FACTORS ASSOCIATED WITH DATA COMPLETENESS ON ELECTRONIC HOSPITAL INFORMATION SYSTEM AT MUHIMBILI NATIONAL HOSPITAL, DAR ES SALAAM

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By

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A Dissertation Submitted in Partial Fulfillment of the Requirement for the Degree of Master of Science in Health Information Management of

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CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by the Muhimbili University of Health and Allied Sciences as dissertation entitled: ***Factors associated with data completeness on the electronic Hospital Information System at Muhimbili National Hospital, Dar es Salaam*** in partial fulfilment of the requirement for the degree of Master of Health Information Management of Muhimbili University of Health and Allied Sciences.

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Dr. Bruno Sunguya

(Supervisor)

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Date

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DECLARATION AND COPYRIGHT

I, Sixmund Silvatory, declare that this **dissertation** is my own original work and that has not been presented to any other University for a similar or any other degree award.

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ACKNOWLEDGEMENT

DEDICATION

I dedicate this dissertation to my late mother Ngiana Kessy, my wife Akwelina and son Ivan for their encouragement and curiosity that enabled me to accomplish this work.

ABSTRACT

Background: Electronic Hospital Information System is a computerized health records used to capture, store, access and share summary information for a patient between health care organization and providers.

Since the inception of Hospital Information System (HIS) in Tanzania, various studies on HIS have been conducted but data completeness on clinical and demographic information in the HIS is largely unexplored. Effective utilization of health system work flow for quality provision of health services through clinical data entry, clinical decision making and integrated communication support is still a challenge in health sector in Tanzania.

Study Objectives: To assess the factors associated with data completeness in the electronic HIS at MNH and improve data capturing and subsequently enhance provision of quality of service

Methodology: This explorative cross-sectional study was conducted in Muhimbili National Hospital. The study involved electronic Hospital Information System (HIS) as the tool for capturing patient's information. Also, document review technique was used to examine the magnitude of data completeness in the electronic HIS among clinicians, nurse and health records staff. Pearson chi square test and logistic regression analysis methods were conducted. In analysis frequency measures were used to provide descriptive characteristics of study population. The degree of association between variables was tested by using Pearson chi square test value of $p < 0.05$ at 95% confidence interval was considered to be statistically significant. Fisher's exact test was used when expected number was less than 4. The influencing factors on the completeness of documentation were evaluated in total and by the groups. The influencing factors on the completeness of documentation were evaluated in total and by the groups. Additionally, the analysis to obtain frequency distribution of all variables was performed.

Logistic regression and multiple logistic regression analyses were done to determine the odds ratio and adjusted odds ratio for different predictors of data completeness in the electronic HIS.

Results: About (90%) of clinical and demographic data of patients were incomplete in the electronic HIS at MNH. Factors associated with incompleteness data included 15(33.80%) of respondents indicated lack of sustainable and sensitization training on HIS, 10(40%) indicated that there is negative attitude towards data capturing in the electronic HIS, 20 (65%) indicated poor knowledge and skills on data capturing process led to incompleteness of data in the electronic HIS, 25(80%) of the respondents indicated that high workload and insufficient computer devices led to incompleteness of data in the electronic HIS. Data incompleteness were found to be higher thirty-two (32) times (AOR=32.14, 95% CI =12.81-80.59), behavior were five (5) times higher (AOR=5.47, 95% CI=2.40-12.43), inadequate training were fifteen (15) times (AOR=15.25, 95% CI=7.32-43.98) and usage in technology and communication were (4) times poor (AOR=3.86, 95% CI =1.55-9.62.) towards data completeness in the electronic HIS.

Conclusion and recommendations: The rate of incompleteness of patients' information in the electronic HIS in the hospital is high due to poor emphasis by management on the usage of the electronic HIS in capturing patients' information in the system. Therefore, MNH should organize and coordinate sensitization training to improve knowledge and skills on usage electronic HIS and hence address the problem of negative attitude and perception of data capturing in the electronic HIS revealed by the study.

On the other hand, strong initiatives and commitment from the top management especially on recruitment of staff and procurement of sufficient number of computer devices is of great importance to reduce the problem of high workload and hence facilitate improvement of staff in capturing patients' information in the HIS system. It is also important to develop strict rules and regulations on the need of capturing all patients' information in the electronic HIS so as to address the problem of negative attitude of staff towards data capturing processes in the electronic HIS.

Therefore, strong initiatives and commitment from the top management is of great importance to facilitate improvement of the staff in capturing patients' information in the HIS system. It is also important to develop strict rules and regulations on the need of capturing all patients' information in the electronic HIS so as to improve quality health services delivery at MNH.

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LIST OF ABBREVIATIONS

CMR	Computerized Medical Record
CPR	Computer-Based Patient Record
DHIS	District Health Information System
EHR	Electronic Health Record
EMR	Electronic Medical Record
EPR	Electronic Patient Record
HIS	Hospital Information System
HIV	Human Immunodeficiency Virus
ICT	Information and Communication Technology
MNH	Muhimbili National Hospital
MOHCDGEC	Ministry of Health, Community Development, Gender, Elderly and Children
NP	Nappier Software
POMR	Problem Oriented Medical Record
SPSS	Statistical Package for Social Science

DEFINITION OF KEY TERMS

Health Information System; - Is any system that captures, stores, manages or transmits information related to the health of individuals or the activities of organizations that work within the health sector.

e-Health:- is the use of information and communication technologies (ICT) for health, it works with partners at the global, regional and country level to promote and strengthen the use of ICT in health development, from applications in the field to global governance.

System: - Any collection of components that work together to achieve a common objective

Information System: -A combination of hardware, software, infrastructure and trained personnel organized to facilitate planning, control, coordination and decision making in an organization.

Electronic Medical Record: - Is a computerized medical record used to capture, store and share information between health care providers in an organization supporting the delivery of Health services to patient. Also, a system may stand alone or may be integrated with other information system in a health services organization.

Electronic Health Record: - Is a computerized health records used to capture, store, access and share summary information for a patient between health care organization and providers include demographic data, medical history, medication and allergies, immunization and other summary information.

Data Completeness: - Is the indication of whether or not all the data necessary to meet the current and future business information demand are available in the data resource. The number of complete records in the clinical database is far lower than the nominal total. The proportion that meets criteria for completeness is heavily dependent on the definition of completeness used by researcher and the different definitions generate different subsets of records.

Therefore, concept of completeness in HIS is contextual. The research defines how a complete record and transparent about the limitations of their data.

This study defines the data completeness according to the data captured by whom. Medical record staff should capture the demographical data which are first name, second name, surname, sex, date of birth, marital status, workplace, education level, occupation, address, phone number, guardian name, guardian address, guardian phone number, tribe and religion. There about 16 field to be captured and so if the missing filed is more than 5 field it was considered as data is incomplete.

Nurse should capture 9 fields which blood pressure, pulse rate, respiration, body mass index, saturation, weight, height and temperature of the patient. If the missing filed is more than the 5 variable was considered as the data is incomplete.

The required field to be captured by clinician are patient history, drug prescribe, diet, diagnosis, test investigation, systemic examination and family history. There are about 7 field to be capture and if missing field is more than 3 in a clinical detail it will be considered as the data is incomplete. Therefore, if the patient is missing 5 fields in the demographical data, 5 field in the vital sign data and 3 for clinical data is considered as patient information is incomplete.

Clinical Data: - Are the records information about the health status of patients and the health care they receive over varying periods of time typically focus on patients who share a common reason for needing health care so as to see what treatments are available, and how patients with different characteristics respond to various treatments. This information can be used to inform patients and their health care professionals as they decide the best course of treatment and to improve care for patients in the future. Information from registries may also be used to compare the performance of healthcare providers with regard to their outcomes and resource use

CHAPTER ONE: INTRODUCTION

1.1.   Background

The idea of recording patient information electronically instead of using paper based has been introduced since the late 1960s, when Larry Weed introduced the concept of the Problem Oriented Medical Record (POMR) into medical practice (Dick 1986). To date, there are more than 1,000 electronic medical record platforms globally with recognizable names (Makoul 2001). Also, countless smaller vendors are present, some of whom providing customized electronic Health Information System (HIS) for clinicians, nurses, health records staff, pharmacists and laboratory technicians. Functions of these systems vary greatly from one another making data entry inefficient and time consuming for some systems. Other functionality issues challenges include slow processing and formats that are not user friendly or limited (Makoul 2001).

The computer systems in healthcare uses various names as electronic hospital information system (eHIS), electronic medical record (EMR), electronic patient record (EPR), computerized medical record (CMR), computer-based patient record (CPR), and electronic health record (EHR). These are often used to mean the same thing but there some minor differences in the meanings depending on the defining country of origin, health sector, professional discipline, and period of time (Nohr 2006). Electronic HIS play a many-sided role in healthcare delivery than just being a computer system. It can be used for clinical documentation, physician order entry, communication or messaging, results management, charge capture/billing, disease management and management of security issue (Acquah-Swanzy 2015)

Over the past 10 years, the Ministry of Health, Community Development, Gender, Elderly and Children (MOHCDGEC) in Tanzania had initiated the process of transforming the paper based hospital information management to electronic hospital information system with a notable success.

The national Health Information System Project (HISP) Tanzania was initiated in 2002 as a part of health management information system to strengthening the quality of data and access of data from the district level to the national level. Reasons for transforming from paper based information to electronic hospital information system included lack of confidentiality, lack of instant access, illegible handwriting in records and prescriptions of paper based system, and poor monitoring and evaluation for paper based system (Mike 2010).

MOHCDGEC introduced District Health Information System (DHIS) 2 software to collect health data electronically and links all health-related data from one point. In parallel, electronic systems were development and installation for data collection in most hospitals in the country. Information and communication technology (ICT) initiatives support MOHCDGEC in implementing the electronic health record keeping in the hospitals for strengthening information capture of patient, patient history, billing and financial systems and medication in stock. The aim of the Health Information system was to improve the collection, complete and quality data from the health care setting, store and analyze data. It collects information in a digital on patient registrations, diagnoses, treatments, laboratory tests, billing and pharmacy records.

In conformity with government directives, most of the government hospitals took initiatives of procuring, installing and implementing the Health Information system in service delivery in their respective work settings. Muhimbili National Hospital (MNH) also introduced and started to implement electronic medical system (JEEVA system) from the year 2005. The system comprising of 26 different modules that covers services areas of the hospital department and patients' management such as Medical Records, In patient services, out patients, Nursing station, Doctors consultation, Pharmacy, Laboratory and Theatre management, Finance management, Procurement, Human Resources and Engineering. Each department or user has access depending on the privileges, and specialization it is therefore every user to be equipped with user name and security access code.

It was believed that the electronic hospital information system would allow sharing and coordination of patient records with ease, integrate health care delivery operations, patient admission process, appointment, and pharmacy and revenue collection in government hospitals. However, the problem of under reporting remained to be huge due to incompleteness of data and that is also linked to lack of knowledge and poor practices among the health workers (Nyamtema 2010). This is also characterized by insufficient analysis skills, training and lack of initiative for using information.

Despite of Tanzania Government initiatives on implementing Hospital Information System for healthcare services delivery and improve the process of data capturing, storage and sharing, poor data completeness is still observed in most of the Government Hospitals including MNH. Moreover, evidence of the magnitude and factors associated with such challenge remains unclear in Tanzania and especially at MNH. This study therefore examined magnitude of data completeness, and factors associated with data completeness in electronic Hospital Information System in MNH. Evidence generated may be useful in improving the HIS in other service provision points in Tanzania.

1.2.　　Problem Statement

In Tanzania, the first version of the Health management information system was launched in 1993 and the second in 1998. The first version was entirely in English and it was soon realized upon testing that the users had limited commands in this language which led to limited usage of the system in data completeness (Nyamtema 2010). Since the inception of HIS in Tanzania, various studies on HIS have been conducted but data completeness on clinical and demographic information in the HIS is largely unexplored. Effective utilization of health system work flow for quality provision of health services through clinical data entry, clinical decision making and integrated communication support is still a challenge in health sector in Tanzania.

According to Nyamtema (2010) indicated that data incompleteness found in various health facilities in Kilombero District were due to workload pressure, forgetfulness and poor knowledge on data recording. Twaakyondo (2005) found despite the large collection of HMIS registers, forms and tally sheets, some datasets were identified as missing. This led to some curious health workers to invent local tools to record their data resulting to data inconsistency and contradictive interpretations in Bagamoyo and Kibaha Districts to the higher levels which is the MOHCDGEC.

It is from this juncture; this study sought to explore factors associated with data completeness on Electronic Hospital Information System and its magnitude. The study took Muhimbili National Hospital as its key study.

1.3. Rationale of the Study

A study by (Malik 2009) observed that Health Information Systems are rarely assessed in developed and developing countries, despite the large resources allocated to them. Assessment of these systems would give valuable information for improving the effectiveness and efficiency of health services. This notion is further supported by (Garrib et al., 2008) in a study to evaluate the District Health Information System in rural South Africa. They describe the Health Information System in the country as not been systematically evaluated to assess its impact on health service delivery (Garrib et al., 2008).

A health information system is expected to produce quality information in support of health system performance, and more particularly of health service delivery. HIS is the backbone for planning and management of the health services, and can potentially play an important role in program improvement and reporting at all levels. Unfortunately, HIS in many developing countries are unable to provide the information support needed. The data produced are of low quality and the information generated is poorly used to inform decision making (Belay and Lippeveld 2013).

Although reliable and timely health information is the foundation of public health action, it is often unavailable due to under-investment in systems for data collection, analysis, dissemination and use. Consequently, decision-makers cannot identify problems and needs, track progress, evaluate the impact of interventions and make evidence-based decisions on health policy, programme design and resource allocation. (WHO 2008).

