JIMMA UNIVERSITY

COLLEGE OF NATURAL SCIENCES

DEPARTMENT OF INFORMATION SCIENCE

ASSESSING THE STATUS AND EFFECTIVENESS OF HEALTH MANAGEMENT INFORMATION SYSTEM: THE CASE OF JIMMA UNIVERSITY TEACHING HOSPITAL

By:

TAMENE FUFA

Principal Advisor: Rahel Bekele (PhD)

Co-Advisor: Worku Jimma (MSc)

January, 2015

Jimma, Ethiopia

JIMMA UNIVERSITY

COLLEGE OF NATURAL SCIENCES

DEPARTMENT OF INFORMATION SCIENCE

ASSESSING THE STATUS AND EFFECTIVENESS OF HEALTH MANAGEMENT INFORMATION SYSTEM: THE CASE OF JIMMA UNIVERSITY TEACHING HOSPITAL

A Thesis Submitted in Partial Fulfillment of the Requirements for Degree of Masters of Science in Information and Knowledge Management

By:

TAMENE FUFA

Principal Advisor: Rahel Bekele (PhD)

Co-Advisor: Worku Jimma (MSc)

January, 2015

Jimma, Ethiopia

DEDICATED

To

My family

DECLARATION

I declare that the thesis is my original work and it has not been presented for a degree in any other university. All the material sources used in this work are duly acknowledged.

_____

This thesis has been submitted to the department for examination with our approval as university advisors:

Approved by Board of Examiners	Signature	Date
External examiner		
_____	_____	_____
Internal examiner		
_____	_____	_____
Advisors		
_____	_____	_____
Department Head		
_____	_____	_____

January, 2015

AKNOWLEDGEMENT

First, I thank the Almighty GOD and next my thesis Principal Advisor Dr. Rahel Bekele and Co-advisor Mr. Worku Jimmafor their continuous support, scholarly guidance, and encouragement comments throughout the research work. They spent their precious time in commenting my work and showing me the right directions to complete my research work.

My greatest gratitude is extended to the staffs of Jimma University Information Science department, for their follow up and showing me the right directions to complete my research work.

My greatest gratitude is extended to the Jimma University Teaching Hospitals staff for their contribution of filling the questionnaires during the time of my thesis work.

Thanks to all my classmates and my friends Teferi Kebeba, Getachew Mamo, Mesfin, Chala ,Tilahun and Yetinayet, I enjoyed their hot discussions and exchange idea all the time we have been together.

Finally, I am grateful for those who are not mentioned in name but who helped me in this research study during the time of my research work.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRNOMYS

AS:	Administrative Staff
AHIMA	American Health Information Management Association
CSA	Central Statistical Agency
DBMS	Database Management system
EMR	Electronic Medical Record
JUTH	Jimma University Teaching Hospital
HIM	Health information management
HO	Health Officer
HSD	Health Service Delivery
HMN	Health Metrics Network
HP	Health Professionals
SMS	Shelf Management System
WHO	World Health Organization

ABSTRACT

Health Management Information Systems (HMIS) integrate data collection, processing, reporting, and use of information utilization for improving health service effectiveness and efficiency through better management system for top management and decision makers. HMIS systems increase the effectiveness of health care service depending on the accuracy, timely, relevance and completeness. Valid information and interpretation of information is required and is the basis for decision making and policy planning for top management in the hospitals.

The main aim of this study was to assess the status and effectiveness of Health Management Information System in JUTH as per WHO standard. The study type was descriptive and the study design was quantitative. This study focused on assessing how report is summarized, and how data are stored and accessed or retrieved. It also includes data analysis and use of information, monitoring of information of health services delivery to utilization of reports for decision-making. The sampling technique of the study was purposive.

The survey result shows that, the effectiveness, information accessibility and storage of JUTH HMISwas below the standard set by WHO (2008), which is less than 80% for the major factors: accuracy, relevance, timeliness and completeness. Because of this, it is very difficult for further utilization of data and information from the existing HMIS system of JUTH as per the standard of the WHO. It is highly recommended to organize awareness creation training programs for the staffs of the Hospital who are dealing with record keeping. There is also needed to decentralize the ICT services of the University and build Electronic Health Record so that information is effectively shared and used whenever needed.

CHAPTER ONE

INTRODUCTION

1.1.Background of the Study

Health information management (HIM) is as information processing of organizing, maintaining and tracking care of health records by traditional or paper based and electronic for patients in hospitals, and other facilities that provide health care or maintenance of health records and their respective information processing role to utilize information management (Wilson et al.,2001).

One of the major components of HIM is Health Management Information System. According to Campbell (1997), Health Management Information System (HMIS) is defined as "an organized system of record keeping, reporting, processing, analysis, use and feedback of information which is designed to provide different level of beneficiaries (clients, community, service providers, managers, planners and policy makers). It includes timely and relevant information necessary to formulate policy, plan, implement, monitor, supervise and evaluate health programmers. According to Chetley (2006), Health Management Information System (HMIS) is designed to integrate data collection, processing, reporting, analyze, maintaining and use for the patient health care for improvement of patient health services. Information or data delivered through the HMIS come from health status and effective of patient care delivery services and records keeping as part of regular day to day transactions at health information management. HMIS integrates health and management information in order to produce paper and electronic reporting at the district and central level. This enables to facilitate the reports, interpret situations, inform strategic planning, improve health status and health management, plan for effective utilization of

health resources, designed to management and planning of healthcares at all levels of health services for decision making purposes (WHO, 2004).

A major objective of HMIS is to optimize the health of individual patients and of the population as a whole in reasonable, efficient and effective method that is adequate to health workers, patients, providers, administrators and decision makers or policy makers (Markus and Benjamin, 1997).The health system in Ethiopia has changed drastically in the last few years from a centralized system with hierarchical reporting to a decentralized system (Gladwin *et al.*, 2003).

Health systems in a centralized system only used to focus on morbidity and mortality reporting from individual health units to the health post, Woreda, district, national level and finally to referral hospital (Gladwin *et al.*, 2003). With the introduction of a decentralized system there has been significant change, emphasized by the Federal Ministry of Health (FMOH), through the implementation of health management information systems (HMIS) which emphasize the use of information at the point of collection. Through decentralization gives more freedom and responsibilities are given to each point of care, more skills are demanded of primary health care managers, concerning the data and information handling at all levels of a health care system on a global level (Gladwin *et al.*, 2000).

1.2.Statement of the Problem

In Ethiopia, Ministry of Health uses HMIS as a reporting system to generate reports that are highly required for decision making purposes to improve health care services.

HMIS for JUTH was established and became operational in 2011 by Federal Ministry of Health. Although the hospital has been using the system to prepare and disseminate reports on time for higher decision making bodies and the system has been in operation for more than 5 years, its

status and effectiveness is not investigated yet. The study was focused on how the system is operated based on its established objective and to identify whether the system has shortcoming to improve the service of the system for the future.

Although HMIS is implemented in JUTH, it is not active in delivering quality service. The data stored and retrieved were poor and could not help in decision making. Data which were used to feed the HMIS were not collected timely from different departments. The performance of HMIS in JUTH is not with the standard and guidelines of World health organization (WHO, 2004). According to WHO (2004), the major criteria set for the effectiveness of HMIS in health institutions are: accuracy, relevance, timeline and completeness.

There is poor reporting system between different departments which creates a knowledge gap among the departments. Top management of the hospital could not get timely and well organized report on health care services (personal communication, Medical Directorate of JUTH). There might also be inconsistent data, problem on data quality which is often a source of medical errors, incomplete, or poorly formatted data and deals with duplicate records within storage and accessibly of record keeping system to retrieve the unordered data storage (Helga and William 2004). The most vital problems to easily facilitate the health care to support the services for the improvement of record and information within the hospital systems to easily identify the solutions that the health services provided at the hospital in the JUTH.

Though assessment of HMIS was conducted on health institutions in Mekele and Addis Ababa, the research work did not fully follow the criteria set by WHO, namely accuracy, relevance time and completeness (WHO, 2008). Because of this, their work does not give the full picture of how HMIS is functioning in Ethiopian case in general, and JUTH in particular.

To the researcher knowledge there was no research conducted on patient health care, and health

information management study in JUTH. Therefore, this study was initiated with the main objective to assess the status and effectiveness of health management information system of Jimma University Teaching Hospital.

Thus, this study tries to answer the following research questions:

- How is information created and organized in JUTH?
- How relevant is the report produced by HMIS to decision makers?
- How timely is the report delivered to the right person?
- How accurate is the information generated by the HMIS?
- How complete is the information produced by the system?

1.3.Objectives of the study

1.3.1. General objective

The general objective of the study is to assess the status and effectiveness of health management information system of Jimma University Teaching Hospital per the standard set by WHOso as tosuggest ways to improve the services of HMIS foreffective decision making.

1.3.2. Specific objectives

The specific objectives of the study are:

- ✓ To identify how information on health services is created and organized in JUTH
- ✓ To investigate the importance of HMIS report in decision making
- ✓ To investigate how timely the HMIS is delivering information to the right person
- ✓ To assess the accuracy of report produced by HMIS
- ✓ To explore the completeness of the information generated by HMIS

1.4. Scope and limitation of the Study

This research focuses on HMIS in Jimma University Teaching Hospital which is found in Jimma town. The scope of the research is to assess the status and effectiveness of health management information system of JUTH in generating timely, highly reliable and quality reports for decision making. This in turn could improve the health services given at the hospital by operating using efficient and effective health information management system. The researcher used quantitative research design as a primary data source by using questionnaire for collecting data. It was also used qualitative description for supporting and strengthening the quantified data by using interviews and observation. The study was conducted by taking JUTH employees' as population and using purposive sampling technique for sample size determination. The researcher used SPSS for analysis and discussed the results with other similar literatures.

The limitation of this study is the shortage of time and thus the boundary was focused on assessing the status and effectiveness of the HIMS for JUTH to improve the health services in JUTH. This study was conducted from September to December 2014.

1.5.Significance of the study

The main significance of the study is to show whether HMIS has been successfully providing services for which it was established per the criteria set by WHO. It helps to indicate shortcoming of the system so that the responsible bodies take action for the improved health care services.

Besides, the study could be used as a baseline for future researches in the area of HMIS in general and HMIS of Jimma University Hospital in particular. The finding could also enrich the available literature on the area of health information management and patient record.

According to HMIS Reform Team (2008), the Health Sector Development Program's (HSDPIII) strategic plan are developing and implemented HMIS to ensure the uses of information for evidence based planning and management and decision-making of health services to achieve 80% of completeness and timely for reporting for concerned bodies. Thus, the finding of this research would also help in this regard so that the necessary is done to improve health services of JUTH.

1.6.Operational Definition

Information System is a prearranged set of resources, technology, and processes around the objective of producing information. It can be organized formally or functionally, and it is part of the institution here it provides inputs or to constitute a specific component of information network that make it possible to contribute information for decision-making.

Management Information System is a system on the basis of decision makers that makes it possible for the executives (top managements) to organize of information for fast information, decision-making analysis, and support.

Health information management is information processing of organizing, maintaining and tracking care of health records by traditional or paper based and electronic for patients in hospitals, and other facilities that provide health care or maintenance of health records and their respective information processing role to utilize information management.

Health Management Information System (HMIS) is an organized information of data to designed to integrate data collection, processing, reporting, analyze, maintaining and use for the health care for improvement of the facilities of decision makers.

Accuracy is a correctly following procedure for compiling data, continuously cross checking to eliminate errors and make corrections where necessary, and store data and accessibly at any time

Timeline is to store the record keeping and accessibly of information whenever it needed to retrieve and is the Concept of data quality that involves whether the data is up-to-date and available within a useful time frame; timeliness is determined by manner and context in which the data are being used

Relevancy is the extent to which healthcare-related data are useful for the purposes for which they were collected.

Completeness is the data being collected and entered into the HMIS are complete and error free of data or missing information for all clients and is the all required data items are included to ensures that the entire scope of the data is collected with on purpose boundaries of data for healthcare data are reliable documented.

1.7.Organization of the Thesis

The main body of this thesis organized in five chapters. The first chapter presents the introduction part with sub headings of: background of the study, statement of the problem objective, scope of the study and significance of the study.

