ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

The Practice of Health Commodity Management Information System in Public Hospitals of Addis Ababa

By: Seada Abrar

May, 2018

Addis Ababa, Ethiopia

The Practice of Health Commodity Management Information System in Public Hospitals of Addis Ababa

Seada Abrar

ID. Number: SGS/0117/2009A

Advisor: Tesfaye Debela (PhD)

A THIESIS SUBMITTED TO ST.MARY'S UNIVERSITY SCHOOL OF GRADUATE STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF BUSINESS ADMINISTRATIONIN MANAGEMENT.

MAY, 2018

ADDIS ABABA, ETHIOPIA

ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

OF BUSSINESS

The Practice of Health Commodity Management Information System in Public Hospitals of Addis Ababa

BOARD OF EXAMINEIRS

Dean, Graduate Studies   ---------------------------------------

                                               Signature and date

Advisor   ---------------------------------------

                                               Signature and date

External Examiner   ---------------------------------------

                                               Signature and date

Internal Examiner   ---------------------------------------

                                               Signature and date

DECLARATION

I, the undersigned, declare that this thesis is my original work, prepared under the Guidance of' Tesfaye Debela (PhD). All sources of materials used for the thesis have been duly acknowledged, I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree".

------------------------------------   -------------------------------

Name   Signature

ENDORSEMENT

This thesis has been submitted to St. Mary's university, school of

Graduate Studies for examination with my approval as a university advisor.

------------------------------   -------------------------------

Advisor Signature   May 2018

ACKNOWLEDGEMENT

Table of Contents

Contents   **Pages**

Annexes

    Annex 1. Self-Administered Questionnaire to DSM members

    Annex 2.Check List for HCMIS, Documents &Voucher Review (System Implementation)

    Annex 3 In-depth interview guide

List of Tables

List of figures

List of Abbreviations

ARV	Anti Retro Viral
CEO	Chief Executive Officer
CLMIS	Contraceptive Logistics Management Information Systems
DSM	Drug Supply Management
ED	Essential Drug
ETB	Ethiopian Birr
FEFO	First To Expire, First Out
FMOH	Federal Ministry Of Health
HCMIS FE	Health Commodity Management Information System facility Edition
HIS	Health Information System
HMIS	Health Management Information System
HSDP	Health Sector Development Plan
ICs	Inventory Control System
IPLS	Integrated Pharmaceutical Logistic System
LMIS	Logistic Management Information System
M&E	Monitoring And Evaluation
MOH	Ministry Of Health
NGO	Non Governmental Organization
PFSA	Pharmaceutical Fund And Supply Agency
RRF	Report And Requisition Format
RDF	Revolving Drug Fund
SOH	Stock On Hand
TD	Tracer Drug
SPSS	Statistical Package For Social Sciences
USAID	United state Agency For International Development
vLMIS	Vaccine Logistics Management Information Systems

Abstract

The aim of this study is to assess the practice and challenges of implementing health commodity management information system (HCMIS) in Addis Ababa public Hospitals. Facility based cross-sectional descriptive study design is adopted through mixed approach of both Quantitative and Qualitative methods. This research was conducted in ten HCMIS implementing public hospitals. In-depth interviews were made with ten pharmacy heads and four medical directors. Self-administered questionnaire was distributed to thirty six DSM members. The HCMIS, Manual Bin cards, Vouchers and RRF are reviewed. Quantitative data was entered and analyzed using SPSS version 20 and in-depth interview were summarized and analyzed based on their thematic areas. The findings show that the implementation level of HCMIS is poor. The report (RRF) generated from the system is only one hospital that fulfilled the expected six RRF in one fiscal year. This study discovered that 2 of the hospitals used the system sometimes before and sometimes after the actual transaction and rest of 80% hospitals used the HCMIS only to update after the manual transaction so none of the hospital uses the HCMIS before the actual transaction. The finding of this study shows that only 22.2% take the training of HCMIS whereas the rest 77.8% cannot operate the system because of lack of training. The comparison result for the physical count and the HCMIS count for the selected tracer drugs, in 40% of the hospitals none of the five tracer drugs have similarities. The most difficult challenge this Facility face in maintaining HCMIS are staff turnover and knowledge gap. As the qualitative and quantitative data findings indicate that the system is very useful and ideal despite this fact the evaluation shows the implementation status of HCMIS is poor so that I recommended that; HCMIS should be fully implemented in all health facilities in Ethiopia.

Key words: Health Commodity Management Information System, Report Requisition Form, inventory control.

CHAPTER ONE

INTRODUCTION

1.1. Background of the study

Health is an important indicator of the status of development of a society and country, and medicines are the cornerstone and integral part of every health care system. Majority of the common leading causes of morbidity and mortality can be substantially reduced if essential drugs (EDs) are made available and appropriately used (Hertzman, 2013).

Mortality figures across developing regions reflect a huge burden of illness that can be substantially reduced if carefully selected, low-cost pharmaceuticals are available and appropriately used (Emelia, 2014).

As countries continue to expand health programs and strengthen the supply chains that support them, there is an increased need for user-friendly tools and software packages to support the timely and accurate collection and reporting of logistics management information (Snow, 2012).

Few developing countries have strong and effective health information systems to meet all these diverse information needs. New technologies can contribute to improving data generation, Compilation and exchange but will require the existence of clear data quality standards to be of optimal value (Belesti, 2008).

Automation of a Logistics Management Information System (LMIS) can greatly facilitate the work of supply chain managers by enabling faster collection, transmission, and aggregation of data; by reducing human error in calculations; and by allowing for visibility of data up and down the supply chain. Reducing the time required for data collection, transmission, and aggregation results in data being available more quickly for timely decisions and actions to help ensure products are available where and when needed (Snow, 2012).

The electronic system—Health Commodity Management Information System, Facility Edition (HCMIS FE)— was introduced in 2009 built by the USAID|DELIVER PROJECT to improve the ability of health facilities to manage health commodities in their stores. The HCMIS is a locally-developed, user-friendly software package that helps health facilities to manage all essential drugs, as well as medical and laboratory supplies. The HCMIS automatically receives and issues reports and orders, manages inventory, and produces a variety of commodity reports for store managers, supply managers, and facility heads. (Snow, 2012). Currently, According to 2012 health and health related indicator there are 11 public hospitals, 37 private and NGO hospitals (Mezid, 2014). More than 2500 health facilities implement IPLS, of which more than 500 health facilities have started using automated system (HCMIS)─ a system that improves processes, customer services and visibility of data (PFSA, 2014).