According to Kimaro and Twaakyondo, (2005), pointed out that most health workers lack adequate knowledge, skills and resources to make sense of understanding general role of HIS in their work. This affects their use of information in fulfilling their duties. When information is not used and there is no routine feedback or regular training, it can lead to a perception that reporting is done for the sake of the system, and secondary to the provision of direct health services. A consequence of this is little emphasis on collecting accurate data, as well as late or missing reports (Kimaro and Twaakyondo, 2005).

The study is intended to find out factors behind data completeness in the patient folder in the electronic HIS at MNH. This will facilitate improvement of data capture in the HIS and enhance provision of quality service delivery at MNH. The quality data in the electronic HIS will reduce clinical errors, increase efficiency and improve quality of patient care. Also the quality data will be used for reimbursement cases, compensation report, referral cases for further treatment, reference cases for students and different report needed by the government

1.4.   Research Questions

1. Which cadres of health workers are responsible for data incompleteness in the electronic HIS at MNH?

2. To what extent the clinical and demographical data are incomplete in the patient folder in electronic HIS at MHN?

3. What are the factors associated with incompleteness of clinical and demographical data in the patient folder in the electronic HIS at MNH?

1.5.   Objectives

1.5.1. General Objective

To examine the magnitude and factors associated with data incompleteness in the electronic HIS at MNH.

1.5.2. Specific Objectives

1. To examine data incompleteness by cadre of health workers in the electronic HIS at MNH.

2. To assess the incompleteness of clinical and demographical data in the patient folder in the electronic HIS at MNH.

3. To analyse factors associated with incompleteness of clinical and demographical data in the patient folder in the electronic HIS at MNH.

1.6.   Conceptual Framework

Data completeness as shown on conceptual framework is affected by various factors such as training, skills/knowledge, technology and communication, behavior, attitude, scheduling and workload. Therefore, the relationship between dependent variable which is "data completeness in the area of clinical and demographical data" and independent variables which are factors mentioned in the conceptual framework.

Figure 1. 1 Conceptual framework

Conceptual frame work for data completeness in the electronic Hospital Information System at MHN

Training

Skills/knowledge

Attitude

Communication

Data Completeness

Clinical data

-History
-Medication
-Investigation
-Prescription
-Management plan

Demographical data

-First name
-Other name
-Surname
-Age
-Next kin
-Address
-Mobile No

Behavior

Technology

Scheduling

Workload

Page 1
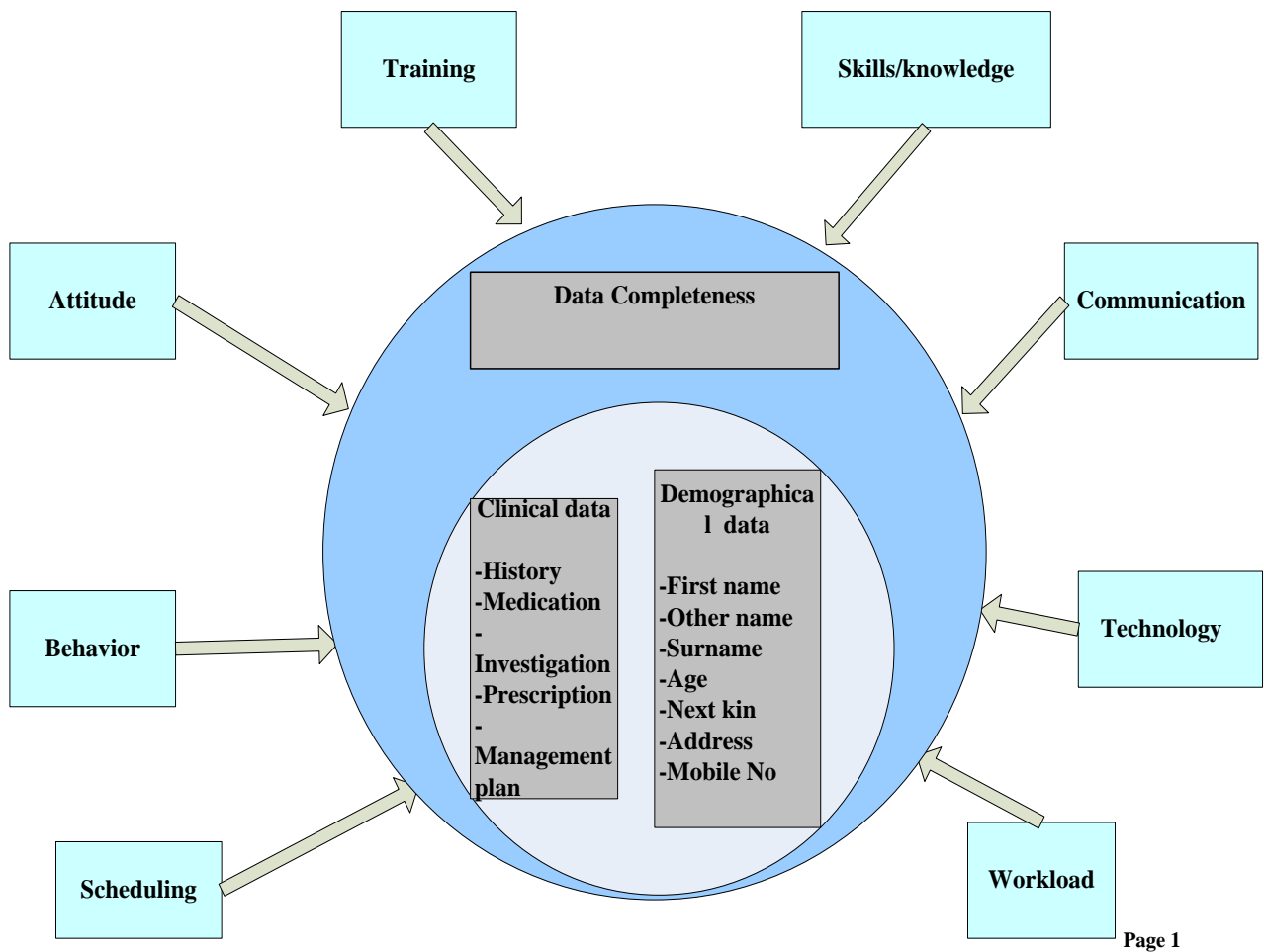
The diagram above analyses the relationship of the factors which affect data completeness in the above conceptual frame work for data completeness in the electronic hospital information system at MNH.

Training

Inadequate training on data capturing and it's important to clinicians, nurses and health records staffs on processing patient data is among factors which cause data completeness in patient folders. During filling patient details in folders clinicians and health records staffs may not complete some fields on form which may be very important information for future use.

Skills and knowledge

Data incompleteness is caused by lack of enough skills which the clinicians, nurses and health records staffs have, due to lack of proper training. Improper system usage and inappropriate capture of details affects the process of data filling and lead to gaps in the patient folder. In order for the clinicians, nurses and health records staff to get proper training on data capture and its importance towards usage of HIS. This is caused by poor allocation of budget for training of staffs, thus hospitals should budget a fund for conducting proper training for responsible personnel so as to have enough knowledge and skills on data capturing and filling to avoid the gaps

Behavior and Attitude

Behavior and attitudes of clinicians, nurses and health record staffs towards usage of computer is among the social factors that affect the incomplete of data in the electronic HIS. The tendency of clinicians, nurses and health records staffs not filling each required details on the patient folders in the system may lead to incomplete data.

Technology and Communication

Large number of people accessing the system at the same time may cause the system to be slow. Poor advancement of technology include stability of power and network infrastructure can cause incomplete information. This will affect the process of data capturing for clinicians, nurses and health records. Thus staffs will fill few details of patients so as to ensure each patient receive service without considering capturing all data is important.

 Delay of notification of changes in the point to point communication may cause incomplete information due to the factor that system is not friendly to capture patient data.

Scheduling and Workload

Poor appointment allocation done by health records staff (scheduling of patients to clinicians for consultation) may cause workload to the clinicians which will affect the data filling process in the system. It is found that most clinicians have no enough speed in typing and its implication is high workload to them, thus cause them to miss filling important/data in the patient folder.

CHAPTER TWO: LITERATURE REVIEW

This chapter focused on literature related on the study. The chapter is presented under the following sections: Electronic Hospital Information System focuses on the data completeness in the electronic system as well as the factors associated with the completeness of the data. The data in the Hospital Information System is the then assessed focuses on the relevant literature relating to the completeness of data.

2.1.   Overview

Hospital Information System 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 coordinated information sharing (Takhti et al., 2012). The main goal of current HIS is to manage information from all healthcare related activities, including planning, monitoring, coordination, and decision making. Key objectives of HIS implementation are to improve the availability of patient records by making information accessible for patient care, to decrease the wait time for diagnostic information, such as laboratory results and to improve patient administration procedures (Littlejohns 2003).

HIS implementation seems essential to meet increasing healthcare demands and the associated diagnostic, treatment and administrative system burdens so as to support better patient care planning and clinical or administrative decision making (Ledikwe 2014). The real time access exchange and receipt of clinical data provided by HIS have improved clinical documentation, reduced the duplication of care services, and supported better decision making related to patient care (Menke 2001).

Clinicians, Health Recorders and Nurses are the key providers of patient care, including assessment, diagnosis and intervention (Karuri et al., 2014).Nurses must quickly incorporate information about various patients and immediately organize and interpret the information to plan quality care (Bowman 2009). Thus, it is imperative that HIS are designed to meet nursing care requirements to optimally coordinate patient care activities (Karuri et al., 2014).High

quality data and effective data quality assessment are required for accurately evaluating the impact of public health interventions and measuring public health outcomes (Ishijima 2015).

In many developing countries, lack of reliable data and grossly inadequate appreciation and use of available information in planning and management of health services are two main weaknesses of health information systems (Kimaro and Twaakyondo 2005). The key performance metrics for the HIS are the availability and quality of the data it generates. The state that the quality of data in public health information systems can be ensured by effective data quality assessments and in order to conduct effective data quality assessments, measurable data attributes/ dimensions have to be precisely defined (Chen et al., 2014).

According to Chen et al., (2014), identify the dimensions of data quality from different studies, completeness, accuracy, timeliness, validity, periodicity, relevance, reliability, precision, integrity, confidentiality, comparability, consistency, concordance, granularity, repeatability, usability, objectivity, accessibility, transparency and representativeness. WHO also identifies the following as dimensions or components of data quality, accuracy and validity, reliability, completeness, legibility, currency and timeliness, accessibility, meaning or usefulness and confidentiality or security (WHO 2003). The HIS should undertake regular assessments of these dimensions for core indicators. The aim is to make a judgment whether the level and trend for each indicator adequately reflects reality or whether the level and trend is likely to be a data artefact and does not reflect reality due to poor data quality (Wanjiku 2015).

Adjustment of the data may be necessary to avoid misleading conclusions, or omission of that indicator may be required until the data quality is improved in future collection (Wanjiku 2015). This study focused on single dimensions of data completeness and factor associated with completeness of data in the HIS. It also assessed the completeness of data and its magnitude. The empirical review therefore focused on the four components completeness, and timeliness of data and information use.

2.2.   Understanding about electronic Hospital Information System

Hospital Information Systems improve workflow and increase patient's access to health care (Stella et al., 2008). According to Busagala (2013), asserted that the applications of information and communication technologies facilitate ubiquitous and instantaneous communication between organizations and their stakeholders. ICT enable people and organizations to achieve seamless workflow and effective processes through improved interactions. Electronic health technologies enable effective networking by physicians, allow online review of patients' treatment and provide for accurate prescription of drugs. Radiology information systems enable the transmission of radiological images for evaluation in remote sites (Weimar 2009).

2.3.   Electronic Hospital Information System at MHN (Jeeva System)

In 2004 an Indian based Karishma Software company was tendered to install electronic HIS at MNH with major emphasis on the replacement of most manual based information system that has existed since its inception back in 1951.

The organization installed electronic HIS which has a total of twenty-four modules. These modules were integrated to form HIS and they include the following modules Out-Patient, Doctor Consultation, In-Patient   Medical Records, Laboratory Operational Theatre, Central Sterile Stores Department, Blood Bank Radiology, Mortuary Payroll, Pharmacy Purchase, Nursing Station General Store, HIV IP Billing, IP Cashier Order Management, Laundry Back Office and Security Master Module.

Four of these modules are underutilized including nursing station and doctor's consultation modules. These two modules are primarily used by nurses and doctors and were the major focus of this study. Other underutilized modules include the inpatient module and laundry module but these are not utilized by clinicians. The rest of the modules are utilized by between eight percent and one hundred percent (MNH-ICT report 2007).

Nursing Station module is used for booking of patient's specimens ready for the laboratory analysis, discharging patients, internal patient transfer (intra and extra department clinic),

tracking results status, viewing laboratory results once they are analyzed in the laboratory, checking bed states preparation of morning reports and production of several other reports as may be required among others. Nursing station module is supposed to manage clinical data in a manner that data is made available in a timely and orderly fashion to aid clinicians in improving patient care (MNH-ICT report 2007).

Doctor consultation module is designed to book patient for future appointment, treat, patient, prescribe drugs, book investigation, transfer patient as well as track patients. It is primarily designed for physicians although nurses use it too (MNH-ICT report 2007).

This module provides a clinical data repository that stores clinical data such as the patient's history of illness and the interaction with care providers. The repository encodes information capable of helping physician decide about the patient's condition, treatment options and well ness as the status of decisions, actions undertaken and other relevant information that could help in executing those actions (MNH-ICT report 2007).