The second chapter presents about literature review. It introduces the available related and relevant documents to give an overview about HMIS and its use and application.

The third chapter discusses about methodology of the research to explain why and how different data collection tool and research method used followed in the research.

The fourth chapter presents about the analysis and result found in the research. Finally, chapter five discuss the major findings, based on which it provides concluding remarks and recommendations for further research.

CHAPTER TWO

LITERATURE REVIEW

2.0. Information technology

Heeks (1998) defined Information Technology (IT) as a computing and telecommunications technologies that provide data and information depending on the data get from the users and produce output to handling information. Information systems (IS) are systems of individual human and technical components that accept, store, process, output, and transmit information. Information systems may be based on any combination of human accomplishments, paper-based methods and Information Technology.

Information Technology and the ways it will change the management of health care information management control the literature as a key health information management development system. For example point-of-care systems (Perreault& Metzger, 1999), internet and intranet platforms for access to health-related information services deliver (Chadwick et al., 2000) interactions with the healthcare system (Kloss, 1999).

2.1. Information system

Information systems can be best understood by looking at a technology that support modern system-wide computerized information systems that permit data management and effective tracking of utilization and outcomes. An information system can be defined as a set of organized mechanism that are used for data collection or retrieve, store, process, and distribute information to support decision making and control in an organization. Quality information systems also increase communication capacity and information flow across integrated pathways (Coddington*et al,.* 2001; Leatt*et al.*, 2000). In addition to supporting decision making,

coordination, and control, information systems may also help managers and workers analyze problems, visualize complex subjects, and create new products to reuse another time. Information systems contain information about significant people, places, and things within the organization or in the environment surrounding it.

Health management requires the monitoring of the health status of the provision, the population of services as to the exposure and utility, drugs stocks and consumption patterns, equipment status and availability, finances, personnel on a regular basis. This requires timely and accurate information from various sources. Accurate, relevant and current information is essential to health service managers if they are to recognize weakness in health service provision and take actions that will improve the health service delivery. Accordingly, the development of effective information systems is a necessary organize and monitor to managerial improvement activities (Jane, 2000).

Medication management is a continuum that shows all information or data prescription medications. Medication management includes prescribing and ordering, order communication (or order transmission) between prescribers and pharmacists, provision, administering, and monitoring, as well as bringing together, adherence, and education. It is complex and costly and enhances the health and well-being of more than half of the population in the developing world. Health management information system holds great promise to improve the quality of health care and reduce potential and real errors in medication management while at the same time providing cost-effective care (Gamble, 2009). It is a process whereby health data (input) are recorded, stored, retrieved and processed for decision-making (output).

2.2. Health Management Information Systems (HMIS)

Different organizations and different scholars give different definitions' for HMIS. According to Lippeveld, *et al.* (2000), HMIS is a set of components and procedures organized with the objective of generating information which will improve health care management decisions at health system delivery services.

In addition, HMIS is a process of collecting data for performance monitoring from administrative records and health delivery services (HMIS Reform Team, 2008).

Moreover, HMIS is defined as the management of interrelated component parts, as well as the community itself, which produce a combined effect on the health of a population (WHO, 2000).

It is also defined by WHO as system that provides specific information support to decision-making process at each level of an organization (WHO, 2000).

Furthermore, HMIS defined as "an organized system of record keeping, reporting, processing analysis, use and feedback of information which is designed to provide different level of beneficiaries (clients, community, service providers, managers, planners and policy makers) with timely and relevant information necessary to formulate policy, plan, implement, monitor, supervise and evaluate health programmers" (Campbell, 1997).

In general, the very term of health management information system is to emphasize the use of the information for management of the health systems. It is a process whereby health data (input) are recorded, stored, retrieved, and processed to provide information (output) for the management of health programme or system and for monitoring health activities (Bodavala, 2000).

The HMIS should address the following demand dimensions (HMIS Reform Team, 2008)

- Inputs to the health system and related processes (e.g., health infrastructure, human and

financial resources, equipment, policy, and organization)

- Performance outputs of the health system or
- Health determinants
- Health outcomes (e.g., mortality, morbidity, disability, well-being, and health status)
- Health inequities in determinants (e.g., coverage and use of services stratified by sex, socioeconomic status, ethnic group, and geographical location).

Health Management Information Systems (HMIS) play an important role in the effective management of health services at all levels of the healthcare service. A report by the World Health Organization (WHO) in 1987 painted the serious role that HIS play in managing health services: Of the major barrier to effective management, information and decision making support is the one most frequently cited' (Sauerborn&Lippeveld, 2000).

The purpose of Health management information technology is the use of tendency for the management of information in order to ensure that it is available to the right person at the right time and place. Health management information system is the basis for a more patient-centered and evidence-based medicine with the real-time availability of high-quality information.

The growth of Information Technology (IT) has led hospital administrators to recognize IT as a powerful tool to enhance their organizational productivity (James *et al.*, 1996). Almost all of hospitals around the world are in the process of moving away from manual or traditional of paper-based health information and put into service as computerized electronic health information management system to support patient care. Health information has caused problems in the delivery of patient care when using traditional information systems of paper-based medical records are easily misplaced and disorder hospitals have started to use Hospital Information System (HIS) to facilitate and improve the process of patient care via the

generation of electronic health records (Ting-Ting, 2004).

HMIS are designed to support clinicians in accessing and working with a variety of patient information (Gruber *et al.*, 2009) and promoting health care quality through interconnected information sharing. The main goal of HMIS is to manage information from all health care-related activities, including monitoring, planning, coordination, and decision making. HMIS implementation are to improve the availability of patient records by making information accessible for patient care, to facilitate availability of the services in good manner and to decrease the wait time for diagnostic information in the hospital (Kubus*et al.*, 1999).

HMIS implementation appear primary to meet increasing health care demands and diagnostic, treatment and administrative system, to support better patient care planning, and clinical or administrative decision making (Edward, 1995). The concurrent access, exchange a and receipt of clinical data provided by HMIS have improved clinical documentation, reduced the duplication of care services , and supported better decision making related to patient care (Tiina*et al.*, 2009).

Nurses are the key providers of patient care, including assessment, diagnosis and intervention (Lee, 2004). They must quickly incorporate information about various patients and immediately organize and interpret the information to plan quality care (Bosman, 2009). Thus, it is imperative that HMIS are designed to meet nursing care requirements to optimally coordinate patient care activities (Lee &Mcelmurry, 2010).

2.3. Basic Concept of paper-based patient records

Paper-based medical records (PMR) are important information to register health patient cares for clinicians for records and communication in relation to patient care delivery services. They are

also used to medical record and research purposes for hospital administrators for health information management. Although, illegible handwriting, incomplete data of patients and data destruction have caused problems in quality and improvement of health care (Dick*et al.*, 1997). Complete and accurate information is not registered of patient history; communication between doctors can be disrupted during convey of patients across and within patient care surroundings (Jha *et al.*,2009; Branger e*t al.*, 1998).

According to Dick and Steen, (1992) paper records may not be adequate for the information demands of modern health care delivery systems. A number of weaknesses of paper records have been identified by the researcher.

Paper-based patient records document the care giving process in adequately. Medical record keeping is a hurried, ancillary activity in the encounter room. Clinicians may not have enough time to completely and accurately fill out the forms comprising the paper records, and the required health information. Physicians' and nurses' Detailed descriptions of the patient's health problem and the reasoning behind diagnoses and choices of services may be left out or abbreviated because they are hard to summarize and tedious to record. Other components, such as laboratory and radiological reports, may be missing because of filing or communication errors.

Paper-based patient records hinder information flow. Once information has been recorded within a set of bulky paper records, it may not be readily accessible later. Efforts to compile a more complete paper record are likely to exacerbate this problem. Collecting and aggregating data from multiple records for purposes of quality monitoring or clinical research involves an expensive and time-consuming manual search. Data are only as secure as the paper itself, and

entire records, or individual pages within a record, can easily be misplaced, damaged, lost, or stolen. There are various weaknesses of paper-based medical records have been identified, such as illegible handwriting, ambiguous and incomplete data, data fragmentation, and poor availability (Dick and Steen, 1997).

Paper records impede the integration of health care delivery, research, and administration. The wide variety of formats, styles, and organizational systems for paper records frustrates the coordination of care between different providers, or even between departments or practitioners in the same institution. The impenetrability of the record means that there are few tools that can use information in the paper records to generate reminders, decision aids, and other supports for work.

2.3.1. Patients' records

Patients' records are among the most basic of clinical tools and are participating in almost every reference of the clinical care to give a clear and accurate picture of the care and treatment of patients. They help physician and nurses to communicate with other health-care professionals and with themselves (Medical Defense Union, 2003), and are necessary to ensure that an individual's assessed needs are met comprehensively and in good time.

2.3.2. The purposes of record-keeping

The clinical record has many functions or purposes, the most important are to act as a working document for day-to-day recording of patient care ,store a written record of the patient's life, illnesses, its context and who did what and to what effect , enable the clinician to communicate with him- or herself, aid communication between team members, allow continuity of approach in a continuing illness , record any special factors that appear to affect the patient or the patient's

response to treatment , record any factors that might render the patient more vulnerable to an adverse reaction to management or treatment, record risk assessments to protect the patient and others , record the advice given to general practitioners, other clinicians and other agencies, record the information received from others, including careers , store a record to which the patient may have access , inform medico-legal investigations , inform clinical audit, governance and accreditation , inform bodies handling complaints and inquiries ,allow contributions to national data-sets, morbidity registers, inform research and analyses of clinical activity(Scottish Embassy, 1995)

2.4. Electronic Medical records

The electronic medical record (EMR) is considered to be part of the solution to solve the problems identified on the paper based medical record by allowing doctors to enter and retrieve data directly for easy access of patient cares. Efficient health information management of medical data, with or without electronic decision support, also gives to improvement in the quality of care through reliable and relevant medical records of health care services (Chaudhry *et al.*, 2006).

Electronic medical records improve the accessibly of recorded data and quality of patient care through better access to improved health care services efficiency and effectively , reduce patient demographic history error, reduced medical errors, better continuity of care and improved clinical outcomes for chronic, diabetes and hypertension disease management (Cebu*et al.*, 2011; Cripps 2011).

Physician data entry is known to be one of the major concerns for inputting data and utilization of EMRs (Retchin& Wenzel 1999; Gilbert 1998; Kaplan 1994). If the quality of data in the EMR

is poor this may compromise the patient and may threaten the quality of care (Chiang *et al.*, 2003). This is particularly true in the earlier stages of implementing the EMR, when doctors who are familiar with a PMR might not enter data in the EMR (Embi*et al.*, 2004).

The quality of patient client/care across the time depends on the integrity, accessibility, reliability, and accuracy of health information management (AHIMA, 2012) .Acceptance of health information technology (HIT), including electronic health records (EHRs), is a vital for the transformation of the current US health care system into one that is more efficient and effective, is safer, and consistently or systematized delivers high-quality care (Sullivan, 2007).

2.5. Patient Care

The concept of patient care can be defined as the creation of more value for patients through the removal of all non-value-added steps or actions (Victoria & Kannan, 2008). The current administrative emphasis on the management of frequently used resources, cost control, the effectiveness of patient care, and improved quality and responsibility, reinforces the importance of optimal patient care. An important precondition of optimal patient care is that patient information is completely and accurately recorded and accessible (Ammenwerth*et al.*, 2001). Undoubtedly, if patient medical records are used as a means of communication between health care providers; these records will function as unique tools for planning, coordinating and organizing patient care (Nilmini& Steve, 2008). Time required for patient care is related to complete, timely and adequate patient medical information. Optimal patient care requires accurate real-time data acquisition and updated patient profiles (Masoud&Ric, 2008).To investigate the effects of a particular HIS on the delivery of patient care, we asked the question, what information and system characteristics of HIS support nurses in the patient care process?

2.5.1 Evaluating the Quality of Health Care

Health Services evaluation of quality of care has verified to be Quality of care is the degree to which health services for individuals and populations increase the likelihood of achieving desired health outcomes and are consistent with current professional knowledge in the diagnostic and treatment processes of health care (Steinwachs , 2002).

The complexity in measuring quality comes from gaps of knowledge regarding for which health services and patients will really improve the likelihood of desired health outcomes.