By definition an HCMIS is a system of records and reports used to aggregate, analyze, validate, and display data (from all levels of the logistics system) that can be used to make logistics decisions and manage the supply chain. A well-functioning LMIS provides decision-makers throughout a supply chain with accurate timely and appropriate data, such as stock on hand, losses and adjustments, consumption, demand, issues, and information about the cost of commodities managed in the system (Snow, 2012).

Analytical tools provide users and managers with reports on cost, price only (value per batch to determine charge to the dispensary), 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 (Snow, 2010).

There is Primary user who uses HCMIS on the day to day basis to manage health commodities for example store Managers and HCMIS officer utilize HCMIS in order to manage their inventory. There are also Secondary users who use outputs generated from HCMIS for decision making they are pharmacy directorate supply manager of Health Facility Administrator/

Management Units for decision making and PFSA for resupply decisions and stock out/wastages monitoring (HCMIS, 2017).

The HCMIS Program tries to build capacity within health facility program to effectively manage all aspects of health commodity management systems, pharmaceutical, medical service and laboratory services. MSH/HCSM focuses on improving governance in the pharmaceutical and laboratory sector, strengthening resource allocation management systems and financing mechanisms, for transparency and accountable and to bring integrated work performance and for prioritization of needs (PFSA, 2014).

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 (Snow, 2010).

1.2. Statement of the Problem

A study done in Kenya shows Supply chain information typically is automated via a warehouse management system. The challenge is to move beyond the walls of the warehouse and see inventory and usage at local levels. The data flow blockages rising from below create a scenario where inventory is determined by forecasts based on consumption histories from the past that contain inaccuracies and dated information (Ng'ang'a KJ, 2013).

In Ethiopia, there is a huge accumulation of medicines waste as a result of the absence of good pharmaceutical management practice. Continuous availability of quality assured medicines become a challenge for delivering good health care services (Ejigu, 2012).

HCMIS first implemented in the city called wukro in Tigray region, Ethiopia before the implementation of HCMIS availability of essential medicine and other vital health supplies was a major challenge. Availability was less than 40 % at the hospital. At the same time 400,000 ETB around 20,000$ were wasted each year due to damage and expiry. The lack of logistic data including stock status and consumption was significant contributor to this. After the implementation of HCMIS it shows a significant reduction in waste and improvement in availability. But according to august site status national report currently its practicability is on/off and doesn't Send RRF print out from HCMIS. It also indicates more than half of the health facilities don't use HCMIS for reporting system (Snow, 2012).

As indicated on the Ethiopian Health Sector Transformation Plan (HSTP) 0f the 2008-2012 EFY one of the Performance Measures and Strategic Initiative is to improve supply chain and logistics management (HSTP) but here and the previous five year HSDPs and also on the Pharmaceutical supply transformation plan automating the logistics management system and the inventory control is not considered as one of the major initiative and due to this the implementation of the HCMIS is left as a good will practice on the health facilities of the country rather than being an obligation like the HMIS (MOH, 2012)

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 hospital service in the country when those challenges can be reduced via the implementation of HCMIS most of the Health facilities are using the manual report and requisition format (RRF) instead of generating report and refilling their stock using HCMIS. To rely on automated HCMIS report data must be clear and accurate. But most of the health facilities don't use this data to generate a report by using HCMIS. The aim of this research is to assess the practice of Health Commodity Management Information System (HCMIS) in public Hospitals of Addis Ababa.

1.3. Research question

1. How is the level of implementation of HCMIS in public hospitals?
2. What is the benefit of implementation of the HCMIS?
3. What are the challenges to implement HCMIS?

1.4. Objectives

1.4.1. General objective of the study

The general objective of this study is to assess the practice of Facility edition Health Commodity Management Information System (HCMIS) in all public Hospital of Addis Ababa, Ethiopia.

1.4.2. Specific objective

1. To determine the level of implementation of HCMIS in the selected public hospitals
2. To describe the benefit of implementation of the HCMIS.
3. To identify challenges that affect implementation of the HCMIS

1.5. Significance of the study

The findings of this study would help the health facilities, to gain the benefit from automation of the system. particularly hospitals drug supply management team to create a demand by showing the benefit of implementation on continuous availability of pharmaceuticals and to strength their Drug Supply Management system and also the stake holders like federal & regional health office to visualize factors affecting the implementation status of the system and to enforce the implementation of the system and for pharmaceutical fund and supply agency to improve the

effectiveness and efficiency of the country supply chain management system and also finally for partners working with these stake holders particularly USAID to strengthen the system. The practical significance of this study is to increase understanding of how to develop competitive pharmaceutical management systems using automation.

1.6. Scope and Limitation of the study

1.6.1. Scope of the study

This study is done in Addis Ababa Ethiopia on public hospital 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 on the mentioned Hospitals. Health centers are not included.

1.6.2. Limitation of the study

Although there are notable contributions from this study there were certain limitations of this study. One limitation of this research was lack of studies conducted in Ethiopia investigating the practice of HCMIS. In addition there was no adequate literature which conducted in this area of study. Since the research study was conduct only in Addis Ababa; it would not be generalized to others. Therefore future research should be conducted on large scale by considering more hospitals and health centers overall the country.

1.7. Definition of terms

Stock out: unavailability of usable stocks in the store or a balance of zero on the

Bin cards at store.

Stock on hand: usable stocks in the store.

Over stock: stocks found in the store more than the needed quantity.

Report and requisition form: document generated by store manager to notify the purchasing department of items it needs to order, their quantity and timeframe.

Inventory control: also refer to as stock control it is managing all aspects of companies inventories: purchasing, shipping, receiving, tracking, warehousing or storage and recording by one integrated system.

