Factors Affecting the Implementation of Health Commodity Management Information System: The Case of Addis Ababa Public Health Facilities

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DECLARATION

I, Demelash Regassa declared that a thesis entitled with "Factors Affecting the Implementation of Health Commodity Management Information System: The Case of Addis Ababa Public Health Facilities" is my original research work and have never been submitted to any other university for any Diploma or Degree. I also declare that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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Certification

This is to certify that a research under taken by Demelash Regassa under my advising entitled with: “Factors Affecting the Implementation of Health Commodity Management Information System: The Case of Addis Ababa Public Health Facilities” submitted to the AAU in partial fulfillment of the requirements for the Degree of Master of Arts in Logistics and Supply Chain Management complies with the regulations of the Addis Ababa University and meets the accepted standards with respect to originality and quality.

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Signature_____

Date_____

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Acronyms

HCMIS	Health commodity management information system
RRF	Requisition and report form
MIS	Management information system
LMIS	logistic management information system
USAID	United States Agency for International Development
EPSA	Ethiopia pharmaceutical supply agency
RDF	Revolving drug fund
IS	Information system
IT	Information technology
TQM	Total quality management
HMIS	Health management information system
IPLS	Integrated Pharmaceutical Logistics System
NIMIS	Networked Inventory Management Information Systems
DSM	Drug supply managers

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Abstract

The health commodity management information system (HCMIS) has been implemented in Ethiopia to serve the country's public health commodity supply chain since 2009. It is claimed to improve pharmaceutical management majorly through data visibility. These study aims to assess what are the factors affecting HCMIS implementation. Three factors are vital in the successful implementation of management information system. These are organizational factors, technological factors and human factors. A Mixed research approach using quantitative and qualitative methods and descriptive design was employed in this study. The questionnaire was developed by using 5-point Likert Scale and structured and semi- structured type questionnaire also used. To ensure reliability of this study, a Cronbach's Alpha will performed. To ensure validity of a study, a pilot study was conducted. Data analysis involved descriptive statistics and inferential statistics data analysis using Statistical Package for Social Sciences (SPSS) version 20. Multiple Regression analysis of model summary shows the value of R2 is 0.551 which indicates that organizational, human and technological simultaneously contribute 55.1% variation in HCMIS implementation and the rest can be attributed to other factors. The study established that utilization of health management information for decision making was poor in most health facilities in Addis Ababa. HCMIS implementation is determined by organizational, human and technological factors especially organizational factors played a key role in enhancing followed by the human and technological factors. It is therefore recommended that these three factors should be enhanced and strengthened so as to maximize the use of information to make decisions.

Key words – management information system, Health commodity management information system, organizational factors, human factors, technological factors

CHAPTER 1 INTRODUCTION

This chapter provides the background about health commodity management information system and its benefit. Briefly raise factors that affect its implementations. The statement of the problem, aim and objectives of the study to the health organizations, scholars and justifies the necessity for the conducting this study included in this chapter. The scope, the limitation of the study and definition of key words in the study also found. Finally the chapter presents how the study is organized.

1.1 Background of the study

Efficient and effective supply chain is critical to the success of any health system. To ensure essential health commodities availability to the right clients, when they need them, supply chain managers need to have visibility into all functions of the supply chain from quantifying demand to procurement. Some functions can't operate independently, which is why a strong logistics management information system (LMIS) is needed. A strong LMIS can ensure data visibility throughout each function, and essential logistics data can be communicated to supply chain managers for decision making. Information is the engine that drives the logistics cycle; without information, the logistics system would not run smoothly (USAID/DELIVER, 2015).

One method of reducing poor commodity management is to use technology in inventory management. Automation of health commodity management could be a better solution, which is a set of hardware and software based tools that automates the process of inventory (health commodity) management. Automated inventory management requires a lot of information processing within and outside the organization. The transformation, storage and communication of information about the inventory in the stock points as well as in the intermediate processes across the supply chain is highly complex. The driving forces for automated inventory management are increasing customer requirements, the need for networked organizations and the opportunity of networked inventory management. In networked firms where the inventory managers have to deal with several other organizations as far as stock management is concerned, the Networked Inventory Management Information Systems come in handy (Samuel & Ondiek, 2014).

The health commodity management information system (HCMIS) in Ethiopia is an open source, custom software solution; it was developed in Ethiopia for the country's health commodity supply chain. First developed and deployed in 2009 to manage inventories in health facility pharmaceutical stores (Facility Edition), it was adapted in 2010 for the Pharmaceuticals Fund and Supply Agency (PFSA) to use in its network of distribution hubs. The HCMIS Facility contains the essential data required to manage and account for all health commodities managed by facilities, including donated items and the commodities purchased with the revolving drug fund (RDF). Analytical tools provide users and managers with reports on cost, price only (value per batch to determine charge to the patient), as well as value of inventory, expiries, and near expiries. The HCMIS Facility also manages transactions for issuing commodities to dispensing units within the facility, capturing consumption, stock balance, and losses and adjustments to calculate issue quantity. All the data are aggregated into a single Report and Requisition Form (RRF) that facilities can generate electronically and use to order from PFSA (USAID/DELIVER, 2015).

A proper implementation of Management Information Systems (MIS) can improve an organization's performance, productivity, and work efficiently. Three factors are vital in the successful implementation of MIS. These are organization factors, technology factors and human factors. There are several other factors but these three are the most important ones according to observation. All other factors can be incorporated into these three factors. These three main factors work in an integrated and coordinated way. There are several other important sub-factors in each of these three areas. These are also discussed in this paper. Management Information Systems (MIS) play a vital role in decision-making process. Managers can improve their decision-making process with the successful execution of Information Systems (Chowdhury & Salahuddin 2017)

Globally, health management information systems (HMIS) have been hailed as important tools for health reform. However, their implementation has become a major challenge for researchers and practitioners because of the significant proportion of failure of implementation efforts. Researchers have attributed this significant failure of HMIS implementation, in part, to the complexity of meeting with and satisfying multiple (poorly understood) logics in the implementation process. Our main goal in this paper is to determine the factors that affect

HCMIS implementations and make discussions on them. How they affect the successful implementation of MIS is also discussed here.

1.2 Statement of the Problem

Implementing information systems (IS) successfully in organizations appears to be a complex task and healthcare information systems are also no exception.

The Public Sector encounters great challenges in its attempts to strengthen its public services. Public servants are in need of accurate and up-to-date information that can be readily accessible. They need internal and external information to be made available for effective and efficient decision-making. In order to improve their service delivery, the Public Sector must aim to reach their objectives to increase and improve efficiency, productivity and quality of services (Bessick, 2016).

The successful adoption of MIS in any companies is much depending on technology, project, organization, user, social, and task factors. However, in reality these factors are much neglected by organizations. Organizations must understand the factors that affect successful implementation MIS toward enhancing the individual performance (Al-Mamary et al 2015). The implementation of MIS in healthcare has been particularly slow and lagging behind that of major organizations by as much as 10-15 years (Goldschmidt, 2005). This is further exacerbated by the failure in HIS implementation as well as resistance to the use of the technology by healthcare professionals (Berg, 2001; Heeks, 2006).

Poor MIS implementation can be expressed by unnecessary data is being collected and vice versa, adding extra work at the point of data capture; therefore, relevant pieces of supply chain information are missed which leads to guess work and inadequate data for supply chain decisions; this leads to frequent stock-outs and over stock which wastes resources (USAID/SIAPS, 2013).When the automation failed, trust and self-confidence in the system were decreased (Weinstock, Oron- gilad & Parmet, 2012).

For information to be used effectively should be available, accessible, of quality, and there should be knowledge for its applications and user-friendly. Data/ information utilization rate is only 30%. This is very low usage of data/information to make informed decisions. This has led

to inequity in allocation of resources and poor planning for provision of essential healthcare services. This low utilization rate of health information in planning has increased essential drug stock outs and other commodities such as diagnostics for malaria diagnosis and expiries of some drugs due to overstocking. Consequently, there is inefficiency and ineffectiveness in healthcare service provision by healthcare workers which includes disease surveillance, commodity supply, staffing and many others. This is evident in the distribution of healthcare workers which is 12%, 20% and 30% in hospitals, health centers and dispensaries respectively. This is far below and unacceptable as per health staffing norms. Health systems' personnel responsible for data collection and analysis were undervalued, under skilled and under staffed. This led to unprofessionalism practices in health information which compromised quality of data and information, consequently making it unworthy for decision making (Obwocha et al., 2016).

Health facilities need efficient and effective MIS to manage their health commodity so to fulfill this they install HCMIS as a MIS. But its implementation is so poor and they can't manage their commodity well. Additionally they didn't assess its implementation status and factors affect its implementation.

The 2014 five year country report of integrated pharmaceutical logistic system shows that the major challenges of the country are lack of system institutionalization, data quality and data utilization for decision making. In addition to this stock out, over stock, expiry, real time data and poor inventory management are still challenges for the country. when those challenges can reduced by the implementation of HCMIS but till now except few Health facilities most of them are using the manual report and requisition format (RRF) rather than generating the report from the HCMIS to refill their stock and almost all assessment performed in the country regarding integrated pharmaceutical logistic system is focuses on the manual pharmaceutical management information system and due to this little is known about the practice of the automated logistic management information system the so called HCMIS.

Assessing the success of management information systems has been identified as one of the most critical issues in IS field several conceptual and empirical studies have been conducted to explore this confusing yet important issue. A huge debate continues the concerning of the appropriate set of variables that can be used to determine the users' perception of IS success. However, studies relating to this issue are few and lack of the ability to propose an appropriate evaluation criterion.

As mentioned by past scholars, the successful adoption of technology in any companies is much depending on technology, project, organization, user, social, and task factors. However, in reality these factors are much neglected by organizations. Organizations must understand the factors that affect successful adoption of MIS toward enhancing the individual performance (Al-adaileh, 2009).

1.3 Research Hypothesis

The study will guided by the following hypothesis. The following hypothesis developed based on conceptual framework build under mentioned.

H01: Organizational factors don't have any significantly influence the implementation of health commodity management information system (HCMIS) in the public health facilities.

H1: Organizational factors significantly influence the implementation of health commodity management information system (HCMIS) in the public health facilities.

H02 Human factors don't have any significantly influence the implementation of health commodity management information system (HCMIS) in the public health facilities.

H2: Human factors significantly influence the implementation of health commodity management information system (HCMIS) in the public health facilities.

H03: factors significantly influence the implementation of health commodity management information system (HCMIS) in the public health facilities.

H3: Technological factors significantly influence the implementation of health commodity management information system (HCMIS) in the public health facilities.

1.4 Research Objectives

1.4.1 General objective

To assess factors that affect full implementation of health commodity management information system (HCMIS)

1.4.2 Specific objectives

To determine organization factors that affect implementation of the HCMIS

To determine individual/ human factors that affect implementation of the HCMIS

To determine technological factors that affect implementation of the HCMIS

1.5 Significance of the Study

By investigating the factors affecting the success of HCMIS implementation in the public health facilities, the study will hopefully have significant impact on the development of implementation Policies and procedures. This study helped to provide the facility manager, Stores managers, pharmacy head, drug supply managers (DSM) and the entire health facility to make informed decision making that will help to achieve the organization goal. The study offered more meaningful and acceptable solution to help the health facilities in considering / in knowing real factors affecting the success of health commodity management and to tackle these factors which hinder health commodity management and implementing strategies that enhance health commodity management.

The studies also enabled higher officials and partners to consider factors that affects MIS when establish the kind of technology and software. The study may benefit the public to get the service that is expected from the facilities.

The results of this study can also be used as a source of reference by other scholars in future and add knowledge to the existing body of knowledge.

1.6 Scope of the study

The study was conducted to identify factors that affect HCMIS implementation by using structured and semi- structured questions. The respondents are relevant health professionals found in the facilities that use or expected to use HCMIS on their job and the primary users are warehouse managers.

The study cover public Health sector specifically health centers and hospitals which found in Addis Ababa those use HCMIS to manage their inventory (health commodities). Conducting the study in Addis Ababa is done because most health facilities use HCMIS so the result found from this assessment will be representative.

In the country's pharmaceutical logistic management system there are two types of automated systems which are facility edition and warehouse edition HCMIS and the emphasis of this study

is on the facility edition particularly Hospitals and health centers found under Addis Ababa Regional Health Bureau and Federal hospitals and Health centers are included.

The study was conducted from March, 2020 to June 2020.

1.7 Limitation of the Study

Due to the study only focused on public health center found in Addis Ababa it lacks diversity in geographical study for comparison. Secondly, time constraints and inadequate financial and material resources will be the challenges that limited the depth of coverage of the research work. A longer time and enough resources would have helped to unearth more findings especially with other healthcare institutions in other regions of the country to determine factors affect HCMIS implementation. There is also limited research done on both its implementation status which helps to analyze hindering factors more accurately and factors affect its full implementations. This study also doesn't assess the automation technology in depth and whether it is the appropriate type of automation or not. The study didn't use interview to assess in depth due to covid- 19 so it is better to use interview to dig out the underlying cause for poor implementation of HCMIS.

1.8 Definition of terms

Stock out – a situation in which the demand or requirement for an item cannot be fulfilled from the current inventory.

Over stock - excess inventory, is the result of poor management of stock demand or of material flow in process management?

Real time data - is information that is delivered immediately after collection.

Management information system (MIS): This term has been used to refer to those systems used by managers and administrators in disseminating and acquiring information with regard to organizations operations (Bakos & Brynjolfsson 2005).

Information System (IS): This term is used to mean a set of people, procedures and resources that collects, transforms and disseminates information in an organization (Bakos & Brynjolfsson 2005).

Health Information systems or health management information systems:- are according to the literature systems used to collect, analyze, retain, retrieve and evaluate health information (Haux et al. (2004); Tan (2002)).

1.9 Organization of the Study

This research study is organized in five chapters

Chapter one starts with general introduction about the research followed by statement of the problem and continues with the research objectives and questions, the scope and limitations of the study, significance of the study and the organization of the study.

Chapter two: Literature review of the study is presented in this chapter. An overview of HCMIS and its benefit is discussed. Theoretical and empirical literatures reviews on factors affecting HCMIS implementation also found in this chapter. Finally conceptual framework of the study is presented.

Chapter three: Presents the research methodology and provides the research approach, design, population, sampling frame, sampling technique, sample size, data sources and types, data collection procedures and methods of data analyses.

Chapter four: In this chapter,data presentation, the analysis of the collected data and interpretation are presented. Based on the data, further discussion on the findings also made.

Chapter five: The final chapter presents conclusion and recommendations.

At the end of this study references and annexed material will be attached.

CHAPER 2 LITERATURE REVIEW

2.1 Introduction

The aim of the literature review is to provide a context for the entire research study. Reviewing existing literature, on the aspect in question, allows the researcher to identify the "gap" that exists. The researcher achieves this by performing an in-depth critique of the existing study.

This chapter intends to review the available literature in order to gain an understanding of the HCMIS, its benefit and factors affect its implementation. In the discussion, factors affecting the success of HCMIS are grouped together into three categories: organizational factors, technological factors and human factors. Empirical literature review about factors affecting HCMIS implementation also assessed in this chapter and conceptual frame work are discussed here.