2.6. The role of Health Information Systems

Management level of healthcare association includes health patient/client information management, health unit management and health system management (Lippeveld, 2000).The sufficient, timely and reliable HMIS is essential support instrument for decision makers at all levels of management. Although, for health information to play a powerful role in management processes, it has to be used by decision makers at all management levels.

Information has been defined as a significant group of facts and data, while a system is described as any group of components that work jointly to accomplish regular objectives (Sauerborn&Lippeveld, 2000). HMIS is required to insure the production of high-quality information as 'resource' or input on timely fashion for the needed purpose. Therefore, HIS can be defined as a set of components and procedures organized with the objective of generating information that will improve healthcare management decisions at all levels of the health system (Sauerborn&Lippeveld, 2000). HMIS join together and organize data collection, data processing, reporting, and use of information to facilitate the health service accessibility. However, it can improve health services by applying health management information system through optimal

information support that assists managers to improve their effectiveness in detecting problems, defining priorities, identifying innovative solutions, utilization of appropriate storage, create and organize information, accessing and allocating resources(Cibulskis&Hiawalyer, 2002).

Access to reliable and relevant data or information about health needs, service delivery and the use of resources can improve efficiency and effectiveness of a healthcare organization such that it (Cibulskis&Hiawalyer, 2002):

- facilitates health system resources and delivers for planning and health patient cares monitoring system.
- improves the responsibility of the healthcare in the organization;
- facilitates the relevant health patient cares services with quality data storage and accessibly;
- facilitates evaluation of the effectiveness of health programs or patient cares to greater efficiency and effectiveness in service delivery process.

Health information managers' (HIMs) professional responsibilities to cover the patient care/client system to people's health care or patient care to record keeping to collection, storage, analysis and dissemination of health care information for medical patient care planning.

The role of Health Information Managers (HIMs) is to do health information managers (HIMs) design and manage information systems in the healthcare system, HIMs collect and generate records and reports about patients who are being treated by doctors and other clinicians, HIMs use their clinical knowledge of disease and surgical procedures, technical knowledge of computer systems and databases and their management skills to set up and monitor these systems, HIMs also play a key role in the security and legal use of people's medical records and

health information by establishing appropriate procedures and handling and protecting personal data.

2.6.1. Health Information Management Association

According to (AHIMA, 2012) report Health information management professionals contribute to the health information systems key to the integration of patient records in efficiency as well as effectiveness improvements to patient care depending on the following level of health care and health services to developing strategy to position the profession positively in the health care environment , advocating policy and positions to better enable health information management professionals to contribute to health care delivery , developing quality and practice standards to support the standing of our members in their workplaces and, perhaps most importantly, ensuring workforce supply through quality education and training.

2.7. Why Health Management Information System?

Any health organization/entity requires data in order to (Humberto, 2007):

- Assess the impact of program interventions
- Prioritize interventions of resource constraints
- Adapt to reforms
- Prioritize policies and strategies
- Obtain information pertinent to new styles, participants, and locations of (health) services management and decision-making

Why countries need Health Management Information System? Such systems are needed:

- To monitor progress towards major international goals
- To apply performance-based resource allocation

- To build and maintain efficient health care services
- To understand and influence how the health care service delivery operates: access, coverage, quality
- To fulfill donor requirements
- To respond to public calls for transparency/accountability

2.7.1. How Health Management Information System works?

HISs generally evolves in an erratic way in response to different pressures faced by the health system: administrative, economic, legal, or donor pressures. The result has been health systems that are fragmented and have a dispersal and dilution of responsibility. Competing interests between different stakeholders further contribute to the generation of parallel subsystems within the HMIS. Programs that are disease-specific also contribute to the fragmentation in their efforts to respond to donor requirements and international reporting of indicators. All these factors result in an overburdened and uncoordinated HMIS.

The performance of an HMIS is linked not only to technical determinants such as data quality, system design, or adequate use of information technology. Other determinants are also involved, such as

1. Organizational and environmental determinants that relate to the information culture within the country context, the structure of the HMIS, the roles and responsibilities of the different actors and the available resources for HMIS, and
2. The behavioral determinants such as the knowledge and skills, attitudes, values, and motivation of those involved in the production, collection, collation, analysis, and dissemination of information (Lafond and Field, 2003).

For the HMIS to work adequately, certain prerequisites need to be in place, such as

- **Information policies: -** referent to the existing legislative and regulatory framework for public and private providers, use of standards
- **Financial resources: -** investment in the processes for the production of health information (e.g., collection of data, collation, analysis, dissemination, and use)
- **Human resources: -** adequately trained personnel at different levels of government
- **Communication infrastructure: -** infrastructure and policies for transfer and management or storage of information
- **Coordination and leadership: -** mechanisms to effectively lead the HIS

a) Advantages and disadvantages of HMIS

World Health Organization (WHO) argues that investment in health management information systems (HMIS) now could reap multiple benefits, including:

- helping decision makers to detect and control emerging and endemic health problems, monitor progress towards health goals, and promote equity;
- empowering individuals and communities with timely and understandable health-related information, and drive improvements in quality of services;
- strengthening the evidence base for effective health policies, permitting evaluation of scale-up efforts, and enabling innovation through research;
- Improving governance, mobilizing new resources, and ensuring accountability in the way they are used.

Moreover, the HMIS aims to provide timely and accurate information leading to better health care planning, improved diagnosis and increased patient access to health services. Direct users are the health workers, who are expected to:

- get better access to patient information

- be able to spend more time on patients
- be able to spend less time on administration

b) Components of HMIS

A health Management Information System consists of several separate subsystems (Humberto, 2007):

- Data collection based on patient and service records and reporting from community health workers, health workers and health facilities
- Program-specific monitoring and evaluation (ex: EPI, Malaria, TB, HIV/AIDS)
- Administration and resource management (budget, personnel, supplies)
- Disease surveillance and outbreak notification
- Data generated through household surveys (KPC, DHS)
- Registration of vital events and censuses (births, deaths and causes of death)

c) HMIS Basic Functions

Information systems, that are including HMIS, are built upon the conceptualization of three fundamental information processing phases: data input, data management, and data output. The data input phase includes data acquisition and data verification. The data management or processing phase includes data storage, data classification, data update, and data computation. Finally, the data output phase includes data retrieval and data presentation. Altogether, these eightelements and three phases define a typical information system, as presented schematically in Figure 2.1.

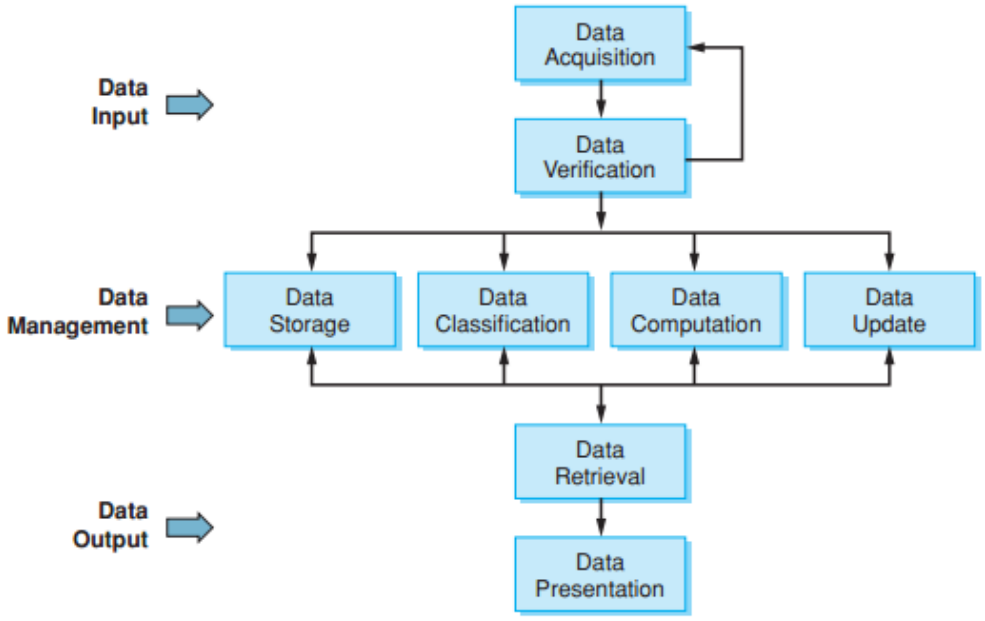


Figure 2.1. Basic functions of HMIS (Tan, 1998)

Data acquisition involves both the generation and the collection of accurate, timely, and relevant data. Data are the raw materials needing verification, organization, and transformation before they can be useful information. The process of data generation in HMIS is normally achieved through the input data. The process of data collection differs from that of data generation in that data can be entered directly at the source thereby enhancing data timeliness, validity, and integrity. Data verification involves the authentication and validation of gathered data. It is generally known that the quality of collected data depends largely on the authority, validity, and reliability of the data sources.

Data retrieval is concerned with the processes of data transfer and data distribution. The data transfer process is constrained by the time it takes to transmit the required data from the source to the appropriate end-user.

Data presentation has to do with how users interpret the information produced by the system. In situations where only operational or even tactical managerial decision making is expected, summary tables and statistical reports may suffice. However, certain managerial decision making involves strategic thinking and active collaboration. The use of presentation graphics for higher level managerial decision analysis is particularly encouraged because these appear to provide a better intuitive feel of data trend. According to Tan and Benbasat, (1990) and Tan (1998) have presented a theory to explain and predict the human processing of graphical information, which is valuable to guide HMIS designers in the matching of presentation graphics to tasks.

2.8. Applications of HMIS

The application of IT to healthcare systems is the fruit of a public policy decision to improve the effectiveness and efficiency of the health sector.

Currently, the vast majority of clinical records are paper-based, but this has a number of disadvantages related to accessing, entering and processing data, both within a single institution and between various institutions, and also in terms of security and confidentiality. Electronic health records (EHR) remedy these shortcomings and offer additional advantages as well. The features that such systems offer can be grouped in the following functionalities (Tan, 1998):

- Health information management
- Results management
- Management of medical orders
- Decision-making support systems
- Electronic communication systems and connectivity
- Patient support
- Administrative processes

- Reporting systems and public health systems
- Issue of medical reports

Sound and reliable information is the foundation of decision-making across all health system building blocks, and is essential for health system policy development and implementation, governance and regulation, health research, human resources development, health education and training, service delivery and financing (WHO, 2008).

The health information system provides the underpinnings for decision-making and has four key functions: data generation, compilation, analysis and synthesis, and communication and use. The health information system collects data from the health sector and other relevant sectors, analyses the data and ensures their overall quality, relevance and timeliness, and converts data into information for health-related decision-making(WHO, 2008) .

Every level in the government is used to a decisions based on personal and value based observations. The critical cycle in the HMIS process is the use of the information supplied by the HMIS system. Users are again of all levels right from the first generator of information to the principle secretary of health in Delhi. On applying the information for decisions, the user knows its validity, limitation or timeliness. Unfortunately, the data culture is very limited in all levels of administration.

The starting point of any health information system development at the primary health care level should therefore be the strengthening of the managerial function. Managers should be able to formulate questions to be addressed by the health information system, should grasp the information presented to them and should use it to plan, evaluate and control the health services. As long as this does not occur, the HMIS remains as a mere data based system.

In public health the resources are few, time is extremely limited (with AIDS kind of epidemics, out breaks of plague (it is an emerging epidemic in India now) and results have to be achieved in a limited time frame, there is need for more and more tools, implements and whatever that makes these tasks easy and efficient. India spends 85% of the budget on the personnel and personnel alone. Employment of some personnel or creation of one department or a post will not automatically ensure achievement of the set objectives. Public health is to licensing or regulating (even these are now slowly disappearing in the liberalized India). It is a proactive and developmental function. The personnel need some implements, tolls, training and others to effectively discharge their duties. Often the series criticism on computers is that 'we need drugs first". Drugs are certainly needed and also the capability to know how much are needed, where they are needed, in what quantities they are needed how are they going to be spend. These questions having not been addressed for all these years have costed the country billions. We need effective systems to utilize the available resources. The key to the success of the countries lies in effective utilization of available resources for the benefit of the communities. Strengthening health systems is emerging as a cornerstone of global health policy. The poor state of health systems in many parts of the developing world is keeping individuals from accessing essential health care and slowing progress toward health-related UN Millennium Development Goals (Jody, 2011).

