrastructure and using the materials to the proper system (Rotich JK et al, 2003).

This analysis supports the idea of (Fritz, 2015). Also reported aspects that improve health performance of the workers includes the availability of enough space seats to use the system, availability of enough resources in print and electronics, logically organized data center, giving the updated training to the system, to encourage the workers to give intensive and scholarship used to motivate to use the system.

#### **4.9.5 EMR Implementation and Roles Played by Stakeholders**

The health policies included the EMR using guidelines and also recommendations to increase the usability of the system. To the improvement, workflow practice the health policies including the EMR system use very importantly.

The finding indicates that the lack of using digital policy hinders the implementation and also bottleneck in the workflow especially in public hospitals. Policies promoting the user to use electronic medical records as mandatory. Also, the hospital service improves the and the patients' satisfaction increase (Msiska KEM et al, 2017 ). Using the same standard EMR system increase the service delivery decrees regulatory barriers to interoperability and different organizations share and organized in EMRs under different systems the government easily monitoring the health service through one system (WHO, 2013).

The study revealed that the majority of Private hospitals also encourage and compel their employees to use electronic medical records. But government hospitals do not encourage or force. Public hospital officials do not visit electronic medical records, and public hospital professionals do not disclose their responsibilities to stakeholders.

#### **4.9.6 Descriptions of Proposed EMR Framework for Public and Private Hospitals**

Here in the FMOH there are the two sectors private and public by using the whole integrated Database to communicates each other it needs like this plat form. The FMOH by monitoring the two health sectors, allocated the needed budget for hospitals to establish EMR full package, Give the needed training fulfilling the ICT equipment's and also give one standard lastly it needs follow up their status. When apply this proposed Frame work the health service improves and also save the peoples live from different medical errors. Lastly through short period of time saving the health professionals and patients satisfactions increase.