CHAPTER TWO

LITERATURE REVIEW

2.1. Theoretical Review

Information is the main thing for the logistics cycle; without information, the logistics system may face interruption of the whole cycle. In the beginning of the cycle, managers gather information about each activity in the system and analyze that information to make decisions and coordinate future actions. As information about product consumption and inventory levels must be gathered to ensure that a manager knows how much of a product to Procure. (McCarty, 2015)

Information makes a similar impact even on the public sector. Public servants are now beginning to realize that information can change the way they work, quite dramatically. Use of information at appropriate time in a right manner enables them to improve their general efficiency in ways that are similar to those used in private sectors − through automation of their day to day routines, through decision support systems, through electronic financial transactions, etc. In other sectors like, education, health, social security, public servants ultimately handles information and their decisions are all depend on the available information. (Ravichandra, 2001)

The Pharmaceutical management information system integrates pharmaceutical data collection and the processing and presentation of information that helps staff at all levels of a country's health system make evidence based decisions to manage pharmaceutical services (Ejigu, 2012).
A good Pharmaceutical management information system provides the necessary information to make sound decisions in the pharmaceutical sector (Humphries, 2003).

There are many organizations or institution that works on health program in worldwide. In order to operate their program they need operating data. The accuracy of the data produced is a major reason for success measurement. In most cases medicines are wasted because of inability to recognize the expiry date is approaching. Because of lack of information pharmaceuticals such as ARV medicines, which are very expensive can be lost and this kind of loss is unacceptable especially in developing countries. To prevent this there are measures to be taken (Eyerusalem and Gebremedhin, 2013).

There are three logistic functions of the **Integrated Pharmaceuticals Logistics System** which are

1. Logistics Management Information System (LMIS),

2. Inventory Control System (ICs) and

3. Storage of Pharmaceuticals

Among the three functions LMIS & ICs will be discussed because HCMIS includes only these two components.

2.1.1. Logistics Management Information System (LMIS).

The purpose of a Logistics Management Information System (LMIS) is to collect, organize, and report information to other levels in the system in order to make decisions.

The primary function of the LMIS is to support the management of essential pharmaceuticals.

There are three essential data items are required to run a logistics system and, These are:-

2.1.1.1. *Stock on Hand*: Quantities of usable stock available at a particular point in time.

2.1.1.2. *Consumption Data*: The quantity of pharmaceuticals used during the reporting period.

2.1.1.3. *Losses/Adjustments*: Losses are the quantities of products removed from your stock for anything other than in the provision of services to patients or issuing to another facility (e.g. expiry, lost, theft, or damage) and are recorded as negative (-) numbers. Adjustments are quantities of a product received from any source other than PFSA, or issued to anyone other than your health facility. An adjustment may also be a correction due to an error in mathematics. An adjustment may be a negative (-) or positive (+) number.

There are different LMIS tools used for recording and reporting purpose and those are Bin card, Stock record card, Internal Facility Report and Resupply Form, and Report & Requisition Form and those tools are expected to be filled manually which is time taking and prone to error and that is why the HCMIS is introduced to overcome those challenges and to produce real time data (PFSA SOP, 2014).

2.1.2. Inventory Control System (ICs)

The purpose of an inventory control system is to inform personnel when and how much of a pharmaceuticals to order and to maintain an appropriate stock level to meet the needs of patients. A well designed and well operated inventory control system helps to prevent shortages, oversupply, and expiry of pharmaceuticals (PFSA SOP, 2014).

An efficient inventory control system would help the optimize use of resources and eventually help to improve patient care, by ensuring the availability of essential stocks and preventing stock-outs (Karthikeyan and Santhi. 2016).

The goals of inventory management are to protect stored items from loss, damage, theft, or wastage, and to manage the reliable movement of supplies from source to user in the least expensive way (Snow, 2016). The inventory control system for the IPLS is a Forced Ordering Maximum/Minimum inventory control system. This means that all facilities are required to report on a fixed schedule (monthly at health posts, every other month at health centers and hospitals) for all products. In addition, all products are re-supplied each time a report is completed.

2.2. Automated System

Automation is the use of control system such as computer or robots and information technologies for handling different process and machineries in an organization to replace manual work. An information system as "a system consisting of the network of all communication channels used within an organization (Becta, 2005).

MIS as "a system or process that provides information needed to manage organizations effectively" MIS is deemed to be a system which provides organizations top management and, even lower level management, with appropriate information based on data from both internal and

external sources, to allow them to make effective and timely decisions that best achieve their organization goals and satisfy stakeholder requirements (Adeoti, 2006).

The use of automated pharmaceutical management systems becomes more common at this time as they are received, stored, issued, and quality controlled (Ayad, 2011). Computer software programs play an important role in the inventory management of a pharmacy (Karthikeyan and Santhi, 2016).

As technology continues to evolve in public health systems within developing countries, managers are beginning to demand up-to-the-minute, accurate data, which helps them to manage product flow better for all levels within the system. Technology makes methods of inventory management and methods of evaluating inventory management more efficient, more precise, and more accurate (Ayad, 2011).

Concerning electronic health record, lack of coordination and standardization among various efforts, and lack of clear long term plan to move the whole system is a major concern (MOH, 2012). More recently, Ethiopia has seen a significant deployment of the SmartCare system used in Zambia. Over 100 clinics and hospitals in the Dire Dawa region, covering the entire area, have successfully deployed this system for building and maintaining electronic medical records, which will improve both the quality of health information as well as patient care (Mengiste, 2010).

Computerized applications for healthcare include: SMARTCARE Ethiopia – an electronic health record system that supports longitudinal recordkeeping for a clinical care, especially for HIV/AIDS treatment, TB care, VCT, and antenatal care. The system is being rolled out nationally and provides clinical decision support and data portability via the use of smart cards (Foster, 2012). SmartCare's most attractive features include the ability of SmartCare to personalize Patient's medical record by using SmartCards. SmartCards are pocket/credit card sized plastic cards embedded with an electronic memory chip capable of storing Patient's information.

Furthermore, SmartCards are used as an ID for a patient so that it will easier to filter and retrieve his/her record and history during the follow-up sessions or visiting different point of services like reception, laboratory, pharmacy and so on (Mengesha, , 2011).

In many organizations decision support systems (DSS) are used as a part of management tool to reduce risk. For example, an application for a personal loan can be approved / disapproved even by a middle manager, provided the manager has access to a DSS to obtain a "credit score" – applicants who score above certain level receive the loan. Success of such a system is totally depending on the availability of information (Ravichandra, 2001).