Existing health information systems in developing countries are managed and used mainly by biometrically trained personnel and by general healthcare administrators. They focus on epidemiology, service utilization and finance; they generate little of the socio-cultural data needed for developing and adjusting health services and disease control program to local health related perceptions, values and resources (Narayana, 2001).

Improving health systems requires enhancements to health worker capacity and levels of staffing, service delivery, infrastructure, commodities (such as equipment and medicines), logistics, progress-tracking, and financing. When applied to health systems in all these areas, information and communication technologies can transform health systems globally; improve quality of care, and save lives.

Human resources are another central domain of health systems where improved information can provide significant benefits. Better data on health worker supply and demand can help allocate human resources appropriately across geographies and specialties. This is particularly critical where there is a shortage of healthcare workers and where health managers may face issues of absenteeism, lack of certification and proper qualification and training of workers.

Users of health information include health managers (HMs) at national, regional, district and institutional levels, researchers and evaluators, legislative and policy analysts, non-governmental organizations, consumer organizations, advocacy groups, private sector health providers, insurers, journalists, donors, international agencies, and individuals. Internationally, health information is used to detect and control the consequences of epidemics, results-based management of development assistance programs, and advocacy for increased financing of health.

2.9 Related Works

In this section, the researcher has reviewed some related works that have been done on HMIS in different health organizations.

The first related work was done with a title of "Assessment of Health Management Information System in Addis Ababa Health Bureau": which has been conducted to assess and determine how health information is generated and utilized in the decision-making process and health care

facilities in the Addis Ababa region (GhebreHiwot, 2005). The study also attempted to identify factors affecting the quality of reporting, information generation and utilization at regional, sub-city and health facility levels. The researcher used qualitative research method and used questionnaires, interviews, participant observation, and analysis of certain documents were applied to collect necessary data.

The findings of the research indicated that the need for awareness for better quality of information and steps are taken to improve the HMIS capacity at sub-city and health facility levels by adopting the District Health Information System (DHIS) software. The research also indicated that there is critical constraint of trained personnel; to analyze value and utilize the available data, which seemed to be significant challenge for the progress of the system at all levels. Finally, the researcher recommended that technology acquisition and the understanding of health managers and health professional should be improved on the importance health information as well as the proper utilization of the available data and information. To do so, there should be proper training and increasing the proportion of trained staff in HMIS on a sustainable manner.

The second related work was done with a title "Assessment of Health Management Information System Implementation in Ayder Referral Hospital" (Tadesse*et al.,* 2014). They used cross sectional research design in Ayder referral and teaching hospital. They have assessed six months reports including all the data, which were registered in six months. They also included tally sheets generated during these six months as part of the assessment. Out of the six months' data they used, they obtained 63.3% accurate. More than 95% of the reviewed patient cards were complete. Out of the questioned 50 staffs (93%) have good attitude towards HMIS. Data consistency between register and the tally sheets was measured as 72.2%. There was 78.6% an

average report completeness measure in the HMIS unit.

Based on the analysis, they point out the following findings. There was no sign of using the information generated by the facility, Use of accurate data in the facility was low, In addition, information was not still used for action, the original HMIS tallies were not used in the hospital instead minimized and photocopied tallies were used, refreshing training was not given to staff.

Then, they recommended the following points: training should be given to the higher bodies and all staffs about the importance of HMIS and the value of health data in decision making, the performance monitoring team should have to be established and the HMIS unit staffs should have to be trained on basic indicators calculation.

The third related work was done on assessment of the quality of health management information system, the quality of data in terms of completeness, accuracy and timeliness in selected health facilities in Malawi. It was conducted in Lilongwe district (Moyo, 2005). They used combination of both qualitative and quantitative research design methods in the selected study area. Purposive sampling was used for in-depth investigation of data quality issues and simple random sampling for health facilities. Their result showed that data quality of HMIS in the health facilities was low; the reporting rate was low as more than half of the selected reporting facilities did not send complete reports to top managements. The District health management Team members didn't adequately provide feedback and supportive supervision to health facilities to improve data quality. The rate of timeliness of the reports to District health officers were only 33% of the facilities had been sent the report timely for decision makers. The quality of data they were collecting on their facility in terms of completeness of HMIS of data was 71% of the data are complete. The researchers concluded that data quality in terms of completeness, accuracy and timeliness of reports is low. The study identified some factors for improving data quality and the

recommendations were: to pursue the establishment of an effective supervision system, so as to ensure that HMIS data to the highest possible quality assurance, promotion on the use of HMIS data for dissemination of good practices or offering rewards for the best performing district and Supervision and feedback from the District health management were also viewed as motivating factors to have good quality data.

The fourth related work was an assessment of bridging the gaps in the Health Management Information System in the context of a changing health sector in Tanzania (Nyamtema, 2010). A cross sectional descriptive study was conducted in 11 heath facilities in Kilombero district of Tanzania. The researches study showed that 65% did not properly define what HMIS is. The findings suggested declining knowledge on this HMIS and lack of informed decision-making at the facility level and the factors for change in the country's HMIS. The gaps in the current HMIS were linked to lack of training, inactive supervision, staff workload pressure and the lengthy and laborious nature of the system. The researcher recommended training of health care providers in order to improve HMIS, improved supervision and increased staffing levels at the facility level and for revision and simplification of the HMIS to be more user-friendly.

CHAPTER THREE

METHODOLOGY

3.1.Research design

For the study, quantitative research method was used. The main reason for choosing quantitative approach was to collect data, which usually was to quantify the collected data through questionnaire, by using interview and observation to support the primary data sources. This complements the data gathered through questionnaire and lets the assessment of the system to be complete and conclusive. The qualitative approach has been mainly used to measure the accuracy, relevance and timelines services of HMIS against WHO standard which is 80%.

For the data analysis, the researcher performed examining, comparing and contrasting, and interpreting meaningful patterns.

3.2.Study Area

Jimma town has two hospitals: Jimma University Teaching hospital and Shanen Gibe hospital, three health centers and 33 private clinics. The hospitals give health services at higher level. Jimma University Teaching Hospital is a referral hospital, which provides health services for communities of Jimma and its neighboring zones (Illu Abba Bora, Bonga, Mizan and Tepi).

Jimma University Teaching Hospital is located in Jimma town, 350 km south west of Addis Ababa. The hospital was established in 1937 by Italian conquerors to give medical services to their soldiers. After the expulsion of Italians, the center was made open to the general public under Ministry of Health. Later on, the hospital was transferred from Oromia Health Bureau to

Jimma University to be used as teaching Hospital. The study area selected for the study was JUTH which serves as the teaching hospital of Jimma University College of public and medical science students and provides health care services for the community of Jimma town and neighboring zones.

3.3.Source of data

For this study, primary data sources were used. This method was chosen because it could provide accurate and consistent data that the researcher could use for studying the system.

In general, primary sources were used sources in which the data was gathered from the information source itself, not from other sources far away from the source. In primary sources, the data was collected directly from the sample population which was done by distributing questionnaires. For this research, data was collected directly from the hospital's employees by distributing questionnaires, interviewing employees and observing their operations directly.

3.4.Population and Sample Size

The study was conducted in Jimma University Teaching Hospital and the targeted population was health professionals and administrative staffs. The total populations of the health professionals and administrative staffs of the hospital members were 1088. Among them, administrative staff members were 124 and health professionals were 964.

The sample size was calculated by Cochran (1977) formula.

$n = \frac{(Z_1-\alpha/2)^2 \times p(1-p)}{D^2 p}$ Where: n= minimum sample size

D^2p =an estimate of prevalence ($p = 0.5$)

D =the margin of sampling error ($D=0.05$)

Z_1-α/2=standard normal variance, where α = 0.05.

$n= (1.96)^2 \times 0.5(1-0.5)$

$D^2 = (0.05)^2$

n=384

Since the total population of the health professional and administrative staff are less than 10,000, the sample size of the correction factor formula is as follows;

$$nf = \frac{n}{1 + \frac{n}{N}}$$

where,nf= the desired sample sized when population is less than 10000

N= the estimated population

nf= 384/ (1+ (384/1088)) = 283

For the study, samples were selected from the total population, the sample size selected were 283 administrative staff and health professionals found in JUTH.

3.5.Sampling Method

To select samples from the population, the researcher used purposive sampling technique. Purposive sampling was selected because it allowed collecting information from individuals who are directly related to HMIS. This could provide accurate and rich information needed for the assessment.

According to Chasdwick*et al.* (1984), Purposive sampling is carried out with the basis of the researcher using his expertise to select the respondents that represent the remaining. The researcher uses judgments in selecting the sample (Grinnell, 1993).

Therefore, in order to select the JUTH administrative staff and health professionals a purposive sampling procedure was used. Purposive sampling technique was employed to collect data from the administrative staff and health professionals of JUTH using questionnaire, interview checklist and observation. The use of purposive sampling restricted to specific types of people who can provide full information about the services delivered and knowledge on the target of the points or they conform to some criteria set by the researcher (Sekaran, 2003). The purposive sampling was used to select health professional and administrative staff to easily manage the respondents of the staff members.

3.6.Data Collection Instruments

In the study primary data collection methods used were through questionnaire, observation and interviews to collect data from the respondents in assessing the status and effectiveness of health management information system in JUTH. The data collection was undertaken during the months of September, October, Novemberand December of 2014.

3.6.1. Questionnaire

Close-ended and open ended questions were prepared for health professionals and administrative staffs of JUTH to identify the existing status and need for improved system in storage, accessibility of record keeping, process and utilization of the existence of the HMIS and in creating, organizing and sharing of knowledge creation in the hospitals within the staff.

The questionnaire was prepared and distributed for assessing the status and effectiveness of health information management system of Jimma University Teaching Hospital to improve health services for health professionals and administrative staffs of the hospital. The

questionnaire had three parts: Part I contains general information about the personal data that contains gender, Professional status, and work experience; Part II contains questions about health information management by assessing the status of the existing record keeping information on health service when it is created, stored, accessed and during information sharing in Jimma University Teaching Hospital. In Part III respondents were asked to rate observation of the current health information management of the patient record keeping in JUTH by using a five-point Likert scale of agreeing and disagreeing.

3.6.2. Interviews

Observation and Interview was mainly used to support information that has been collected through questionnaires. Interviews were used to determine shared understandings of information of a particular group. The propose of interviewees should be to share critical similarities related to the research question of the accessibility, record keeping storage and effectiveness of the information flow to find the result of the research questions to improve the health care's (McCracken, 1988). Selecting in depth interview participants is based on an iterative process referred to as purposeful sampling that seeks to know the maximize number of patient cares or health care's too deeply and richness of the data to address the research question from administrative staff and health professions. According to Kuzel and Miller (1999), interviews used to identify and know in-depth about opinion of caring for patient cares with any health professionals are to explore the improvements of the health care by selecting target persons.

3.6.3. Observations

During the study time the activities on the current medical care for knowledge creation, information sharing on the existing health information management system, how the patient

information is accessed and medical storage record keeping is performed and how information is processed and utilized were observed on the health professionals and administrative staff to identify the effectiveness and improvement of the health services.

3.7 Pilot Testing

The purpose of a pre-test exercise was to test reliability and validity of the data collection instruments. Reliability is the extent to which a procedure yields the same answer time after time. In testing reliability, the researcher was interested in knowing if the instrument brings consistency in the research.

Validity is the degree to which the researcher collects data that reflects the true picture of the phenomenon being studied. In measuring the validity, the researcher tested whether the instruments collect credible data. For example, for the question asked for the existence of HMIS, about 96% of the respondents respond its existence.

Prior to final data collection, a pilot study was done to test the questionnaire. It was leading towards establishing whether the questions were clear, appropriate, and if there were other questions that could be asked. It also helped in testing the language and content of the questions, and the length and approach of the interviews.

The chosen place for the study was JimmaShenen Gibe Hospital and was done by distributing questionnaire randomly for 28 Health Professionals and Administrative staff. The responses were then analyzed with the view to improve the reliability and validity of the instruments.Shenen Gibe Hospital was preferred over the study site owing to the fact that the number of employees in Shenen Gibe is less compared to JUTH and this makes the pilot testing more manageable. On the other hand, pilot testing on the study site could lead to employees in JUTH to be bored to fill

the same questionnaire twice. To avoid respondents from this, Shenen Gibe was used for the pilot testing purpose.