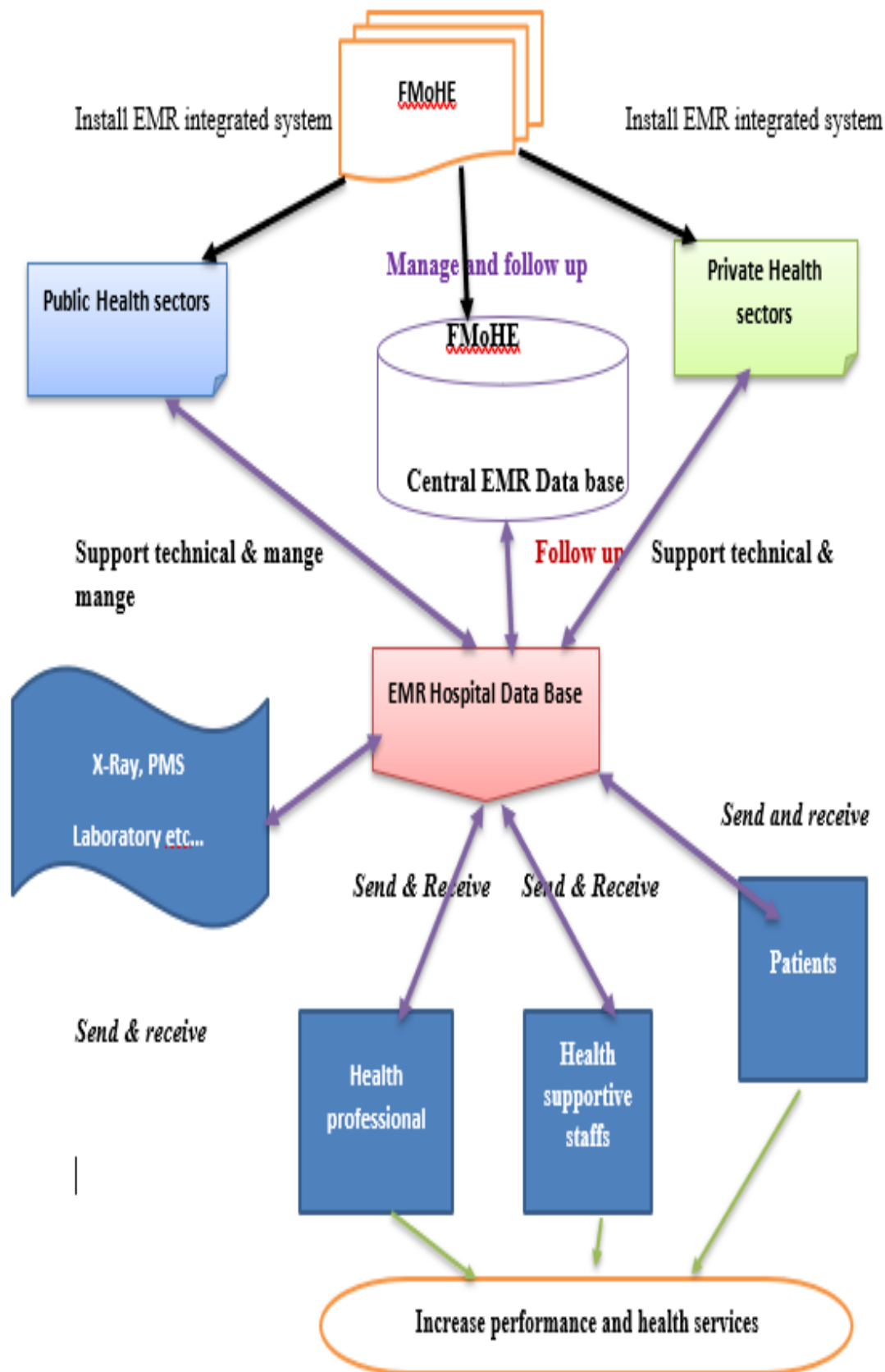


Figure 7: proposed Framework Effectively to use EMR private and public hospitals



## CHAPTER FIVE

### CONCLUSION AND RECOMMENDATIONS

#### 5.1 Conclusion

This study is a comparative study on the impact of EMR between private and public hospitals on the performance of health professional and the use of resources on the need to change the hospital. EMR findings show that private hospital health professionals are satisfied with the facilities in their hospital's EMR. Public hospital health professionals are dissatisfied with the resources available in their hospitals, as well as in almost all private health facilities. Therefore, private hospital health professionals are better than public hospital health professionals in terms of the use of private hospital EMR resources. During compare the government hospital to private hospital one the private hospital health professional's higher percent use EMR systems to deliver health services. In both private and public hospitals higher percentage of the health professional's agreeing that EMR resources utilization and availability of EMR systems and adequate resources play an important role to achieve better performance. So, the perceptual differences between private hospital and public hospitals were not pointed out. If hospital EMR resources are utilized effectively, it has a positive impact on health worker's performance and also patients 'satisfactions. Along the line of this, the study identified major challenges that hinder effective EMR utilization and factors that affect the performance of health services and workers in private and public hospitals. Finally, the comparison made between their results scored by private hospital workers and public hospital workers in using EMR shows that the average result of health professionals at private hospitals is significantly higher than those at the public hospital. Depending on the results of this study health professional's' performance of private hospitals is better than health professional's' performance of public hospitals because of EMR system resource availability and effective utilization of resources available in their hospitals.

Throughout the study, the private hospital uses a variety of opportunities to reduce the cost of hard copy to increase patient satisfaction. Conversely, public hospitals are being privatized for a variety of services. It can cost them more and more life and prevent them from being treated at the right time.

It also requires laws and regulations in the country for those who are responsible for enforcing EMR as a mandate. Since the same EMR system has the same problem for a public hospital, if the problem is identified and implemented from the bottom up, both staff and patients will benefit and the health service will be modernized.

## **5.2 Recommendations**

Research indicates that the use of EMR is involved are contributive to the upgraded effectiveness of health service distributions in the initial world. At the same time, many scholars believe that especially developing countries to change their health service using the EMR system it is not optional but it is must because less additional costs from government and patients when entering to automated the medical record system.

Lastly in our country Ethiopia to improve the health service facilities according to the research result indicates especially the public hospitals and other public health service providers pay attention to change their attitude to take out the technology and change the service it needs persistence from all health service users. Because today's world has gotten into the technology era all things are interchangeable. Today the health sector changes attention to the use of technology around the world. Other, due to medical information explosion, suitable decision and adjust weights truthful, appropriate, pertinent, and correctly organized information. Inappropriately, the utmost state of African sub-Saharan and other unfortunate countries lack establishment to use ICT set-up, deposit, and professionals to enable up-to-date healthcare delivery.