2.4.   Challenges and factors affecting usage of electronic HIS

There is good evidence that electronic HIS offer tremendous advantages to reduce clinical errors increase efficiency and improve quality of patient care (Ochieng 2005). At the same time.

EHR may vary between health professional groups, adding to the complexity of implementing this technology in a pluralist healthcare system. EHR acceptance by healthcare professionals is an essential condition to ensure that the expected benefits will materialize. Thus, understanding factors influencing EHR acceptance is one of the key elements in ensuring its optimal integration and ultimately, measurable benefits within health system and population. Factors related to users and their working environment have to be considered (Elizabeth 2008).

Individual factors affecting physician to accept EHR system. The theoretical model most were based on the Technology Acceptance Model (TAM). The TAM hypothesizes that user

intended behavior predicts their actual system use. It proposes two main factors that determine users' behavioral intention (BI) toward using a new technology, specifically perceived usefulness (PU) and perceived ease of use (PEoU). This theory suggests that external variables, such as human and social factors, indirectly determine attitude toward technology acceptance by influencing PU and PEoU. The TAM is one of the most influential frameworks for predicting users' perceptions about information system use (Bickel et al., 2007).

According to Gagnon et al., (2014), investigate the factors associated with their acceptance of EMR using two models the TAM and the Theory of Planned Behavior (TPB). Results from their multiple regression analyses showed that the TPB was more powerful than the TAM in explaining physicians' acceptance, but that a framework combining both models was even more powerful. Attitude toward EMR use and perceived behavioral control were the most important predictors of physicians' intention to use an EMR.

Gagnon et al., (2014), compared EHR perceptions of Canadian physicians already using EMR systems with those not yet using them through an integrated theoretical approach inspired by the Unified Theory of Acceptance and Use of Technology (UTAUT), a model offering an extension to the TAM by including key concepts from other technology acceptance models (Venkatesh et al., 2003). Their theoretical model explained 55.8% of the variance in behavioral intention to use EHR among physicians who were EMR users, and 66.8% among non-EMR users. Effort expectancy (a concept similar to PEoU) was found to be the strongest determinant of intention among EHR users, while performance expectancy (equivalent to PU) was the strongest determinant for nonusers. Contextual factors could also play an important role as barriers or enablers to EHR use (Gagnon et al., 2014).

2.4.1. Data completeness

There are several dimensions to EHR data completeness. First, the object of interest can be seen as the patient or as the health care process through which the patient was treated. There is a difference between complete information about the patient versus complete information about the patient's encounters.

A patient with no health care encounters and an empty record has a complete record with respect to the health care process, but a blank one with respect to the patient (Weiskopf et al., 2013). Furthermore, one can measure completeness at different granularities the record as a whole or of logical components of the record, each of which may have its own requirements or expectations according to the guideline of MOHCDGEC.

The demographic patient information should have surname, second name, first name, sex, date of birth, marital status, education, occupation, religion, address, mobile number, tribe, and next of the kin details. Another dimension of completeness in the clinical patient information are patients, assessment, findings, management and dosage, procedures reports and history. Missing of the necessary minimum patient information requirement in the provided field will determine that the data is incomplete in the field. Data completeness in terms of intrinsic expectations based a priori upon the content or extrinsic requirements based upon the use.

2.4.2. Training and skills/ knowledge

Inadequate training on data capturing and its importance to clinicians, nurses and health records staffs on processing patient data is among factors which cause data incompleteness in patient folders (Nyamtema 2010). During filling patient details in folders clinicians and health records staffs may not complete some fields on form which may be very important information for future use (Nyamtema 2010). Data incompleteness is caused by lack of enough skills which the clinicians and health records staffs have due to lack of proper training. Improper system usage and inappropriate capture of details affects the process of data filling and lead to gaps in the patient folder. In order for the clinicians to get proper training on data capture and its importance towards usage of HIS. This is caused by poor allocation of budget for training of staffs, thus hospitals should budget a fund for conducting proper training for responsible personnel so as to have enough knowledge and skills on data capturing and filling to avoid the gaps (Nyamtema, 2010)

2.4.3. The Triandis theory of interpersonal behavior

The Triandis model (Egmond & Bruel, 2007) explains individuals' behaviour in terms of what they have always done (habit), by what they think they should do (social norms) and by the consequences, they associate with a behavior (perceived consequences). The model also contains aspects that are directly related to the individual, for example attitudes, genetic factors, intention, and behavior and others that are related to the individual's environment, for example culture, facilitating conditions, and social situations (Osbourne 2006). Numerous studies have identified a variety of factors that affect innovation adoption in business organization. (Fishbein and Ajzen 1975) developed a general model that explains and predicts behavioral intentions in many general settings.

The model is referred to as TRA (Theory of Reasoned Action). The theory hypothesizes that a person's behavioral intention (BI) to perform or not to perform. A behavior is determined by that person's attitude and subjective norms. Behavioral Intention is a measure of the strength of one's intention to perform a specific behavior.

Attitude describes an individual's positive or negative feelings about performing the target behavior. Subjective norms refer to the person's perception that most people who are important to him or her think he/she should or should not perform the behavior (Fishbein and Jazzed, 1975). Davis (1989) found that behavioral intention to use a system is significantly correlated with usage, and that behavioral intention is a major determinant of user behavior. Hill (1987), also indicated that behavioral intentions significantly predict action. Likewise, Sheppard et al., (1988), in a meta-analysis of 86 TRA studies, found an average correlation of 0.54 between intentions and actions.

Davis (1985), adapted Ajzen and Fishbein's (TRA) Theory of Reasoned Action (1980) to model intentions to accept information technology. Davis' model is referred to as the TAM (Technology Acceptance Model). It explains the causal links between beliefs (for example, beliefs about the usefulness and ease of use of an information system (IS) and users' attitudes, intentions, and actual usage of the system. Perceived usefulness and perceived ease of use are

independent variables in the model. The dependent variable is the behavioral intention (BI). One mediating variable of the TAM is the individual's attitude toward use. Numerous studies discovered that the technology acceptance theory (TAM) yields consistently high explained variance in users' choices to utilize information systems (Mathieson 1991 and Pavri 1988). Hence, the technology adoption model put forward by Davis will be utilized in this study.

Among multiple healthcare organizations, clinicians, nurse and health records represent the largest technology user group in the hospital setting. Despite the benefits of electronic HIS on documentation, there are barriers that can obstruct the utilization of computerized documentation systems. Some of these barriers can result from behavioral issues in regards to perception and satisfaction toward information technology and the time spent documenting the patient information (Lee 2004). The challenge comes when some clinical staff have doubts about working in a nursing environment filled with technology. Even though they are provided with reference guides, screen shots, and cheat sheets that are helpful, some staff still have a hard time adjusting to electronic charting.

Some of them have a fear of clicking in the wrong place as they work with computerized charts and they become aggravated when they cannot perform their electronic tasks. According to Polly (2009), stated that "the integrated theory of health behavior change suggests that health behavior change can be enhanced by fostering knowledge and beliefs, increasing self-regulation skills and abilities, and enhancing social facilitation.

2.4.4. Attitude

TAM assess factors associated with physician's attitude toward using EHR. Overall, PU explained 73% of the variance in physicians' attitude toward EHR use, whereas PEoU did not significantly influence attitude. None of the physician's characteristics (age, years in practice, clinical specialty, health system relationship, and prior computer experience) were correlated with any of the TAM variables. Clinician may differ from other types of users in terms of IT acceptance. The most significant factors influencing physicians' intention to use an Electronic Medical Record (EMR) were attitude, PU, logical access and physical access (Gagnon et al.,

2014). Abdekhoda et al.,(2014) have highlighted the role of perceived threat to professional autonomy as an important antecedent to PU, intention, and EMR usage.

According to Makoul et al., (2001), the attitudes of clinicians, nurses and health record staffs towards usage of computer is among the social factors that affect the incomplete of data in the electronic HIS. The tendency of clinicians, nurses and health records staffs not filling each required detail on the patient folders in the system may lead to incomplete data. The believes of clinicians, nurses and health records staffs attitudes towards data usage of the electronic Hospital Information System may lead to incomplete information in the patient folder.

2.4.5. Technology and Communication

According to Busagala et al., (2013) large number of people accessing the system at the same time may cause the system to be slow and this will affect the process of data capturing for clinicians, nurses and health records. Thus, staffs fill few details of patients so as to ensure each patient receive service without considering capturing all data is important

2.4.6. Poor scheduling and Workload affect doctor to patient and nurse to patient ratios

Poor appointment allocation (scheduling of patients to clinicians for consultation) may cause workload to the clinicians which will affect their data filling in the system. It is found that most clinicians have no enough speed in typing, thus cause them miss filling some important information/data in the patient folder (Samaan et al., 2009).

The recent United Nations Development Programmes 2011 Human Development Report indicates that Tanzania human welfare status is on the decline (UNDP, 2011). The gross school enrollment has also declined from 44% in 1980 to 34% in 1995, and Tanzania has the lowest University enrollment capacity in eastern and southern Africa. Consequently, the doctor to patient ratio in Tanzania is 26,000 whereas the recommended rate is 1: 7,500. Comparatively, Uganda is 1: 8,000, Zambia is 1: 11,000 (KCMC, 2012) and Kenya's is 1: 7,000 (Africapedia, 2012). The nurse to patient ration in Tanzania is 1:6000 (Msuya and Shija, 2011).

Generally, several factors affecting electronic Hospital Information System were stated in several theories include theoretical behaviour intention (BI) of user towards implementation of EHR, theory of reasoned action (TRA) on acceptance, TAM on assess physician's attitude towards usage of the EHR. Also inadequate training, poor technology, high workload and poor allocation of appointment contribute highly on incompleteness of data in the electronic HIS.

CHAPTER THREE: METHODOLOGY

3.1. Study area

The study was conducted at the Muhimbili National Hospital (MNH) in Dar es Salaam-Tanzania. The hospital has a bed capacity of 1500 and attend 1200 outpatient and admits average 1000 patient per week. MNH has 3054 employees of them 880 are clinical personnel and 2174 supportive staff in various departments. The researcher chose MNH for the study because it is the only National Hospital in Tanzania which introduced and fully implemented HIS in recording patient's information electronically only in health service delivery for a number of years. Other government health facilities use both electronic and paper based system and this acted a challenge for the study as it focuses on assessing completeness of patients' information in the electronic HIS only.

The study involved electronic Hospital Information System (HIS) as the tool for capturing patient's information. The system support inpatients and outpatients on provision of the health care. The study area focused to the outpatients who are getting services through electronic HIS. The patients admitted in various wards are recorded in paper and electronic based systems and this make it difficult to assess the incompleteness of data in the electronic HIS.

Data captured in the electronic HIS at MNH are demographical and clinical data for outpatients. Demographical data includes patient name, sex, and date of births, marital status, workplace, education, occupation, ward leader, religions, physical address and mobile number. Also, other details include guardian names, relationship, contact and physical address while follow-up, symptoms, investigation and medication, treatment and patient management plan. Nurses captures patient's vital investigation which includes blood pressure, weight, height, body mass index and temperature.

3.2. Study Design

The study opted for the explorative descriptive cross sectional study. This design is normally applicable in a situation where either the whole population or part of population selected for information gathering. On the other hand, due to limited time of the researcher (January to February 2017), Cross sectional research study was also applied because it enabled the researcher to study phenomenon over a short period of time in a sequential manner. Moreover, results under cross-sectional design do give room for the researcher to make generalization and future predictions of a phenomenon (Wells et al., 2013)

3.3. Population

The study population included staff working in the outpatient's clinics at MNH. A representative sample was drawn from the source population to constitute the study population.

3.4. Inclusion and Exclusion Criteria

Inclusion

All clinicians, nurses and health records staff who were working in outpatient clinic for the period of January and February 2017.

Exclusion

Clinicians, nurses and health records staff who were absent for study leave and students who were temporarily assigned for training purpose during the period between January and February 2017 were excluded.

3.5.   Sample Size and Sampling Techniques

The sample size for the clinicians, nurse and medical record staff was 105. The obtained sample size represented the total number of clinicians, nurses and medical records staff working in the outpatient clinics at MNH. The proportion of factors affect data completeness in patient folders was observed to be 55% (Nyamtema, A.S 2010).

The following formula was used to calculate the sample size

$$n= \frac{Z^2 \, P \,(100 - P)}{e^2}$$

Hence, $n = \frac{1.96^2 \, x55(100\text{-}55)}{5^2}$ = 380 staff

Where by   n- Sample size

z = standard normal deviate corresponding to 95% Confidence level which is 1.96)

p = the proportion of factors affect data completeness in patient folders was observed to be 55% (Nyamtema, A.S; 2010).

ε = Marginal error, 5%

The researcher assumed that there will be a non-response rate in the study; therefore, this was represented by calculating an adjusted factor.

n= n*Adjusted factor

Adjusted factor = (100/100-f %)

$$n = \frac{380 \times 100\%}{100\text{-}10}$$

$$n = \frac{38000}{90}$$

n=422 staff

An average of clinicians, nurses and medical records staff working in the outpatient clinics are 150 per period of the study conducted, these does not meet the number of sample size calculated.

The research used finite population correction factor to calculate the sample size.

Formula

$nc = \underline{n_1}$

$1+n_1/N$

Where N is equal to population size.

$n = \underline{422}$

$1+ (422/150)$

$n = 105$ staff

3.5.1. Sampling Techniques

According to the outpatient clinic at Muhimbili National Hospital clinicians, nurses and medical records staff a were directly involved in the filling of the patient records in the electronic HIS. A list of the medical records staff, nurses and clinicians obtained in the HIS. The systematic sampling method was used to select names of the nurses, medical records staff and clinicians who participated in the study.