2.2 Theoretical Literature review

The theoretical literature review of Health commodity Management information System in relation to this study and management information system (MIS) are discussed. It specifically discuss factors that affect HCMIS implementations these are human factors (the perception, attitudes, values, motivation, roles and responsibilities) of the data collectors and users, the and technical (the knowledge, skills on information technology and computers, data collection processes and indicator understanding, systems, forms, and methods) associated with reporting, mistakes and delays in data processing and in disseminating of information which lead to availability and accessibility of data/ information for use (Mahmood and Swanberg, 2001). Technological factors (ease of use, system flexibility, system reliability, and ease of learning, relevance, understandability, accuracy, conciseness, completeness, understandability, currency, timeliness, and usability, responsiveness, accuracy, reliability) (Petter, & DeLone, & McLean (2008), and organizational factors (top management support, Information culture, structure, policies/guidelines, resources, supervision and feedback) Qassim (2005).

2.2.1 Health commodity management information system (HCMIS)

Information is very important for company management in decision making. The information system is an arrangement of people, data, processes, and information technology that interact to

collect, process, store and supply as output the information necessary for an organization. .Information system created in order to simplify the management of data and information as well as help us in searching for data and information needed. Health commodities information system is a system that provides information or reports required by management related to order, storage and inventory (Fitriana, Moengin & Riana, 2016).

The health commodity management information system (HCMIS) in Ethiopia is an open source, custom software solution; it was developed in Ethiopia for the country's health commodity supply chain. First developed and deployed in 2009 to manage inventories in health facility pharmaceutical stores (Facility Edition), it was adapted in 2010 for the Pharmaceuticals Fund and Supply Agency (PFSA) to use in its network of distribution hubs (Warehouse Edition). The USAID | DELIVER PROJECT developed and implemented the HCMIS; a core team of local programmers continues to support the system's evolution, and the team provides help desk services for user and administrator support. USAID has provided most of the funding for the HCMIS; additional support from the Bill & Melinda Gates Foundation helped the programmers adapt the system for vaccine management. As of 2015, the HCMIS platform has been implemented in more than 500 health facilities, the entire PFSA network of the central stores and 11 hubs and central and 18 regional cold rooms for vaccines. The two primary tasks in the hub are warehouse management and inventory control. The warehouse management task manages the movement and storage of stock in the hub. Overseeing and recording deliveries and pickups, maintaining inventory records, location tracking, and controlling inventory levels are some of the crucial functions in the hub. The HCMIS includes web-based dashboards for managers, enabling them to visualize data from all PFSA locations and generate reports on key operational and performance indicators, including stock status, stock aging, demand, etc. These dashboards only display reports; data cannot be entered through the web portal. Web access is also being deployed to PFSA partners, including the Federal Ministry of Health. The HCMIS Facility contains the essential data required to manage and account for all health commodities managed by facilities, including donated items and the commodities purchased with the revolving drug fund (RDF). Analytical tools provide users and managers with reports on cost, price only (value per batch to determine charge to the patient), as well as value of inventory, expiries, and near expiries. The HCMIS Facility also manages transactions for issuing commodities to dispensing units within the facility, capturing consumption, stock balance, and losses and adjustments to

calculate issue quantity. All the data are aggregated into a single Report and Requisition Form (RRF) that facilities can generate electronically and use to order from PFSA. (USAID/DELIVER, 2015).

2.2.2 Benefit of Health commodity management information system (HCMIS) and MIS

The use of management information systems has become necessary for any organization to facilitate the work procedures, improve efficiency, productivity, and improve performance in general. The adoption of technology and management information systems in organizations directly contribute to improve performance, productivity, efficiency, and profitability.

MIS in Organizations According to Al-Mamary et al., (2013)., provides several benefits to the organization: to come out with appropriate responses; the means of effective and efficient coordination between different departments at all the levels of the organization; access to relevant data and documents; use of less labor; improvement in organizational and departmental techniques; management of day-to day activities. Health management information systems offer many potential benefits for healthcare, including financial benefits and for improving the quality of care (Dehnavieh et al., 2018).

The goal of a Health Management Information System is to check quality by comparing perceptions of services delivered with the expected standards and to provide timely and accurate information leading to better health care planning and improved diagnosis and more patients getting access to health services for an entire country (Haux et al. (2004); Tan (2002)

The three main functions of public health interventions have been classified as assessment of health needs and health status, policy development to serve the public interest and assurance that necessary service is provided. “Data, information and knowledge support these three functions thus high quality data is required for better information, better decision-making and better population health”. there is a broad consensus that a strong health management information system is an integral part of the health system, the operational boundaries of which include all resources, organizations and actors that are involved in the regulation, financing and provision of actions whose primary intent is to protect, promote or improve health ” Effective management of today’s health systems depends on critical use of data and information for the effective policy-making, planning, monitoring of services and making decisions.

Sound and reliable information is the foundation of decision-making across all health system building blocks, and is essential for health system policy development and implementation, governance and regulation, health research, human resources development, health education and training, service delivery and financing. The health information system provides the underpinnings for decision-making and has four key functions: data generation, compilation, analysis and synthesis, and communication and use. The health information system collects data from the health sector and other relevant sectors, analyses the data and ensures their overall quality, relevance and timeliness, and converts data into information for health-related decision-making. The health information system is sometimes equated with monitoring and evaluation but this is too reductionist a perspective. In addition to being essential for monitoring and evaluation, the information system also serves broader ends, providing an alert and early warning capability, supporting patient and health facility management, enabling planning, supporting and stimulating research, permitting health situation and trends analysis, supporting global reporting, and underpinning communication of health challenges to diverse users. Information is of little value if it is not available in formats that meet the needs of multiple users − policy-makers, planners, managers, health care providers, communities, individuals. Therefore, dissemination and communication are essential attributes of the health information system (WHO 2006).

One of the six pillars which is crucial to health systems escalation is Health information management. It is a data collection system specifically designed to support planning, management and decision making in health facilities and organizations. It is a process whereby health data are recorded, stored and processed for policy-making, planning, implementation and evaluation of health programs". Health management information has been in most cases expressed as the foundation for better health and as an essential component of appropriate decision-making. Information is the core pillar in strengthening the health systems and that information availability enables managers of health to utilize the information for better implementation, planning, policy-making, monitoring and evaluation of programs in health. Reliable and timely information on service delivery and other key indicators is very valuable for health managers at all levels (Chorongo, 2016).

The HCMIS is helping health facilities to improve commodity management, data visibility, and overall performance. Users with various backgrounds ranging from those with limited computing

experience to advanced users and experts can use HCMIS due to its user-friendly interface. The HCMIS Warehouse has given managers the ability to oversee and record deliveries and pickups, maintain inventory records, and track inventory location. They can use this detailed information to best manage their inventory at all times. Web-based dashboards enhance decision-making by adding the capability of visualizing the most updated data from all PFSA locations then using data from stock status and demand reports to make decisions about forecasting, resupply, and inventory management. Since HCMIS Facility gives facility managers visibility to every health commodity in their store, including donated items and the commodities purchased with the RDF, managers can now provide stakeholders with instant information regarding all expiries, costs, and inventory. Users and managers can react quicker to changes in inventory and make more informed decisions about which products and how much of those products are needed to bring any facility up to adequate stock quantities, reducing the number and length of stock outs (USAID/DELIVER, 2015).

HCMIS, used in the store to control stock movement, Respondents said that this software has many advantage. Firstly they mentioned that it makes their job easy. They also acknowledged it for summarizing their data, preparing different reports, having its own expiry tracking chart and it helped them to understand the utilization pattern of the drug (Berhanemeskel, 2014).

2.2.3 Organizational factors affect HCMIS implementation

Besides the major concern of MIS effectiveness, factors influencing MIS effectiveness are also important. One of these factors is the organizational factor. Organizational factors had a considerable impact on implementation of information technology (Aqil et al., 2009).

According to Gans, et al., (2005) the major impediments in implementation of MIS are organizational factors like lack of support , lack of capital resources, lack of skills or training to use on MIS. The study by Ang, Davies, and Finlay (2001) identified organizational factors that influence IT usage as: managerial IT knowledge, top management support, financial resources, goal alignment and budgeting method. And from a comprehensive list of organizational factors from related studies (Ang et al., 2001; and Tallon, Kraemer, & Gurbaxani, 2000), also identified several organizational factors to influence IS success. The factors are IS Department structure, top management support, goal alignment, managerial IT knowledge, management style, resources allocation and IS infrastructure. Organization is given responsibility for the overall coordination of

all activities relating to the HMIS, including the training of health workers, and monitoring and evaluation of the implementation (MOH, 2000).

The lack of evaluation criteria in the organization also presents a major shortfall in the design, implementation and operation of MIS. There is need to incorporate basic sets of evaluation criteria at the design stage of HMIS. Pre-implementation evaluation criteria should be used to evaluate the system's viability prior to committing resources to its implementation; concurrent evaluation criteria should be used to monitor the process of implementation; and finally, post-implementation evaluation criteria need to be applied to assess the system's effectiveness in the management of district health services. This factor is based on the premise that any information system cannot function effectively unless the people who develop, manage and use it are adequately trained, and users have developed an 'information culture' which enables them to appreciate the value of information as a resource for effective health service delivery. In addition, the lack of adequate resources and managerial support further posed obstacles to the systems' operations (Odhiambo-Otieno, and Odero 2005).

The lack of feedback in the organization from high level as a challenge can‟t be overlooked. Feedback from the high level are important to know how services are implemented and what is the progress and if possible providing recommendations on how to maintain or improve the situation (Karuri et al, 2014). Studies by (Humba 2015 and Kyobe 2004) also highlight the lack of adequate support as critical factors to the use of IT in business factor.

The organization needs to build basic, long term, sustainable skills that can survive changing times, technology, and needs. That means development of user skills should be viewed as a continuous process in order to allow use to learn from their experience and to change course when required. Managers need to upgrade their skills for better management of information flows and planning. In order to build and retain human capacity there is a need to build a conducive working environment not only for organizational but also group and individual benefits. A conducive environment implies better workers' benefits, incentives and work procedures created by the involved actors in response to performing their attached responsibilities (Kimaroa and Nhamposs 2007).

The implementation of sustainable information system necessitate right environment for system implementation and ensure proper guidance to people who are using, managing and developing the system. Top management has been recognized by prior researchers as the key actor on the implementation of the information system for projects and has an important role in the implementation of information system. It has been revealed as a critical success factor (Young and Jordan 2009) and recognized as vital in formulating organization action plans to solve organizational problems, motivating changes in the organization and making decisions (Laudon and Laudon 2012).

2.2.4 Human factors affect HCMIS implementation

The most prevalent barriers that delayed or hindered the adoption and successful implementation of health information systems , according to researchers were the human barriers, including negative beliefs, behaviors and attitudes of healthcare professionals towards such systems (Khalifa 2013).

Healthcare is very complex. The paper based and manual processes that have evolved over the last 100 years will not change easily. The need to involve individual in transforming processes from paper to electronic media is the reason that often 50% of the expenditures for implementation are not related to technology but to involving human components (FACTOR), educating them, obtaining their input, and in supporting them learning by doing. Any technology tool will require humans to run that tool, so involvement, training, careful process mapping and redesign are critical. In the end, medical informatics deployment is more likely to fail due to human factors rather than a failure of technology itself.' (Goldstein, et al., 2007, p.20)

However, studies had shows a severe shortage of skilled manpower and had no any contingency plan to deal with the additional responsibilities. The HMIS unit has thus never been able to accomplish its increased responsibilities (MoH, 2000).

The human factors impact on the usage of information technology and information system revealed as a continuing research question in management information system literature (Szewczak and Snodgrass, 2002). The most success factor for information systems are linked to individual factors and it has been revealed that people are vital assets in any organization (Aziz

et al., 2012). Information technology and information system implementation is likewise affected by skill level, education level, training level, professional level and individual attitude toward information technology and information systems within the organization (Mahmood and Swanberg, 2001). Lack of training/skills to organization staff reported as a cause for failure in numerous information systems implementation while lack of competent personnel to plan and implement projects and program recognized as the main course of project failure (Ika 2012). Manager's work experience reviewed as critical success factors (Hyvari, 2006). The inefficiency of information system is due to lack of competency skills personnel, and absence of training to staff (Shareia, 2006) and personnel competency viewed as important in the success of HCMIS implementation (Daoud and Triki, 2013). Training for project staff is a critical success factor for project achievement (Ika et al., 2012). The level of a staffs experience, education, skills, and knowledge are examined to measure their impact on the implementation of management information system.

Babaei & Beikzad (2014), had explained the position, aim, role, definition are existing barriers and also these humanistic factors are challenges and problems for implementation of management information systems. Individual differences, tasks, & decision models have an effect on user acceptance of MIS).

Actually the analysis of the human barriers of adopting and successfully implementing health information systems and electronic medical records could reveal a lot of factors related directly to the beliefs, attitudes and behaviors of healthcare professionals such as the ability to learn over time, computer knowledge and typing proficiency, understanding and believing in HIS, motivation and personal initiative to explore and use the systems and user-developed strategies and workarounds to solve minor difficulties (Holden 2011).

While capacity to adapt information to ensure that it is culturally appropriate and relevant is a major challenge, so too is the capacity to use MIS effectively. A skilled MIS work force is an essential ingredient for the effective use of HMIS in healthcare. Systems professionals, services providers and project team leaders with high skill levels and experience in an organization are important components of success. It is therefore very important to identify the skills present in the organization and the skills which still need to be trained (Chetley et al. 2006).

2.2.5 Technological factors affect HCMIS implementation

One of the critical factors for the use of a MIS may be related to technological factor: the quality of information provided by the system, the quality of the system itself and the service provided, the technological complexity of the acquired system; training given users, the support of senior management in the deployment process, the efficiency of communication and cooperation in relation to the MIS and the ease of use and usefulness perceived by the user. The intention to use an information technology is directly related to two aspects: the usefulness and ease of use of this technology perceived by the user.

In technological factors, three dimensions are suggested: system quality, information quality, and service quality. The quality of the system and quality of the information are considered as a key factors affecting IS acceptance and improve the organizational performance (Al-Mamary, & Shamsuddin, & Nor Aziati (2014). System quality is the desirable characteristics of information system. For example: ease of use, system flexibility, system reliability, and ease of learning, as well as system features of intuitiveness, sophistication, flexibility, and response times (Petter et al, 2008). Information quality is the desirable characteristics of the system outputs. For example: relevance, understandability, accuracy, conciseness, completeness, understandability, currency, timeliness, and usability. Service quality is the quality of the support that system users receive from the IS department and IT support personnel. For example: responsiveness, accuracy, reliability, technical competence, and empathy of the personnel staff.

The empirical evidence also supports the impact of technological factors that act as the antecedent factors in influencing IS success. Consequently, the study adds to the literature on technological factors influencing IS success that needs more emphasis. Furthermore, the study found strong support on the relationship between the IS success dimensions as proposed by DeLone & McLean's (2002).