Government initiates the computer programs to do local programs, also to customize by selecting open-source EMR software according to the public hospital their standards and preparing intensively for their doing well is very important.

- The researcher recommends further research on the gap of Comparative Study of EMR in Selected Public and Private Hospitals in Ethiopia.
- Future studies can carry out the accessibility of Comparative Study of EMR in Selected Public and Private Hospitals in Ethiopia
- Developing EMR to minimize the gap between public hospital and private hospitals resources to improve the health service performance of the health professionals.

## **5.3 Recommendations for Future Research**

The digitizing paper-based health record system can take a lot of benefits for physicians, patients, administrators. So, we confidence this examining study resolve assist as a zero for money establishments to support health informaticians discover and cooperate through somewhat of nongovernmental that care the health services for developing countries plan EMR implement for clinical decision support system. To access the level of delivery development in

developing countries. Finally, it needs further study to solve the problem of the use of EMR, especially in the public.

## REFERENCES

- Adeleke, I. (2014). Relevance of health information management (HIM) and the roles of HIM professionals in healthcare delivery systems. Retrieved from <https://www.researchgate.net/publication/271699527> Relevance of health information management HIM and the roles of HIM professionals in healthcare delivery systems.
- Aklilu. (2012). Need Assessment Framework For Electronic Health Record Management System In Ethiopia. pp.1-114.
- Allen et al. (2013). Rapid deployment of electronic medical records for ARV rollout in Rwanda. Retrieved March 22, 2013, from, from <http://www.ncbi.nlm.nih.gov/pmc/articles/pmc1839720>
- Ariffin et al. (2018, July 23 ). Implementation of Electronic Medical Records in Developing Countries: Challenges & Barriers. 7 (3), pp187–199. doi:10.6007/IJARPED/v7-i3/4358
- Azliza et al. (2018, July 23 ). Implementation of Electronic Medical Records in Developing Countries: Challenges & Barriers. *Vol. 7(2226-6348)*, pp187 - 199. doi:10.6007/IJARPED/v7-i3/4358
- Bakhtiyari et al. (2011). Users as the biggest threats to the security of Health Information Systems. Users as the biggest threats to the security of Health Information Systems. 2(1), pp 29-33.
- Bhavnani et al. (2016). Mobile technology and the digitization of healthcare. 18(37).
- Bisrat et al. (2021, November 02). Implementation challenges and perception of care providers on Electronic Medical Records at St. Paul’s and Ayder Hospitals, Ethiopia. Retrieved from <https://doi.org/10.1186/s12911-021-01670-z>
- Boryushkina, V. (2020). LA inhalers for COPD: perceptions/reality of ABCDGOLD tool use. *JOURNAL OF COMMUNITY HOSPITAL INTERNAL MEDICINE PERSPECTIVES, VOL. 10(NO. 4, )*, pp 324–327. Retrieved from <http://creativecommons.org/licenses/by-nc/4.0>
- Broekhuis & Boonstra. (2010). Barriers to the acceptance of electronic medical records by physicians from systematic review to taxonomy and interventions. *BMC Health Services Research*. pp.1-275.
- Campbell, S., Greenwood, M., Prior, S., Shearer, T., Walkem, K., Young, S., . . . and Walker, K. (2020). Purposive sampling: complex or simple? Research case examples . *Journal of Research in Nursing, 25(8)*, 652-661.
- Chen Hsi et al. (2020, December 4 ). Effects of Electronic Health Record Implementation and Barriers to Adoption and Use: A Scoping Review and Qualitative Analysis of the Content. doi:10.3390/life10120327