3.6. Variables

In this study, dependent variable of interest is "data completeness in the electronic HIS" while independent variables are those factors which affect process which include routine training, skills/knowledge (important of data capturing), technology (power blackout), communication (notification of changes, delay of point to point), behavior, attitudes, scheduling (in balancing of patient against staff) and workload/overloading (there are few staffs). All the variables were measured on the questions prepared which stand as the tool used to measure each variables from the related study.

3.7.   Measurement of Variables

3.7.1. Dependent Variables

Data completeness

Dependent variable, data completeness was measured through addressing the frequency of incompleteness of records in the patient folder and the reasons for the incompleteness (Nyamtema et al., 2010) on bridging the gaps in the Health Management Information System in the context of a changing health sector for data completeness.

3.7.2. Independent Variables

Independent variable, these are factors which affect completeness of data includes routine training, attitudes, behaviour, workload, scheduling, technology and communication. These factors were measured through questionnaire with questions regarding notification of changes, delay/loss of data from other point, in balancing of workload and adequate capacity of staff proportional to the patient, unskilled technical support, typing problems, skills/knowledge of using system and slowness of system performance.

Training, Knowledge and Skills

 This measured level of training, knowledge, and skills on the use of electronic HIS. Like in other studies (Olok et al., 2015), likert scale questions were used to measure the knowledge and skills of respondents towards e-health use in healthcare delivery. Likert type scale: Very Poor, Poor, Average, Good and Very Good were used. Respondents were asked questions on the level of their training and knowledge on the use of electronic HIS.

Attitude

In this study the attitude towards usage of HIS was measured using questionnaire. The likert scale questions was developed by the (Acquah-Swanzy, 2015) has been used in the factor influencing diffusion of electronic medical records . Seven (7) attitude likert scale questions were asked to the clinicians, nurse and health recorder towards attitude on using electronic HIS in a patient care where strongly disagree, disagree, neutral, agree and strongly agree closed ended questions were asked.

Behaviour

The behaviour on the practice of the HIS was measured using a scale developed by (Almutairi et al., 2005) and was used in the Study of Nurses Perceptions and Attitude of Electronic Medical Records in Riyadh and Jeddah's Hospitals.

Seven (7) behaviour questions were asked to the clinicians, nurse and health records towards behaviour on using electronic HIS in a patient documentation where questions based on likert scale: Very Fréquently, Frequently ,Occasionnally, Rarely and Very Rarely.

Technology and Communication

Advancement of technology and failure of communication among devices are independent variable which affect the process of data capturing in the hospital care setting. These variables were measured by using likert scale questions from Very Poor, Poor, Average, Good and Very Good. The questions were adopted from a study by (Wang et al., 2016) and have been used to measure effect of computer technology downtime on hospital processing. The questionnaire **was used** to assess the measurement. Seven (7) questions of adaptation of technology and communication were used so as to assess the measurement.

 Workload and scheduling

 Large number of patient who are unproportional to the number of staff affect the process of data capturing where by the workload for the healthcare will increase. Likert scale questions where address in the impact of Electronic Health Records on Time Efficiency of Physicians and Nurses where questions address workload and time (Poissant et al., 2005). Seven (7) workload and scheduling likert scale questions were asked to the clinicians, nurse and health records towards workload and scheduling towards provision of the healthcare.

3.8.   Data Collection and Techniques

3.8.1. Questionnaire

The researcher prepared structured questionnaires in which there were closed ended questions for clinicians, Nurses and Health records staff for outpatients in the Hospital. The questionnaire contained social demographic characteristics of the respondents including age, level of education, attitude on using the electronic hospital information system, training, knowledge on using the system and importance of data filling. The questionnaire was designed in English language. The method of self-filled of questionnaire has been chosen by the researcher because it saves time for the researcher and it does not require the presence of researcher during filling of questionnaires as it contain all instructions, it give respondents more time and freedom of responding to the questionnaire towards the study.

3.8.2. Document Review

Electronic patients' folders were reviewed by the researcher to obtain extra information in relation to the study. Entries about the clinical and demographical data were reviewed by the researcher with a view to gain understanding about the level of data completeness. In order to facilitate the review process, the researcher also conducted document review on clinical and demographical data of patients' folders from the HIS so as to understand the completeness of information in the patients.

Patient's folders were exported from the database to obtain the list of outpatients for the period of January and February 2017. The researcher conducted random selection to obtain three hundred and fifty (350) patient records in the electronic HIS so as to obtain the information about completeness of demographical and clinical data.

3.8.3 Sample Size of the patient folder

The sample size of the patient folder were calculated using the following formula for a single proportion

$$n= \frac{Z^2 P (100 – P)}{e^2}$$

Hence, $n= \frac{1.96^2 \text{ x } 91(100\text{-}91)}{3^2} = 350$

Where by   n- Sample size

z =standard normal deviate corresponding to 95% Confidence level which is 1.96)

p = the proportion of completeness of data in patient folders was observed to be 91% (Nyamtema, A.S; 2010).

ε = Marginal error, 3%

3.9. Validity

Validity of the data determines whether the research truly measures what it was intended to measure in the study population. Validity is concerned with whether the findings are really about what they appear to be about. Validity refers to the extent to which inferences, conclusions and decisions made on the basis of test scores are appropriate and meaningful. Prior to the research study, the questionnaire was reviewed by the knowledgeable person to ensure its content validity as far as the research study is concern.

3.10. Reliability

The consistency among the questions   in the questionnaire from the several studies ensure that response are consistency. In order to ensure the reliability of the instruments the questions provided the results in a similar conditions and the questions were administered to the clinicians, nurses and health records staff so as to find similar level of responses.

3.11. Data Analysis

Data collection from questionnaires were arranged accordingly. Quantitative data were sorted, arranged, coded. and analyzed to obtain frequency distribution of all variables were performed. For categorical data chi-square test was done check for significant different between variables. (Fisher's exact test was used when any expected number was less than 4).

The significant level was set at $p <0.05$. Binary logistic regression and multiple regression analyses were done to determine the odds ratio and adjusted odds ratio for different predictors associated with completeness in the electronic HIS.

Analysis of document review

The frequency table were used to examine the magnitude of incomplete of data and examine level of data incompleteness by cadre of health workers through characterized the proportional of data in the patient folder in the electronic HIS. The data were exported from the database and imported in the excel file to be sorted and arranged accordingly. This is because SPSS output meet and suit specific objectives of the study through use of tables and percentages.

Medical record staff should capture the demographical data which are first name, second name, surname, sex, date of birth, marital status, workplace, education level, occupation, address, phone number, guardian name, guardian address, guardian phone number, tribe and religion. There about 16 field to be capture and if the missing filed is more than 5 field its considered as incomplete data.

Nurses are supposed to capture 9 fields sections in the electronic HIS which are blood pressure, pulse rate, respiration, body mass index, saturation, weight, height and temperature of the patient. If the missing filed is more than the 5 variable it is considered as incomplete field.

Clinicians are required to capture patient history, prescribe drugs, diet, diagnosis, test investigation, systemic examination and family history. There are about 7 field to be capture and if missing field is more than 3 in a clinical detail it will be considered as the incomplete information.

Therefore, if the patient is missing 5 fields in the demographical data, 2 field in the vital sign data and 3 for clinical data is considered as patient information is incomplete.

On analyzing the data the comparison of the demographical data, vital sign and clinical data were performed so that to come up with which cadre having high incomplete data of their patient and overall of data completeness of patient in the HIS.

3.12. Study Limitation

The study was conducted at Muhimbili National Hospital thus it was not taken as a representative of other hospital settings in Tanzania. The information provided to researcher and document reviewed were confidential and sensitive, therefore the names were not taken. The factors were controlled by logistic regression where by a value of $P<0.05$ at 95% confidence interval were considered statistically significant.

3.13. Ethical Consideration

The study was conducted in line with the existing standard ethical guidelines. To ensure protection of participants the research proposal addressed the informed consent, privacy and anonymity to participants as ethical issues.

To ensure informed consent, all participants were informed on the general objectives and contents of the research. Participants will be free to participate in this study. No respondent was forced to participate in this study.

According to Aina (2002), right to anonymity insists that identification of individuals is not salient feature of the research. A participant was considered anonymous when the researcher or another person was not identifying the information provided. To ensure anonymity, the researcher prepared the questionnaires which did not involve the names and code address. Respondents were assured their right to privacy, confidentiality or anonymity and protection from harm.

Authentication and authorization functions of data collection were used by researcher so as to maintain the security of the patient records in the electronic HIS.

Procedures to managed access, authentication and authorization were followed so as to maintain privacy of the patient records. All processes of data collection, data entry and processing should were done in such a way that the records collected and captured are correct and complete.

Data captured should then be validated for accuracy and ensure encryption cause are so confidentiality and the format should be same.

Before starting data collection exercise, research permission were sought from the Muhimbili National Hospital (MNH) where data was collected. Thereafter, the researcher introduced himself to the concern authorities at the MHN explaining the purpose of the study, the mode of data collection, and the target population.

The approval to conduct this study was sought from the Directorate of research and Publication committee of Muhimbili University of Health and Allied Sciences (MUHAS). Permission to conduct the study was obtained from the Director of Muhimbili National Hospital and the data was collected with high level of confidentiality to uphold the image of the institutions. Also, the researcher informed the hospital on the need to conduct the research and its impact thus observe informed consent.

CHAPTER FOUR: RESULTS

4.1.   Socio- demographic characteristics of respondents

A total of 105 respondents participated in this study comprising of Medical doctors, Medical records staff and Nurses and more than half 54 (51%) of the respondents were females. Majority of the study participants 89 (85%) were aged between 24 and 45 years old. The mean age was 37 years old ($\pm$ SD 8), ranging from 24 – 56 years. Regarding education 34 (32%) of participants had Diploma, 31 (30%) degree, 23 (22%) had masters and only 17 (16%) had certificate. The median working experience was 8 years ($\pm$ SD 6), with 38 (36%) of participants having experience between 1 – 5 years, 36 (34%) had between 6 – 10 years, 14 (13%) had 11 – 15 years, 10 (10%) had 21 years and above and 7 (7%) had 16 – 20 years. Table 4.1 shows socio-demographic characteristics of participants.

Table 4.1: Socio-demographic characteristics of the study population (n=105)

Variables	n	%
Sex:		
Male	51	49
Female	54	51
Age group (years):		
24 – 45	89	85
46 and above	16	15
Highest level of Education:		
Certificate	17	16
Diploma	34	32
Degree	31	30
Masters	23	22
Designation:		
Medical Doctors	35	33.3
Medical Records	35	33.3
Nurses	35	33.3
Work experience:		
1 - 5	38	36
6 - 10	36	34
11 - 15	14	13
16 - 20	7	7
21 and above	10	10

4.2.   Data incompleteness by cadre of health workers in the electronic HIS at MNH.

The results of these analysis has been illustrated in the Table 4.2, Table 4.3 and Table 4.4

4.2.1. Completeness of clinical data by Clinicians

Overall completeness of clinical data by clinicians was 201 (42.6%).

Table 4.2: Completeness of clinical data by clinicians (n = 350)

Patients Information in HIS	Complete	Incomplete
History presentation	335 (96%)	15 (4%)
Symptoms	243 (69%)	107 (31%)
Drugs	173 (49%)	177 (51%)
Test investigations	106 (30%)	244 (70%)
Disease coding	180 (51%)	170 (49%)
Provision diagnosis	221 (63%)	129 (37%)
Final diagnosis	114 (33%)	236 (67%)

4.2.2. Completeness of clinical data by nurses

Overall completeness of clinical data by nurses was 17 (18.3%)

Table 4.3: Completeness of clinical data by nurses (n = 350)

Patients Information in HIS	Complete	Incomplete
Blood pressure	16 (5%)	334 (95%)
Pulse rate	10 (3%)	340 (97%)
Temperature	13 (4%)	337 (96%)
Respiratory rate	1 (0.3%)	349 (99.7%)
Weight	89 (25%)	261 (75%)
Body mass index	24 (7%)	326 (93%)
Saturation	3 (1%)	347 (99%)
Height	70 (20%)	280 (80%)
Systematic examination	54 (15%)	296 (85%)

4.2.3. Completeness of demographical data by Medical records staffs

Overall completeness of demographical data by Medical records was 250 (71.4%).