Mugenda and Mugenda (2003), argue that at least a tenth of the total population is adequate for a pre-test. For this study, 10% of the total study sample was used for the pre-test.

The pre-testing exercise helped in identifying problems in the interview and the questionnaire. The major problem was found with the clarity of the questions. Modifications were made appropriately on the basis of the suggestions and comment offered and the findings of the pre-test. These modifications included removal of questions and addition of some missing points that the researcher felt were redundant and changing the grammatical error.

3.8. Data collection procedure.

The data for this study was collected using a questionnaire (Appendix I), Interview(Appendix II) and observation (Appendix III). The questionnaires were developed and modified after the pilot test and individual questions prepared by the researcher and approved by the advisors. To collect data from the respondents the researcher got official letter from the Department of Information Science. The researcher submitted the letter to Jimma University Teaching Hospital Medical Director to ask for support and to get permission for the research. The Medical Director of the hospitals forwarded the letter to the ethical board of JUTH. And then the researcher got permission to get necessary data for the accomplishment of the study.

The questionnaire was distributed to the staffs that have an idea about HMIS by using purposive sampling technique. The respondents were selected with the help of employees' coordinators who are working closely with both health professionals and administrative staff. The researcher distributed the questionnaires by going to the hospital working area and accessing workers while

they are directly on their work place. For both Health Professionals and Administrative staff the researcher distributed questionnaires at morning 2:30-6:30 and after noon at 7:30-11:30 because this is a time to get most staffs in their offices. After that the researcher distributed the questionnaires for five days. The first day, the respondents were not willing to fill the questionnaires. On the second day, the researcher asked the Director of Department of Nursing to assign one person to facilitate the data collection so that the questionnaires could be filled for the researcher.

Then, on the second and third days, the health professionals filled the questionnaires. The researcher was waiting for their responses and giving explanation on some topics where the respondents could not understand the questionnaires.

On the fourth day, the researcher asked Record Keeping and Archiving Department office head to facilitate the staff to fill the questionnaires, then one person was assigned for the researcher to arrange the staff of record keeping and archiving. After that, the researcher distributed the questionnaires, and then the researcher collected the responses and giving explanation on some question regarding what it means.

On the last day, interview questions were prepared in order to get information from concerned bodies and the top management or decision makers of the hospital. The interviews were focused on the reporting procedures, on timeliness, and relevance of HMIS use when reporting is done for decision making.

3.9 Method of data analysis

The data collected by using questionnaire was organized, processed, checked for errors and cleared. Then the quantitative data were encoded into SPSS software for analysis using

frequency, percentage, charts, cross tabulation and descriptive statistics. For qualitative data i.e., data collected through structured interviews and observations was presented by narrations to give more insight for the study.

3.10 Ethical Considerations

Permission to conduct this study was obtained from the JUTH staff and the individual participants and respondents were informed about the research purpose. Also the study considered research ethics like protection of respondents from harm, privacy, confidentiality of research data and honesty with professional colleagues. Therefore, this research work violates no ethics as the researchers shall stick to research ethics throughout the study and also when the data is analyzed.

CHAPTER FOUR

RESULT AND DISCUSSION

As shown in table 4.1, out of the total sample size of 283, 85.5% of the questionnaire was returned and the remaining, 14.5% of the respondents, did not return the questionnaire. This gives a return rate of 85.5%.

Table 4.1 Respondent of fill the questionnaires

Category	Frequency
Returned paper	242 (85.5%)
Not Returned Paper	41 (14.5%)
Total	283(100%)

From returned paper 221(91.2%) respondents filled the questionnaire correctly and was valid, whereas 21 (8.8%) of the questionnaire was invalid and hence could not be used for analysis.

Table 4.1(a) Respondent of returns the questionnaires papers

Returned paper	Frequency
Valid Paper	221(91.2%)
Invalid Paper	21 (8.8%)
	242 (100%)

4.1.2. Socio-Demographic Characteristics of respondents

For the background information of respondents, three Socio-demographic variables; namely, gender, professional status and work experience of respondents were presented using descriptive statistics.

Accordingly, 139 (62.9%) were males while 82 (37.1%) were females. Among the respondent 174 (78.7%) were health professionals while 47 (21.3%) were administrative staffs (Table 4.2).

Table 4.2: Demographic characteristics of the respondents

		respondents							
		Doctor	Nurse	Midwifery	Pharmacist	HO	Laboratory	AS	Total
Gender	M	12	67	2	7	9	14	28	139(62.9%)
	F	7	40	5	2	2	7	19	82(37.1%)
PS	HP	19	107	7	9	11	21	0	174(78.7%)
	AS	0	0	0	0	0	0	47	47(21.3%)
Work Experience	1-3	9	43	2	6	3	2	9	74(33.5%)
	3-6	1	18	2	2	2	5	19	49(22.2%)
	6-9	7	18	0	0	3	4	10	42(19 %)
	9-12	1	0	1	0	0	0	0	2(0.9%)
	>12	1	28	2	1	3	10	9	54(24.4%)
	Total	19	107	7	9	11	21	47	221(100%)

Relating to the level of work experience, most of the participants of the study that accounts for 33.5% are with less than three years of work experience. On the other hand,participants with work experience between 3 and 6 years were 49(22.2%), with work experience between 6 and 9 years were 42(19 %), with work experience between 9 and 12 years were 2(0.9%) and work experience of more than twelve years were 54(24.4%).

4.1.3 Status of Health Management Information System in JUTH

4.1.3.1 HMIS in JUTH for record keeping

As it is shown below in Table 4.3, from respondents which were replied about the existence of HMIS recording system; 213(96.05%) of respondents indicated the existence of HMIS by saying yes while 8(3.95%) were answered that by saying No which means there is no HMIS recording system.

Table 4.3 HMIS recording system

	Yes	No
Existence of HMIS	213(96.05%)	8(3.95%)

The response from respondents varies from one stratum to another. This could be attributed to lack of understanding about HMIS itself of the respondents who were from different work divisions. For instance, during the time of the study, the hospital was using database management system to record patient names and their card number in order to find patient card numbers faster and to make manual searching easier. This data base management system is used only to find card numbers of patients' and nothing more. Some respondents took this database patient record as HMIS and responded positively. On the other hand, most health professionals

confused HMIS with Electronic Record Management (ERM) and hence responded negatively. This shows that there were no equal understandings about HMIS within the respondents (administrative staff and health professionals). From this it can be said that the patient record is not useful for decision making of both administrative and clinical purposes.

4.1.3.2 HMIS record keeping

To identify the current patients' history recording keeping or storage, a question "How is the patients' history (record) kept/stored?" was included in the questionnaire. From the respondents, it was quite different owing to their knowledge and proximity to record keeping and HMIS. Out of 174 health professional respondents, 146(84.8%) said that the record is kept using manual system of file cabinets whereas 26(14.3%) responded that the hospital used HMIS for record keeping. Out of 47 administrative staff, 41(80%) responded to the same question by responding that the hospital uses manual record keeping system, while the reaming 6(20%) said the hospital uses database system. Thus, the majority, from both administrative and health professional believes that recording keeping in JUTH is manual system.

Table 4.4 Patient history record keeping

patient medical storage record	Health professional	Administrative staff	Sub total
Database management system	26 (14.3%)	6 (20%)	32 (14.5%)
Manual system	146 (84.8%)	41 (80%)	187 (84.6 %)
Not sure	2(0.9%)	0	2(0.9%)
Total	174 (100%)	47(100%)	221(100%)

Therefore, from the result it has been shown that more than 187 (84.6%) of the respondents indicate the presence and usage of manual system for record keeping/storage.

4.1.3.3 Assessing the health care facility with the storage system

To identify the status of respondents in storing patients' history card a question was raised as: **"**Does **t**he current Patients' history record stored with the standard of H|MIS".As it is depicted below in Table*4.5*, out of the total respondents 17(7.77%) answered as Strongly Disagreed, 20(9.19%) Disagreed, 43(19.1) were Neutral, 72(32.5%) Agreed and 69(31.4%) strongly agreed. Therefore, from the result more than 60% of the respondents show that there is dissatisfaction with the current HMIS recording system. From the result it can be said that HMIS is not applied well in keeping patients' history for reporting or other future use. From this it could be noted that record keeping/storage is not implemented fully as per the standard set by WHO.

Table 4.5 Patient's health information storage system

Patient's health information storage as per the standard of HMIS				
Strongly agree N (%)	Agree N (%)	Neutral N (%)	Disagree N (%)	Strongly disagree N (%)
17(7.77%)	20 (9.19%)	41(19.1)	72(32.5%)	69(31.4%)

4.1.3.4 Accessibility of patients' history card

To identify how patients' history card is accessed, the researcher posed a question: "How is the patients' history record accessed/ retrieved?"As it is shown in Table 4.6: From valid collected questionnaire, among the respondents the majority, 198(89.6%) indicated that accessibility is in manual recording system where as 21(9.5%) indicated accessibility is in Database management system and 2 (0.9%) answered that they are not sure about the existing accessibility system.

Table 4.6 Patient record keeping access type

		Respondent N(%)
Patient record keeping accessed	MS	198(89.6%)
	DBMS	21(9.5%)
	Other	2(0.9%)
Total		221(100%)

Therefore, the result of study showed that the health record keeping accessibility system of the current system in JUTH is manual system 198(89.6%) respondent's responses used as manual.

4.1.3.5 Assessing the health care facility with the Accessibility of the HMIS

To check the current accessibility of patient history to maintain, control, analyze the data from the JUTH patient recording keeping its difficult to search and access easily. From the analysis of the patient's or health care easily accessibility of records in JUTH the participants or respondent shows 12(5.4%) Strongly Disagreed, 35(15.8%) Disagreed, 73(33.0%) neutral, 75(33.9%) Agreed and 26(11.8%) Strongly Agreed (Table 4.7)

Table 4.7 Accessibility/ Retrieval of patient card

		Respondent N(%)
The patient card easily accessible	Strongly Disagree	73(33.0%)
	Disagree	75(33.9%)
	Average	26(11.8%)
	Agree	35(15.8%)
	Strongly Agree	12(5.4%)

Total	221(100%)

From the total respondents, 66.9% responded as disagree which means the accessibility of the patients' records were difficult so that it is not easy to re-use the previous patients' records for better health services. From this it could be said patient's record retrieval is not implemented fully using HMIS as per the standard set by WHO.

4.1.3.6 Presence of uniform format in JUTH

To know whether JUTH uses uniform format for recording, follow-up, report within different departments the following question was asked. "Does JUTH use uniform format for recording the patient history?

The patients' history record has to be recorded in the format that make easier for the patient, health professionals as well as HMIS. Uniform formats include a complete medical record for the duration of a patient's care to register and to avoid the incompleteness of the health care deliver services.

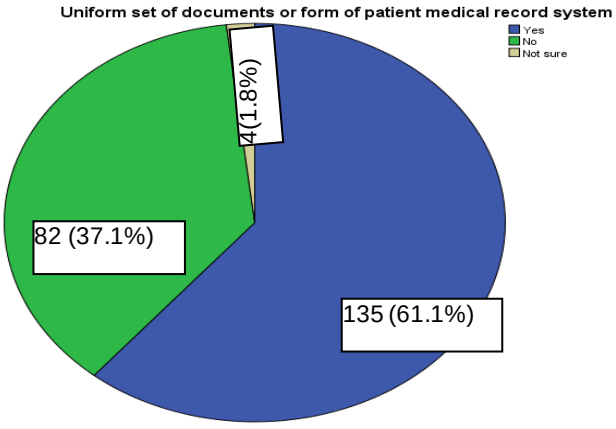


Figure 4.1 uniform set of documents or form of patient medical record

Usages of a uniform set of documents/forms that comprise a complete medical record for the duration of a patient's care were listed on the above figure (Figure 4.1). As it is shown in the

figure, the majority, 135 (61.1%) of the participants responded yes while 82 (37.1%) responded No and 42(1.8%) of the respondents were not sure about the uniformity of the forms.