- Choung, R. S., Locke III, G. R., Schleck, C. D., Ziegenfuss, J. Y., Beebe, T. J., Zinsmeister, A. R., & Talley, N. J. (2013). A low response rate does not necessarily indicate non-response bias in gastroenterology survey research: a population-based study. *Journal of Public Health, 21*(1), 87-95.
- Currie & Finnegan. (2011). The policy-practice nexus of electronic health records adoption in the UK NHS. *2* (24 ), pp146 - 170.
- Dick et al. (1997). The computer-based patient record: an essential technology for health care. Retrieved 2000.
- Dilawar et.al. (2019). Blockchain: Securing Internet of Medical Things. *Vol. 10*. Retrieved from [www.ijacsa.thesai.org](http://www.ijacsa.thesai.org)
- Dillip & Kanhu . (2009, December). An Overview of Digitization of Information Resources. pp1-8.
- Dominique et al. (2015, May 5). Contribution of Electronic Medical Records to the Management of Rare Diseases. Contribution of Electronic Medical Records to the Management of Rare Diseases. Retrieved July 21, 2015, from <http://dx.doi.org>
- European-Union. (2019). *Assessing the impact of digital transformation of health services*.
- FDRE. (2019). *National ICT Policy*. Retrieved from <https://ictpolicyafrica.org/en/document/0c7hb4elpdcd?page=2>
- Fincham, J. E. (2008). Response Rates and Responsiveness for Surveys, Standards, and the Journal. *American Journal Of Pharmaceutical Education, 72*(2), 43.
- FMoH. (2012). *Proposed Technical Overview of m-Health, first learning wave*.
- FMoH, E. (2010). *Health Sector Development Program-IV (HSDP-IV)*.
- FMoHE. ( 2015). *HSTPHealth Sector Transformation Plan*.
- FMoHE. (2011). *SmartCare project plan. Public Health infrastructure Directorate*.
- FMoHE. (2015). Benefits of Electronic Health Records(EHRs). In B. o. IT (Ed.).
- FMoHE. (2015). *HSTPHealth Sector Transformation Plan*.
- FMoHE. (2011). SmartCare project plan. Public Health infrastructure Directorate. FMoHE.
- Fonkych & Taylor. (2005). The state and pattern of health information technology adoption. *The state and pattern of health information technology adoption*.
- Fritz, F. (2015). Success criteria for electronic medical record implementations in low resource settings: a systematic review Inform Assoc. Success criteria for electronic medical record implementations in low-resource settings. *2*(22), 479–88.

- G/EGZIABHER, Y. (2013). Challenges Associated with Physicians' Acceptance and Usage of Electronic Medical Records in Public Hospitals of Addis Ababa.
- Gastaldi et al. (2012). Performance improvement in hospitals: leveraging on knowledge asset dynamics through the introduction of an electronic medical record. *Measuring Business Excellence*, 4(16), pp14 - 30.
- Gastaldi et al. (2012). Performance improvement in hospitals: leveraging on knowledge asset dynamics through the introduction of an electronic medical record. *Measuring Business Excellence*,. 4(16), pp14 - 30.
- Gastaldi et al. (2012). Performance improvement in hospitals:leveraging on knowledge asset dynamics through the introduction of an electronic medical record. *Measuring Business Excellence*, 16( 4)), 14 - 30.
- Gimpel. (2018). Structuring Digital Transformation: A Framework of Action Fields and its Application at ZEISS. *Journal of Information Technology Theory and Application*. pp1-19.
- Hagel C, et al. (2020, March 31). Data for tracking SDGs: challenges in capturing neonatal data from hospitals in Kenya. 5(e002108. ). doi:10.1136/bmjgh-2019-002108
- Hamer, E. H. (2019, July 08 ). Applying a Commercialization-Readiness Framework to Optimize Value for Achieving Sustainability of an Electronic Health Data Research Network and Its Data Capabilities: The SAFTINe. *Generating Evidence & Methods to improve patient outcomes* , pp. 1–14. doi:https://doi.org/10.5334/egems.295
- Herrick et al. (2010). Health information technology:Benefits and problems. *Health information technology: Benefits and problems*.
- Jawhari et al. (2016). Benefits and challenges of EMR implementations in low resource settings:a state-of-the-art review. 16 (116). doi:10.1186/s12911-016-0354-8
- Julius, O. (2013). Sampling in Qualitative Research: Improving the Quality of Research Outcomes in Higher Education. *Makerere Journal of Higher Education*, 169-185.
- Kisii, T. (2015). Private Sector Innovation Programme for Health: Public-Private Partnerships for Improved Customer Care and Access to Healthcare. Nairobi Kenya:Nairobi: Private Sector Innovation Programme for Health (PSP4H).
- Legner et al. (2017). Digitalization: Opportunity and Challenge for the Business and nformation Systems Engineering Community. *Business & Information Systems Engineering*. pp.301-308.
- LeRouge et al. (2007). Healthcare information systems research, revelations, and visions. *Healthcare information systems research,revelations, and visions*.. 6(16), pp669-671.