Many countries that are managing public health supply chains have adopted an open source eLMIS, which has no initial or recurring licensing fees and electronically collects, organizes, and presents logistics data that have been gathered across all levels of the system. With the introduction of the eLMIS, program managers now have quicker access to aggregate and/ or specific data at their fingertips. With electronic reports, automated approval workflows, and email/ Short Message Service (SMS) notifications, processing time for requisitions can dramatically decrease. An eLMIS enables district health management teams to easily identify overstock and under stock situations and then to redistribute stock to meet patient needs and reduce losses through commodity expiry (Snow, 2010).

2.3. Health Commodity Management Information System (HCMIS)

The HCMIS which is an electronic inventory management system automatically receives and issues reports and orders, manages inventory, and produces a variety of commodity reports for store managers, supply managers, and facility heads and also improved data visibility (Snow, 2010).

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 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 RDF (Snow, 2010).

2.3.1. Objectives of the HCMIS

HCMIS was designed to address the following objectives: To improve the country's pharmaceutical supply chain management system, To strength pharmaceutical logistic management information system, To create strong inventory control system in the health facility, To bring efficient medicines budget utilization in health facilities by reducing expiry and via better stock management, To enable health facilities produce reliable and quality data timely.

2.3.2. Users of the HCMIS

There are Primary users who use HCMIS day to day to manage health commodities this are Store Manager and HCMIS officer they utilize HCMIS in order to manage their inventory and LMIS. There is also Secondary users who use outputs generated from HCMIS for decision making this are Health Facility Administrator/ Management Units for decision making and PFSA for resupply decisions and stock out/wastages monitoring. (Ng'ang'a KJ, 2013).

2.3.3. Benefit of Effective Automated Health Commodities Management system

Designing an effective and sustainable supply chain system for drugs and other commodities is important and can be complex. Commodity management is important for the following reasons such as demand for health care services, Quality of health services, cost, prevents wastage, ensures continuous availability, ensures full supply and avoids irrational or incorrect use (Emeli, 2014).

Automation plays big role by making methods of inventory management and methods of evaluating inventory management more efficient, more precise, and more accurate. Drug inventory management can be tedious. Having the automation system has been shown to save human resources and money as well (Ayad, 2011).

2.3.4. Challenges of implementing HCMIS

There is shortage of skilled human resource for HIS, the professional mix is poor and the attrition rate is very high in the health sector. In general the human resources capacity in core health information sciences to meet health information needs is limited (Foster, 2012).

Lack of timeliness and completeness of HIS reporting remains a weakness, and such delays contribute to the failure (at all levels) to use data as the basis for informed decision-making in health care planning and management. Recognizing the weaknesses of existing routine paper-based system, there have been repeated efforts to reform HMIS in the country (Mengesha, 2011).

For a successful implementation of IM programmers', there is a need for staff development activities to improve the competence of information managers. The managers must be trained to handle users, information, and systems. The 'users' part includes: skill to conduct user studies to identify their need , want, demand and their information seeking behavior patterns of information use (Ravichandra, 2001)

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 vale 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 (MOH, 2012).

Health Sector Transformation Plan health sector showed significant achievements in planning, budgeting, decentralization, review of plans and progress, involvement of partners and utilizing information in decision making. HMIS is a major source of information for monitoring and adjusting policy implementation and resource use. In the health facilities the inefficient inventory control measures by procurement officers and store keepers have always been a central Problem (Obiri, David and Makafui, 2015)

2.4. Empirical Review

Automation in pharmacy inventory management creates additional time for pharmacists to provide pharmaceutical care and other pharmaceutical services to patients and customers (HIS, 2008).

The novel software Medz helped in giving a priority management and economic forecasting of all the items in a community pharmacy (karthikeran & santhi , 2016).

Inventory management and distribution in the health care industry has been traditionally considered as an area of low value. However, recent studies have shown that tremendous cost savings and potential revenue can be generated with the enhanced management of distribution and inventory (Crystiana, 2014).

Twenty one (87.5%) HCs used HCMIS software to manage NPDs in the store and all of them were functional at time of survey. The HCs used the HCMIS mainly to trace expiry date of drugs 21(100%) and rarely for conducting ABC analysis 2(9.5%) (Mezid, 2014)

In the United State, medicine distribution roles have been taken over by pharmaceutical automation, so pharmacists have been able to expand their roles to be more clinical (Vania, 2016). A study in Kenyatta National Hospital, Kenya, indicated that "low employee's capacity led to a decrease in provision of service quality by factor of 0.981" while inadequate technology adoption for health service led to a decrease in provision of service quality by a factor of 0.917 (Kenneth, 2012).

In Japan after the implementation of the automated inventory management system called Artimathe workload in the inventory management in each section of the Pharmacy Department as well as in clinical units was dramatically reduced and this gave Pharmacists in creating new clinical service. (Takehiro and Yoshikazu, 2005) A case study conducted by USAID in Amhara region Hidar 11 hospital on 2011 on the Implementation of HCMIS Facility Edition and Proper Warehouse Management Practices shows that it improved the store management system.

Other study in Tigray region called wukro which is the first to implement **HCMIS** in Ethiopia availability of essential medicine and other vital health supplies was a major challenge for many years. Availability was less than 40 % at the hospital. At the same time 400,000 ETB around

20,000$ were wasted each year due to damage and expiry. The lack of logistic data including stock status and consumption was significant contributor to this. After the implementation of HCMIS it shows a significant reduction in waste and improvement in availability. But according to august site status national report currently its practicability is on/off and doesn't Send RRF print out from HCMIS. It also indicates more than half of the health facilities don't use HCMIS for reporting system (Snow, 2012)

.

All HCs prepared their own forms to order NPDs from suppliers, except 2 HCs that use RRF. In all HCs similar forms (IFRR) were used to request NPDs from HCs' pharmaceutical store. Receiving and issuing of NPDs also made with similar forms (government receiving voucher/model 19 and government issuing voucher/model 22, respectively). Availability and up-to-dateness of bin cards, and accuracy of keeping logistics records was assessed for the NPTDs. Bin card was available for majority of NPTDs. On average, 84.5% of the NPTDs had bin cards of which 69.5% were updated (Mezid, 2014)

HCMIS is an important tool in inventory management, therefore accurate record keeping is essential. A study in Tanzania reported 8% and 72% recorded balance that was less and greater than the physical count. This shows how poor is the implementation of the system (Kagnashe & Messawe , 2012).