Table 4.4: Completeness of demographical data by medical records staffs (n = 350)

Patients Information in HIS	Complete	Incomplete
Sex	350 (100%)	0
Surname	350 (100%)	0
Tribe	334 (95%)	16 (5%)
First name	328 (94%)	22 (6%)
Guardians name	320 (91%)	30 (9%)
Religion	311 (89%)	39 (11%)
Education level	308 (88%)	42 (12%)
Second name	301 (86%)	49 (14%)
Date of birth	302 (86%)	48 (14%)
Marital status	300 (86%)	50 (14%)
Address	282 (81%)	68 (19%)
Phone number	272 (78%)	78 (22%)
Guardian phone number	257 (73%)	93 (27%)
Address of the guardian	250 (71%)	30 (29%)
Workplace	32 (9%)	318 (91%)
Occupation	28 (8%)	322 (92%)

Figure 4. 1 : Data incompleteness by cadre of health workers in the electronic HIS at MNH
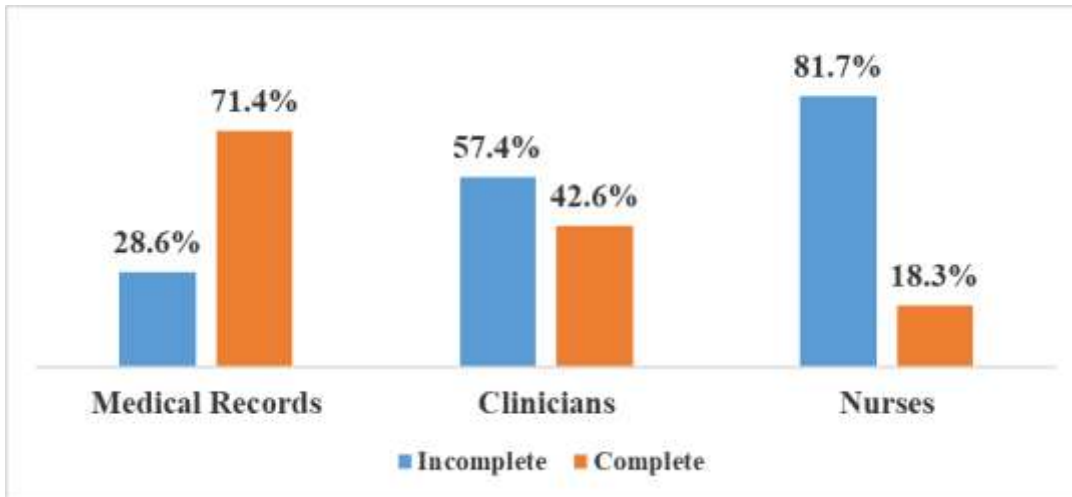
4.3.   The completeness of clinical and demographical data in the patient folder in the electronic HIS at MNH.

Level of data completeness in the electronic HIS at MNH were categories into complete and incomplete data. Figure 4.2 below shows that more than half of the clinical and demographical data are incomplete 90%.

Figure 4. 2 : Completeness of clinical and demographical data in the patient folder in the electronic HIS at MNH.
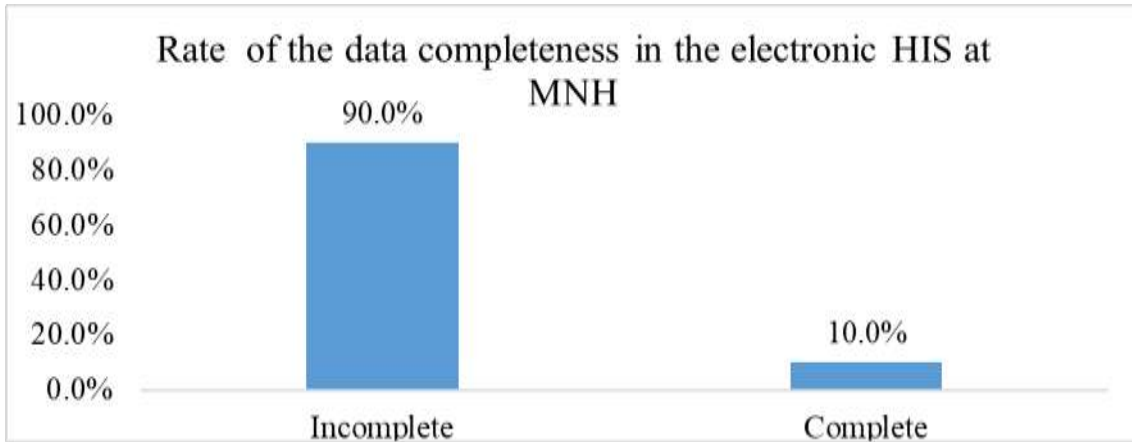
4.4.   Examine factors associated with incompleteness of clinical and demographical data in the patient folder in the electronic HIS at MNH.

4.4.1. Attitude towards data completeness in the electronic HIS by respondent's characteristics

Table 4.5 below summarizes health care worker's attitude towards usage of the electronic HIS in patient information capturing by social demographical characteristics. This study has shown about 88.6% of nurse cadre had negative attitude towards data completeness in the electronic HIS, compared to clinicians and medical records staffs. The relationship was statistically significant (p=0.01*). Health care workers sex did not show significant influence on the attitude towards data completeness in electronic HIS (p=0.20). Furthermore, clinicians, nurses and medical record staff, educational level did not show influence on attitude towards data completeness in the electronic HIS(p=0.6). It was also shown in this study that healthcare workers working experience could not influence attitude towards data completeness in the electronic HIS(p=0.06).

Table 4.5: Attitude towards data completeness in the electronic HIS by health worker's characteristics (n=105)

Variable	Attitude		P-value
Sex	**Positive** **n (%)**	**Negative** **n (%)**	
Male	12 (23.5)	39 (76.5)	0.20
Female	15 (27.8)	39 (72.2)	
Education level			
Certificate	6 (35.3)	11 (64.7)	0.60
Diploma	9 (26.5)	25 (73.5)	
Degree	6 (19.4)	25(80.6)	
Masters	6 (26.1)	17(73.9)	
Cadre			
Clinicians	8 (22.9)	27 (77.1)	0.01*
Medical record Staff	15 (42.9)	20 (57.1)	
Nurse	4(11.4)	31(88.6)	
Working experience in years			
0-10	35 (84.7)	4 (15.3)	0.06*
11-20	31 (79.9)	7 (20.1)	
21-Above	18 (61.7)	10 (38.3)	

Fisher's exact test

4.4.2. Behavioral Practice of users towards usage of electronic HIS

The table 4.6 below summarizes health care workers' behavioral practices towards usage electronic HIS on data capturing processes by social demographic characteristics. The results of this findings shows that 91.4% of nurses rarely use the electronic HIS as compared to clinicians and medical records staff. The relationship was statistically significant (p=0.03). It was also show that health care workers educational level show significant influence on behavioral practice towards effective data completeness in the electronic HIS (p=0.03) and on the other hand the results shows that health care workers sex did not show significant influence on behavioral practice towards data completeness(p=0.53). Furthermore, healthcare workers job experience did not show influence on behavioral practice towards data completeness on the electronic HIS.

Table 4.6: Behavioral Practice of users towards usage of electronic HIS

Characteristics	Behavioral Practice		P-value
Sex	**Frequently**	**Rarely**	
	n (%)	**n (%)**	
Male	8 (15.7)	43 (84.3)	0.53
Female	11(20.4)	43 (79.6)	
Education level			
Certificate	5 (29.4)	12 (70.6)	0.03*
Diploma	4 (11.8)	30 (88.2)	
Degree	2 (6.5)	29 (93.5)	
Masters	8 (34.8)	15 (65.2)	
Cadre			
Clinicians	10 (28.6)	25 (71.4)	0.03*
Medical record Staff	6 (17.1)	29 (82.9)	
Nurse	3 (8.6)	32 (91.4)	
Job experience in years			
0-10	2 (8.7)	21 (91.3)	0.06*
11-20	7 (14.9)	40 (85.1)	
21-Above	10 (33.3)	25 (66.7)	

Fisher's exact test

4.4.3. Provision of Training to users towards usage of electronic HIS

The table 4.7 below summarizes health care workers' sustainable training of user towards usage electronic HIS on data capturing processes by social demographic characteristics. The results of this findings shows that 82.9 % of staff with highest working experience are non-trained staff on usage of electronic HIS as compared to staff with low working experience. The relationship was statistically significant (p=0.00). It was also show that health care workers educational level show significant influence on training towards effective data completeness in the electronic HIS (p=0.03) and on the other hand the results shows that health care workers sex did not show significant influence on training towards data completeness(p=0.20). Furthermore, healthcare worker's cadre not show influence on training towards data completeness on the electronic HIS(p=0.29).

Table 4.7: Provision of Training to users towards usage of electronic HIS

Variable	Training		P-value
Sex	**Trained**	**Non Trained**	
	n (%)	**n (%)**	
Male	21 (48.8)	22 (51.2)	0.20
Female	26 (41.9)	36 (58.1)	
Education level			
Certificate	8 (47.1)	9 (52.9)	0.03*
Diploma	14 (41.2)	20 (58.8)	
Degree	13 (41.9)	18 (58.1)	
Masters	20 (87.0)	3 (13.0)	
Cadre			
Clinicians	11 (30.6)	25 (69.4)	0.29*
Medical record Staff	19 (46.3)	22 (53.7)	
Nurse	9 (32.1)	19 (67.9)	
Work experience in years			
0-10	9 (39.1)	14 (60.9)	0.00
11-20	23 (48.9)	24 (51.1)	
21- Above	6 (17.1)	29 (82.9)	

Fisher's exact test

4.4.4. Knowledge and skills of users towards usage of electronic HIS

Table 4.8 below summarizes health care worker's knowledge and skills towards usage of the electronic HIS in patient information capturing by social demographical characteristics. This study didn't show significant influence on sex, educational level, cadre and working experience. Furthermore, social demographical characteristics namely sex, educational level, cadre and working experience didn't show influence on skills and knowledge towards data completeness on the electronic HIS(p>0.05).

Table 4.8: Knowledge and skills of users towards usage of electronic HIS

Variable	Knowledge and skills		P-value
Sex	**Low**	**High**	
	n (%)	**n (%)**	
Male	24 (47.1)	27 (52.9)	0.15
Female	33 (61.1)	21 (38.9)	
Education level			
Certificate	9 (52.9)	11 (64.7)	0.92
Diploma	17 (50.0)	17 (50.0)	
Degree	18 (58.1)	13 (41.9)	
Masters	13 (56.5)	10 (43.5)	
Cadre			
Clinicians	18 (50.0)	15 (50.0)	0.81
Medical record Staff	23 (56.1)	18 (43.9)	
Nurse	16 (75.1)	12 (42.9)	
Job experience in years			
0-10	14 (60.9)	9 (39.1)	0.59
11-20	23 (48.9)	24 (51.1)	
21-Above	20 (57.5)	15 (42.9)	

4.4.5. Workload and Scheduling of users towards usage of electronic HIS

Table 4.9 below summarizes health care worker's workload and scheduling towards usage of the electronic HIS in patient information capturing by social demographical characteristics. This study didn't show significant influence on sex, educational level, cadre and working experience. Furthermore, social demographical characteristics namely sex, educational level, cadre and working experience didn't show influence on workload and scheduling towards data completeness on the electronic HIS(p>0.05).

Table 4.9: Workload and scheduling of users towards usage of electronic HIS

Variable	Workload and Scheduling		P-value
Sex	**Low**	**High**	
	n (%)	**n (%)**	
Male	34 (66.7)	17 (33.3)	0.84
Female	37 (68.5)	17 (31.5)	
Education level			
Certificate	10 (58.5)	7 (41.2)	0.71
Diploma	22 (64.7)	12 (35.3)	
Degree	23 (74.2)	8 (25.8)	
Masters	16 (69.6)	7 (30.4)	
Cadre			
Clinicians	25 (69.4)	11 (30.6)	0.75
Medical record Staff	26 (63.4)	15 (36.6)	
Nurse	20 (71.4)	8(28.6)	
Job experience in years			
0-10	29 (74.4)	10 (25.6)	0.17
11-20	27 (71.1)	11 (28.9)	
21-Above	15 (53.6)	13 (46.4)	

4.4.6. Usage of Technology and Communication on electronic HIS

Table 4.10 below summarizes health care workers towards usage technology and communication of the electronic HIS in patient information capturing by social demographical characteristics. This study has shown about 89.7% of staff with low working experience on using electronic HIS towards data completeness in the electronic HIS, compared to staff with high working experience. It was also show that health care workers working experience show significant influence on usage of technology and communication towards effective data completeness in the electronic HIS (p=0.02) and on the other hand the results show that health care workers sex did not show significant influence on usage of technology and communication towards data completeness(p=0.70). Furthermore, healthcare worker's educational level (p=0.71) and cadre not show influence on usage of technology and communication towards data completeness on the electronic HIS (p=0.57).

Table 4.10: Usage of Technology and Communication on electronic HIS

Variable	Technology and Communication		P-value
Sex	**Poor**	**Good**	
	n (%)	**n (%)**	
Male	39 (76.5)	12 (23.5)	0.70
Female	43 (79.6)	11 (20.4)	
Education level			
Certificate	15 (88.2)	2 (11.8)	0.71
Diploma	27 (79.4)	7 (20.6)	
Degree	23 (74.2)	8 (25.8)	
Masters	17 (73.9)	6 (26.1)	
Cadre			
Clinicians	26 (72.2)	10 (27.8)	0.57
Medical record Staff	33 (80.5)	8 (19.5)	
Nurse	23 (82.1)	5 (17.9)	
Job experience in years			
0-10	35 (89.7)	4 (10.3)	0.02*
11-20	30 (78.7)	8 (21.1)	
21-Above	17 (60.7)	11 (39.3)	

Fisher's exact test

4.4.7. Logistic Regression Analysis of factor associated with data completeness in the electronic HIS.

Factor associated with data completeness in the electronic HIS was carried out using the identified factor (sex, age group, educational level, experience of using system, attitude, behavior practice, training, knowledge and skills, communication and technology, workload and scheduling) as predictors. A binary logistic regression was conducted for every single factor (Univariate) and then followed by a multiple regression. Table 4.11 summarizes univariate/bivariate logistic regression analyses of factors associated with data completeness in the electronic HIS among healthcare workers.

In univariate analysis sex were not seen to influence the data incompleteness (OR=0.02, 95% CI=0.48-2.23) p=0.9 also age group (OR= 5.23, 95% CI=1.02-1.21) p=0.02, of health care workers were not seen as factors influence data incompleteness in the electronic HIS.

Another factor of knowledge and skills were not seen to influence data incompleteness (OR=0.47, 95% CI=0.58-3.01) p=0.49. In behavior practice were also not seen as the factors associated with data completeness (OR=16.39, 95%CI=2.40-12.43) p=0.00. Communication and technology were also not seen as the factors associated with data incompleteness (OR=0.44, 95% CI=1.55-9.62) p=0.00.