Information management is dependent on technology, both for their creation and their storage. Therefore, information must be managed in an effective technology environment (Mckeen & Smith, 2007). The technology platform must support a mobile solution and integrated systems to collect, process, store, and distribute information for decision making (Evans and Price, 2012; Wang, 2010; Hicks, 2007).

Developing the right infrastructure is an essential part of MIS planning activity. If this is not afforded sufficient attention, then software systems may perform sub-optimally (eg, if wireless networks are unavailable or bandwidth is too narrow), or may be inaccessible to users altogether (eg, if there is a lack of available hardware). Again, this increases the possibility that systems are not used at all or used in ways other than intended, potentially compromising benefits and increasing risks associated with technological systems (Sheikh, et al. 2011). We have repeatedly found that inappropriate infrastructure can negatively shape user attitudes towards software systems themselves, as it can impact on usability and performance. Inappropriate infrastructure, such as a slow wireless connection, may for example, reduce the speed of a system, which is an important (if not the most important) factor in determining adoption (Bates, et al. 2011)

One of the major concerns with IS, is the fact that users often claim that they are not user friendly and lack intuitive data input. Because of the way in which data is put into a system reflects the individual's practice style. The interface design and structure of the data need therefore to conform to each other. The other issue is that it depends on the technology being used. Flexibility and adaptability is also a challenge when introducing such a system. Here looking for the right terminology for input is also a concern (Kuhn et al. 2001).

2.3 Empirical literature review

One study shows on HMIS implementation that all respondents, 81% had never been trained on HMIS, 65% did not properly define this system, 54% didn't know who is supposed to use the information collected and 42% did not use the collected data for planning, budgeting and evaluation of services provision. Although the attitude towards the system was positive among 91%, the reviewed HMIS booklets were never completed in 25% - 55% of the facilities. The most common type of HMIS booklets which were never filled were those for deliveries (55%). The gaps in the current HMIS were linked to lack of training, inactive supervision, staff workload pressure and the lengthy and laborious nature of the system. Like many other reports the incompleteness and poor use of health data collected at a health facility, found in this study, can be attributed to poor knowledge on HMIS; inadequate financial, human and technological resource capacity; lack of user-friendly systems; lack of coordination and evaluation, as well as inadequate policies to manage the sustainability of the system . Considering the lengthy and laborious HMIS procedural requirements for completion of the booklets and the context of acute

shortage of care providers, revision for a more user-friendly system is highly recommended (Nyamtema, 2010).

One of organizational factors, Top management support is conceptualized as the involvement and participation of the executive or top-level management of the organization in MIS activities. It is not surprising to discover that top management support has been one of the most widely discussed organizational factors in several IT/IS success studies. For example, top management support has been investigated in several studies linking its influence on IT/IS use, IT/IS adoption, implementation, strategic use of IS , IS success and other related IS studies. Top management support facilitated the successful deployment of strategic IS applications, while lack of top management support inhibited the strategic use of IT/IS. From the point of view of end-users, the importance of organizational support on most of the factors investigated – perceived usefulness, perceived complexity, social pressure, perceived fun and system usage. Using a structural equation modeling Igbaria et al., (1997) concluded that management support has positive direct effects on the perceived usefulness and perceived ease of use factors on personal computing adoption in small firms.

With particular reference to the public sector in Malaysia, at least one study has shown that a strong role of central direction is necessary in order for effective implementation of MIS Moreover, examined IT usage in 47 Malaysian public sector agencies to support total quality management (TQM). Top management support for IT applications was found to be one of the highest predictor of IT usage in this study. Those findings further substantiate the argument that top management support has significant influence on IS success (Ang, Davies, Finlay, 2001).

HCMIS is a national system, which is designed and controlled accordingly. Because of the above mentioned services in TASH, there is a need of huge amount of pharmaceuticals in different varieties, so that the probability of acquiring pharmaceuticals other than the list customized by the HCMIS is expected. During such condition when pharmaceuticals acquired varied from the default lists, the hospital setting doesn't have authorization to add the list of items to HCMIS. This was supported by one of key informant: HCMIS sometimes doesn't include as default lists for some of the pharmaceuticals we acquired. During such situation we are unable to add lists to the software immediately after we got received the pharmaceuticals. Still paper based work may challenge the service delivery. HCMIS incorporate model 19(receiving) and model 22(issuing)

features. But it's not allowed to use the system model, because MoFED(Ministry of Finance and Economic Development) doesn't approve the use of system level serial number that used for auditing. As a result of this the store man spare most of the work time in entering data to HCMIS and writing to the hard copy model. Many participants observed as lack of confidence on the system due to different reason. This witnessed by one key informant as: Even though the system has reliable back up at institutional and central level and the digitalization has its own limitation, most of the users don't have confident on the system, rather they rely on parallel manual recording which create workload to the professionals working in the warehouse. From the study it was revealed that nationally due to lack of organized and visible data management system beginning from product entry to the country, it's unable to customize the lists of products flow in the country to HCMIS exactly as required by different facilities. Though there is initiation in electronic product registration by EFMHACA and MOH, such condition increase waiting time of technical staff from stakeholder organization (JSI) to enter data to HCMIS soon after product received by facilities. For hospital like TASH; the highest hospital in terms of service delivery and medical teaching, the increased waiting time for data entry may secondarily affect the warehouse ability to fill the products to different pharmacy outlets and to those of different units on time and on needed amount. That in turn compromise the services rendered by the hospital. Secondarily affect the country at large as it cover the greatest part of health care services rendered in Ethiopia.

HCMIS sometimes doesn't accommodate the actual need of warehousing and inventory management system. For example one of the key informants describes one big challenge faced throughout the process as: HCMIS is adjusted by FEFO system, but actually we face challenges from different units, sometimes they already have near expired products by hand, but to reach maximum quantity they require to be filled by long expired of the same products. During such condition we are forced to fill the lines with longer ones than the near expired products, but HCMIS may consider it's issued from near expired ones and deduct the issued amount from the near expired amount, though physically deducted from long expiry products (Tefera,G. 2019).

Besha, Negash, Amoroso (2009), had done a study on Impact of Organizational Culture on IS Implementation Success in Ethiopia: the Case of Selected Public and Private Organizations. This study investigated the relationships between organizational/corporate culture and management

support with IS implementation success in selected organizations. This presented a model for IS implementation success in a low-income country context.

As one human factor, health professionals' reluctance to change is an obstacle for an effective and efficient implementation program. One of the issues that are related to their reluctance is the shift from paper-based to electronic files. They motivate this reluctance with the fact that a shift from paper-based information to electronic files may cause severe data loss and a disruption of their work process (Culler et al., 2009). According to our analysis, this barrier is a common one, since only one US state (Pennsylvania) and two European countries (Spain and Turkey) have not reported it. Its capacity to block the implementation easily makes it an obstacle that must be avoided or solved immediately. Lack of communication between the ones that are developing and implementing the system and the ones that are using it (medical staff) is also negatively impacting HIS implementation (Culler et al., 2009). Wright et al. (2009) report that medical staff may not find the information system useful if it does not receive academic, social or financial benefits. The lack of literacy regarding IT skills is also an issue that stands up in front of the implementers. The most illiterate medical professionals are the ones that are close to their retirement age, which is understandable given the fact that they had a minimal contact with new technology during their career and it is difficult for them to go through the learning process of new information technologies (Agno and Guo 2013).

In technological factors dimension , It is observed that questions regarding the ease of understanding of the content of the system, the existence of information that meet the user's needs and level of customization of the system had positive performance. Additionally, there was a predominance of disagreement when observing the performance of activities related to system complexity and amount of time using the system variables. In general, industries do not believe the system is too complex or that it takes a long time of work to operate (Reis and Freitas, 2014).

In short, it is clear that the significant relationship between the technological factors investigated and IS success dimensions evidently suggests the importance of the five factors in ensuring successful information systems. The empirical evidence also supports the impact of technological factors that act as the antecedent factors in influencing IS success. Consequently, the study adds to the literature on technological factors influencing IS success that needs more

emphasis. Furthermore, the study found strong support on the relationship between the IS success dimensions as proposed by (DeLone & McLean's, 2003).

Also the significant relationship between the six organizational factors investigated and IS success dimensions evidently indicate the importance of the factors in ensuring successful information systems. The empirical evidence also support the impact of organizational factors that act as the antecedent factors in influencing IS success. Apparently, the study adds to the literature on organizational factors influencing IS success that needs more emphasis (De Lone & Mc Lean, 2003).

2.4 Conceptual framework

As per to the different literatures stated above, the below conceptual frame work was developed. The interrelationships between the study variables are conceptualized as shown below

Independent variable dependent variable

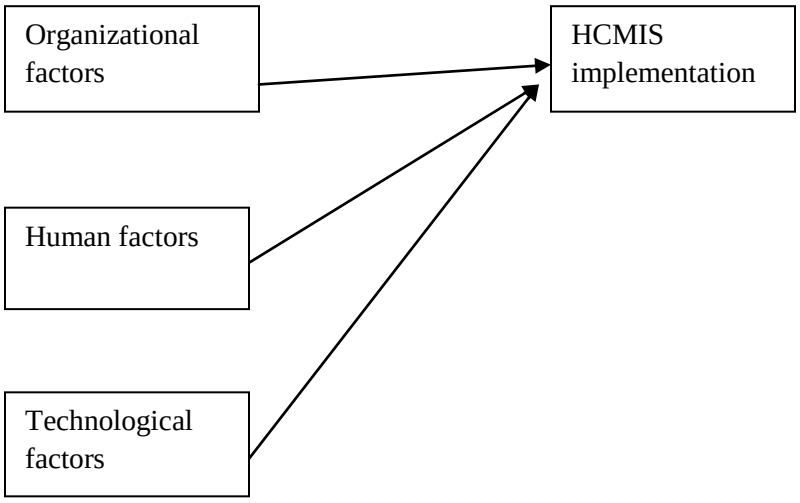

Figure 1 conceptual frame work

Thus, this research study was developed by the above conceptual framework following the different literature reviews and the practical problem of the organization that was indicated in the statement of the problem section in chapter one of this study. The conceptual frame works is formulated with a view that the independent variables, organizational factors, human factors and technological factors are the significant factors for proper implementation of HCMIS.

In line with this the hypothesis was formulated which is tested using regression analysis and presented in chapter four of this study.

CHAPTER 3 RESEARCH METHODOLOGY

3.1 Introduction

This chapter intends to discuss about the methods of the study. It provides understanding about where the study undertaken, what type of research design and approach used. It also provides information about population and sample design. The data source and type and how to collect the data, after data collection how to analyze it also clarified in this chapter. Ethical consideration that was done and how validity of the research was done and reliability test of the research also presented.

3.2 Study area

The study was conducted in Addis Ababa which is the capital city of Ethiopia, seat of African Union and Economic Commission. It is located in the geographic centre of the country and covers a landmass of 540 sq. km. It is administratively sub-divided into 10 sub cities and 116 weredas (Lowest level administrative unit in the city) According to central statistical agency 2008 report the city has an estimated population of 2.98 million .The city has 12 public hospitals, 94 public health centers. The study area was chosen because it is the most accessible area for conducting the study also when we consider time and financial aspect it is feasible.

As mentioned the study focused to identify factors affect HCMIS implementation on public health so it was conducted on public health facilities that used HCMIS for managing their health commodities.

3.3 Research design

The research design is descriptive. Facility based questionnaire was used to assess factors affect the implementation status of HCMIS among public health sectors in Addis Ababa that was began full scale data collection from march on ward and finished the research on June 2020. The questionnaire was developed by using 5-point Likert Scale, where 5(five) is the highest degree of agreement (strongly agree) and 1(one) is the least degree of agreement (strongly disagree). After collecting the questionnaire, the researcher tried to describe and relate the gathered data by quantitatively testing with different statistical techniques and qualitatively summarizing close ended questionnaire.

3.4 Research approach

The study mainly focuses on assessment of factors affecting the implementation of HCMIS in public health facilities found in Addis Ababa. The research approach to the study involves both quantitative and qualitative approach to collect data.

3.5 Population and sample design

The target population for this study consisted of one warehouse managers from each public health facilities under Addis Ababa Region, as it's described earlier there are 94 health centers and 12 hospitals in Addis Ababa. So our population was 106 public health facilities ware house managers. They are the employees who are directly responsible to operate on HCMIS for health commodity management to ensure that the customer demands are effectively and efficiently met. Census methods were implemented.

3.6 Data source and type

The sources of the data were both primary and secondary data. The questionnaires were constructed in both open and closed ended questions to enable for quantitative and qualitative analysis respectively. As stated above to collect primary data the developed questionnaires was distributed to the selected respondents. The reason for selecting questionnaire data collection method is because not only it makes the manageability of the gathered data easier but also the high possibility of getting the response. Additionally assessment of health facility records was used as a secondary data.

3.7 Data collection procedures

The questionnaire was distributed to the expected staffs that use HCMIS, warehouse managers who should use the system routinely to assess their stock status and to make informed decision. The researcher distributed and collected the questionnaire. . Quantitative data's are collected by the researcher after administering the structured questionnaire, observing a one year RRF, whether it is done manually or generate from the HCMIS and by reviewing documents like bin card, and model-19 to compare their compliance with the system. Appropriate information was also given to concerned staff before distributing the questionnaire both verbally and in written

outlined on the questionnaire itself. Frequent follow-up was followed to make the respondent rate as good as 95%.

3.8 Reliability and validity test

3.8.1 Reliability

In this study, a reliability test was performed in order to see whether the study gave similar results if the same study is repeated. Reliability refers to the degree to which the instrument will give the same results if a survey is repeated on the same sample. To ensure reliability of this study, a Cronbach's Alpha was performed. To determine whether the items are associated, the Alpha coefficient must be close to one and if items are badly correlated, the Alpha coefficient will be close to zero. This was done by using IBM SPSS, version 21.0.

3.8.2 Validity

To ensure validity of a study, a pilot study was conducted and the results were scrutinized. . To test validity of the instrument, questionnaires were undertaken by interviewing store managers in HCMIS implemented health facilities. Based on The pilot result to ensured validity a few changes were made in the questionnaire.

3.9 Data analysis method

Orodho (2002) defines data analysis as an assessment of what has been collected in a survey or experiment and making conclusions and assumptions from this data thorough organizing the data, breaking it into manageable units, synthesizing it as well as searching for patterns.

3.9.1. Descriptive Analysis

The quantitative data collected was coded, entered and analyzed using SPSS software and statistical tests such as mean, standard deviation, percentage, and frequency were run. Descriptive statistical tools such as graphs and frequency tables were employed using excel spreadsheet.

3.9.2. Inferential Analysis

Inferential analysis was employed to assess cause and effect relationship between independent variables (organizational, human and technological factors) and dependent variables (HCMIS implementation). Specifically, linear regression was conducted for independent variables:

organizational, human and technological factors to determine the causal relationship between each variable on the HCMIS implementation. But, the constructs under each independent and dependent variables describing effectiveness of information system were transformed first into continuous variable which combined these individual items into a single mean rating before running the system. Finally, the results were interpreted and made to provide the results.