According to the result from the study the majority confirms that uniform format for record keeping is used in JUTH to register the patient care information in the hospital. This is one of the pre-requisite for application of HMIS per the standard of WHO and thus can be concluded that JUSH's record keeping is not to the standard.

4.1.4. Effectiveness of HMIS in JUTH

To assess the effectiveness of Health Management Information System in Jimma University Teaching Hospital, questionnaire was prepared on the basis of major criteria set by world health organization: accuracy, timeliness, relevance and completeness. These three criteria are described separately.

4.1.4.1 Effectiveness of HMIS in terms of Accuracy

Regarding the accuracy of HMIS, how data and information should be correctly stored and accessed following procedures for compiling data by continuous cross checking to minimize errors and make corrections whenever necessary. In this case the researcher identified how HMIS accurately used by health professionals and administrative staff for decision making. So for this the issue of: **"**Does patients' information recorded, stored and retrieved accurately in HMIS?" Is included in the survey.

Table 4.8 Accuracy of information stored and accessed in HMIS

Types of effectiveness	Accuracy		WHO standard
	Yes	No	Yes
Storage	148(67%)	73(33%)	>80%
Accessibility	164(74%)	57(26%)	>80%

From the analysis of effectiveness of the record keeping for storage in terms of accuracy 73(33%) of participants responded by saying No and the rest 148(67%) responded by saying Yes. For the analysis of effectiveness of the record keeping for accessibility in relation to accuracy 57(26%) of the respondents say No and the rest 164(74%) answered Yes. These results shown that record keeping of patients' using HMIS was not fully applied to store and retrieve the records accurately so that its report could be used for decision makers.

4.1.4.2 Effectiveness of HMIS in terms of timeline

Regarding thetimeliness of HMIS, the researcher measured it in terms of timely generated reports for decision makers. The HMIS department generates report two times a year. Accordingly, I collected report generated from 2010 to 2014. Then, as indicated in Table 4.9, out of 5 years generated reports 6(60%) were generated timely. The other 4(40%) were not generated timely.

As a result, according to WHO standard, the timeliness of HMIS department is below standard.

Table 4.9:The Timely of information stored and accessed in HMIS

Types of effectiveness	Timeliness		WHO standard
	Timely generated	Not Timely generated	Timeliness
Report generated	6(60%)	4(40%)	>80%

4.1.4.3. Effectiveness of HMIS in terms of Relevance

Relevant information which is produced as a report from HMIS, could be used how data and information were the reliable data for the improving the storage and accessibility that the collected information was to utilize and re-usable for further uses. In this case the researcher

identified how HMIS relevance used by health professionals and administrative staffs for decision making. So for the respondents the following question was asked**: "**Does relevant report produced by HMIS to be used for decision makers?"

From the analysis of Effectiveness of the record keeping based on storage and accessibility in terms of relevance, 165(74.6%) and 172(77.8%) of respondents replied by saying "yes" respectively while 56(25.4%) and 49(22.2%) answered "no" respectively.

Therefore, the finding of the current effectiveness of HMIS in JUTH according to the standard set by WHO the storage and accessibility depending on the relevance is not effective from the respondents shown on the tables.

Table 4.10 The Relevance of information stored and accessed in HMIS

Types of effectiveness	Relevance		WHO standard
	Yes	No	Yes
Storage	165(74.6%)	56(25.4%)	>80%
Accessibility	172(77.8%)	49(22.2%)	>80%

4.1.4.4. Effectiveness of HMIS in terms of Completeness

Regarding completeness of HMIS, how data and information were complete in HMIS to be used which contain quality data for improving the storage and accessibility that are used for utilization of the performance of the quality data. In this case the researcher identified how HMIS completeness of data is used by health professionals and administrative staffs for decision making. So from the respondents to answer the question was "Does complete report produced by HMIS to be used for decision makers?"

From the analysis of Effectiveness of the record keeping based on storage and accessibility, in terms of completeness for the storage and accessibility, 174(78.7%) and 132(59.7%) of

respondents replied by saying "yes" respectively while 47(21.3%) and 89(40.3%) answered "no" respectively.

Therefore, the finding revealed that the current effectiveness of HMIS in JUTH according to per standard set by WHO the storage are complete and effective and the accessibility are not complete and not effective from the respondents shown on the table below (Table 4.11).

Table 4.11 The completeness of information stored and accessed in HMIS

Types of effectiveness	Completeness		WHO standard
	Yes	No	Yes
Storage	174(78.7%)	47(21.3%)	>80%
Accessibility	132(59.7%)	89(40.3%)	>80%

4.1.4.5 The summarized the effectiveness of HMIS in JUTH

The HMIS information collected is used to improve and provide accurate, timely and relevant information as per the standard of WHO in order to accomplish the status of health care delivery and achieve health care services in case of JUTH. In general, it was found that the effectiveness of HMIS of JUTH is below standard set by WHO. The percentage of accuracy, timeline, relevance and completeness that have been summarized from answers of respondents were below 80% of the standard set by WHO, as they are shown in Tables: 4.8, 4.9, 4.10 and 4.11.

4.1.5. Applicability and Importance of HMIS

4.1.5.1 Applicability of HMIS process in JUTH

To identify the information management process in JUTH, the question "What is the current HMIS process in JUTH?" was asked. As it is shown in *4.12*, among the respondents 83(37.6%) answered the need for centralized information management center, 117 (52.9%) indicated information management center has to be decentralized in each department and the

rest 21 (9.5%) indicated there has to be other information management process.

Table 4.12Information management process

		Respondent N(%)
Information management process	There is central information center	83 (37.6%)
	Separately, within each department	117 (52.9%)
	Other	21 (9.5%)
Total		221(100%)

Therefore , the researcher conclude that the HMIS process in JUTH uses as a decentralized HMIS system to easily capture and uses for further utilization of data.

4.1.5.2 Importance of HMIS for health Information service

For the issue raised to know the importance of HMIS for improving health information services,90% of the respondents agreed that it is important for improving health services, 5.9 could not tell whether it is important or not; whereas, 6 (2.7%) and 3 (1.4%) disagreed and strongly disagreed of the importance of HMIS for improving health services.

Table 4.13 HIMS important for improving health information services

.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
HP	3	4	12	51	104
AS	0	2	1	12	32
Total	1.4% (3)	2.7%(6)	5.9%(13)	28.5%(63)	61.5%(136)

Therefore, the HMIS importance of the record keeping more than 90 % of the respondents agreed that the HMIS is important to improve the health services of JUTH and thus, should be given attention and the necessary be done.

4.1.6. QualitativeResults for Interviews and Observation

The interviews and observation conducted with frequent users of HMIS services and HMIS teams were interpreted below.

4.1.6.1. Facilities of the department.

Since facilities including computers, special software (HMIS) and communication networks are a greater factor on producing qualified information and timely access information, the results were discussed about facilities with concerned bodies. Thus, almost the department has sufficient materials like computers and special software (HMIS software) that can automatically generate reports. However, since the system is desktop based, users have to go to the department to get necessary information. Due to this, it takes some times of users to get necessary information.

4.1.6.2 Accessibilities of information.

The result about accessibilities of information is mainly concerned on network and quality of staffs. As it is mentioned in discussion 1, timely access of information is related to networks. Since the system of the department is not networked, getting information timely is difficult as most of the respondents response. Besides, the department lack qualified professional staffs that can operate and use the system properly. During the interview, the researcher identified that most of the employees of HMIS department are not IT professionals; rather the majority are graduates of statistics. Expectedly, users face difficulties operating and making the best use of the system.

4.1.6.3 . Accuracy of the current system

The HMIS gets the data used in the system from various departments in the hospital that directly treat patients. The departments collect the data while treating patients. This data comes to HMIS department in the form of tally sheets. The quality of the data depends on the departments that collect it directly. Most of the time, since the data is not collected properly it lacks accuracy.

4.1.6.4 Relevance of HMIS

The main purpose of HMIS department is providing timely reports to managers of the hospital so that they can make informed decisions. In this regard, the research result indicated that the system is contributing a lot towards this goal. The system provides reports that are important for decision makers and this helped planning and taking the right decision regarding how to manage the hospital and improve health service.

4.1.6.5 Timeliness

The timeliness of the system can be viewed from two different angles. The first one is whether the information used by the HMIS system itself arrives in HMIS department on time. Regarding this, the interview showed that the data collected by departments of JUTH does not reach HMIS department in time. In some cases, the HMIS staffs have to go through each department and collect the data when report preparation time is overdue. The second angle is whether the HMIS system is providing reports for decision makers on timely basis. Regarding this, the HMIS department tries to provide the reports to higher management body on timely basis provided that the data from departments is collected on time. Otherwise, the reports are not prepared and delivered on time.

4.1.6.6 Completeness of data

The research result indicated that the departments of JUTH collect all the data required for reporting and operational purpose. Data were tallied by individuals through manuallyprocess thus there is missing of data and error. Accordingly, the responses of respondents indicated that there is incomplete data produced for HMIS.

4.2 Discussion

According to HMIS Reform Team (2008), the Health Sector Development Program's (HSDPIII) strategic plan are developing and implemented HMIS to ensure the uses of information for evidence based planning and management and decision-making of health services to achieve 80% of completeness and timely for reporting for concerned bodies. Thus, the finding of this research would also help in this regard so that the necessary is done to improve health services of JUTH.

The research aimed to assess the effectiveness of current health management information System of JUTH in providing health care service and to improve the health delivery service. The unit of HMIS mainly produces reports for decision making bodies.

The researcher tried to assess the storageand accessibility of information produced by HMIS of JUTH.

As the research output indicates, information storage keeping system and accessibility of them is only 30%. From this it could said that the status of the HMIS in storing and accessing information is below standard of WHO (less than 80 % per standard set by WHO, 2008).

The result of the study revealed the respondents were confused in understanding HMIS with Electronic Record Management (ERM) and hence responded negatively. This explains the

variation in the response to availability of HMIS in JUTH. This shows that there are no equal understandings about HMIS within the administrative and health professionals. Similar result was reported by Nyamtema (2010) who found that 65% of the respondents could not define what HMIS is, which means that the majority of health professionals don't know the use of HMIS. As the research of Nyamtema (2010) concluded, this is due to lack of training on HMIS. Thus, the finding of this research is in agreement with the result of Nyamtema (2010).

It can be concluded that there is dissatisfaction of respondents for the current record keeping because more than 60% of the respondents show their dissatisfaction with the current HMIS record keeping and application system. From this it can be said that there is a problem in the organization that there is dissatisfaction for applying of HMIS as per the WHO standard. Similar result was reported by Tadasse*et al,* (2014) the use of accurate data in the facility on average was 63.3% which indicates significant percentage of data inaccuracy and 78.6% an average report completeness of the HMIS. In his work, Tadesse*et al,* (2014) concluded that the Use of accurate data in the facility was low, which is in line with the result of this research.

The finding of this research showed that there is a uniformity of the record keeping document used in JUTH to register the patient care information in the hospitals, because more the 60% of the respondents confirmed it. This is one of the pre-requisite for application of HMIS per the standard of WHO.

It was identified that the effectiveness of the record keeping for decision making purposes of the accuracy, timeliness, completeness and relevance of information stored and accessed in HMIS the result has been confirmed by only 30% of the respondents. This show is by far below the WHO standards (less than 80 % per standard set by (WHO, 2008). Thus, it is possible to conclude that this result of HMIS in JUTH needs to be intervened in order to

improve health care services and meet the WHO standard.

It was found that, the status of improvement and effectiveness of the record keeping has been shown below the standard as per the WHO(less than 80 % per standard set by (WHO, 2008). In the research it is shown that it was not effective to monitor and control the record. There is a strong need of providing all the necessary as per HMIS standard of WHO to overcome the shortcoming to facilitate and improvements to solve the current record system in JUTH.

There is an importance of HMIS because the vast majority, 90% of the respondents indicated the requirement for health Information service to facilitate and easily management's patient record to be used by decision makers. It is highly recommended that due to its many advantages HMIS should be implemented overall in the Hospital to easily get reports and manage the activities of the services delivered. According to Ghebrehiwot (2005), technology acquisition and the understanding of health managers and health professional should be improved as well as the proper utilization of the available data and information. This author also concluded that proper training and increasing the proportion of trained staff in HMIS on a sustainable manner. The finding of this research also revealed the need of training the staff, which agrees with the finding of Gebrehiwot.