The several factors were seen as the factors associated with data incompleteness in the electronic HIS include attitude, training and workload and scheduling. The likelihood of data completeness was fifty-four (54) times (OR=54.3, 95% CI=12.81-80.59) p=0.00 as high if they had negative attitude towards data completeness compared to those with positive attitude. Healthcare workers with inadequate training were fourty (40) times (OR=39.83, 95% CI=7.23-43.98) p=0.00 more likely to data completeness in the electronic HIS compared to those with adequate training. The likelihood of the healthcare workers on data completeness in the electronic HIS were 1.1 times (OR=1.14, 95% CI=0.70-3.31) p=0.20 as high workload and poor scheduling compared with the low workload and good scheduling.

Table 4.11: Predictors of data incompleteness in the electronic HIS among the study participants (n=105)

Factor	OR	95% CI	p-value
Sex			
Male	1		
Female	0.02	0.48-2.23	0.90
Age group (year)			
24-46	1		
47-Above	5.23	1.02-1.21	0.02
Attitude			
Positive	1		
Negative	54.3	12.81-80.59	0.00
Behavior			
Positive	1		
Negative	16.39	2.40-12.43	0.00
Training			
Trained	1		
Non Trained	39.83	7.32-43.98	0.00
Knowledge and Skills			
Low	1		
High	0.47	0.58-3.01	0.49
Workload and Scheduling			
Available	1		
Not Available	1.14	0.70-3.31	0.20
Communication and Technology			
Good	1		
Poor	0.44	1.55-9.62	0.00

Keys: OR, odds ratio; CI, Confidence interval;

4.4.8. Multiple Logistic Regression Analysis

In multiple logistic analyses only factor with less than 0.2 in bivariate analysis were in cooperated in the model. The analysis results for several factors to be independent predictors of data completeness in the electronic HIS were included. Factors found to be independent predictors are age group, attitude, behavior, training, workload and scheduling, technology and communication. Table 4.12 presents the results of the multiple logistic regression analyses. Variables entered in the model were those found to be significantly correlated with data completeness in the electronic HIS and its bivariate level (p-value<0.2).

The relationship of each factor on data completeness in the electronic HIS and its indicated status of adjusted odds ratio and confidence interval for each category in Table 4.12. After adjusted odds ratio, confidence interval for age group categories the likelihood of data for the age group above 47 years were 1.1 times (AOR=1.1, 95%CI=1.02-1.21) more likely age group above 47 influence data incompleteness in the electronic HIS. The likelihood of data completeness was thirty-two (32) times (AOR=32.14, 95% CI =12.81-80.59) as high if they had negative attitude towards data incompleteness compared to those with positive attitude. HealthCare workers who had negative behavior on data completeness in the electronic HIS were five (5) times (AOR=5.47, 95% CI=2.40-12.43) more likely to have data incompleteness in the electronic HIS compared to those with positive behavior.

Also healthcare workers with inadequate training were fifteen (15) times (AOR=15.25, 95% CI=7.32-43.98) more likely to data incompleteness in the electronic HIS compared to those with adequate training. Lastly the likelihood of the healthcare workers on data incompleteness in the electronic HIS was four (4) times (AOR=3.86, 95% CI =1.55-9.62) as poor on usage in technology and communication compared to those with good skills of using technology and communication.

Before adjustment for age, sex, knowledge and skills these factors were not even seen as factors influence data incompleteness in the electronic HIS. But after adjustment age, behavior, technology and communication were seen as significant association factors

influence data incompleteness in the electronic HIS. However, there was no enough evidence to support workload and scheduling, after adjustment were two (2) times (AOR=1.53, 95 % CI=0.70-3.31 p=0.29 as high the workload and poor scheduling compared with the low workload and good scheduling. There were no significant association between workload and scheduling on data incompleteness in the electronic HIS p=0.20.

Table 4.12: Multiple Regression Analysis of factor affecting data completeness in the electronic HIS.

Factor	OR	95% CI	AOR	*p*-value
Age group (year)				
24-46	1			
47-Above	5.23	1.02-1.21	1.11	0.02
Attitude				
Positive	1			
Negative	54.3	12.81-80.59	32.14	0.00
Behavior				
Positive	1			
Negative	16.39	2.40-12.43	5.47	0.00
Training				
Adequate	1			
Inadequate	39.83	7.32-43.98	15.25	0.00
Workload and Scheduling				
Low	1			
High	1.14	0.70-3.31	1.53	0.20
Communication and Technology				
Good	1			
Poor	0.44	1.55-9.62	3.86	0.20

  Keys: OR, odds ratio; AOR, adjusted odds ratio; CI, Confidence interval;

CHAPTER FIVE: DISCUSSION

5.1. Data incompleteness in the electronic HIS at MNH.

The researcher sought to address the first research question which was examine incompleteness of data by cadre of health workers in the electronic HIS at MNH. The data were collected through document review. The study revealed that nurses had 81.7% incompleteness of clinical data due to the fact that the nurses lacks enough computers to undertake their daily tasks effectively in the HIS as well as performing multiple tasks in serving patients hence failed to capture all the necessary information in the electronic HIS. This finding was similar to the study conducted in Saudi Arabia which revealed that lack of enough computers terminals in the healthcare workstations and poor standard of data entry influence data incompleteness in the electronic HIS (Khalifa, 2013).

The study also found that clinicians had 42.6% of incompleteness of clinical data in the electronic HIS and this is attributed to their negative attitude towards utilization of electronic HIS in filling complete patients information as not part and parcel of their duties while in Medical records cadre, the study found that there is only 28.6% of incompleteness of demographic data and this is attributed to the good knowledge of records capturing techniques and management of patients records as most of them were professionally health records management officers. Also the similar findings were revealed in Thailand and it has been observed that the capacity of nurses to fill in patients' information in the electronic HIS is challenging and poor as compared to clinicians and medical records staff and this is because the management did not put more emphasis on purchase enough and usage of computers for the nurses as well as the awareness of nurses on filling important patient information in the system is very low (Weiskopf, Hripcsak, Swaminathan, & Weng, 2013).

5.2. **Completeness of clinical and demographical data in the patients' folder in the electronic HIS at MNH.**

This was the second research question in which the researcher was interested to examine the completeness of clinical and demographic data in the patients' folder in the electronic HIS for the specified three cadres for the entire hospital. The study found that the overall incompleteness of patients' folder in electronic HIS for the clinicians, nurses and medical records staff in the entire MNH is 90% as shown in Figure 4.2 A study conducted in South Africa shows the data incompleteness in the electronic HIS were not high (55%) (Wegner and Rhoda 2013).

Most of respondents indicated typing speed by (76.2%) is a challenge during capturing of patient records, poor scheduling and workload (66.7%), network problem (66.7%), insufficient computer devices (61.0%) as well as poor knowledge (64.8%) due lack of sensitization training and orientation programme on frequent use of the system in filling the patient information as indicated in Table 8. A study conducted in New York, 60% of the clinicians in the study were lacked typing skills on data capturing in the electronic HIS. As the use of electronic HIS increases, a lack of typing skills may impact health care workers time on provision of health services.

5.3. **Factors associated with incompleteness of clinical and demographical data in the patient folder in the electronic HIS at MNH**

This was the last research question of the study, the researcher was intended to examine the factors associated with incompleteness of clinical and demographical data in the patient folder in the electronic HIS at MNH. In addressing this question, the researcher was interested to examine developed factors as indicated in figure 1 to see whether they have direct or indirect association with incompleteness of clinical and demographical data in the patient folder in the electronic HIS.

These factors include attitude, behavior, knowledge and skills, training, scheduling and workload, technology and communication, the researcher tested reality of these factors through questionnaires based on the above mentioned factors, the responses from the respondents on these factors were discussed in this chapter and the findings were organized and presented into subsections as follows;

5.3.1. Attitude towards incompleteness of clinical and demographic data in the patient folder in the electronic HIS at MNH

The study found that about 81.7% of nurse cadres had negative attitude towards completeness of patients' information in the electronic HIS as compared to clinicians and medical records staff. A study conducted in Ghana, similar findings were revealed that negative attitude and perception of the healthcare workers were mentioned as the factors associated with adaptation on using electronic HIS on capturing patient data due to down time of computer network and assurance of existence of availability of power (Acquah-Swanzy 2015).

According to the present study, 68.4% of nurses shown a statistically significant negative attitude towards completeness of patients' information in the electronic HIS. This finding suggests that, nurses had low chances of using electronic HIS on their service points compared to clinicians and medical records staff at MNH. This was consistent with the findings of (Chau & Hu, 2002) who reported that there is a negative attitude of physicians and nurses towards using computer for providing patient care due to lack of computer experience which directly affect their intention on using electronic HIS known "SmartCare Software". Also Ajami, (2014), findings revealed that, inadequate training create negative attitude among end users of electron HIS and lead to ineffective usage.

5.3.2. Behavioral practice of users towards usage of electronic HIS

Health care workers' behavioral practices towards usage electronic HIS on data capturing processes by social demographic characteristics were among the factors associated with data completeness in the electronic HIS. The results of this findings shows that 81.4% of nurses rarely use the electronic HIS as compared to clinicians and medical records staff.

Similar study conducted in Ghana, indicated that attitude was found to be a predictor of behaviour intent in nursing staff. The behaviour of healthcare workers towards usage of electronic HIS was found to be a critical role in the reaction of acceptance on usage technology (Acquah-Swanzy, 2015).

Another study were conducted again in Ghana showed having motivation for a particular task in or behavior could be influenced by both internal and external factors. The motivation of the healthcare workers to use electronic HIS were being found as a challenge on effectiveness of electronic HIS usage. Intrinsically, the participant realized that the need to adopt electronic HIS, an alternative record keeping system, an effort which is not linked to extrinsic motivational factors such as management decision to increase pay or introduce other incentives (Djorlolo & Ellingsen, 2013).

5.3.3. Training for improvement of data completeness in the electronic HIS

Training is considered to be the most important factor for data completeness in the electronic HIS in the Hospital settings. The researcher was interested to know whether or not the provision of sustainable training for staff facilitated improvement of data completeness of electronic HIS at MNH.

The results of shows that the majority of the MNH staff 53(50%) attended training on electronic HIS for one week, whereby other staff attended for two weeks 7(7%), one month 9(9%), three months 11(10%) and one year 25(24%) among nurses, clinicians and Medical records staff at MNH. Therefore, this shows that there is inadequate of sustainable training because large number of staff (50%) attended training for the short period of time (one week) which led to the high rate of incomplete information in the electronic HIS. This findings in line with findings of (Aikins et al., 2012) which revealed that there were inadequate training on usage of electronic HIS.

Similar study were revealed in Iran where respondents report that the inadequate training in electronic HIS among healthcare workers contributing to failure of the completion IT projects and full utilization of the electronic HIS. Also in adequate training among healthcare workers

were among of the factor contributing in negative attitude and perceptions of healthcare workers towards usage of electronic HIS (Ajami & Mohammadi-bertiani, 2014).

A study done in Ethiopia on factors affecting adaptation of electronic HIS among healthcare workers' similar findings were revealed. The high rate of incomplete information in the electronic HIS among clinicians, nurses and medical records staff was due to the inadequate training conducted for the short period of time. Also the respondents indicated that the frequency changes of modules made regularly in the system without provision of sustainable on job training to staff contributed to the incomplete of patients' information in the electronic system. On the other hand, respondents indicated that training conducted was irrelevant as it mostly focuses on general usage of the system rather than imparting knowledge on capturing important patients' information in the electronic HIS (Belay, 2013).

5.3.4. The level of skills and knowledge towards data completeness in the electronic HIS

The study found that clinicians, nurses and medical records staff at MNH have poor knowledge and skills on data capturing process in the electronic HIS and this is due to the fact that the rate of incomplete data in the electronic HIS is very high (90 %) in MNH.

A study done in Kenya on determinants of electronic HIS in developing countries, similar findings were revealed. In adequate ICT skills and knowledge of healthcare worker's professionals contributing to low usage of electronic HIS. The findings indicate inadequate the ICT skills and knowledge among healthcare workers affect adaptation of electronic HIS and these can be extrapolated as among of the factors associated with data completeness in the electronic HIS(Mugo, 2014).

Also in similar study conducted in Tanzania, findings were contrary. Healthcare workers were capable to knowhow to utilise the electronic HIS in relatively similar across the various sources of computer literacy. This means mean that computer literacy does not necessarily translate into increased utilization of electronic HIS (Ishijima et al., 2015).

5.3.5. Workload and scheduling

The study found that the doctor to patient ratio is 26,000 whereas the recommended rate is 1: 7,500, the nurse to patient ratio is 1: 6000.and the results of the study shows the transformation from paper based system to paperless created high workload in capturing patients' information in the electronic HIS and this is due to the poor knowledge on electronic HIS usage which resulted to low typing speed of clinicians, nurses and medical record staffs (WHO, 2008).

Network problem, Insufficient technical support, Power device and Power blackout were identified by the respondents to be the cause of the increased workload hence affected capturing of data in the electronic HIS. increasing of workload on using the electronic HIS on service delivery at the same time (Aikins et al., 2012).

The study conducted in Ghana, similar findings were revealed. The workload reduction and better working scheduling as direct indicator that is most likely to reinforce the system utilization behaviour and certainty the majority of the study participants had that expectations when the system came into existence.