- Loick et al. (2017). The Digitization of Healthcare. In *New Challenges and Opportunities*. pp.1-37.
- Luna et.al. (2013). Health Informatics in Developing Countries: Systematic Review of Reviews Contribution of the IMIA Working Group Health Informatics for development. *Health Informatics in Developing Countries: Systematic Review of Reviews*.
- MacDonald, S., & Nicola, H. (2015). *Research Methods Handbook: Introductory guide to research methods for social research*. Manchester: Centre for Local Economic Strategies.
- Marcolino et al. (2017). Is There Evidence of Cost Benefits of Electronic Medical Records, Standards, or Interoperability in Hospital Information Systems? Overview of Systematic Reviews. *JMIR Medical Informatics*, 5(3).
- Mayan et al. (2014). Health Informatics in Developing Countries: Going beyond Pilot Practices to Sustainable Implementations: A Review Of The Current Challenges. *Health Informatics in Developing Countries: Going beyond Pilot Practices to Sustainable Implementations: A Review Of The Current Challenges*, pp3–10.
- McGrath et al. (2004). Electronic Medical Record (EMR) systems for HIV care in resource poor settings: report from an international workshop. (pp. pp11-16). International Conference of AIDS. Retrieved Retrieved 2004 Jul
- Mengesha. (2010). Electronic Solutions for Ethiopian Health Sector. Business Information Technology, Oulu University of Applied Sciences.
- Mengesha, T. (2011). ELECTRONIC SOLUTIONS FOR THE ETHIOPIAN HEALTH SECTOR. 1-48.
- Mikael et al. (2012). An Electronic Medical Record (EMR) Implementation Framework for HIV Care and Treatment Facilities in Ethiopia. *Vol.1(11)*.
- Moazzam, A. (2014). *Sampling & Sample Size*. Geneva: Switzerland.
- Moodley et al. (2005). Implementing electronic medical record systems in developing countries. *Implementing electronic medical record systems indeveloping countries*, pp 83–95.
- Msiska KEM et al. (2017 , Sep 29). Factors affecting the utilisation of electronic medical records system in Malawian central hospitals. pp247-253. . doi:10.4314/mmj.v29i3.4.
- Nambisana et al. (2019). The digital transformation of innovation and entrepreneurship:Progress challenges and key themes. *Research Policy*. pp.1-10.
- Nir & Taleah. (2011, May 11). Benefits and drawbacks of electronic health record systems. *Risk Management and Healthcare Policy*. pp.1-9.



- Nkanata et al. (2018). Comparative analysis of hospital information management systems among healthcare workers in two selected hospitals in Kenya. .
- Oumer, A. (2018). Utilization of Electronic Medical Record and Associated Factors Among Health Professionals in Public Health Facilities With Service Delivery, Eastern Ethiopia. (pp. pp 1-16). Department of public health, University, Southwest Ethiopia. doi:<https://doi.org/10.21203/rs.3.rs-51343/v1>
- PAHO. (2016). Electronic Medical Records in Latin America and the Caribbean. An Analysis of the current situation and recommendations for the Region.
- Parviainen et.al. (2017). Tackling the digitalization challenge: how to benefit from digitalization in practice. " (*International Journal of Information Systems and project Management.*, 2-3.
- R. S. Dick and E. B. Steen. (2000). The Computer-based Patient Record: An Essential Technology for Health Care.
- Rajput NA et al. (2011). Doebbeling BN OpenMRS Collaborative Investigators. OpenMRS, A global medical records system collaborative: factors influencing successful implementation. *AMIA Annual Symposium Proceedings*. Retrieved Jan 6 , 2015, from [http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3243141/pdf/0960\\_amia\\_2011\\_proc.pdf](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3243141/pdf/0960_amia_2011_proc.pdf)
- Raza, M. (2012). Good Medical Record Keeping. *International Journal of Collaborative Research on Internal Medicine & Public Health*, 4(5).
- Rebekah et.al. (2018, July 10). Effects of eHealth on hospital practice: Synthesis of the current literature. *Effects of eHealth on hospital practice: Synthesis of the current literature*. doi:10.1071/AH17255
- Reina et al. (2012). Managing the knowledge interdependence with the electronic medical record. . pp 31 - 41.
- Richards et al. (2012). Electronic medical records: tools for competitive advantage. *4* (2), 120-136.
- Robel. (2013). E-health Policies in the Ethiopian Policy and Strategy Documents: Content Analysis., (pp. . A Thesis Submitted to the School of Public Health and School of Information Science, Addis Ababa University, In Partial Fulfillment of the Requirements for the Degree of Masters in Health Informatics.).
- Robinson, K. a. (2018 ). Novel electronic health record (EHR) Education Intervention in Large Healthcare Organization. *Definitions, Evidence, and Practical Recommendations for Latin America and the Caribbean*, *Medicine* 97(38). Retrieved from [www.souvenirme.com](http://www.souvenirme.com)