A national health information system assessment was carried out in 2008 using the Health Metrics Network framework and tools and this was updated and validated in 2011 as a step towards developing a national health information system strategic plan. According to the validated assessment results, among the six components of HIS, four components scored low, and the remaining two scored adequate. Data management scored as "not functional" (13%), and three components, HIS resources (42%), dissemination and use (48%) and data sources (52%) were found to be present but not adequate. Indicators (83%) and information products (73%) were considered adequate (PFSA, 2014).

Stock out of non-program ORS was encountered in 14 out of 18 HCs (77.8%) whereas only in 2 out of 16 HCs (12.5%) stock out of non-program PCM encountered. On average, non-program

MBZ and ORS were stocked out more than once (mean = 1.3, S.D =3.0; mean = 1.1, S.D=0.8, respectively). On average, non-program MBZ was stock out for longer period of time compared to the other NPTDs (mean=99.4, S.D=113.7) in the year. For majority of the HCs full data for PTDs were not available to measure stock outs (Mezid, 2014)

After implementing HCMIS availability of most essential medicines has increased significantly. A 2014 survey Shewarega showed availability of select essential medicines at around 90 percent; compared to about 70 percent as reported in a similar survey in 2003 (FMOH, 2003).

Despite the information produced by the HCMIS a proper storeroom with trained staff is a requirement for implementation of the paper system; because a successful paper system implementation required for automation (Snow, 2016).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Research Design

The objective of this research is to assess the practice of Facility edition Health Commodity Management Information System (HCMIS) in public hospitals found in Addis Ababa, Ethiopia and In order to fulfill this objective a mixed approach of both Quantitative and Qualitative methods through the facility based cross-sectional descriptive study design is adopted because the researcher aims to understand, observe and to measure the implementation level of the HCMIS FE.

3.2. Study Site

The total number of hospitals in Addis Ababa city is 51out of the total hospital 11 of them are public. The rest are run by private investors and nonprofit organization (FMOH, 2001).

All public hospitals found in Addis Ababa will be included in this study. Except Tirunesh Bejing it is because of recently initiate the automation system it is only 6 month since they implement HCMIS. The other 10 hospitals From federal; Amanuel, Alert , Blacklion specialized Hospital, St.Paul , And St.Peter and from regional; Ras Desta Damtew memorial hospital, Zewditu, Minilik Memorial Hospital, Gandi memorial hospital and Yekatit 12 are included.

3.3. Selection of study subjects and source of data

In the study from the selected Hospitals purposefully pick responsible body those are DSM members are chosen to fill the questioner and pharmacy head and medical directors are included in the in depth interview. Then on the observation five tracer drugs are selected from the list of tracer drugs listed by the hospitals. Those tracer drugs should be always available at hospitals all the time. The HCMIS, manual bin cards, report& requisition form and receiving voucher (model -19) for those tracer drugs are selected to be review.

3.4. Target population

The target populations of this research are all public hospitals found in Addis Ababa included in this study. From federal; Amanuel, Alert, Blacklion specialized Hospital, St.Paul, And St.Peter and from regional; Ras Desta, Zewditu, Dagmawi Minilik memorial hospital, Gandi memorial hospital and Yekatit 12 were included. Those hospitals are selected by using the inclusion criteria those hospitals using the system currently and continuously implementing the system for at least one year and from these hospitals DSM members like store manager, DSM officer, HCMIS officer and pharmacy head would be included and also medical director of the hospital and pharmacy head were included in the interview part.

In selecting study participants, purposive sampling technique were employed to pick responsible body from the study hospitals. Because based on the characteristic of a population and the purpose of the study the HCMIS is used directly or indirectly by this core staffs and from other studies used this kind of criteria were used to answer the research question. From DSM members: HCMIS officer, DSM officer and store manager would choose. The head of the department and medical director also chosen, since the store manager and HCMIS officer directly involve in HCMIS practices; DSM officer, the department head and medical director acts on the report generated by the system. Self-administer questionnaire distributed to 36 DSM members which are Ten DSM officer, ten store manager, ten pharmacy head and six HCMIS officer this is because in four hospitals the store management and HCMIS simultaneously work by one person. Which is Dagmawi Minilik, Ras Desta, St.Peter and Gandi memorial hospital each 3 participant. From ALERT, Amanuel, Black lion, St.Paul, Yekatit 12 and Zewditu hospital each 4 participant.

In addition ten pharmacy head and four medical directors are interviewed. Total of 14 participants are included in the interview part. The response rate for in depth interviews were 10pharmacy heads and 4 Medical directors.

Length of time DSM members work with the HCMIS

		Frequency	Valid Percent
Valid	3_5months	2	5.6
	6months_1year	15	41.7
	morethan1year	19	52.8
	Total	36	100.0

Table 1: Length of time work with the HCMIS

From the study hospitals the response rate for questioner was (100%) and from the respondents 52.8% of them worked more than one year on the system, 41.7% worked from 6month to one year and the rest is worked below six month. From the in depth interview it was found that from ten hospital Minilik-Hospital were using the system for the last five years and the other five hospitals ALERT, Rasdesta, Yekatit, St Paul &Gandi were using the system for the last four to five years; Black Lion & Zewditu-hospital were using it for the last 3years and the rest two hospitals Amanuel & St peter were using the system between one to two years length of time the hospital implement HCMIS.

3.5. Data management

All missing or unimportant values are removed from the data analysis. All participants who work in mentioned hospitals response would be used to determined valuable information through different questions to assess the utilization of health commodity management's information system to analysis and interpretation data to get tangible information. Questioner and observation was done to assess health commodity management information system and in depth interview for head of the department and medical director were conducted.