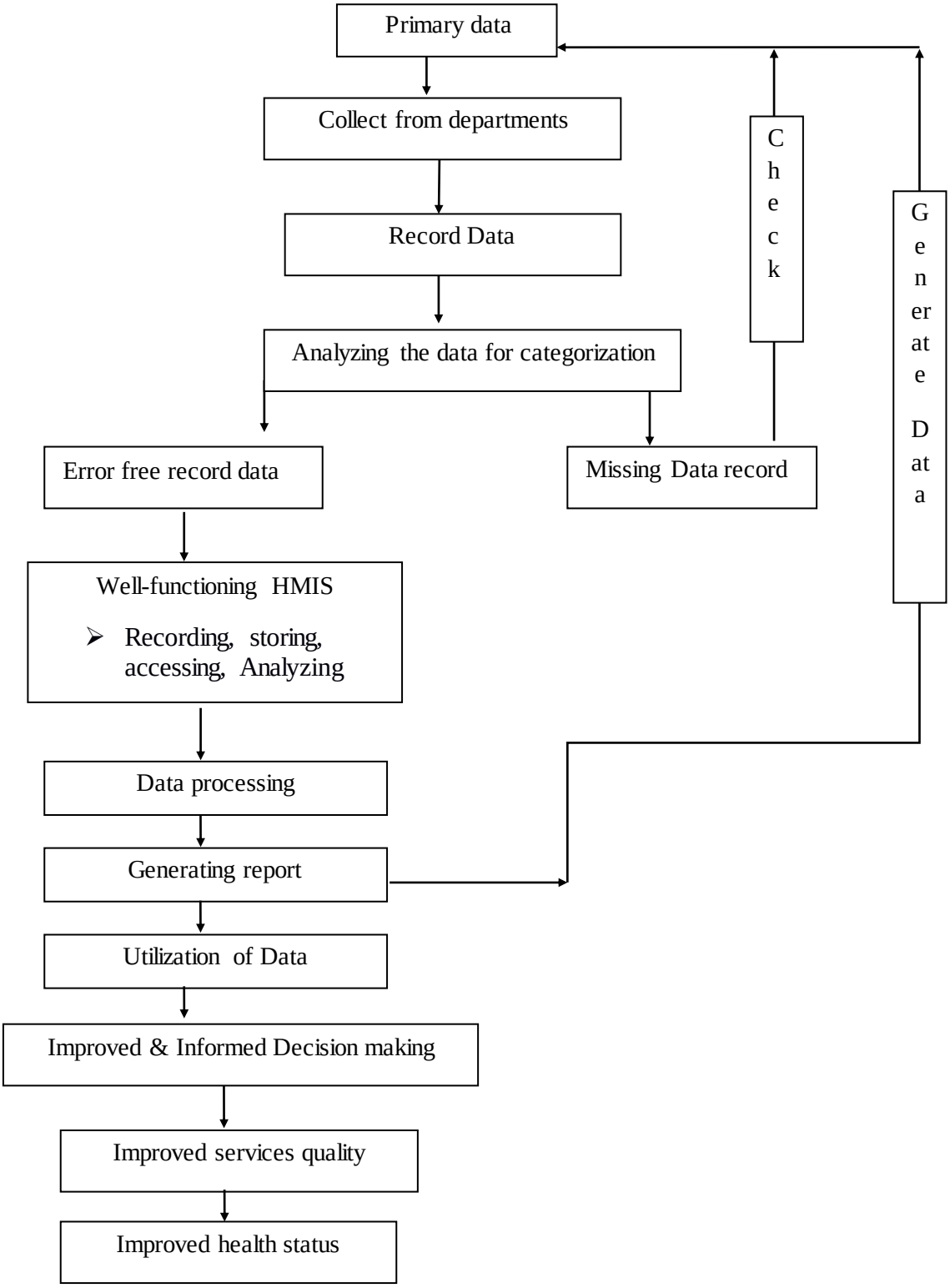
This work attempted to find out the status of the HMIS effectiveness and only 25% of the respondents agreed on the effectiveness of current health management information. This result showed the HMIS in JUTH is not implemented and used as per the WHO standard. According to Moyo (2005) district health services adequately provide feedback and supportive supervision to health facilities to improve data quality. Timely reports to District Health Officer only 33% of the health facilities and completeness of HMIS of data 71% of the data are complete for decision

makers. Moyo (2005) concluded that the quality of data is low. The result of the present research is in line with the result.

4.3 The Proposed conceptual frame work

The patient health record is the primary record keeping storage of documenting the health care or patient history that provided in any aspect of the health care system. The record keeping includes routine clinical or the health patients' history, records of care in any health related setting to facilitate the services, preventive care and collected data from different departments. Categorization of information about a single patient is generated by health care professionals. Missing value of data is evaluated and rechecked. And it returns to the original data of a patient. Also if it is free from error the recorded data are feed to the HMIS system,processed and report is generated. Lastly the report is utilizes for furthers uses to improved and informed decision making to take action for top managements and to facilitates improved services quality and improved health status for the community.

Figure 5.1 Conceptual framework of HMIS Program for data collection



CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

For patients to get quality service, the need of proper handling and usage of their medical records during their stay in health institution is vital. For this application, using HMIS is a better approach and standard for storage, accessibility and use of information as it is required. The assessment for the case of JUTH showed the level of information storage andaccessibility is not to the standard and in addition the information is not complete for usage in decision making. Since the information gained had low relevance and incomplete and the level of storage and retrieval is not to the standard of WHO, it is concluded that HMIS in JUTH is not effective for further utilization and quality service. The status of the HMIS in JUTH has been low performance of data quality.

One of the primary obstacles in the implementing quality health care delivery in JUTH is lack of appropriate information for effective decision-making. As the study showed, low level of information recording and keeping resulted in accessing incomplete and less relevant data which resulted in poor quality information which have negative impacts in giving proper decisions. There was also a challenge in understanding the concept of HMIS within the health professionals and administration; they were confused with electronic information management system.

5.2 Recommendations

To continue the achievements and improving the quality of HMIS:

- There is a strong need of awareness creation for the staff of JUTH on the use and advantages of the HMIS implementation and how to gather quality data for HMIS from different departments.
- Training should also be provided for Staff and HMIS department of JUTH to understand about HMIS and proper documentation.
- Decentralizing HMIS and hire IT professionals in each major departments of the JUTH so that it can be networked with the central HMIS for easily follow-up of accurate use of HMIS and minimize the issues of incompleteness of data.
- The proposed conceptual framework should further be studied and evaluated in detail before implementation.
- Since the record system of the departments was manual, it should be automated to facilitate the exchange of information among different departments.
- One main problem of HMIS was getting data timely from different departments. Thus, there should be networked information exchange system between HMIS department and these sources of data.
- For fully application of HMIS in JUTH, a model which encompasses all indicators for effective and efficient service care is recommended for quality health care.

References

Anell, A., and Willis, M.(2000). International comparison of health care systems using resource profiles. **Bulletin of the World Health Organization**78(6):770-78

Nyamtema, A. S. (2010), Bridging the gaps in the Health Management Information System in the context of a changing health sector. **BMC Med. Inf. & Decision Making10(36).**

AGHCRQ (2006). Agency for Healthcare Research and Quality. National health care quality report. Washington, DC: Department of Health and Human Services

Ammenwerth, E., Kutscha, U., Kutscha, A., Mahler, C., Eichstadter, R., &Haux, R. (2001). Nursing process documentation systems in clinical routine prerequisites and experiences. **International Journal of Medical Informatics,** 64(2), 187-200.

Barry, RE (1996). Making the distinction between information management and records management. Unpublished draft retrieved from **www 17/04/01http://www.rbarry.com/IMT-ARM/IMT-ARM1.html**

Buckeridge L, Goel V (2001). Health informatics education: an opportunity for public health in Canada. Canadian Journal of Public Health, 92 (3): 233-236.

Butcher D, Rowley J (1998). The 7R's of information management. Managing Information, 5 (2). Retrieved from **www 15/01/14 http://www.aslib.co.uk/man-inf/mar98/article1.html**

Bodavala, Raganyakulu (2000), Evaluation of Health Management Information System in India, Need for Computerized Databases in HMIS, Harvard School of Public Health, Boston, U.S.A.

Bosman, R. J. (2009). Impact of computerized information systems on workload in operating room and intensive care unit Best Practice & Research Clinical Anaesthesiology, 23(1),15-26.

Booz Allen Hamilton (2006). Information Sharing, New York: HarperCollins. Retrieved from Oct 26, 2008 **http://www.boozallen.com/media/file/Toward_Health_Information_Liquidity.pdf**

Campbell, Bruce Benner (1997), Health Management Information System in Lower Income Countries, Analysis of system design, implementation and utilization in Ghana and Nepal, WHO,N.Y, USA

Cebul, R.D., Love, T.E., Jain, A.K. and Hebert, C.J. (2011). Electronic health records and quality of diabetes care. **New England Journal of Medicine 365:** 825-833.

Cibulskis, R.E. and Hiawalyer, G. (2002). Information systems for health sector monitoring in Papua New Guinea. Bulletin of the World Health Organization 80 (9): 752.

Chadwick D, Crook P, Young A, McDowell D (2000). Using the internet to access confidential patient records: A case study. British Medical Journal, 321 (7270): 612-614.

Chaudhry, B., Wang, J., Wu, S., Maglione, M., Mojica, W., Roth, E., Morton, S.C. and Shekelle, P.G. (2006). Systematic review: impact of health information technology on quality, efficiency, and costs of medical care. Annals of Internal Medicine 144: 742-52

ChristonMesheckMoyo (2005) an assessment of the quality of health management information

system data in selected health facilities in lilongwe district, Malawi

Chetley, A. (2006), Improving health, connecting people: the role of ICT in the health sectors of developing countries a framework paper,**InfoDev.**

Clarke SP, Sloane DM, Aiken LH (2002). Effects of hospital staffing and organizational climate on needle stick injuries to nurses. Am J Public Health, 92:1115–9

CoddingtonDC(2001). Integrated Healthcare Is Alive and Well. Frontiers of Health Services Management. 2001c; 17:31–40.

Committee on Quality of Health Care in America (2001). Crossing the quality chasm: a new health system for the 21st century Institute of Medicine. National Academy Press; Washington, DC

Cohn SP, Chute CJ (1997). Clinical terminologies and computer-based patient records. Journal of American Health Information Management Association, 68 (2): 41-43. Retrieved from **www15/04/01** **http://www.ahima.org./journal/features/_feature.0011.4.html**

Cripps, H., Standing, C. and Prijatelj, V. (2011). The implementation of electronic health records: a two country comparison. 24th Bled e Conference Future: Creating solutions for the individual, organizations and society. Bled, Slovenia.

Davis K. (1999).International health policy: common problems, alternative strategies. Health Aff, 18(3):135–43

Dick RS, Steen EB.(1997). The Computer-Based Patient Record: An Essential Technology for Health Care. Revised ed. Washington, DC: National Academy Press, p 12

Donabedian A. (1966). Evaluating the quality of medical care. Milbank Memorial Fund Quarterly, 44:166–203

Donald Steinwachs, (2008). Director, Health Services Research and Development Center; Bloomberg School of Public Health; Johns Hopkins University; Baltimore

Edward, E. H. (1995). The computer-based patient record vision contrasted with HIS/MIS. International Journal of Bio-Medical Computing, 39, 19-23.

Embi, P.J., Yackel, T.R., Logan, J.R., Bowen, J.L., Cooney, T.G. and Gorman, P.N. (2004). Impacts of computerized physician documentation in a teaching hospital: perceptions of faculty and resident physicians. Journal of the American Medical Informatics Association 11: 300-9.

Evans RG, Barer ML, Marmor TR, (1994). The determinants of health of populations. New York: Aldine De Gruyter

FMOH (2008). Health Management Information System (HMIS)/Monitoring and Evaluation (M&E) Strategic Plan for Ethiopian Health Sector. HMIS Reform Team. Federal Ministry of Health, Addis Ababa.

Gamble KH. Cutting the cord(2009). CIOs are leveraging wireless technologies to help nurses deliver patient care safely and efficiently. Healthcare informatics: the business magazine for information and communication systems; 26(9):30-3.