The qualitative data obtained from and semi- structured questions are summarized in narrative form.

3.10 Ethical considerations

A formal letter was written from Addis Ababa University College of business and economics school of commerce to public health facilities requesting for the study. The data collection was started after getting consent from medical directors of the health facilities and pharmacy personnel who is involved in the study. Besides, names of the health facilities assessed and identity of key informants that participated in the study kept confidential throughout the process of data collection, analysis, presentation and interpretation of results.

CHAPTER FOUR

DATA PRESENTATION, DISCUSSION, ANALYSIS AND SUMMARY

4.1 Introduction

The findings of the study are presented in this chapter. Necessary discussions of the findings are also made to establish understanding and show relationships among variables in relation to literature and the research objectives. The data gathered was analyzed descriptively and inferentially to provide insight into the effect of organizational, human and technological factors on HCMIS implementation.

4.2 Response Rate

The study issued 106 questionnaires to respondents, only a total of 79 questionnaires were returned among these 5 responses became invalid (missing) indicating (74.5%) response rate while 25.5% of the questionnaire were not returned. This indicated that majorities of the respondents were in agreement under the study as it was suitable and the results were presented in figure 2.

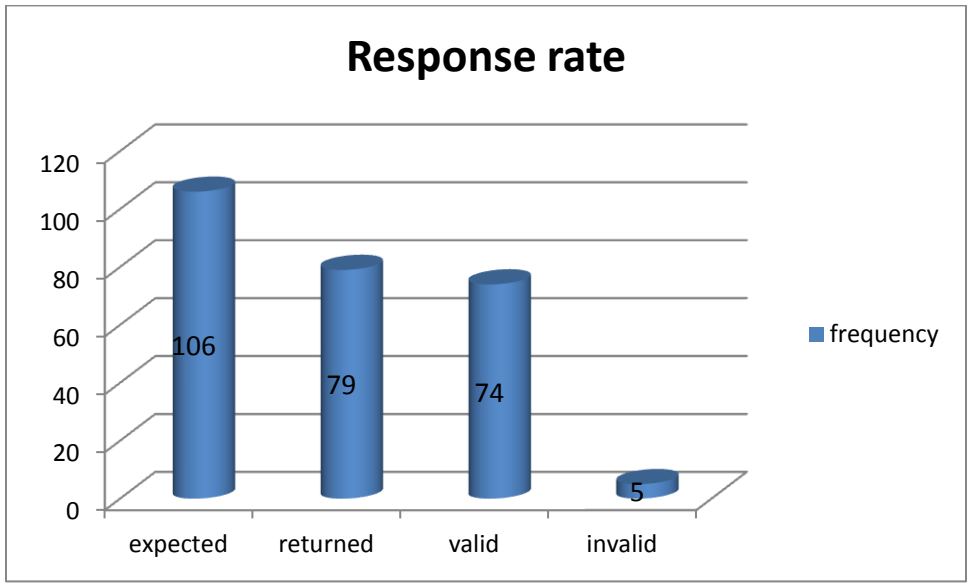

Figure 2 Questionnaires response rate

4.3 Demographics of Respondents

The findings of demographic characteristics of the sample include: gender, age, position, level of education, and year of service. This aspect of the analysis deals with the personal data on the respondents of the questionnaire.

As noted in table 1 below, the majority of the respondents (54%) were male and the remaining 46 % were female. Out of 74 respondents the majority respondents are from health centers 65 (88%) and the remaining is from hospitals 9(12%).With their age ranges, it could be seen that 49 % were between 31 and 40 years, followed by about 43 % who were between the age of 20 and 30 years. A few respondents (8%) were between the ages of 41 and 50 no respondent on more than 50 years. Given their educational background, above half (62%; n=46) of them are degree holders, while about 38 % (n= 28) have diploma. About 1% employees worked >6 months and another 1% respondent experience shows 6 months - 1 year, 10 % of the respondents have worked in the health facility between 1 and 3 years, whereas about 23% and 65% have worked in the hospital for 3 -5 years and above 5 years respectively.

The finding of the study shows that 32.4% of the facilities installed the system 3- 4 years, some facilities use the system for <1years and > 5 years 9.5% and 5.4% respectively. According the responses of the respondent, most of them use it for > 1year (51.4%) and 21.6% and 27% use the system for < 6 months and > 1 years respectively.

General assessment of HCMIS use response presented and analyze as follow.

The finding on question " *What are the expected benefits of HCMIS to your facility?(you can circle more than one choice) among the following listed benefits Reduced wastage, Helps forecasting, Helps informed decision-making for routine decisions like resupply, Planning/budgeting medicine requirements, Helped to easily produce reports and Improved reporting quality, and consistency, Improved product availability and Improved inventory control* "showed in fig 3 indicates the respond 82% of the respondent replies the entire listed choice are the benefits of HCMIS if they use it effectively.

Gender		frequency	%age
	male	40	54%
	female	34	46%
	total	**74**	**100%**
Age	20 – 30 years	32	43%
	31 – 40 years	36	49%
	41 – 50 years	6	8%
	> 50 years	0	0%
	total	74	100%
Educational level	Diploma	28	38%
	Degree	46	62%
	total	74	100%
Work experience	< 6 months	1	1%
	6 months – 1year	1	1%
	1 – 3 years	7	10%
	3 – 5 years	17	23%
	>5years	48	65%
	total	74	100%
Period of HCMIS implementation by facilities	< 1 year	7	9.5%
	1-2 years	13	17.6%
	2-3 years	14	18.9%
	3-4 years	24	32.4%
	4-5 years	12	16.2%
	> 5 years	4	5.4%
	Total	74	100.0%
Respondent experience on HCMIS	< 6 months	16	21.6%
	6months – 1 year	38	51.4%
	>1 year	20	27.0%
	Total	74	100.0%

Table 1 demographic data

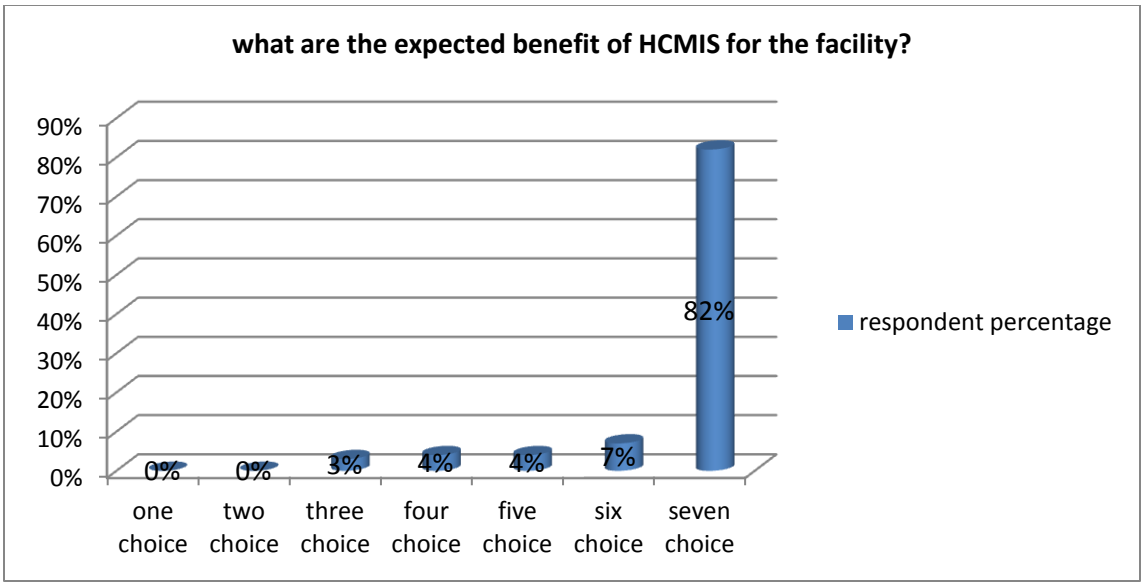

Figure 3 frequency of response on expected benefit of HCMIS

The finding showed in fig 4 indicates the respond for the construct "*Did the system add value in managing health commodities in your facility?"* 73% of the respondent replies yes and only 27% disagreed.

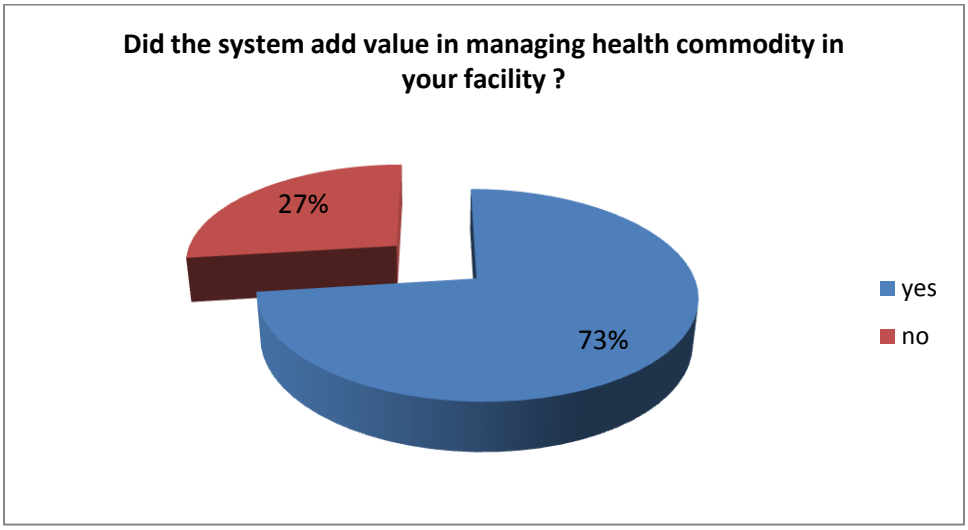

Figure 4 percentage of response on added value of the system

For the construct ask "*Is it easy to produce reports using HCMIS as compared to the previous manual system?"* 85% of the response confirmed that it is easy to produce report using HCMIS

based on the finding shown in fig 5 and the remaining 15 % found the system difficult to produce report.

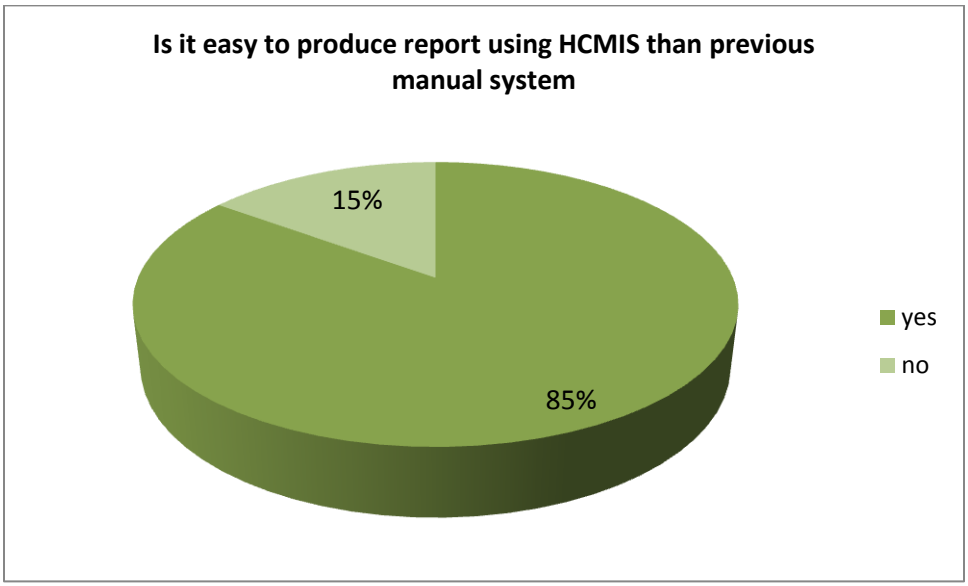

Figure 5 percentage of response on easiness of HCMIS to producing report

As showed in fig 6 The findings on respondents experience on using computer before using HCMIS shows 55% reveal they didn't use computer before and only 45% had experience operating computer.

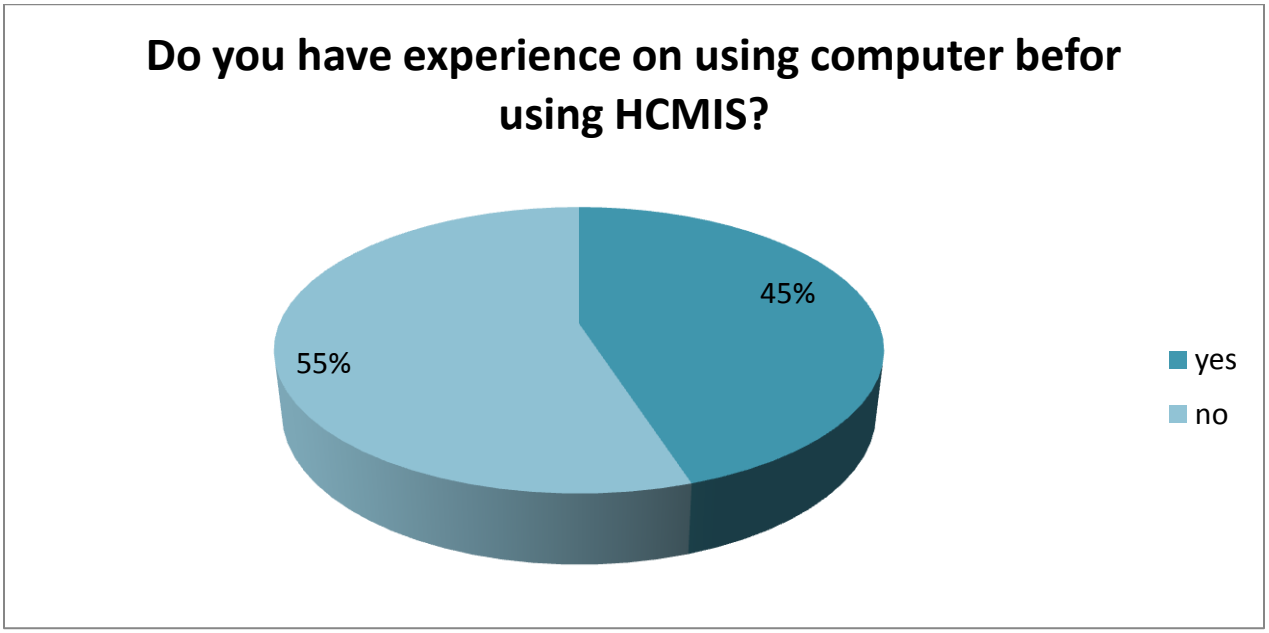

Figure 6 percentage of response on respondent experience on using computer

The response for item *How many times over the past 6 months have you had a serious (serious means you were unable to use the system) problem with HCMIS for at least a week*? Indicated as in figure 7 74% of the respondent agreed that they encounter system failure due to many reasons and only 26% of the respondent respond they didn't find any problems on HCMIS.