3.6. Study procedure and techniques

In order to conduct this study, receiving permission from St. Mary's university registrar office to be official for distribute questioner, to undertake observation and to interview the selected hospitals in order to get both primary and secondary data. This study conducted in Addis Ababa, Ethiopian in 2010 for the study, all public hospitals found in Addis Ababa were invited and I

assume to select the participant by using purposive sampling method to the original survey for data gathering. Data gathering would follow rule and regulation along with asking their voluntariness of participants.

3.7. Data collection method

In the conduct of this study questionnaire, observation and in depth interview method adopted. The questionnaire and interview method enables the collection of a large amount of primary data on the variables that considered important to the research. Quantitative and qualitative data's are collected by the researcher by administering the structured questionnaire, using in depth interview and by 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 we can find secondary data. The data collected by means of questionnaires. A structured questionnaire which is adopted from a tool developed by USAID- DELIVER which is used to conduct a facility based survey to assess the performance of HCMIS at facility level (John, 2005).

A structured questionnaire used because it is relatively more economical and convenient for the respondents to answer and in addition it encourages the provision of a true and honest response on sensitive issues.

Interview used because it serves as an extension of ordinary conversation and it allows for interaction "to achieve richness and depth of understanding (Rubin, 1995).

The structured questionnaire was used for the DSM members and for the pharmacy heads and medical director in-depth interview guide was used.

3.8. Data Analysis and process

data analysis as a process which involves drawing conclusions and explaining findings in words about a study. The raw quantitative data are captured, presented and analyzed by using the Statistical Package for Social Sciences (SPSS) using descriptive statistics (Creswell, 2009). Descriptive analysis will perform to assess the implementation of health commodity management information system describes descriptive statistics as a method of organizing, summarizing and presenting data in an informative way (Boman & Sollenberg, 2005).

The results will summarize using SPSS frequency tables. Data will be reviewed and categorized based on themes. The data will be grouped according to key themes and each of the different

positions will summarize. Finding data will be reviewed from documents (BC, model-19, RRF & HCMIS), collect data from purposively selected head pharmacist and medical director using in depth interview guide will be analyzed accordingly.

3.9.   Inclusion and exclusion

3.9.1. Inclusion

Those hospitals using the system currently and continuously implementing the system for at least one year. And who are volunteers and pursue their work in public hospital of Addis Ababa, Ethiopia.

3.9.2. Exclusion

All workers in hospital who was not used the system and not willing to fill the questioner. And also Tirunesh Bejing is excluded from the study because it didn't fulfill the inclusion criteria less than one year to start HCMIS.

3.10. Quality Assurance

This study has been conducted for partial fulfillment of master degree graduation requirements. All of the study process and procedure will follow rule and regulation of research requirements regulation through evaluation committee of St Mary's University and commented by my Advisor.

3.11. Ethical considerations of the study

 Assessing the Practice of health commodity management's information system in Addis Ababa public hospital 2010/2017 to 2018.The study activities has been carried out within Addis Ababa city. In order to study the assessment of practice of health commodity management's information system in public hospitals was obtain permission from St. Mary's official letter to be official. The following approach was used in selected hospital: first, the university of St Mary's write official letter to get permission to do the in depth interview, observation and questioner for hospitals. All participants would inform about the aim of the study. How to answer the questions, voluntary participation and if not interested there should be withdrawal from answering questions. And also participant will be informed on consent sheet about the study. The participants has been answer the questioner and willing to show the store and computer documents.

CHAPTER FOUR

DATA PRESENTATION AND DISCUSSION OF RESULTS

Introduction

This chapter describes the data collection phase of the research. Data can be collected in a variety of ways in different setting and from different sources. In the case of this research the raw survey response from the structured questionnaire survey and the interview response that were conducted for the purpose of discovering the current status of HCMIS implementation. So that this chapter will put forward and analyze results from the questionnaire, in-depth interview and document review by comparing different vouchers with the system.

4.1. Background Information

4.1. Respondent's background

Background	Distribution	Frequency	percentage
Sex	Male	25	69.4
	Female	11	30.6
Age	26_30	14	38.9
	31_35	20	55.6
	36_40	2	5.6
Educational background	Degree	25	69.4
	Masters	11	30.6

Table 2: Respondent's background

As indicated in table 1, the demographic profile of the respondents indicates that, most of the respondents are Male i.e. 69.4%. The age of the majority of the respondents found within the age between" 31 to 35 age group followed by respondents aged 26 to 30. Therefore, most of the current sample employees of the hospitals are less than age of 40 and considerably young. Most of the respondents are first degree holders indicating 69.4%.

4.2.   Job Title of Respondents
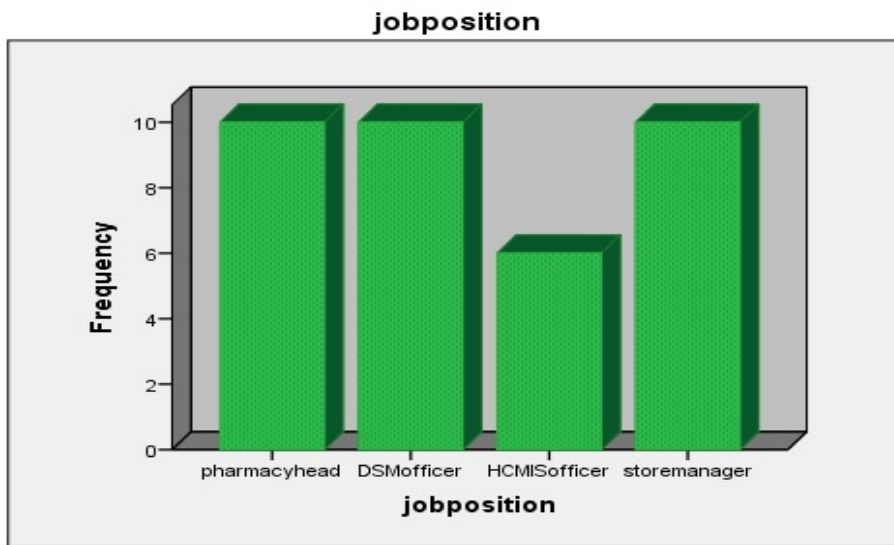
Fig 2: job position of the respondents

Self-administer questionnaire distributed to 36 DSM members this is because in four hospitals the store management and HCMIS simultaneously work by one person and titled as store manager. As the chart shows 10 pharmacy head, DSM officer, and store managers and 6 HCMIS officer are included.