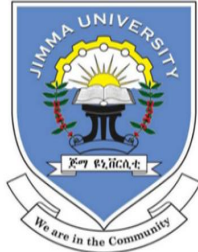
- Rotich JK et al. (2003). Installing and implementing a computer based patient record system in sub-Saharan Africa: The motorist medical record system. *4*(10), pp 295–303. Retrieved from <http://dx.doi.org/10.1197/jamia.M1301>
- Sabbagh et al. (2012). ICT next evolution. Digitization.
- Sandra, V. (2013). The Electronic Health Record and its Contribution to Healthcare Information Systems Interoperability. *nformation Technology Department, Polytechnic Institute of Tomar, Quinta do Contador, 2300-313 Tomar, Portugal*, 940 – 948. doi: 10.1016/j.protcy.2013.12.105
- Sarathchandra, K. (2019., July 08 ). Implementation challenges and Research Gaps of Electronic Medical Records (EMR) in Public Sector Hospitals of Sri Lanka. *Vol 9*,( 2250-3153). doi:10.29322/IJSRP.9.07.2019.p9124
- Schopf et al. (2019, December 04). How well is the electronic health record supporting the clinical tasks of hospital physicians? A survey of physicians at three Norwegian hospitals. Retrieved November 20 , 2019, from <https://doi.org/10.1186/s12913-019-4763-0>
- Seebregts et.al. (2017). *Enterprise Architectures for Digital Health. Global Health Informatics: Principles of EHealth and MHealth to Improve Quality of Care.*
- Simon et al. (2007). Physicians and Electronic Health Records: A Statewide Survey. *5*(167), 507-512.
- Solumis, C. (2016). A Brief History of the EMR. *EMR: The Progress to 100% Electronic Medical Records.*
- Sridhar GR et al. (2009). Electronic medical records and hospital management systems for management of diabetes. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews, Vol.3* (1), pp 55 – 59.
- Stanberry. (2011). The US and global efforts to expand the use of electronic health records. *Vol. 21* (3), pp. 214 - 224.
- Stanberry, K. (2011). US and global efforts to expand the use of electronic health records. *Records Management Journal, Vol. 21* (Iss 3 ), 214 - 224.
- Taylor et al. (2005). Promoting health information technology: is there a case for more aggressive government action? . *24*, 1234-1245.
- Tekelegiorgis. (2016). Health Management Information System for the health sector.
- Terefe. (2015). Electronics Health Management Information System.
- Tezera, R. (2013, May 05). E-health Policies in the Ethiopian Policy and Strategy Documents: Content Analysis. Retrieved 2018 , from <http://localhost:80/xmlui/handle/123456789/14705>