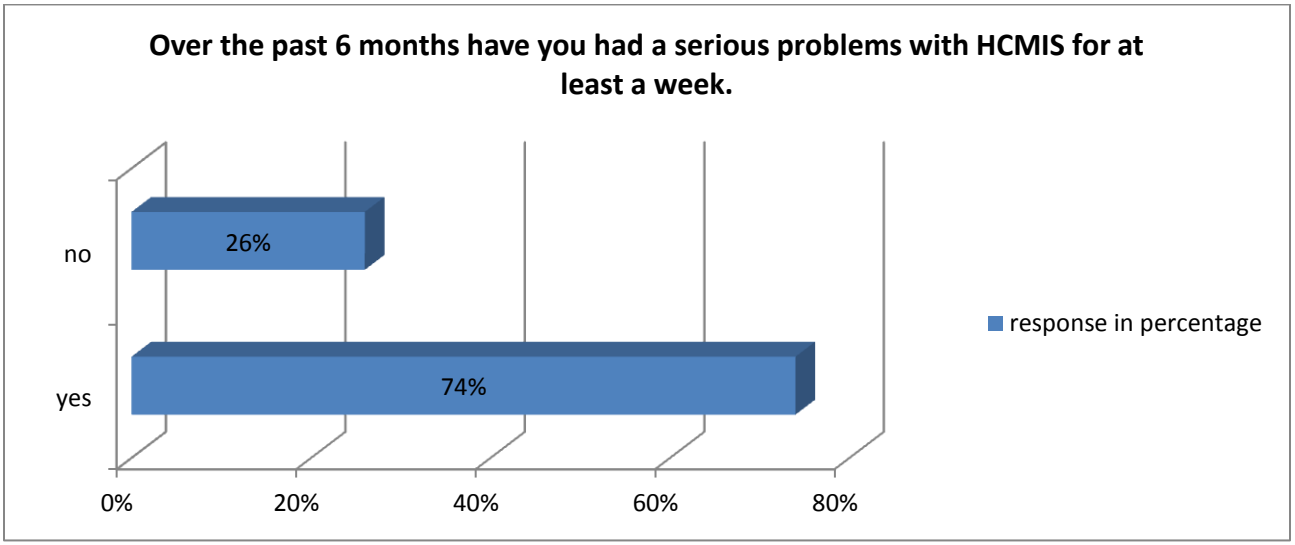

Figure 7 percentage of response on problems encounter on HCMIS

As showed in figure 8 among the respondents those encounter system failure for construct that asked "*Did you able to fix the problem yourself or facility IT officers or need outside help*?" 84% of the respondent respond the found the help from JSI/DELIVER and only 16% got help from their facility IT personnel.

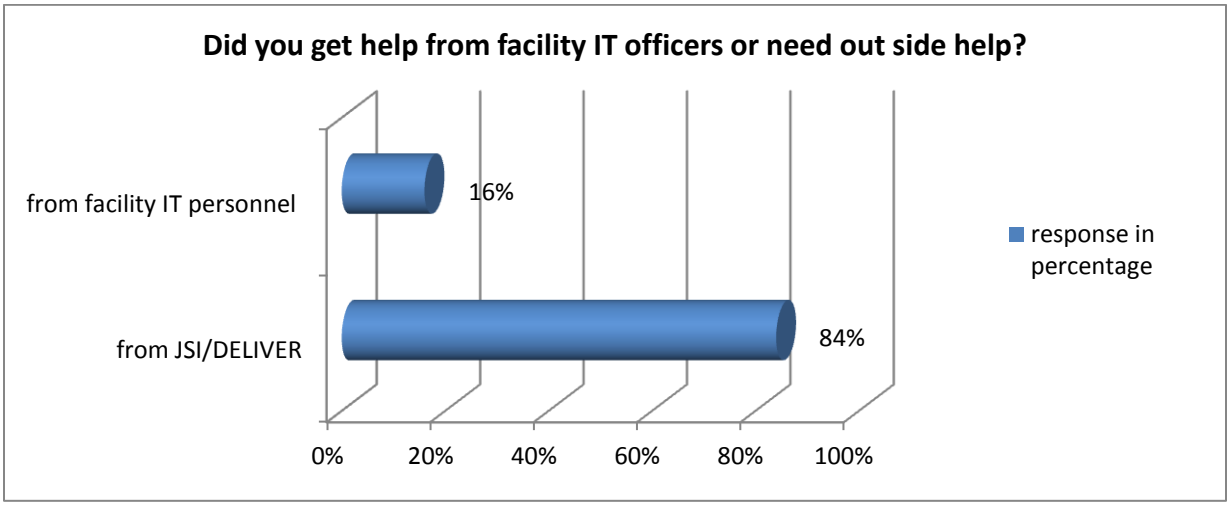

Figure 8 percentage of response on solving the problems encounter on HCMIS

4.4 Reliability test result

Variables	Cronbach's Alpha
Organizational factors	0.724
Human factors	0.732
Technological factors	0.701

Table 2 Reliability statistics

4.5 Measures of variables

The factors that might affect MIS implementation in public institutions were measured by the human factors, organizational factors and technological factors. Two items were used to measure MIS implementation. Organizational factors was measured using five, human factors measured using 6 items and technological factors also measured by 6 items.

Constracts	**Code**	**indicators**	**No of items**
HCMIS factors			
organizational	OFQ	OFQ1- OFQ5	5
Human	HFQ	HFQ1-HFQ6	6
technological	TFQ	TFQ1-TFQ6	6
HCMIS implementation			
Implementation status	HIQ	HIQ1- HIQ2	2

Table 3 measures of variable

4.6 Descriptive analysis of HCMIS implementations status

The implementation status was tried to be assessed using two construct one based on the aim (major benefit) of HCMIS in the facilities like

- Enhance data visibility
- At least inter linked with facilities head and pharmacy head which are main actors in using HCMIS in the facility
- Find HCMIS better than physical count to know your stock status
- Using HCMIS for report other than RRF for RDF drugs
- Using HCMIS data for forecasting facility demand requisitions
- Using HCMIS for tracking inventory location in the warehouse

- Using HCMIS to send RRF for program drugs

and two directly asking respondent their comment whether HCMIS fully implemented or not.

The HCMIS warehouse version has given managers the ability to oversee and record deliveries and pickups, maintain inventory records, and track inventory location. They can use this detailed information to best manage their inventory at all times. Web-based dashboards enhance decision-making by adding the capability of visualizing the most updated data from all PFSA locations then using data from stock status and demand reports to make decisions about forecasting, resupply, and inventory management. Also HCMIS Facility gives facility managers visibility to every health commodity in their store, including donated items and the commodities purchased with the RDF, managers can now provide stakeholders with instant information regarding all expiries, costs, and inventory. Users and managers can react quicker to changes in inventory and make more informed decisions about which products and how much of those products are needed to bring any facility up to adequate stock quantities, reducing the number and length of stock outs (USAID/DELIVER, 2015). Out of 7 at least 4 of the above benefit fulfilled we could say it is implemented and the result showed in fig 9 79.7 % of the respondent disagreed and this implied that HCMIS is poorly implemented in most health facilities.

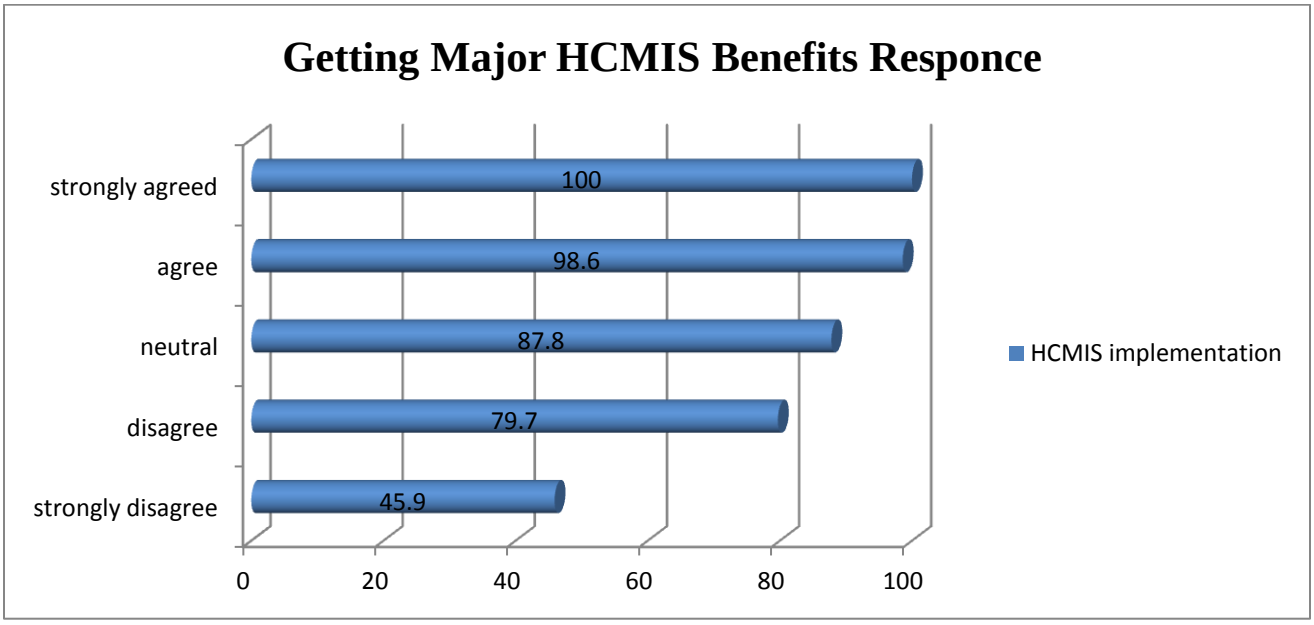

Figure 9 percent of response on HCMIS benefits

HCMIS Implementation status	Mean	Std. Deviation
Do you get most of the benefits of HCMIS, at least 4 out of seven listed below? Based on under mentioned list	1.8784	1.04623
Did HCMIS fully implemented	2.0000	1.14676

Table 4 HCMIS Implementation status response mean and std. deviation

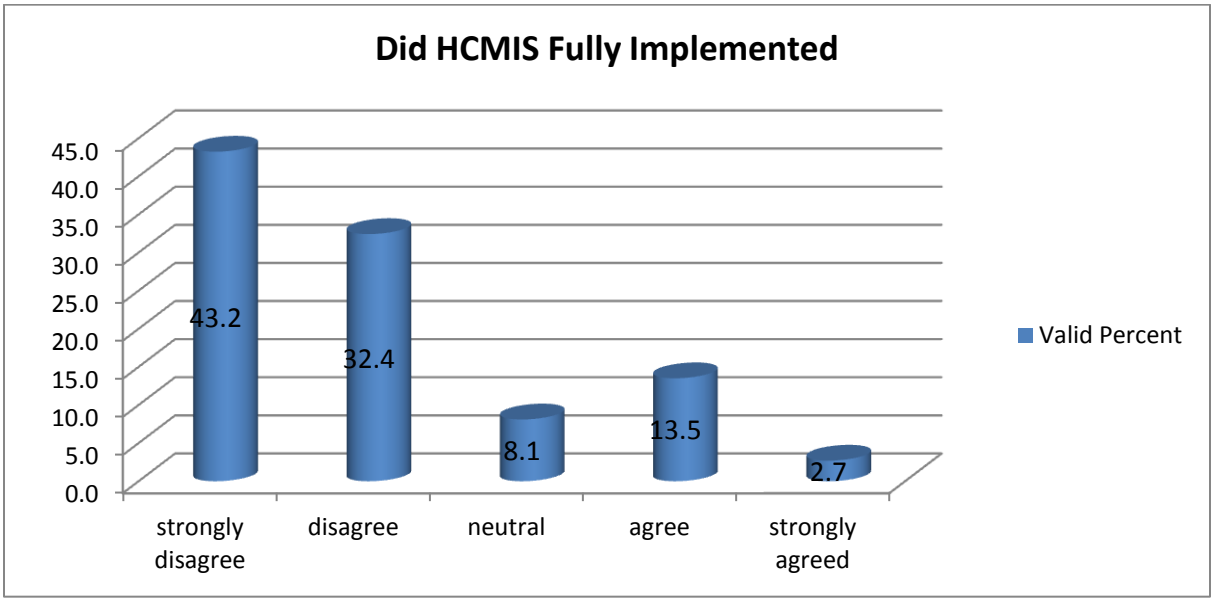

Figure 10 Percent of response on HCMIS implementation

M= 1.88 and SD = 1.04 this indicate majority did not agree and strongly disagree that the system is implemented based on the parameters listed above.

The finding as shown in figure 10 on the second construct that assessed HCMIS implementation" did HCMIS fully implemented?" revealed 75.7% disagreed and strongly disagreed only 16.2% of the respondent agreed and strongly agreed and score M = 2.00 and SD = 1.15.

4.7 Descriptive analysis of Organizational factors

The researcher tries to analyze organizational factors based on five parameters which most literature mentioned that these organizational factors have impact on implementation of MIS.

code	construct	N	Minimum	Maximum	Mean	Std. Deviation
OFQ1	The facility has police or procedures that enforce HCMIS usage	74	1	5	2.1216	1.13418
OFQ2	There are Management close support on HCMIS use and its implementation	74	1	5	2.2703	1.17389
OFQ3	The facility provide training for the concerned staff on how to operate HCMIS	74	1	5	2.2162	1.37761
OFQ4	You have provided with resources that enables you to operate the system well. (If any)	74	1	5	2.3514	1.17546
OFQ5	There are M & E systems on the implementation of HCMIS	74	1	5	2.1757	1.16287

Table 5 organizational factors response mean and std. deviation

It could be seen from Table 5. 5 items were used to measure what looks like organizational factors in their facility. When we look each variables, the first one is the presence of facility's police and procedure that enforce proper implementation of HCMIS, the response shows mean= 2.12 and SD = 1.13 were less than 3.0 ,which is the midpoint signifying "Indifferent",. It could be seen that the highest response indicating agreement with the variable where as less than 3 indicates disagreement with the variables. The second variables management support and commitment to strengthen HCMIS use and the response shows mean = 2.27 and SD = 1.17. The third variables the provision of training to the relevant staffs use and the response shows mean = 2.21 and SD = 1.37. The fourth variables the provision of resources that facilitate proper use of HCMIS and the response shows mean = 2.35 and SD = 1.17. The fifth variables the presence of different M & E system to track the implementation status of HCMIS and the response shows mean = 2.17 and SD = 1.16.

The study tried to establish the extent to which respondents agreed or disagreed with the statements, from the study findings, majority of the respondents disagreed to the 5 parameters of organizational factors, presence of policy, procedures and M & E system that enforce and assess HCMIS implementations, the provision of resource and training which is the crucial thing for proper implementation of MIS and top management support.