Gladwin, J., Dixon, R., Wilson, T., (2000), Using external training materials to strengthen health information management in East Africa, Information Research, Vol. 5(4).

Gruber, D., Cummings, G. G., Leblanc, L., & Smith, D. L. (2009). Factors Influencing Outcomes of Clinical Information Systems Implementation: A Systematic Review.Computers, Informatics, Nursing 27(3), 151-163.

HMN, (2008). Framework and standards for country health information systems. Second edition. Health Metrics Network, Geneva

Humberto Muquingue (2007), Elective on District Health Information Systems, University of Oslo

James, A. R., Para, C. P., & David, J. P. (1996). End-user perceptions of quality and information technology in health care. Journal of High Technology Management Research, 7(2), 133-147.

Jane A Thomason, (2001)A knowledge based system for monitoring immunization coverage in Papua new Guinea, International Journal of Health Planning and Management, Vol. 8, 59-69

J. K. H. Tan and I. Benbasat, (1990). Processing Graphical Information: A Decomposition Taxonomy to Match Data Extraction Tasks and Graphical Representation. Information Systems Research 1(4) ,416–439.

J. Tan (1998), Health Management Information System: A Managerial Perspective. Jones Bartlett Publishers, LLC, Gaithersburg, 153–173

Jha, A.K., Desroches, C.M., Campbell, E.G., Donelan, K., Rao, S.R., Ferris, T.G., Shields, A., Rosenbaum, S. and Blumenthal, D. (2009).Use of electronic health records in U.S. hospitals. The New England Journal of Medicine 360: 1628-38.

Kerka S (1997). Information management, ERIC Clearinghouse on Adult, Career and Vocational Information. Retrieved from **www 15/04/01 www.ericave.org/mr00009.htm**

Kloss L (1999). A vision of health information management in 2010. Journal of American Health Information Management Association, 70 (10): 32-34.

Kobus, H., Peter, L., Jakes, R., Mark, C., & Jeremy, C. W. (1999). Evaluating computerized health information system: Hardware, Software and Human ware: Experiences from the northern province south Africa. Journal of Public Health Medicine, 21(3), 305-310

Kohn LT, Corrigan JM, Donaldson MS, (2000). A report of the Committee on Quality of Health Care in America, Institute of Medicine. Washington, DC: National Academy Press,320:768–70

Kuzel A., Crabtree B, Miller W, eds. (1999). Doing Qualitative Research. 2nd edn. Thousand Oaks, California: Sage; 33–45.

Lafond, A. and Field, R. (2003) 'The PRISM. Introducing an analytical framework for understanding performance of routine health information system (draft)', RHINO Second International Workshop, 20 September to 4 October, Eastern Cape, South Africa. 28.

Lee, S., &Mcelmurry, B. (2010). Capturing Nursing Care Workflow Disruptions: Comparison between Nursing and Physician Workflows. Computers, Informatics, Nursing 28(3), 151-159.

Leatt P, Pink GH, Naylor (2001). Integrated Delivery Systems: Has Their Time Come in Canada? Canadian Medical Association Journal. 154(6): 803–809.

Leatt P, Pink GH, Guerriere M.(2000). Towards a Canadian Model of Integrated Healthcare. Healthcare Papers. 1:13–35.

Lohr KN, Steinwachs DM. (2002). Health services research: an evolving definition of the field. Health Serv Res. 37(1):7–9.

Lippeveld, Theo, R. Sauerborn, and C. Bodart. (2000). Design and Implementation of Health Information Systems. Geneva: WHO. Pp 15-31.,

Markus, M.L.&Benjamin, R.I. (1997) Change a gentry the next IS frontier.MIS Quarterly, 20, 385–407.

Masoud, M., &Ric, J. Eds.(2008). Healthcare Information Systems. United States of America: Information Science Reference. V (2)

McCracken G. (1988).The Long Interview. Newbury Park, California: Sage;16–8.

Medical Defence Union (2001) Can I see the records? London: MDU. (Concise booklet discussing good practice in clinical record keeping, legal obligations under the Human Rights and Data Protection Acts and disclosure during court hearings.)

Mugenda, O.M. &Mugenda, A.G. (2003). Research methods: Quantitative and qualitative approaches.2nd. Rev. ed. Nairobi: Act press.

Narayana G, Auxila P. (2001) Management information Systems in Health and Family Welfare in India. Hyderbad, Administrative Staff College of India.

Nilmini, W., & Steve, G. (Eds.) (2008). Healthcare Information Systems (Vols. 1). United States of America: Information Science Reference

Pearce, C. and Haikerwal, M.C. (2010). E-health in Australia: time to plunge into the 21st century. Medical Journal of Australia 193: 397-398.

Perreault LE, Metzger JB (1999). A pragmatic framework for decision support. Journal of Healthcare Information Management, 13 (2): 5-22.

Sameh E, Sosena K, Petros O, Dubusho, Banafsheh S. (2009). Ethiopia Improving Health Service Delivery, HNP discussion paper

Sauerborn, R. and Lippeveld, T. (2000) Introduction. In Design and implementation of Health Information Systems, eds. T. Lippeveld, R. Sauerborn and C. Bodart. Geneva, Switzerland: World Health Organization: 1-14.

Schoen C, Osborn R, Doty MM, (2007). Toward higher-performance health systems: adults' health care experience in seven countries. Health Aff. 26(6):717–34.

Scottish Office (1995). Case Records Good Practice Group CRAG Good Practice Statement. Edinburgh: HMSO

Smedley BD, Stith AY, Nelson AD, (2003). Unequal treatment: confronting racial and ethnic disparities in healthcare, Institute of Medicine. Washington, DC: National Academy Press

Sochalski J, Aiken LH. (1999). Accounting for variation in hospital outcomes: a cross-national study. Health Aff. 18(3):256–9

Starfield B, Shi L.(2002). Policy relevant determinants of health: an international perspective. Health Policy. 60(3):201–18

Sultan Abajebel, ChalliJira, andWajuBeyene (2011) Utilization of Health Information System at

District Level in Jimma Zone Oromia Regional State, South West Ethiopia

Sullivan June M. (2007). Recent Developments and Future Trends in Electronic Medical and Personal Health Records. The Health Law,19:16

Ting-Ting, L. (2004). Evaluation of Computerized Nursing Care Plan: Instrument Development. Journal of Professional Nursing, 20(4), 230-238.

Tiina, M., Tarja, S., Paula, A., Marianne, M., &Ilmari, R. (2009). The outcomes of regional healthcare information systems in health care: A review of the research literature. International journal of medical informatics, 78(11), 757.

RanganayakuluBodavala ,(2000), Evaluation of Health Management Information System in India.

Victoria, H., &Kannan, S. (Eds.) (2008). Healthcare Information Systems (Vols. 1). United States of America: Information Science Reference.

WHO (2004). Priority Intervention for Strengthening National Health Information System, Regional Office for Africa.

WHO (2004). Developing Health Management Information Systems: A Practical Guide for Developing Countries.

WHO (2004).Regional Office for the Western Pacific, Developing Health Information Management Systems, A Practical Guide for Developing Countries, WHO, WA.

WHO (2006). Components of a strong health management information system

WHO (2008). Health Metrics Network Framework and Standards for Country Health Information Systems

Wolfson M. (1994) Social perception: measurement, data and information from a population health perspective. New York, NY: Aldine de Gruyter, 1994: p. 309.

APENDICIES

Appendix I

Questionnaire

Health Management Information System is designed to integrate data collection, processing, reporting, analyzing, maintaining and use for the patient health care in order to improve patient health services. This questionnaire is developed for a study with the main aim to assess the current effectiveness of health information management JUTH in providing health care service so that to improve the service delivery.

Your all contribution to this questionnaire is confidential and I thank you in advance for your time.

If you need more clarification about this study, please contact me at my address:

Name: TameneFufa

Phone number:+251911741739

E-mail Address: tamene.fufa@ju.edu.et

Section A: General Information (please tick X on the space provided)

1. What is your Gender?
   - ☐ Male
   - ☐ Female
2. What is your professional?
   - ☐ Health Professional

- ☐ Administrative Staff

3. If the answer for Question Number 2 is Health Professional and Administrative staff, specify your profession
   - ☐ Medical Doctor
   - ☐ Nurse
   - ☐ Midwifery
   - ☐ Pharmacist
   - ☐ Health Officer
   - ☐ Lab. Technician
   - ☐ Administrative staff
   - ☐ Other (please specify) _____
4. How many years you worked in JUSTH?
   - ☐ 0-3year
   - ☐ 3- 6 years
   - ☐ 6-9years
   - ☐ 9-12 years
   - ☐ More than 12 years

Section B: Health Management Information system

1. How does patients record history stored in JUSTH?
   - ☐ Manual system
   - ☐ Computerized system
   - ☐ Other (specify)_____
2. How does patients record history accessed in JUTH?

- ☐ Manual system
- ☐ Computerized system
- ☐ Other (specify)_____

3. Where does Health management information system process take place in JUTH?
   - ☐ There is central information center
   - ☐ Separately, within each departments
   - ☐ Other (Specify)_____
4. Does the JUTH use a uniform set of documents/forms that comprise a complete medical record for the duration of a patient's care?
   - ☐ Yes
   - ☐ No
   - ☐ Not sure
5. Does the JUSH patient health records information easily accessible?
   - ☐ Yes
   - ☐ No
   - ☐ Not sure
6. Does accurate the information is stored, organized & used in HMIS for decision making?
   - ☐ Yes
   - ☐ No
   - ☐ Not sure
7. Does the data record keeping storage are relevance report produced by the HMIS to be used for decision makers?
   - ☐ Yes

☐ No

☐ Not sure

8. Does report generatedtimely from HMIS for decision making of data collected for last consecutive 5 years?

Report generated	Timely generated		Not Timely generated	
	6th month (%)	Annual Report (%)	6th month (%)	Annual Report (%)
2010				
2011				
2012				
2013				
2014				

9. Does the data record keeping accessibility are relevance report produced by the HMIS to be used for decision makers?

☐ Yes

☐ No

☐ Not sure

10. Does accurate the information is Accessibility used in HMIS for decision making?

☐ Yes

☐ No

☐ Not sure

Section C: Health Information Management status and effectiveness to improve health services.

Please indicate the extent to which you agree or disagree with each of the following statements regarding the current Health Management Information System of the patient record keeping in JUTH.

5 = Strongly Agree 4 = Agree 3 = Neutral 2 = Disagree 1=Strongly Disagree

No		1	2	3	4	5
1	A heath Management Information System is important for improve health information services.					
2	The hospital has Health Management Information System which directs users to get heath information about patient.					
3	The patients information or record in the JUTH is accessible					
4	The current status HMIS of JUTH is effective services?					
5	The Health care delivered for patient is good quality services storage of records in JUTH					
6	The patient-reported services is accurate					
7	The patient history is easily accessible for another time.					
8	HIMS of the patient record information is relevant and reliable health services					

9. Do you have any other comments regarding the Health Management Information System status and effectiveness to improve health services in General? Please elaborate?

Thanks in advance for you're filling the questionnaires.

Appendix II

Interview

Health Management Information System is designed to integrate data collection, processing, reporting, analyzing, maintain and use for the patient health care in order to improve patient health services.

Health Management Information System is produce to the collection, storage, use, and transmission of information to meet the legal, professional, ethical and administrative records-keeping requirements of health care delivery services.

1. How the Health Management Information System is accessed in JUTH?
2. How the reports are timely produced for decision makers?
3. How relevant is the report produced by HMIS to decision makers?
4. How accurate is the information generated by the HMIS?
5. How complete is the information in the system as well as information produced?
6. How to investigate the effective the present patient information management in JUTH?
7. The current reporting system of JUTH uses the Health Management Information System (HMIS) for the report purposes? Do you think that JUTH is applied the Health management information is successfully applied? If No/ yes please elaborate the points?
8. Do you have any other comments regarding the Health Management Information system for the status and effectiveness to improve health services in General? Please elaborate?

Thanks in advance for you're filling the question and voluntary for the Interviews.

Appendix III

Observation checklist for existence of quality of data in JUTH.

How qualities of data are measured in JUTH?

- ☐ Completeness
- ☐ Reliability
- ☐ Accessibility
- ☐ Accuracy
- ☐ Timeliness