- Thielst. (2007). The future of healthcare technology. 2(52), 7-9.
- Waithera et al. (2017). Impact of Electronic Medical Records on Healthcare Delivery in Kisii Teaching and Referral Hospital. Impact of Electronic Medical Records on Healthcare Delivery in Kisii Teaching and Referral Hospital Lynn Waithera., *Vol.3*, pp. pp2471-299.
- Waithera et.al. (2017). Impact of Electronic Medical Records on Healthcare Delivery in Kisii Teaching and Referral Hospital. *Impact of Electronic Medical Records on Healthcare Delivery in Kisii Teaching and Referral Hospital Lynn Waithera, Vol.3(2471-299X)*.
- Wali et al. (2020, February 15). Patient satisfaction with the implementation of electronic medical Records in the Western Region, Saudi Arabia. *BMC Family Practice*. doi:<https://doi.org/10.1186/s12875-020-1099-0>
- WHO. (2013). World Health Organization. World health organization. Retrieved from. Retrieved from <http://www.who.int/africahealthinfoway>
- Yoo et al. (2010). The New Organizing Logic of Digital Innovation: An Agenda for Information Systems Research. *Vol.21*, pp. 1-22.
- Young & Avison. (2007). Time to rethink health care and ICT? Communications of the ACM. 6(50), pp 69-74.

# APPENDICES

## Appendix A: Questionnaire

(For health professionals and administrative staff)



**Jimma Institute of Technology**  
**Faculty of Computing and Informatics**  
**Information Science Program**  
**M.Sc. In Electronic & Digital Resource Management**

Dear respondent

This questionnaire is designed for research entitled “**Comparative Study of Electronic Medical Records (EMR) in Selected Public and Private Hospitals in Ethiopia**”. To achieve the intended objective of this study, your careful and honest responses are quite crucial. Thus, you are kindly requested to complete the questionnaire carefully and honestly. Your responses will be kept confidential. Please read the instruction and give your response suitable. If you want to change any of your responses, make sure that you cancel the unwanted ones.

**Note:-** No need of writing name

### **Section one:** Socio-demographic information

**Direction:** For each of the following questions, please indicate your response by a tick (√) mark, or write your possible answers in the appropriate place /box/ (Question 1-5).

1. Name of your Hospital

\_\_\_\_\_

2. What is your current educational status?

Certificate  Diploma  BSc/BA  MSc.  Dr

3. Sex                      Male                       Female

4. Name of your department \_\_\_\_\_

5. What is your responsibility in your hospitals? Specify \_\_\_\_\_.

**Section two: The challenges of using EMR in the hospitals.**

**Direction:** Please indicate your agreement by ticking one of the responses on the provided space or boxes (√) mark and write the appropriate answers. (From Questions 1-9)

**Items Choice:** 5= strongly disagree, 4= disagree 3= neither agree nor disagree, 2= Agree, 1=strongly agree

No.	Key	5	4	3	2	1
1	The utilization of EMR to collect, analyze and use data supports decision making					
2	EMR has developed an efficient health information system.					
3	The IT infrastructure is inadequate, and the internet connectivity is unreliable					
4	The user support is inadequate, and the central coordination is poor.					
5	Monitoring and supervision are key factors to hamper the utilization of EMR.					
6	The inadequacy of short- and long-term training affects the utilization of EMR					
7	Inadequate health services are seriously hampering human, social and economic development.					
8	Access to information should be improved by linking the various patient-based information systems with the EMR.					

9. If you have other comments on the challenge of utilization of EMR, you can write it down on the space provided.

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**Section Three: The extent of utilizing EMR in public hospitals**

Direction: Please indicate your agreement by ticking one of the responses on the provided space or boxes (√) mark and write the appropriate answers. (From Questions 1-10).

Items Choice: (1) Strongly disagree (2) disagree (3) neither agree nor disagree, (4) Agree (5) strongly agree

No.	Variables	1	2	3	4	5
1	EMR is fully functional in your hospital					
2	Most of the time for EMR workers acquire training					
3	Enough staff is there in the office for monitoring and evaluation.					
4	There is a lack of well-skilled manpower to utilize EMR effectively in your hospital.					
5	The hospital patients and health professionals are benefited from the output of EMR in your hospital.					
6	EMR has been used to registers, result send receiving and process complete data within a short period.					
7	The flexibility of the system allows the users to make changes that address their specific requirements by improving usability and relevance data.					
8	EMR enables your hospital to service facilitates without paper sending and receiving report and use data regularly.					
9	EMR is searchable and easy to get the patients by different types of mechanisms for example by first name father name phone number kebele woreda and etc.					