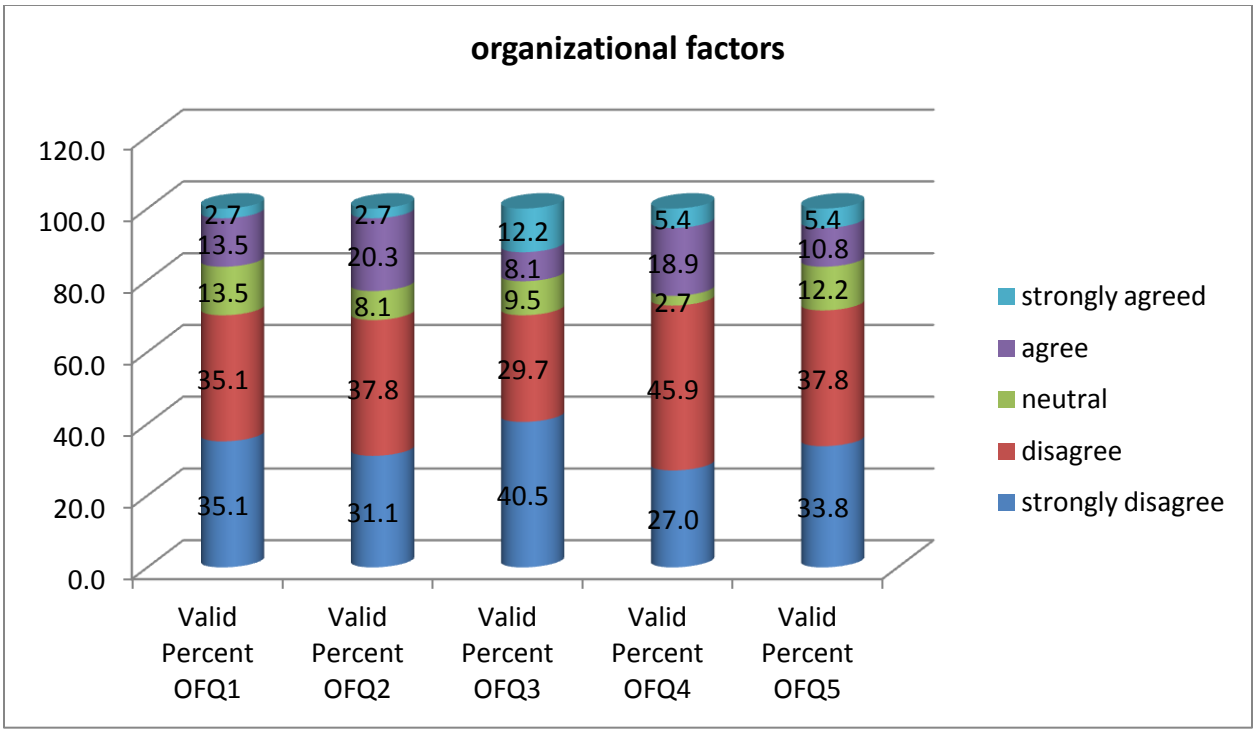

Figure 11 valid percent of responses of respondent on organizational factors

As it is depicted in fig 10,70.3% of the respondents disagree and strongly disagreeing on the facility has police or procedures that enforce HCMIS usage construct. It shows that most of the facilities don't have policy or procedures that enforce HCMIS use. On top Management close support on HCMIS use and its implementation 68.9 % of the respondent disagree and strongly disagreed and 23 % of the respondent agree and strongly agreed. When we saw top management support on HCMIS use majority of health facilities agrees that they don't get expected support from facilities managements. The finding on the statement, the facility provides training for the concerned staff on how to operate HCMIS construct shows 70.3 % of the respondent disagree and strongly disagreed and 20.3 % of the respondent agree and strongly agreed. The finding showed that there is low provision of training in most health facilities. The parameters that ask whether there are M & E systems on the implementation of HCMIS or not indicate that 73 % of the respondent disagree and strongly disagreed and 24.3 % of the respondent agree and strongly agreed. According to the finding most health facilities don't have M & E system that assess the status and make timely feedback and correction. The construct that ask whether they have been provided with resources that enables them to operate the system well or not shows 71.6 % of the respondent disagree and strongly disagreed and 16.2 % of the respondent agree and strongly

agreed. The provision of resource that is needed to proper use of HCMIS is poor in most health facilities according to the findings.

4.8 Descriptive analysis of Human factors

Human factors on the HCMIS implementation are assessed with 6 parameters as that of organizational based on most literature, these are their confidence on their facility to handle the system by itself effectively and on their skill to perform different analysis, their belief on whether the system is important for their area of work or not that mean their perceived usefulness on the system for their area of work, on their opinion on the data obtained from the system used for decision making by the facility, their thought whether they use as expected or not and the training provided for them.

code	construct	N	Minimum	Maximum	Mean	Std. Deviation
HFQ1	You are confident that your facility can maintain HCMIS Independently into the future without assistance from DELIVER/ others?	74	1.00	5.00	1.9865	1.16447
HFQ2	Do you feel you have the skills necessary to analyze and use data and information in order to help with the kinds of decisions that you are involved in?	74	1.00	5.00	3.6622	1.15007
HFQ3	Does HCMIS is important for your area of work?	74	1.00	5.00	3.7162	1.06656
HFQ4	The data obtained from HCMIS used for informed decision making for the facility	74	1.00	5.00	2.1757	1.37849
HFQ5	you use the system as expected/ practical	74	1.00	5.00	2.2432	1.29076
HFQ6	You get enough training on HCMIS how to insert , retrieve and analyze data	74	1.00	5.00	1.7162	1.01388

Table 6 Human factors response mean and std. deviation

As we can see from the above Table 6 the first one is the confident that your facility can maintain HCMIS Independently into the future without assistance from DELIVER/ others and the response shows mean= 1.98 and SD = 1.16 were less than 3.0 which indicate disagreement with this construct. The second variables the skills necessary to analyze and use data and the response shows mean = 3.66 and SD = 1.15. This shows most of the respondent agrees that they

have the skill to operate the basic HCMIS features. The third variables that asked ” Does HCMIS is important for your area of work?” and the response shows mean = 3.71 and SD = 1.06, based on their response most of them agreed that HCMIS add value to the facility better than previous manual system. The fourth variables that measure the use of HCMIS data for informed decision making by the facility and the response shows mean = 2.14 and SD = 1.09 so this response indicate the responders don’t think the data retrieved from HCMIS used for decision making. The fifth variable the use of HCMIS as expected and the response shows mean = 2.24 and SD = 1.29. This indicates the respondents are disagreed that they don’t think they used the system as expected. The sixth variables get necessary and enough training as necessarily and the response shows mean = 1.71 and SD = 1.01 this findings also shows the disagreement with this statement because they think they are not provided with enough and regular training.

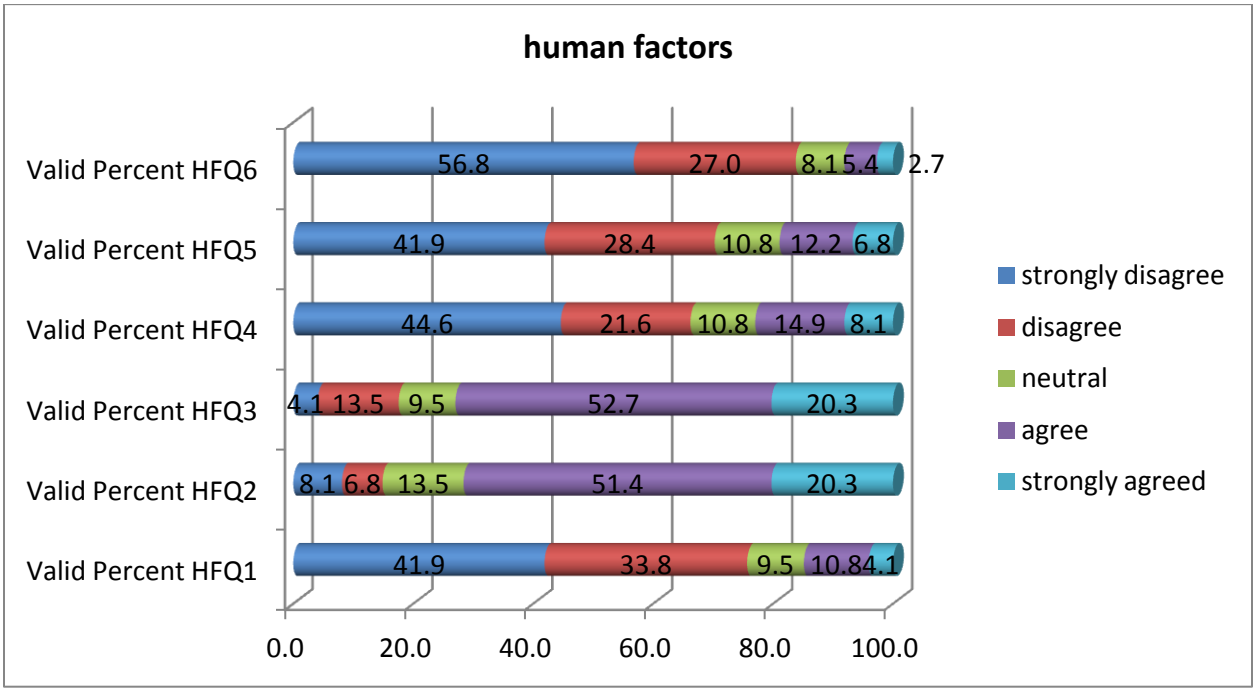

Figure 12 valid percent of responses of respondent on human factors

75.7% of the respondents disagree and strongly disagreeing on the construct that ask on their confidence that their facility can maintain HCMIS Independently into the future without assistance from DELIVER/ others and only 14.9% agreed. Do you feel you have the skills necessary to analyze and use data and information in order to help with the kinds of decisions that you are involved in? only14.9 % of the respondent disagrees and strongly disagreed and 71.6 % of the respondent agree and strongly agreed. So the respondent agreed that they have the skill to operate the basic operation needed for their job as it shown in fig 12.

When the respondents asked does HCMIS important for your area of work? finding shows only 17.6 % of the respondent disagree and strongly disagreed and 73 % of the respondent agree and strongly agreed. Most of the facilities personnel agree on the importance of using the system than pervious manual system for the management of their stock. The data obtained from HCMIS used for informed decision making for the facility 66.2 % of the respondent disagree and strongly disagreed and 23 % of the respondent agree and strongly agreed. Most of the facilities professionals do not think the data retrieved from HCMIS used for decision making. you use the system as expected/ practical construct finding indicate 70.3 % of the respondent disagree and strongly disagreed and 18.9 % of the respondent agree and strongly agreed. The respondent didn't thick they used the system as expected. You get enough training on HCMIS how to insert , retrieve and analyze data 83 % of the respondent disagree and strongly disagreed and 8.1 % of the respondent agree and strongly agreed. The finding shows that most health facilities professionals thick they didn't get enough training that assist them to analyze the system well.

4.9 Descriptive analysis of Technological factors

Technological factors also tried to assess using 6 constructs. They are understandability, presence of guidelines that shows how to operate when you find some information, timeliness, flexibility, presence of all important feature and accuracy and reliability.

code	construct	N	Minimum	Maximum	Mean	Std. Deviation
TFQ1	HCMIS is easily understood when you use it	74	1	5	3.6892	1.08446
TFQ2	There are HCMIS use guideline that shows how to insert information, retrieve date and analyzing data in the system	74	1	5	2.2703	1.34773
TFQ3	The system has up-to-dated information after transaction occurred.	74	1	5	3.6351	1.08001
TFQ4	The flexibility of the system when customization needed	74	1	5	2.1622	1.07304
TFQ5	all important features for your area of work are incorporated in the system	74	1	5	1.7432	0.96601
TFQ6	The system provides accurate and reliable data	74	1	5	3.8378	0.96553

Tablet 7 Technological factors response mean and std. deviation

The result of the finding shows that the user friendly construct shows that M= 3.68 & SD =1.08.the respondents agreed that the system is understandable to use .the second parameter that asses the presence of guidelines that helps user to operate the system smoothly shows M = 2.27

& SD = 1.34.in this construct the warehouse managers disagreed on the availability of the guideline. The third construct about the system capability to up-dating the information after transaction occurred shows M =3.63 & SD 10.8.the result of the finding shows that most of the respondents agreed that the system update the data after transaction occurs. The fourth variable that asked the flexibility of the system when customization needed score M = 2.16 & MD = 1.07.this indicates most respondent agreed that the system is not complicated. The fifth variable assessed whether all important features for your area of work are incorporated in the system OR NOT score indicate M = 1.74 & SD = 0.96. so most respondents replied that the system miss some important feature that can be used for better analysis of date. The last construct that assessed about the reliability of the data that is retrieved from the system shows M = 3.83 & SD = 0.96. Most of the respondent for this statements agreement implies the system is reliable based on the finding in table 7.

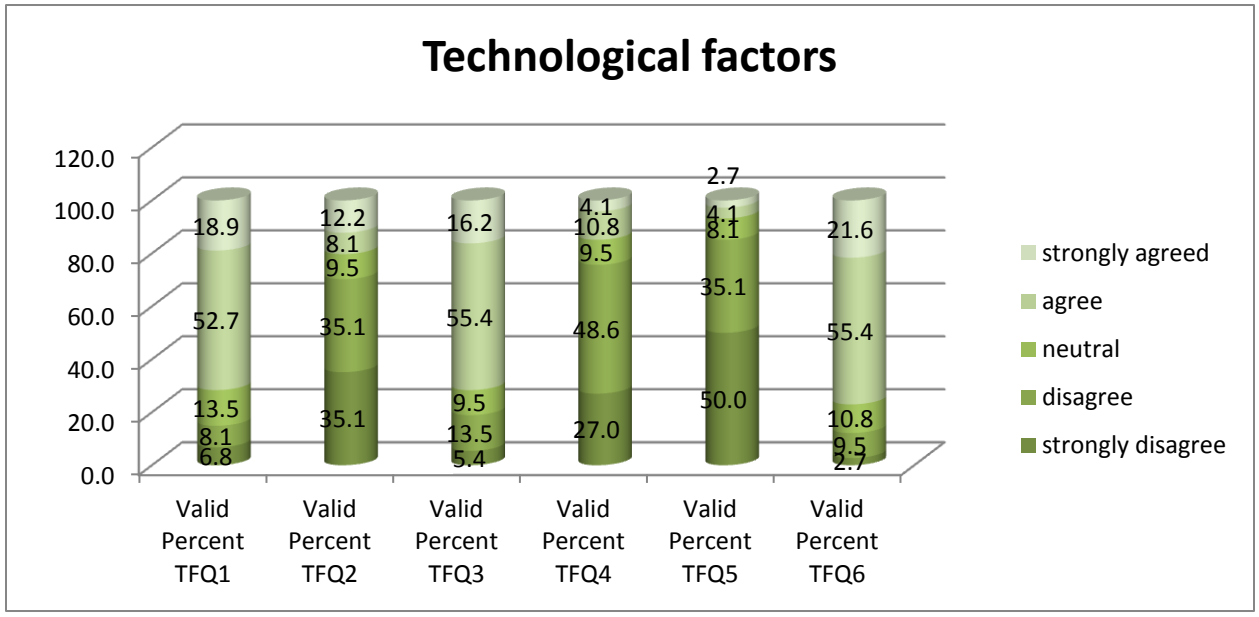

Figure 13 valid percent of responses of respondent on technological factors

Figure 13 shows that the opinion of respondent on how understandable the system are 71.6 % of the respondent agree and strongly agreed and14.9 % of the respondent disagree and strongly disagreed so most of the warehouse managers responded that the system is understandable when operated. The construct on presence of guideline that that shows how to insert information, retrieve date and analyzing data in the system indicated 20.3% of the respondent agree and

strongly agreed 70.8% of the respondent disagree and strongly disagreed on the presence of guidelines on the system. The finding on the system's ability to provide up-to date information shows71.6 % of the respondent agree and strongly agreed and18.9 % of the respondent disagree and strongly disagreed.71.6% of the respondent find the data from the system was up-dated.14.9% of the respondent agree and strongly agreed on the flexibility of the system when customization needed and 75.7 % of the respondents disagree and strongly disagreed. The remark on the system incorporate all important features that is needed for the health facility suggested that 6.8 % of the respondent agree and strongly agreed and 85 % of the respondent disagree and strongly disagreed. The system provides accurate and reliable data. 77 % of the respondent agree and strongly agreed and 12.2 % of the respondent disagree and strongly disagreed.