4.3. Level of satisfaction of DSM members using HCMIS with different parameters

Scale: (5= strongly agree, 4= Agree, 3= neutral, 2=Disagree, 1= strongly Disagree)

Variables	N	Mean	Std. Deviation
The HCMIS system is user friendly	36	4.2500	.60356
I'm conformable in using the HCMIS	36	4.0556	.75383
HCMIS Easily produce report as compare to previous manual system	36	4.5000	.60945
HCMIS has been Beneficial to medicine management	36	4.0000	.75593
Valid N (list wise)	36		

Table 3: level of satisfaction of DSM members with HCMIS

The method used to check the implementation status of the system was measuring level of satisfaction of the DSM members in relation to whether the system is comfortable, user-friendly, easiness for report generating, benefit of the system for both the facility and DSM members. Based on the above parameters the result of this survey shows that from those hospitals the mean values are 4.25, 4.0556, 4.5, and 4.0 with the corresponding standard deviation of 0.60356, 0.75383, 0.60945, and 0.75593 representing the dispersion, showing less variability of opinions of the respondents confirms this fact.

It was found out that respondent's level of satisfaction was agreed to a little extent that they had a good level of satisfaction on the health commodity information management system.

4.4. HCMIS benefit for reduced wastage in your facility

		Frequency	Valid Percent
Valid	Neutral	2	5.6
	Agree	26	72.2
	Strongly agree	8	22.2
	Total	36	100.0

Table 4: HCMIS benefit for reduced wastage in your facility

The working book of the Health commodity management Information system (Snow, 2017) indicate that the expected benefit of successful implementation of the system are:- 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, Improved inventory control. From those benefits both the in-depth interview and the structured questionnaire finding indicate that majority of the benefits are received from the system is beneficial to reduce wastage by early recognition of expiry date and make efforts to transfer the drugs to other facility (22.2%) strongly agree and (72.2%) agree and the rest (5.6%) neutral.

4.5. HCMIS benefit for improved inventory control in your facility

		Frequency	Valid Percent
Valid	Disagree	3	8.3
	Neutral	7	19.4
	Agree	11	30.6
	Strongly agree	15	41.7
	Total	36	100.0

Table 5: HCMIS benefit for improved inventory control in your facility

In Japan after the implementation of the automated inventory management system called Artimathe workload in the inventory management in each section of the Pharmacy Department as well as in clinical units was dramatically reduced and this gave Pharmacists in creating new clinical service. (Takehiro & Yoshikazu, 2005). Similarly on this study the improved inventory controls (41.7%) strongly agreed and 30.6% are agreed that the majority of the respondent says biggest benefit received from the system.

As the data collected by the in-depth interview from ten Pharmacy heads and four medical directors indicated that they considered the system to be very important for generating information about the near expiry products, for better stock management and to bring efficiency in the hospital pharmaceutical management system by improving inventory control which supports the above finding.

4.6. Professionals who take training on HCMIS

		Frequency	Percent	Valid Percent	Cumulative Percent
	No	28	77.8	77.8	77.8
Valid	Yes	8	22.2	22.2	100.0
	Total	36	100.0	100.0	

Table 6: Professionals who take training on HCMIS

As per the standard of the training on the working book of HCMIS two pharmacy professionals, store manager/HCMIS officer and pharmacy heads are expected to take the training so based on this criteria the finding of this study shows that only 22.2% take the training that means only 22.2% who can operate the system whereas the rest 77.8% cannot operate the system.

Observation Results on the Ten Public Hospitals

4.7. Physical count and HCMIS count

Comparison of physical count and HCMIS count

The comparison result for the physical count and the HCMIS count for the selected tracer drugs indicate that on two hospitals four items have similar stock status and on one hospital three items have similar status, on one hospitals only two item is matched, on two hospitals only one items matched and on the rest four hospitals from the five items none of them have equal stock status, As the standard manual working book of the HCMIS dictates that the physical count and the HCMIS count must be equal (Snow, 2017).   The physical count and the HCMIS count among five tracer drugs none of the item has similar count in four of the hospitals.

So that as the result shows in four of the hospitals none of the listed tracer drugs have similarity which means they are using the system just to update after transactions are performed which means the report generated from these hospitals are not reliable that is why those hospitals didn't generate the bimonthly Report & Requisition form.

4.8. Last Manual Bin card transaction and HCMIS count

Comparison of manual bin card and electronic bin card

The standard operating procedure for HCMIS the Manual bin card and the HCMIS count must be balance always. After implementing HCMIS availability of most essential medicines has increased significantly. A 2014 survey Shewarega showed availability of select essential medicines at around 90 percent; compared to about 70 percent as reported in a similar survey in 2003 (FMOH, 2003).

Considering this the comparison result for the last bin card transaction and HCMIS count for the selected five tracer drugs shows that on the two hospitals four items have similar status on both manual bin card and electronic bin card (HCMIS). On two hospitals four items have similar bin card and HCMIS counts, in one hospital three items and two items have similarity and two hospitals have only one item has a similarity and none of the item is matched in four hospitals this means the store management in those four hospitals is poor and also the report they generate is not reliable.

4.9. Similarity of Voucher (Model-19 Received Date and HCMIS Received Date

Comparison between Voucher and HCMIS received date

The working book of the HCMIS and the standard operating procedure for the IPLS (Snow, 2017 & PFSA, 2014) stated that receiving date on voucher (model-19) and the receiving date on the HCMIS must be similar. The finding result for the comparison between model-19 and HCMIS received date of the items shows that on the two hospitals from the selected five tracer drugs three items have similar received date and on three hospitals only two items have similar date and on three hospital only one item have similar date whereas on the rest two hospitals none of the five items received date is similar. This result indicate that most of the hospitals are not timely update their system during received date which leads to false analysis of the quarterly based consumption analysis because as the time of received date not timely recorded the consumption of one month will report as another month report which have wrong implication for the seasonal variation.