5.3.6. Usage of Technology and Communication

This study shown that about 89.7% of staff with low working experience in the organization have high knowledge of technology and communication on using electronic HIS towards data completeness in the electronic HIS compared to staff with high working experience who have low level of technology and communication on electronic HIS. The study also revealed those staff with low level of experience who have high knowledge of technology and communication are computer literate and this influenced them to have more access on the use of electronic HIS more frequently in the hospital during service delivery. On the other hand, those with high working experience the older ones their level of understanding in terms of technology and communication is low due to poor perception on usefulness of the electronic HIS.

Also similar study done in Tanzania revealed that healthcare workers with low working experience have high knowledge and enough skill on the usage of the technological devices. (Kimaro & Twaakyondo, 2005)

Study conducted in Kenya similar findings were contrary, inadequate electronic data exchange and system integration between electronic HIS and other clinical data systems such as radiology and diagnosis. This requiring more time to manually enter data from external systems, and increasing physicians' resistance to EMR use. Furthermore, with fewer data in the electronic HIS. There were less opportunity for intervening electronically to improve quality of data and reduced ability to perform internal analyses or to report performance externally for quality report cards or performance incentive programs (Mugo, 2014).

However, with over half of the respondents saying their expectations had not been met, it's had to see how the system utilization is going to improve. Cucciniello et al., (2015), observed that inability to meet end user's expectations is bound to cause system failure

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

This study has determined the incompleteness of patients' information in the electronic HIS among clinicians, nurses and medical records staff to be very high (90%). The study has also indicated nurse cadre (81.3%) has high data incompleteness in the electronic HIS than clinicians and medical records staff. The generalization of the evaluation of the system in data capturing were considered to be poor and affect quality of data and management on decision making. Among of the most influential factors include attitude, behavior, training, workload and scheduling, technology and communication. Based on the cumulative analysis of these factors, it can be concluded that hospital administrative management needs to address these factors affecting data completeness in the electronic HIS.

6.2. Recommendations

Based on the findings of the study discussed in chapter five, the following recommendations are made to address the existing factors associated with data completeness in the electronic HIS at MNH.

1. The MNH should effectively engage clinicians, nurses and medical records staff during the review process of electronic HIS and establish standards of information to be captured in the electronic HIS in order to increase awareness to the staff for effective usage of the system in order to improve capturing of all necessary patients' information during attending patients in the hospital. This will improve general awareness of the clinicians, nurses and medical records staff especially on the frequent changes which are normally made in the electronic HIS at the MNH.

2. The MNH should enhance training programs for the clinicians, nurses and medical records staff in the use of electronic HIS for effective capturing of patients' data in the system. The trainings should mostly focus on areas of weaknesses of the staff in using the electronic HIS for better improvement of capturing patients' information in the system. This will increase their morale, redness and change negative mind set of staff

in the usage of the electronic HIS and hence filling practice of important patients' information will be improved in the system.

3. The transformation from paper based system to paperless system in out-patient clinic at MNH was purposely done to improve health care documentations and healthcare services delivery. Clinicians, nurses and medical record staff were still filling insurance information manually. Therefore, MNH management and health insurance companies should formulate harmonized policy directing that all insurance information to be captured and printed out direct from the electronic HIS so as to avoid double filling of the same information from the electronic HIS and in insurance forms in order to reduce workload of the clinicians and nurses in attending patients in the hospital.

4. There is a need to encourage clinicians, nurses and medical records staff to effectively use the electronic HIS for capturing patients' information by outlining the importance of the HIS in their daily activities of attending patients.

5. The MNH should procure enough computer devices for the clinicians, nurses and medical records staff and placed in various service points in order to reduce overdependence of the available few computers. Also the management should procure sound to text recognition devices or free text to electronic text devices to solve the problem of typing speed of patient information and increase concentration of clinicians in attending patients.

REFERENCES

Abdekhoda, M., Ahmadi, M., Gohari, M., & Noruzi, A. (2014). The effects of organizational contextual factors on physicians' attitude toward adoption of Electronic Medical Records. *Journal of Biomedical Informatics*, *53*, 8–13. https://doi.org/10.1016/j.jbi.2014.10.008

Acquah-Swanzy, M., 2015. Evaluating Electronic Health Record Systems in Ghana: The case of Effia Nkwanta Regional Hospital. *Munin Open Research Archive*, (May).

Aikins, M. et al., 2012. Improving Medical Records Filing In a Municipal Hospi- Tal In Ghana. *Ghana medical journal*, 3(September), p.46.

Ajami, S. & Mohammadi-bertiani, Z., 2014. Training and its Impact on Hospital Information System (HIS) Success. *J Inform Tech Softw Eng*, 2(January 2012), p.112.

Almutairi, A. & Mccrindlel, R., A Case Study of Nurses Perceptions and Attitude of Electronic Medical Records in Riyadh and Jeddah ' s Hospitals. , pp.45–51.

Belay, D.T., 2013. *Factors Affecting the Adoption of Health Management Information Systems (HMIS) Among Health Workers: The case of SmartCare Software in Addis Ababa Regional Public Hospitals*,

Bickel, C. (2006). Technology Acceptance among Physicians. *Science*, 650–672. Retrieved from http://www.sciencemag.org/cgi/reprint/sci;316/5830/1416.pdf

Busagala, L.S.P. & Kawono, G.C., 2013. Underlying Challenges of E-Health Adoption in Tanzania. *International Journal of Information and Communication Technology Research*, 3(1), pp.34–41.

Chen, H. et al., 2014. A review of data quality assessment methods for public health information systems. *International Journal of Environmental Research and Public Health*, 11(5), pp.5170–5207.

Cucciniello, M. et al., 2015. Understanding key factors affecting electronic medical record implementation a sociotechnical approach. *BMC Health Services Research*, 15, pp.1–19.

Dick, R.S., Steen, E.B. & Detmer, D.E., 1997. *The Computer-Based Patient Record: An Essential Technology for Health Care, Revised Edition*, National Academy of Sciences.

Djorlolo, S.A. & Ellingsen, G., 2013. Readiness Assessment for Implementation of Electronic Patient Record in Ghana : A Case of University of Ghana Hospital. *Journal of Health Informatics in Developing Countries*, 7(2), pp.128–140.

Elizabeth, M., 2008. Use and acceptance of an electronic health record: factors affecting physician attitudes., (August).

Egmond, C. & Bruel, R., 2007. Triandis' Theory of Interpersonal Behaviour. *Analysis of theories and a tool for developing interventions to influence energy-related behaviour*. Available at: http://www.cres.gr/behave/pdf/paper_final_draft_CE1309.pdf%5Cnhttp://www.cres.gr/behave/pdf/Triandis_theory.pdf.

Gagnon, M. P., Ghandour, E. K., Talla, P. K., Simonyan, D., Godin, G., Labrecque, M., … Rousseau, M. (2014). Electronic health record acceptance by physicians: Testing an integrated theoretical model. *Journal of Biomedical Informatics*, *48*, 17–27. https://doi.org/10.1016/j.jbi.2013.10.010

Garrib, A., Stoops, N., Dlamini, L., Govender, T., Rohde, J., & Herbst, K. (2008). An evaluation of the District Health Information System in rural South Africa. *South African Medical Journal*, *98*(7), 522–549. https://doi.org/10.7196/samj.426

Gruber, D. et al., 2009. Factors Influencing Outcomes of Clinical Information Systems Implementation. *CIN: computers, informatics, nursing*, 27(3), pp.151–163.

Ishijima, H. et al., 2015. Challenges and opportunities for effective adoption of HRH information systems in developing countries : national rollout of HRHIS and TIIS in Tanzania. *Human resources for health*, 13(1), pp.1–14.

Karuri, J., Waiganjo, P., Orwa, D., & Manya, A. (2014). DHIS2: The Tool to Improve Health Data Demand and Use in Kenya. *Journal of Health Informatics in Developing Countries*, *8*(1), 38–60. Retrieved from http://www.jhidc.org/index.php/jhidc/article/view/113

Khalifa, M., 2013. Barriers to Health Information Systems and Electronic Medical Records Implementation A Field Study of Saudi Arabian Hospitals. *Procedia - Procedia Computer Science*, 21, pp.335–342. Available at: http://dx.doi.org/10.1016/j.procs.2013.09.044.

Kimaro, H.C. & Twaakyondo, H.M., 2005. Analysing the hindrance to the use of information and technology for improving efficiency of health care delivery system in Tanzania. *Tanzania Journal of Health Research*, 7(September 2005), pp.189–197.

Ledikwe, J.H. et al., 2014. Improving the quality of health information : a qualitative assessment of data management and reporting systems in Botswana. *Health Research Policy and Systems*, 12, pp.1–10.

Littlejohns, P., 2003. Evaluating computerised health information systems: hard lessons still to be learnt. *Bmj*, 326(7394), pp.860–863. Available at: http://www.bmj.com/cgi/doi/10.1136/bmj.326.7394.860.

Makoul, G., Curry, R.H. and Tang, P.C., 2001. The use of electronic medical records. *Journal of the American Medical Informatics Association*, *8*(6), pp.610-615.Malik, M.A. & Khan, H.R., 2009. Understanding the Implementation of an Electronic Hospital Information System in a Developing Country : A Case Study from Pakistan. *ACM Digital Library*, 97 pp.31–36.

Malik, M.A. & Khan, H.R., 2009. Understanding the Implementation of an Electronic Hospital Information System in a Developing Country : A Case Study from Pakistan. *ACM Digital Library*, 97(Hikm), pp.31–36.

Menke, J. A., Broner, C. W., Campbell, D. Y., McKissick, M. Y., & Edwards-Beckett, J. A. (2001). Computerized clinical documentation system in the pediatric intensive care unit. *BMC Medical Informatics and Decision Making*, *1*, 1–7. https://doi.org/10.1186/1472-6947-1-1

Mugo, D.M., 2014. Determinants of Electronic Health in Developing Countries. *International Journal of Arts and Commerce*, 3(3), pp.49–60.

Nøhr, Christian; Andersen, Stig Kjær; Bernstein, Knut; Bruun-Rasmussen, Morten; Vingtoft, S., 2007. *Aalborg Universitet Diffusion of Electronic Health Records*,

Nyamtema, A.S., 2010. Bridging the gaps in the Health Management Information System in the context of a changing health sector. *BMC medical informatics and decision making*, 10(1), p.36.

Ochieng, O.G. & Hosoi, R., 2005. Factors influencing diffusion of electronic medical records : a case study in three healthcare institutions in Japan. , 34(4), pp.120–129

Olok, G.T., Yagos, W.O. & Ovuga, E., 2015. Knowledge and attitudes of doctors towards e-health use in healthcare delivery in government and private hospitals in Northern Uganda : a cross *Medical Informatics and Decision Making*, pp.1–10. Available at: http://dx.doi.org/10.1186/s12911-015-0209-8.-sectional study. *BMC*

Samaan, Z.M., Klein, M.D., Mansour, M.E. and DeWitt, T.G., 2009. The impact of the electronic health record on an academic pediatric primary care center. *The Journal of ambulatory care management*, *32*(3), pp.180-187.

Stella, O., & M, H. (2008). E-health in Rural Areas: Case of Developing Countries — UN-APCICT, *2*(4), 1–9. Retrieved from http://www.unapcict.org/ecohub/resources/e-health-in-rural-areas-case-of-developing-countries-1

Sue Bowman, MJ, RHIA, CCS, F., 2009. Impact of Electronic Health Record Systems on Information Integrity : Quality and Safety Implications. *Perspectives in Health Information Management*, 10, p.19.

Takhti, H.K. et al., 2012. Impact of Hospital Information Systems on patient care_ Nurses' perceptions _ Canadian Journal of Nursing Informatics. *Canadian Journal of Nursing Informatics*, 6(4), pp.1–9.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2018). User acceptance of Information Technology, *27*(3), 425–478.

Wanjiku, N.C., 2015. Assessment of data quality and Information use of the Community Health Information system: a case study of Karurumo community Health unit- Embu County, Kenya. , (November).

Wegner, L. and Rhoda, A., 2013. Missing medical records : an obstacle to archival survey-research in a rural community in South Africa. *South African Journal of Physiotherapy*, pp.15–19.

Weiskopf, N.G. et al., 2013. Defining and measuring completeness of electronic health records for secondary use. *Journal of Biomedical Informatics*, 46(5), pp.830–836.

Wells, B.J. et al., 2013. Strategies for Handling Missing Data in Electronic Health Record Derived Data. *eGEMs*, 1, pp.12–17.

WHO. (2008). Health Information Systems. World Health, 2nd Editio(January), 72. https://doi.org/10.4018/978-1-60566-988-5

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APPENDICES

Appendix I: Participant Information Sheet

TITLE: ASSESSMENT OF FACTORS AFFECTING DATA COMPLETENESS ON ELECTRONIC HOSPITAL INFORMATION SYSTEM AT MUHIMBILI NATIONAL HOSPITAL

PID No ………………

Greetings!

My name is Sixmund Silvatory, I am a postgraduate student at Muhimbili University of Health and Allied Sciences (MUHAS), pursuing Master's Degree of Health Information Management. The thesis I am undertaking is to assess the factors affecting data completeness on electronic hospital information system at Muhimbili National Hospital.

It is my desire that the research outcome will provide an insight into the extent to which the incomplete of data in the electronic Hospital Information System and to overcome other factors which affect the process of data capturing in the electronic HIS.

Ethical clearance approval will be obtained since this research involves human participants

What Participation Involves:

Participants who join the study, will be using questionnaire and the document review in the electronic database of the patient folder in the electronic Hospital Information System.

Participants contribute immensely to this study by objectively answering the questions in the questionnaire. Your hospital have been selected for this study because the researcher values your responses to the questions and would take your views, ideas, attitude, perceptions, expertise, professionalism and practices expressed as confidential.