11. In your opinion, what are the most prominent features of EMR?

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**Section Four: The contributions of EMR for the quality of healthcare services.**

**Direction:** Please indicate the extent to which you agree or disagree with the following impact of electronic medical records for health service **performance** by putting a tick (✓) mark in the appropriate box.

**Items Choice:** Strongly agree=5, Agree=4, Not sure=3, Disagree=2 and strongly disagree=1

S/n	Impact of EMR on health care service performance	5	4	3	2	1
1	For improving my health service performance, electronic medical record management Utilization plays a very important role.					
2	Availability of electronic medical record service resources, helps health professionals to do their works properly.					
3	The absence of electronic medical record use and health service in a hospital can lead to health professional's poor performance in their services					
4	Electronic medical record resources utilization improves health professional's service performance					
5	Using electronic medical record resources do not have a significant positive impact on health service performance					
6	The hospital has got enough electronic medical record materials (Computers & networks etc.) for patients and health professional's is contributing positively to health service performance					
7	The hospital does not have enough electronic medical record materials (Computers & networks etc.) for patients and health professional's thus is contributing to poor health service performance					
8	EMR resources, financial and human resources to support the health service processing the information systems					
9	Effective systems can ensure the availability and use of health information to strengthen and support their health systems					

10. If you have other additional suggestions/ideas/ about t the contribution of electronic medical records to the quality of healthcare services, write it down on the space provided.

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**Section Five: The impact of EMR on the workflow of the hospitals.**

**Direction:** Please indicate your agreement by ticking one of the responses on the provided space or boxes (√) mark and write the appropriate answers. (From Questions 1-11).

Items Choice: (1) Strongly Agree (2) Somewhat Agree (3) Somewhat Disagree, (4) Strongly Disagree (5) Not Applicable

S/N	Parameters	Codes				
		5	4	3	2	1
1	Data accessed through the EMR enable the local and the outside referral hospitals level to monitor implementation of the health services strategies and programs and their impact on overall the country hospital policy goals and health outcomes.					
2	EMR enables health professionals to have easy access to patient data					
3	EMR increases data security & retrieve-ability					
4	EMR improves operational effectiveness					
5	EMR enables the health institutes to get appropriate feedback					
6	EMR brings improvements in the completeness and quality of data					
7	Improves the practice's quality of care.					
8	Increases the practice's efficiency.					
9	Reduces duplicate test ordering.					

10. If you have other additional suggestion /idea/ about the impact of EMR on the work flow of the hospital, write here on the space provided

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11. What type of EMR system is recommended for Ethiopian private and public hospitals?

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**Section six: Evaluation table (Make it thick with this “√” mark on the space provided)**

No.	Item	Availability			Efficiency		
		Always	Some times	Not Used	Always	Some times	Not Used
1	Recording patient history and demographic information?						
2	Recording patient problem list?						
3	Recording and charting vital signs?						
4	Ordering radiology tests?						
5	Viewing imaging results?						
6	Recording patient’s medications and history?						
7	Reconciling lists of patient medications to identify the most accurate list?						
8	Providing notices for guideline-based involvements or screening tests?						
9	The ability for patients to electronically send their online medical record to a third party (e.g., another provider, Personal Health Records)?						

## **Appendix B: Interview Question**

### **Section seven: Dear respondent (For 2-3) selected person**

1. First of all, will you mention background information, please?
2. What is your responsibility in your hospital?
3. How long have you been an EMR tools worker (staff)?
4. For what purpose do you use (search) your EMR tools?
5. What are the main services of EMR?

Would you mention some of the basic services?

1) \_\_\_\_\_ 2) \_\_\_\_\_ 3) \_\_\_\_\_

6. Do you face any difficulties that affect the usability of (EMR Tool)?  
Yes  No
7. What type of Difficulties affects the usability of electronic medical records?
8. What is the contribution of EMR to your Hospital?
9. How the use of EMR does impact the workflow within the hospitals?
10. What are your plans to improve (upgrade) the existing system to give quality services?
11. What are the existing opportunities related to EMR digitalization in public and private hospitals in Ethiopia??