4.10 Inferential Analysis

Organization, human and Technology are major independent variables considered in this study attempting to find a relationship with implementation of HCMIS. To determine the relation between dependent variable and independent variables regression analysis and correlation analysis was done.

Organization, human and Technology are major independent variables considered in this study attempting to find a relationship for implementation of HCMIS. Among the three variables organizational factors is significant at the 0.01 level.

		OFQ	HFQ	TFQ
OFQ	Pearson Correlation	1	.497**	.561**
	Sig. (2-tailed)		.000	.000
	N	74	74	74
HFQ	Pearson Correlation	.497**	1	.332**
	Sig. (2-tailed)	.000		.004
	N	74	74	74
TFQ	Pearson Correlation	.561**	.332**	1
	Sig. (2-tailed)	.000	.004	
	N	74	74	74
**. Correlation is significant at the 0.01 level (2-tailed).				

Table 8 correlation analysis between independent variables

4.10.1 Simple regression analysis

Organizational factors

Linear Regression analysis is applied to test whether there is influence between independent variables (organizational factors) and the dependent variable (HCMIS implementation). Table 9 indicates the model summary of the relationship between organizational factor and HCMIS implementation. The value of R shows the correlation between the observed and predicted values (organizational factors) of the dependent variable (HCMIS implementation). The value of R varies from -1 to 1 and the sign specify the direction either positive or negative relationship. It is found that the value of R is 0.692 which is positive indicating that there is a positive correlation between organization factors and HCMIS implementation. This is due to the regression model selected can predict 69.2% of the variance HCMIS implementation.

R2 explains the change in the dependent variable HCMIS implementation due to independent variable organizational factors. The value of R2 is 0.479 which indicates that organizational factors contribute 47.9% variation in HCMIS implementation and the rest can be attributed to other factors. The value of adjusted R2 reflects the goodness of fit of the model in the population and should be equal to or very close to the value of R2 (Field, 2009). The value difference of adjusted R2 and R2 in the model summary is 0.007 (0.479-0.472) this closeness means the model has been derived from the population rather than the sample.

Model summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.692[a]	.479	.472	.70892

Table 9 Model summary of organizational factors

Table 10 displays the ANOVA results of organizational factors which test if a model is significantly better at predicting the outcome than using mean. The F-Test for regression model is 66.242 with a significant value of 0.000 (p=.000< 0.05) which shows that a model is a good fit for predicting the outcome of the variable. This follows the rule of thumb which states that the model is significant if the value of F-test is greater or equal to 2 Soyinka et al., (2017). However, Field (2009) argue that the model is significant if the value of F-test is greater than 1.

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	33.291	1	33.291	66.242	.000[b]
	Residual	36.185	72	.503		
	Total	69.476	73			

Table 10 ANOVA of organizational factors

Coefficient in table 11 explains the importance of independent variable organizational factors in predicting dependent variable HCMIS implementation. According to Field (2009), the value of unstandardized (B) coefficient explains the relationship between dependent variable (HCMIS implementation) and independent variable (organizational factors). The results indicate that for every increase in organization factors result to the increase in the HCMIS implementation by 0.805. The t value of organizational factors is 8.139 at $p< 0.05$ this means that are a significant predictor of HCMIS implementation. Standard beta coefficient illustrates some deviations that the outcome will change as a result of a change of one standard deviation in the predictor (organizational factors). An organizational factor standard beta coefficient is 0.692 has impact on the model. So based on the finding that there is a relationship between organizational factors and implementation of management information system and this finding is supported by Ghaderi, Jafar Faezi, and Kahrizeh (2017) study findings conducted in 22 precincts of Tehran Municipality the finding on hypothesis testing claim that study hypothesis (organizational factors as one of the factors affecting on MIS use in 22 precincts of Tehran Municipality) with confidence 0.99 is statistically confirmed. The average of scores of each one of organizational factors of use of MIS in 22 precincts of Tehran Municipality Obtained from Friedman variance analysis show that Chi-square test ($\chi 2 = 26.575$ and $P < 0.003$, $df = 7$) is significant.

The finding shows organizational factors affect HCMIS implementation and it is supported by various literatures under mentioned, Influence of organizational factors on MIS success is a major factor for MIS implementation (Rezaei, 2009). All the organizational factors are significantly correlated to the success of IS adoption (Hussein, 2007).

The study that investigates the relationship between organizational factors and IS success dimensions in relation to the Malaysian e-government environment. The findings of this study

provide a clear indication that organizational factors are, indeed, highly significant in ensuring successful information systems adoption particularly in the context of the public service sector. In addition, this study also reaffirms Mohd-Yusofs' (2005) assertion as to the importance of organizational factors in the similar sector.

Coefficients						
		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
	(Constant)	.158	.234		.674	.503
	OFQ	.805	.099	.692	8.139	.000

Table 11 Coefficients of organizational factors

Human factors

Linear Regression analysis is also applied to test whether there is influence between Human factors and the dependent variable HCMIS implementation. Table 12 indicates the model summary of the relationship between Human factors and HCMIS implementation. It is found that the value of R is 0.499 which is positive indicating that there is a positive correlation between Human factors and HCMIS implementation. This is due to the regression model selected can predict 49.9% of the variance HCMIS implementation.

R2 explains the change in the dependent variable HCMIS implementation due to independent variable Human factors. The value of R2 is 0.249 which indicates that Human factors contribute 24.9% variation in HCMIS implementation. The value difference of adjusted R2 and R2 in the model summary is 0.01 (0.249-0.239) this closeness means the model has been derived from the population rather than the sample.

Model summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.499[a]	.249	.239	.85108

Table 12 Model summary of human factors

Table 13 displays the ANOVA results of human factors. The F-Test for regression model is 23.916 with a significant value of 0.001 (p=.001< 0.05) which shows that a model is a good fit for predicting the outcome of the variable.

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17.324	1	17.324	23.916	.000[b]
	Residual	52.153	72	.724		
	Total	69.476	73			

Table 13 ANOVA of human factors

Coefficient in table 14 explains the importance of independent variable Human factors in predicting dependent variable HCMIS implementation. The results indicate that for every increase in Human factors result to the increase in the HCMIS implementation by 0.635. The t value of Human factors is 4.890 at p< 0.05 this means that are a significant predictor of HCMIS implementation.. A Human factor standard beta coefficient is 0.499 has impact on the model. The finding supported by Kumara (2018) and various literatures mentioned below, the critical t is 1.653 (from the table of critical t values) and the observed t is 2.51, therefore H0 can be rejected. So it indicates that there is a relationship between People factors and Successful adoption of MIS. There is a relationship between People factors and Successful adoption of MIS, this study is also supported by Ghaderi, Jafar Faezi, and Kahrizeh (2017) Study in 22 precincts of Tehran Municipality, as obtained average of human factors (3.4386) is greater than index average (3) (at much and very much degree of Likert scale), therefore one can claim that study hypothesis (human factors as one of the factors affecting on MIS use in 22 precincts of Tehran Municipality) with confidence 0.99 is statistically confirmed. Findings obtained from Friedman variance analysis show that Chi-square test ($\chi 2 = 15.773$ and $P < 0.046$, $df = 8$) is significant.

Coefficients						
		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
	(Constant)	.302	.349		.865	.390
	HFQ	.635	.130	.499	4.890	.000

Table 14 coefficients of human factors

Technological factors

Table 15 indicates the model summary of the relationship between technological factors and HCMIS implementation. It is found that the value of R is 0.235 which is positive indicating that there is a positive correlation between technological factors and HCMIS implementation. This is due to the regression model selected can predict 23.5% of the variance HCMIS implementation.

The value of R2 is 0.055 which indicates that technological factors contribute 5.5% variation in HCMIS implementation The value difference of adjusted R2 and R2 in the model summary is 0.013 (0.055-0.042) this closeness means the model has been derived from the population rather than the sample.

Model summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.235[a]	.055	.042	.95478

Table 15 Model summary of technological factors

The F-Test for regression model in table 16 is 4.213 with a significant value of 0.044 (p=.044< 0.05) which shows that a model is a good fit for predicting the outcome of the variable.

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.840	1	3.840	4.213	.044[b]
	Residual	65.636	72	.912		
	Total	69.476	73			

Table 16 ANOVA of technological factors

Coefficient in table 17 explains the importance of independent variable technological factors in predicting dependent variable HCMIS implementation. The results indicate that for every increase in technological factors result to the increase in the HCMIS implementation by 0.331. The t value of organizational factors is 2.052 at $p< 0.05$ this means that are a significant predictor of HCMIS implementation. Standard beta coefficient illustrates some deviations that the outcome will change as a result of a change of one standard deviation in the predictor (technological factors). A technological factor standard beta coefficient is 0.235 has impact on the model. The finding shows technological factors affect HCMIS implementation this is supported by JKITHOME, (2012). The chi-squire tests was testing the relationship between influence of technology and MIS implementation in the institutions, the analyses shows that there was a relationship between the influence technology and the MIS implementation in the institutions. Therefore the conclusion here is that technology was also a critical factor that needed to be considered in the implementation of management information system in the institutions.

As Kumara,(2018) and different studies found below support technological effect on MIS implementation, the decision states that if the one-tailed critical t value is less than the observed t and the means are in the right order, then H0 can be rejected. In this example, the critical t is 1.653 (from the table of critical t values) and the observed t is 2.154, so H0 can be rejected which is "*There is no relationship between technological factors and Successful adoption of MIS"*). So the study support there is a relationship between technological factors and Successful adoption of MIS. The technological factor has a positive effect on IS integrations successful implementation as described by Hussei (2007) and a summated scale of IS success was calculated by averaging the mean of the four IS success dimensions of the study. Correlation analysis was run on the data using SPSS version 11. The results show that the technological factors are significantly correlated with the IS success factors and the IS success summated variate.

Coefficients						
		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.981	.480		2.046	.044
	TFQ	.331	.161	.235	2.052	.044

Table 17 coefficients of technological factors

4.10.2 Correlation analysis

Correlation analysis was done to determine whether there is correlation between dependent and independent variables and inter-variable in independent variables.

As it is stated in the table 18, the value of correlation between HCMIS implementation and organizational factor is 0.692 to which we can say that these two variables has a significant positive relationship between the HCMIS implementation and organizational factor

Again In the table we can see the relationship between HCMIS implementation and human factor. The value of correlation is 0.499 which shows us that there is a significant relationship between HCMIS implementation and human factor. It tells us that if we make the change in one variable value then there is moderate change in the other variable's value.

Based on the result we can also see the relationship between HCMIS implementation and technological factor. The value of correlation is 0.235 which shows us that there is a moderate relationship between HCMIS implementation and technological factor. It also tells us that if we make the change in one variable value then there is moderate change in the other variable's value.

		OFQ	HFQ	TFQ	V1HIS
OFQ	Pearson Correlation	1	.497**	.561**	.692**
	Sig. (2-tailed)		.000	.000	.000
	N	74	74	74	74
HFQ	Pearson Correlation	.497**	1	.332**	.499**
	Sig. (2-tailed)	.000		.004	.000
	N	74	74	74	74
TFQ	Pearson Correlation	.561**	.332**	1	.235*
	Sig. (2-tailed)	.000	.004		.044
	N	74	74	74	74
V1HIS	Pearson Correlation	.692**	.499**	.235*	1
	Sig. (2-tailed)	.000	.000	.044	
	N	74	74	74	74
**. Correlation is significant at the 0.01 level (2-tailed).					
*. Correlation is significant at the 0.05 level (2-tailed).					

Table 18 correlation analysis between variables (dependent and independent variables)

4.10.3 Multiple Regression Analysis

According to Marczyk (2005), linear regression is a method of estimating or predicting a value on some dependent variables given the values of one or more independent variables. Like correlations statistical regression examines the association or relationship between variables. Unlike with correlations, however, the primary purpose of regression is prediction.

Multiple R is a correlation between the observed values of HCMIS implementation, the values of dependent variable predicted by multiple regression models. Therefore, large values of the multiple R represent a large correlation between the predicted and observed values of the outcome. The model summary table reports the strength of relationship between the independent and the dependent variable.

The model summary below, explains the overall significance of the simple regression equation, that is, the percentage variation in the dependent variable being explained by the changes in the independent variable (coefficient of determination). The coefficient of determination (R2) equals 0.551, indicates that 55.1% of the variation in the HCMIS implementation can be explained by the changes in independent variables (organizational, human and technological factors).

R2=55.1% > 50 % hence the model is fit for forecasting (explaining how a change in organizational, human and technological factors affects HCMIS implementation).

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.742[a]	.551	.531	.66787
a. Predictors: (Constant), TFQ, HFQ, OFQ				

Table 19 Model summary of overall variables

The results of multiple regression displayed in table 19 model summary, show a highly significant relationship (p <.05) between the dependent variable HCMIS implementation and a linear combination of the predictor variables organizational, human and technological factors as can be estimated from the coefficient of multiple R (0.742). The coefficient of determination (R2) is a measure of how good a prediction of the criterion variable we can make by knowing the predictor variables. Accordingly, 55.1% of the variation accounted for in the HCMIS implementation is due to the combined effect of the organizational, human and technological factors. But, sometimes R2 tends to somewhat over-estimate the success of the model when applied to real world. Therefore, to see the success of our model in the real world adjusted R2 is more preferable than R2. According to adjusted R2, the variation explained by the regression of HCMIS implementation on the combined effect of all the predictor variables (organizational, human and technological factors) is 53.1%.

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	38.253	3	12.751	28.586	.000[b]
	Residual	31.223	70	.446		
	Total	69.476	73			
a. Dependent Variable: HIQ						
b. Predictors: (Constant), TFQ, HFQ, OFQ						

Table 20 ANOVA of overall variables

The significant level in ANOVA table 20 shows that the combination of variables significantly predicts the dependent variable. ANOVA that tests whether the model is significantly better at predicting the outcome than using the mean as a best guess; specifically, the F-ratio represents the ratio of the improvements in prediction that results from fitting the model, relative to the inaccuracy that still exists in the model. For these data, F is 28.586, which is significant at $p<0.005$. This result tells us that there is less than a 0.5% chance that an F-ratio is larger would happen by chance alone so the research finding supported by Hoerbst et. al., 2010

4.11 Summary of the findings

The study had set out to assess the factors that influence implementation of management information system in public health facilities in Addis Ababa city.