Hence your participation is entirely voluntary but your cooperation and assistance will definitely make a difference in this exercise.

Confidentiality:

The information will be put into a written report, your personal information, facility information and all material collected will be kept confidential. With the exception of my Thesis Supervisor, Dr. Bruno Sunguya no other person will see the data collected. All collected data will be destroyed five years after the end of the thesis.

Who to contact:

If you have any questions, enquiries or would you like to receive further information about the research thesis, please contact the Principal Investigator Sixmund Silvatory (Muhimbili University of Health and Allied Sciences, P.O.Box 65001, Dar es Salaam). If you have any questions about your rights as a participant, you may contact Dr.Bruno Sungya, Chairman of the Senate Research and Publications Committee, P.O.Box 65001, Dar es Salaam.

Signed: _____

Sixmund Silvatory

Appendix II: Informed Consent Form

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

SCHOOL OF PUBLIC HEALTH AND SOCIAL SCIENCES

DIRECTORATE OF RESEARCH AND PUBLICATIONS,

INFORMED CONSENT FORM

ID NO……………………..

Greetings,

My name is …………………………………………………working for school of public health and social sciences at Muhimbili University of Health and Allied Sciences in Dar es Salaam.

Purpose of the study

Dear respondent, I would like to inform you that this is a research study titled ''Factors associated with data completeness in the electronic Hospital Information System at MNH, Dar es Salaam''.

This study seeks to asses factors associated with data completeness in the electronic HIS at MNH. Kindly be honest and true for good results that could lead to better intervention and recommendations in future.

Confidentially

We were protect and treat information provide with high confidentially to the best of our knowledge. We won't wrote your name on the questionnaire or in any reports/documents that might let someone identify you. Your name won't be linked to research information in any way.

The investigator will take care of information to be collected. However, final results after the analysis will be shared with shared with national stakeholder and I will submit manuscript for publication and scientific journals.

Right and withdraw alternatives

Your participation is voluntary. You may decline from participation to the study at any time even if you have consented to participate. Your decision to participate or not to participate will not be associated with the right to get services in the facility. There is no penalty for refusing to participate in the study. You will not experience loss of your refusal to participate in this study.

Personal to contact

If you have any questions about this study you should contact the principal investigator (Sixmund Silvatory Mob: 0753125457/0713766980) of MUHAS, Dar es Salaam. If you have any questions about your participation rights please contact, Supervisor, Dr. Bruno Sunguya Mob: (0685217272) MUHAS Dar es Salaam.

Appendix III: Questionnaire

FOR OFFICIAL USE ONLY

1. Questionnaire number ………………………

PART I : DEMOGRAPHIC DATA

1. Sex :   1= [ ] Male   2= [ ] Female
2. Age :   1= [ ] 20-29 2= [ ] 30-39   3= [ ] 40-49   4= [ ] 50-59   5= [ ] 60 and above
3. Level of education attained :

    1= [ ]   Certificate   2= [ ] Diploma   3= [ ] Degree   4= [ ] Masters   5= [ ] Phd

4. Indicate your designation :

    1= [ ] Medical Doctor 2= [ ] Medical Record   3= [ ]   Nurse 4= System Administrator

    5= [ ] Data Clerk

5. Work experience years

    1= [ ]   0-5yrs   2= [ ]   5-10 yrs 3= [ ]   10-15yrs 4= [ ] 15-25 yrs 5= [ ]   25- above

THE LEVEL OF USE OF AN ELECTRONIC HOSPITAL INFORMATION MANAGEMENT ON DATA CAPTURING

II. TECHNOLOGY AND COMMUNICATION

6. How often do you use electronic system (HIS)

    1= [ ]   Daily   2= [ ]   Weekly   3= [ ]   Once in a Month   4= [ ]   Once in a three Month 5= [ ]   Once in a year

7. Does a system part of your working tool ?

    1= [ ]   Yes   2= [ ]   No

8. If Yes which of the following activities performed by your system effectively

1= [ ]   Registration 2= [ ]   Billing 3= [ ]   Clinical services 4= [ ]   Booking of investigatios   5= [ ]   Prescription management

9. How do you rate the effectiveness of the data capturing process in a different section? (Tick   the appropriate).

	Section	**Very low**	**Low**	**Fair**	**High**	**Very High**
10.	Registration Point					
11.	Billing					
12.	Clinical Services					
13.	Booking on Investigation					

14. Does the system meet your daily demand ?

1= [ ]   Yes 2= [ ]   No

15. Do you have standard operating procedures for documentation ?

1= [ ] Yes 2= [ ] No

16. If   Yes in which rate does the standard operating procédures work in the   data capturing process in HIS

1= [ ] Very Poor 2= [ ]   Poor 3= [ ]   Fair 4= [ ]   Good 5= [ ] Very Good

17. Does the system support communication between different section ?

1= [ ]   Yes 2= [ ]   No

18. If Yes in which rate does it perform communication in several sections.

1= [ ] Very Poor 2= [ ] Poor 3= [ ] Fair 4= [ ] Good 5= [ ] Very Good

19. Does each module in the different section intragrated together ?

1= [ ] Yes 2= [ ] No

20. How do you rate the level of intégration of the modules

1= [ ] Very Poor 2= [ ] Poor 3= [ ] Fair 4= [ ] Good 5= [ ] Very Good

THE KNOWLEDGE AND SKILLS LEVELS ON ELECTRONIC HOSPITAL INFORMATION MANAGEMENT.

III . KNOWLEDGE AND SKILLS

21. What is the length taken to undergo training in using the system

1= [ ] One week 2= [ ] Two weeks 3= [ ] One month 4= [ ] Three months

5= [ ] One Year

22. Have you attended major training on system development/advancement ?

1= [ ] Yes 2= [ ] No

23. Have you ever participated in any training/seminar/workshop regarding electronic Hospital Information System in your formal training?

1= [ ] Yes 2= [ ] No

24. Were you satisfied with the training ?

1= [ ] Very much 2= [ ] Somehow 3= [ ]   Not at all

25. Do you need more training on electronic Hospital Information System ?

   1= [ ]   Yes 2= [ ]   No

26. If Yes, which the area of the electronic Hospital Information System would you like
   to have more training?

   1= [ ]   Demographical registration 2= [ ] Clinical history 3= [ ] To take vital

   sign 4= [ ]   Prescription 5= [ ]   Ordering and issuing medicine

27. Have you attended the advance training on electronic Hospital Information System ?

   1= [ ]   Yes 2= [ ]   No

28. How often the advancement training offered ?

   1= [ ]   One week 2= [ ] One week 3= [ ] One month   4= [ ] Three month

   5= [ ]   One Year

29. How do you asses your knowledge on the use of electronic system ?

   1= [ ] Very Poor 2= [ ]   Poor 3= [ ]   Average 4= [ ]   Good 5= [ ] Very Good

30. Do you have any support guideline in your organization based on your system ?

   1= [ ] Yes 2= [ ] No

31. If Yes, Is it hepful during data processing

   1= [ ] Yes 2= [ ] No

CHALLENGES ENCOUNTERED DURING CAPTURING OF THE PATIENT RECORDS IN THE ELECTRONIC HOSPITAL INFORMATION SYSTEM

V : CHALLENGES ENCOUNTERED

32. What is the major issues/factor   affecting your system performance.

    1=   Power blackout

    2=   Network problem

    3=   Weak device

    4=   Insufficient technical support   [ ]

    5 = Poor knowledge

    6=   Typing speed

    7=   Poor scheduling and Workload

33. How do you rate factors you select in No.1

	Factors	**High**	**Very High**	**Extremely High**
34.	Power blackout			
35.	Network problem			
36.	Weak device			
37.	Insufficient technical support			
38.	Poor knowledge			
39.	Typing speed			
40.	Poor scheduling and Workload			

41. What are the factors contributing to incomplete information

    1= [ ] Frequently changes of the operation

    2= [ ] Frequently changes of the module system

    3= [ ] Lack of sustainable training

    4= [ ] Too many fields (information) to fill

42. Are the user of the system competent?

    1= [ ]   Yes 2= [ ]   No

SCHEDULING AND WORKLOAD		
43.	How does organization observe/rate balance in the patients scheduling?	1= [ ] Very Low 2= [ ] Low 3= [ ] High 4= [ ] Very High 5 = [ ] Extremely High
44.	How does the schedule of training used to users sufficient to master the system?	1= [ ] Very Low 2= [ ] Low 3= [ ] High 4= [ ] Very High 5 = [ ] Extremely High
45. .	How does number of staff proportional to the number of the patient receiving the services?	1= [ ] Very Low 2= [ ] Low 3= [ ] High 4= [ ] Very High 5 = [ ] Extremely High
46. .	How rate the process of appointment of the patients	1= [ ] Very Low 2= [ ] Low 3= [ ] High 4= [ ] Very High 5 = [ ] Extremely High
47.	How do you rate the MHN management involve the staff in recruitment planning.	1= [ ] Very Low 2= [ ] Low 3= [ ] High 4= [ ] Very High 5 = [ ] Extremely High

USER ATTITUDE AND BEHAVIOUR TOWARDS USAGE OF ELECTRONIC HOSPITAL INFORMATION SYSTEM IN DATA CAPTURING

VI. ATTITUDE		
48.	Do you think whether the switch from paper based records to electronic HIS has been positive experience in the capturing of patient data	1= [ ] Strongly Disagree 2= [ ] Disagree 3 = [ ] Neutral 4= [ ] Agree 5= [ ] Strongly Agree
49.	How do you currently records your clinical documentation	1= [ ] Strongly Disagree 2= [ ] Disagree 3 = [ ] Neutral 4= [ ] Agree 5= [ ] Strongly Agree
50.	Do you think that your spending more when dealing with patient records	1= [ ] Strongly Disagree 2= [ ] Disagree 3 = [ ] Neutral 4= [ ] Agree 5= [ ] Strongly Agree
51.	Do you think that your spending more when dealing with patient records	1= [ ] Strongly Disagree 2= [ ] Disagree 3 = [ ] Neutral 4= [ ] Agree 5= [ ] Strongly Agree
52.	Using electronic Hospital Information System means longer consultation	1= [ ] Strongly Disagree 2= [ ] Disagree 3 = [ ] Neutral 4= [ ] Agree 5= [ ] Strongly Agree

53.	Training to understand each section on data capturing is of too much effort on the electronic Hospital Information System	1= [ ] Strongly Disagree 2= [ ] Disagree 3 = [ ] Neutral 4= [ ] Agree 5= [ ] Strongly Agree
54.	Electronic Hospital Information System records are of more value than paper files	1= [ ] Strongly Disagree 2= [ ] Disagree 3 = [ ] Neutral 4= [ ] Agree 5= [ ] Strongly Agree
55.	Electronic Hospital Information System interfere is unjustifiably with clinician -patient consultation	1= [ ] Strongly Disagree 2= [ ] Disagree 3 = [ ] Neutral 4= [ ] Agree 5= [ ] Strongly Agree

VII. BEHAVIOUR,		
56.	When do you fill all the information in the patient electronic folder ?	1= [ ] Very Frequently 2= [ ] Frequently 3 = [ ] Occasionally 4= [ ] Rarely 5= [ ] Very Rarely
57.	How often is the electronic HIS easy to learn how to use	1= [ ] Very Frequently 2= [ ] Frequently 3 = [ ] Occasionally 4= [ ] Rarely 5= [ ] Very Rarely

58.	How often is the electronic hospital Information system has complete patient data	1= [ ] Very Frequently 2= [ ] Frequently 3 = [ ] Occasionally 4= [ ] Rarely 5= [ ] Very Rarely
59.	How often is the electronic hospital Information system has complete patient data	1= [ ] Very Frequently 2= [ ] Frequently 3 = [ ] Occasionally 4= [ ] Rarely 5= [ ] Very Rarely
60.	How often does the information contained in electronic HIS meet the needed	1= [ ] Very Frequently 2= [ ] Frequently 3 = [ ] Occasionally 4= [ ] Rarely 5= [ ] Very Rarely
61.	How often does electronic HIS deliver the information in the different section in timelly manner	1= [ ] Very Frequently 2= [ ] Frequently 3 = [ ] Occasionally 4= [ ] Rarely 5= [ ] Very Rarely
62.	How often is the data in the electronic HIS are complete	1= [ ] Very Frequently 2= [ ] Frequently 3 = [ ] Occasionally 4= [ ] Rarely 5= [ ] Very Rarely

Appendix IV: Ethical clearance certificate

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR OF POSTGRADUATE STUDIES

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Ref. No. MU/ PGS/SAEC/Vol. X/

13th November, 2017

Mr. Sixmund Silvatory
Master of Health Information Management
MUHAS.

RE: APPROVAL OF ETHICAL CLEARANCE FOR A STUDY TITLED: "ASSESSMENT OF FACTORS AFFECTING DATA COMPLETENESS ON ELECTRONIC HOSPITAL INFORMATION SYSTEM AT MUHIMBILI NATIONAL HOSPITAL"

Reference is made to the above heading.

I am pleased to inform you that, the Chairman has, on behalf of the Senate, approved ethical clearance for the above-mentioned study. Hence you may proceed with the planned study.

The ethical clearance is valid for one year only, from 31st October, 2017 to 30th October, 2018. In case you do not complete data analysis and dissertation report writing by 30th October, 2018, you will have to apply for renewal of ethical clearance prior to the expiry date.

13·11·2017

Dr. Erasto Mbugi
Ag: DIRECTOR OF POSTGRADUATE STUDIES

cc: Director of Research and Publications
cc: Dean, School of Public Health and Social Sciences
cc: Supervisor