Based on the finding most warehouse managers know the benefits of HCMIS and it added value for managing commodity if it is used effectively but they didn't use as expected due to many reasons like lack of previous experience on computer use, failure on the system and when failure happens it is maintained not by the facility itself instead need outside help, lack of support and follow up from the facility.

Descriptive analysis shows that most of the organizational factors such as unavailability of policy and procedures, monitoring and evaluation system, lack of training and sufficient resource provision and poor management support, score >3 need to be assessed and the gap needed to be filled in order to HCMIS successfully implemented. most of the human factors like confidence on facility on handling the system internally, use of information for decision making, use of the system as expected and their believe on getting sufficient training, score >3 only two like their skill to operate basic HCMIS functions and perceived use of the system for managing health commodities, score more than 3 and technological factors like presence of guideline on the system, flexibility of the system when customization needed and presence of all important feature, score >3 whereas easily understandability, availability of updated information and provision of reliable and accurate information, score < 3. That of organizational factors need attention because from the finding indicates most of the factors didn't appreciated by warehouse managers.

When we look at inferential statics result all three factors organizational, human and technological factors has effect on implementation of HCMIS. From the three organizational factors has significant effect than the two and human factors followed and at last technological factors has a moderate effect on HCMIS implementation.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter comprises the conclusion on the study and gives recommendation on what is needed to be focused in the future to get the desirable benefits of using HCMIS and MIS in general. Finally future areas of the study are recommended.

5.2 Conclusion

Based on the findings of the study, the following conclusions are made on the influence of organizational, human and technological factors for successful implementation of HCMIS in public health facilities in Addis Ababa. All the three factors studied influenced utilization of HCMIS for managing health commodities. As demonstrated by the correlation coefficients for organizational, human and technological factors they were found to be major factors in low data quality and information use and that they influence the utilization of information for decision making. Al-mamary et al (2015) performed a study to explore the factors affecting the successful implementation of MIS in Yemeni organizations. They categorized these factors into technological factors, people factors and organizational factors. Generally-speaking, challenges stem from the interaction of technical, human, and organizational factors affecting the adoption and use of these systems. To better explain these factors in their proper contexts the "design-reality gap" explain it well which was proposed by Heeks (2006).

Organizational factors like top management support, resource allocation, provision of training, presence of various policies and M & E system demonstrated as effective instruments for efficient and effective use of HCMIS. There is evidences that poor top management support is a barrier for HCMIS implementation as explained by kumar(2006), in reviewing the influence of information systems on today's organizations, it becomes evident that top managers play a crucial role in their inevitable success or failure (kumar, 2006). One of the important factors in IT implementation is top management's support and the role that managerial entities play in the successful implementation of the IT solution (Young and Jordan 2009). Shortage of resource, lack of appropriate training and absence of different policy and procedure has significant effect on implementation An absence of an IM policy shows that there is no clear guidance that is

provided to employees with regard to creating, capturing and managing information in order to fulfill organizational, legal and assigned responsibilities across the organization (Cox, 2014)In order for IM to succeed, organizations require useful policies and procedures, which control their information also M & E system in the organizational and management structures in the areas of support of review meetings, feedbacks and supervision were found to be a very effective strategy of enhancing information utilization to make decisions and also information use culture in a health facility also influenced the utilization of health information by the health facility. Just as it is depicted by schneberger & wade (2006) all organizational factors are significantly correlated to the success of IS (rezaei, 2009).

As reviewed by Sharma and Yetton (2003), Management support is the variable most frequently hypothesized as contributing to implementation success. And it will be measured through attributes believed to reflect the variable namely: beliefs and participation (Chatterjee and Grewal 2002). Organizational culture will also be measured through traits identified in the literature namely: involvement, consistency, adaptability, and mission. Finally IS implementation success will be measured through the two standard success measures, use and user satisfaction. Use and user satisfaction represent the success of various managerial interventions designed to promote end-user adoption. Hence, these variables are also accepted here as the most appropriate proxies for implementation success (Sharma & Yetton 2003).

The study conduct on the impact of organizational or corporate culture on IS implementation success in selected public and private organizations in Ethiopia support the finding that organizational factors greatly affect MIS implementation (Besha ,Negash and Amoroso 2009).

Human factors like confidence on facility on handling the system itself, the skill of the personnel, their believe on the benefit of using HCMIS, their belief the information used for decision making, their use of the system as expected and obtaining of training that assist them demonstrated as effective instruments for efficient and effective use of HCMIS. There is evidences as Babaei & Beikzad (2014), had explained the position, aim, role, definition are existing barriers and also these humanistic factors are challenges and problems for implementation of management information systems. Individual differences, tasks, & decision models have an effect on user acceptance of MIS (Shareia, 2006). Block, (2005) conducted a study on the hindrances to effective implementation of MIS in health organizations in USA. The

study showed that lack of user commitment, ineffective communications with users, conflicts among user departments and lack of IS training by some personnel were a hindrance to effective implementation of MIS systems in organizations.

According to Durodolu (2016), organizational characteristics, system characteristics, users' characteristics and other variables were necessary to explain the procedure for acquiring new skills. In the 21st century, efficient access and utilization of information resources depended on the ability to effectively use the apparatus of Information Technology. This study shows that confidence in the use of technology could lead to increased personal control, flexibility and also the competent use of information. Therefore, increased knowledge could lead to better productivity. This study also reveals that inability to control and accept the use of new technology could be overwhelming which may ultimately lead to anxiety that would weaken the quality of decision making.

Technological Factors Like understandability, presence of guidelines that shows how to operate when you find some information, timeliness, flexibility, presence of all important feature and accuracy and reliability has significant influence on implementation of HCMIS.

The empirical evidence also supports the impact of technological factors that act as the antecedent factors in influencing IS success. Consequently, the study adds to the literature on technological factors influencing IS success that needs more emphasis. Furthermore, the study found strong support on the relationship between the IS success dimensions as proposed by DeLone & McLean's (2002).

Information management is dependent on technology, both for their creation and their storage. Therefore, information must be managed in an effective technology environment (Mckeen & Smith, 2007). The technology platform must support a mobile solution and integrated systems to collect, process, store, and distribute information for decision making (Evans and Price, 2012;; Hicks, 2007).

Generally these three factors play a major role when an organization wants to implement MIS in their organization. These factors are organization factors, technological factors, and management factors. And they are interrelated, and work in an integrated way. When an organization decides to implement MIS in their organization, they need to look carefully whether their MIS

implementation goal is aligned with their organization goal or not. In concluding, these three factors jointly play a vital role in MIS implementation, and an organization will achieve numerous benefits with it. My paper will help future researchers to investigate more thoroughly on the mentioned factors discussed in this paper and they can make further contribution on this topic. THIS work will provide a good baseline for them.

5.3 Recommendations

Strong leadership in support of the MIS is crucial in successful implementation. Follow-up training and on-site support are good steps to ensure that users, having differing levels of computer skill, become comfortable with the software and use it successfully.

Since managers take the important role of decision making, any good management who wants to implement a robust MIS in their organization must acknowledge influencing factors when they implement MIS. Especially Internal sources of technical assistance have a strong understanding of the individual comprehension levels, and would thus be better equipped to train providers and staff. As we noticed from the findings, most facilities do have the capacity to maintain and sustain the system with minimal internal and external support so the facilities need to work on internal capacity the system need to be institutionalized.

Identifying the obstacle for data visibility and use and enforcing further through establishing deferent policy and procedures, training, monitoring, and evaluation of performance.

Creating and improving data use culture by empowering and training staff to analyze and use data for decision making will be key to improving supply chain performance.

Police and procedures that guide use of system generated data along with capacity building and training to access and use the data for decision making is crucial. The Police and procedures should include roles and responsibilities, processes, and job aids to use system generated data.

Local ownership is good so relevant stakes example facility managers, store manager engagement better involved during planning and resource allocation. The intensive technical support and On Job Training (OJT) provided by relevant bodies might have paid off as almost all professionals believe that they have the required level of competency to manage the system comfortably.

The management structures should lay emphasis on information values and create leadership on information use in order to boost positive attitude, values, motivation and perception to use information for decision making despite the roles and responsibilities. Data visibility and data sharing practice should be the focus.

On the technical factors, it is emphasized that there should be trained manpower that will be able to appreciate the use and value of information and it is recommended that those not trained on data collection and information use should be trained through OJT, seminars and workshops. Same recommendation was done by different studies that there was a significant need to train managers in data analysis and use, and to integrate data utilization activities when information systems are installed. Healthcare professionals using the HIS are the driving forces leading to success as well as failure in many.

Healthcare information technology cannot work without dedicated healthcare professionals who have had the opportunity to receive the education and training necessary to use the HIS and more easily integrate it into their unique setting. In other words, technology facilitates but does not in itself bring about change. The healthcare professional, then, is the critical factor in achieving a successful HIS.

Overall, reasonable expectations for the benefits of HIS must be set and understood by all users

Updating the system to enhance speed, reliability, and adaptability based on regular assessment on the implementation on the system

Areas of Further Research:

Some factors have not been properly accounted for due to its scope. It is therefore suggested that further research should be done on some topics related to this one. In this regard, the researcher recommends further research.

Further research could be carried out for an in-depth analysis of the current topic of "Identification of factors that affect successful adoption of MIS". Since the study did not exhaustively cover all areas of organizational, technology and people variables that affect the implementation of information systems. Future research could be done to investigate the

different dimensions like individual factors and technological factors, User satisfaction, Top management challenges and alike.

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ANNEXES

ADDIS ABABA UNIVERSITY COLLEGE OF BUSINESS AND ECONOMICS SCHOOL OF COMMERCE FOR DEGREE OF MASTER IN LOGISTICS AND SUPPLY CHAIN MANAGEMENT (LSCM)

Questionnaire for assessing factors affecting health commodity management information system implementation

Good day. I am Demelash Regassa, a student from Addis Ababa University, College of Business and Economics School of Commerce, and I am carrying out a research on the factors affecting Health Commodity Management Information System implementation in public health facilities in Addis Ababa. You have been identified as one of the key persons for this study and therefore you are requested to give information honestly on HCMIS as per the questionnaire

The purpose of this questionnaire is to collect data on factors affecting health commodity management information system implementation at health centers and Hospitals found in Addis Ababa. The findings will assist in forming strategies and opportunities for improvement. Please express your opinions honestly. Your responses will remain confidential and anonymous and will only be used for purposes of the research in aggregated forms. Your participation and assistance in completing this study is highly appreciated. Thank you in advance for your cooperation

Instructions Kindly provide responses by ticking in the boxes as applicable and by filling in the spaces provided.

SECTION A: Background

Q1. Age Less than 20 ☐ 20-30 years ☐ 31-40 years ☐ 41-50 years ☐ 51 and above ☐

Q2. Gender - Male ☐ Female ☐

Q3. What is your profession? Druggist☐ pharmacist☐ Doctor☐ Nurse ☐ Other (specify)_____

Q4. What is your highest education attained? Certificate☐ Diploma☐ Degree☐ Masters☐

Q5.your work experience Less than 6 months☐ 6 months but less than 1 year ☐ 1 year but less than 3 years ☐ 3 years but less than 5 years☐ above 5 years ☐

Q6. Facility type health center☐ hospital☐

SECTION B HCMIS			
	1. IMPLEMENTATION STATUS		
Q1	For how long does the facility used HCMIS to mange health commodities	1)6 month to 1 year 2)1 year – 2 years 3)2 years 3nyears 4)3 years – 4 years 5)4 years – 5 years 6) above 5 years	
Q2	How long have you been using HCMIS (the respondent)?	1. < 6 month 2. 6 months – 1 year 3. More than 1 year	

SECTION C FACTORS AFFECTING HCMIS IMPLEMENTATIONS						
Rate each item using one of the following responses based on your feeling about the issue. Use the following ratings: **1= Strongly disagree 2=Disagree 3=Neutral 4= Agree 5=Strongly Agree**						
	1. ORGANIZATIONAL FACTORS					
Strongly Disagree	**Disagree**	**Indifferent /neutral**	**Agree**	**Strongly Agree**		
1	2	**3**	**4**	5		
		1	2	3	4	5
Q3	The facility has police or procedures that enforce HCMIS usage					
Q4	There are Management close support on HCMIS use and its implementation					

Q5	The facility provide training for the concerned staff on how to operate HCMIS					
Q6	There are M & E systems on the implementation of HCMIS					
Q7	You have provided with resources that enables you to operate the system well. (If any)					
2. HUMAN FACTORS						
		1	2	3	4	5
Q8	You are confident that your facility can maintain HCMIS Independently into the future without assistance from DELIVER/ others?	-				
Q9	Do you feel you have the skills necessary to analyze and use data and information in order to help with the kinds of decisions that you are involved in?	+				
Q10	Does HCMIS is important for your area of work?	+				
Q11	The data obtained from HCMIS used for informed decision making for the facility	-				
Q12	you use the system as expected/ practical	-				
Q13	You get enough training on HCMIS how to insert , retrieve and analyze data	-				
3. TECHNOLOGICAL FACTORS						
		1	2	3	4	5
Q14	HCMIS is easily understood when you use it	+				
Q15	There are HCMIS use guideline that shows how to insert information, retrieve date and analyzing data in the system	-				
Q16	The system has up-to-dated information after transaction occurred.	+				
Q17	The system has more information /feature than the facility can use	-				
Q18	The system miss some important feature that should be incorporated(all important features for your area of work are incorporated in the system)	-				
Q19	The system provides accurate and reliable data.	+				
4 HCMIS implementation						
		1	2	3	4	5

Q20 -	Do you get all the benefits of HCMIS (fully implemented)at least 4 out of seven listed below? Based on under mentioned remarks **Remark** benefits of HCMIS - enhance data visibility - At least inter linked with facilities head and pharmacy head - find HCMIS better than physical count to know your - STOCK STATUS - Do you use HCMIS other than RRF for RDF drugs - Do you use HCMIS data for forecasting your demand - Do you Use HCMIS for tracking inventory location - Do you use HCMIS to send RRF for program drugs	+				
Q21	Did HCMIS fully implemented?					

SECTION D

Q21. Do you have any experience on using computer before using HCMIS? YES NO

Q23. How many times over the past 6 months have you had a serious (serious means you were unable to use the system) problem with HCMIS for at least a week? _____

If yes continue to Q35

Q24. Did you able to fix the problem yourself or facility IT officers or need outside help?_____

Q25. When you rate factors affect implementation of HCMIS in your facility among organizational, human and technological factors which comes first?

_____

Q26. Did the system add value in managing health commodities in your facility than the previous manual system?

Q27.Is it easy to produce reports using HCMIS as compared to the previous manual system?