4.10. Timely update of the HCMIS

As the HCMIS working book states to make the system functional and to be said functional the system must be always timely updated. Regarding this study discovered that two hospitals used the system sometimes before and sometimes after the actual transaction this indicate they don't use the system in a smooth period and rest of eight hospitals used the HCMIS only to update after the manual transaction so none of the hospital uses the HCMIS before the actual transaction. This implies that those eight of the hospitals among ten are not properly monitor their stock using the system this idea is supported by the in-depth interview which is the level of implementation of the HCMIS is very poor regarding the timely update and other parameters.

4.11. Report Generating from the HCMIS (Report & requisition Form)

Hospitals produce Report & Requisition Form using HCMIS

As per indicated on the standard operating procedure of the integrated pharmaceutical logistic system and the working book of the HCMIS all automated health facilities are expected to generate their bi-monthly Report and requisition form from the system. In one fiscal year the expected number of RRF is they have to generate are six. (USAID, 2017& PFSA, 2014) Based on the above standard the findings on the hospitals shows that only one hospital were produce the expected six report in the year whereas the rest of three hospitals claim to generate with the system but no documentation is found while reviewing previous RRF and six hospitals didn't use the system to produce the RRF which means they are preparing the report manually which is likely to make errors and time taking to prepare. In addition these figures indicate as they are using the system just to update after the traction is conducted. Beside this the qualitative report shows that the pharmacy heads said the HCMIS is proved being one of the key priorities of all hospitals included in the study because as the system save times to generate different reports and also real time data and data quality is improved. But as the findings from the structured questionnaire shows the level of generating the bi-monthly report is very poor which is only one hospital this is may be due to the knowledge gap to generate the RRF or frequent turnover rate of staff as both the qualitative and quantitative data indicated.

4.12. Challenges for the implementation of HCMIS

The Most Difficult Challenge This Facility Face in maintaining HCMIS

(1 most difficult to 5 least difficult)

	N	Mean	Std. Deviation
Staff turnover	36	1.6944	.66845
Knowledge gap or lack of training	36	1.5278	.65405
hardware(computer, printer)problems breakdown	36	3.5278	.94070
software(system crash)	36	3.9167	1.05221
Infrastructure problem loss of electricity	36	4.1944	.85589
Valid N (list wise)	36		

Table 7: The Most Difficult Challenge This Facility Face in maintaining HCMIS

Related to challenges in implementing HCMIS in those hospitals from the mentioned challenges, staff turnover and knowledge gap/lack of Training are the most difficult challenge with the mean value of 1.6944 and 1.5278 with corresponding standard deviation of 0.66845 and 0.65405 that shows small amount of variation. Beside this the qualitative report from in depth interview shows that challenges for HCMIS implementation are staff turnover, work load because both manual and automation is working together and duplication of work, lack of training or knowledge gap, the system cannot be customized in our own, support from the management is poor, the system is not accessible to other DSM members other than HCMIS officer and store manager. In addition to the above finding absence of the legal frame work which enforces the implementation of the HCMIS is one of the challenges for the poor implementation of the system.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

Introduction

This study sought to examine health commodities management information system practices in selected public hospitals, RRF generation with the system and the challenges to implement HCMIS in the selected public hospitals. The responses from respondents through questionnaire administration and in depth interviews conducted with core staff and observation check list provided the input for this study. From the analysis, it was observed that the level of implementation of health commodities management information system was poor in the selected hospital.

5.1. Summary

It was found out that the comparison result for the physical count and the HCMIS count for the selected tracer drugs indicate that on 40% of hospitals none of the listed tracer drugs physical counts and the HCMIS count is similar which means they are using the system just to update after transactions are performed which means the report generated from these hospitals are not reliable that is why those hospitals didn't generate the bimonthly Report & Requisition form.

Similarly result for the last bin card transaction and HCMIS count for the selected five tracer drugs shows that 40% of the hospitals none of the listed tracer drugs matched.

Receiving date on voucher (model-19) and the receiving date on the HCMIS result indicate that most of the hospitals are not timely update their system during received date which leads to false analysis of the quarterly based consumption analysis because as the time of received date not timely recorded the consumption of one moth will report as another month report which have wrong implication for the seasonal variation. It is also stated the level of implementation of the HCMIS is very poor regarding the timely update and other parameters.

Beside this (80%) of the hospitals made the transaction after the manual transaction of the voucher this indicate they use the system just to update the transaction.

It was also observed that benefits of effective health commodities management information system on level of satisfaction of professionals in public hospitals were enormous. It was found out that respondent's level of satisfaction was quite high on the whole.

However confidence of the facility and the professionals for the future maintenance and implementation independently with minimal support were checked and based on the above parameters the result of this survey shows that from those hospitals most of the respondents are disagreed on the mentioned parameters.

As the finding shows the level of generating the bi-monthly report is very poor. This is may be due to the low level support from the management for the implementation and the frequent turnover rate of staff as both the qualitative and quantitative data indicated.

Related to challenges in implementing HCMIS in those hospitals from the mentioned challenges, staff turnover and knowledge gap or lacks of Training are the most difficult challenge. In addition to the above finding the absence of the legal frame work which enforces the implementation of the HCMIS is one of the challenges for the poor implementation of the system.

5.2. Conclusion

Hospitals included in this study implemented HCMIS with big difference of implementation status. The more hospitals implemented the system, the more they have got better outcomes in terms of improvement in data quality, save time to prepare report, real time data access and improved inventory control.

As both the quantitative and qualitative finding shows the implementation status of the HCMIS is poor as the implementation indicators are not fully fulfilled in the study population.

Challenges in implementing HCMIS in those hospitals from the mentioned challenges, staff turnover and knowledge gap or lacks of Training are the most difficult challenge. In addition to the above finding the absence of the legal frame work which enforces the implementation of the HCMIS is one of the challenges for the poor implementation of the system.

Generally the result from both the quantitative and qualitative report shows that the implementation status of the HCMIS is poor.

5.3. Recommendation

✓ It is highly recommended that the system called Health Commodity Management Information System (HCMIS) should be implemented in all hospitals and health centers found in Ethiopia. Because as the finding of this study discover there is poor implementation and also the five year country report indicates the pharmaceutical stock management of the health facilities are still suffering of data quality, frequent stock outs & expiry of pharmaceuticals.

✓ Training should be given for DSM members and additional pharmacists to overcome the knowledge gap and the turnover challenge faced at the store.

✓ There should be a legal frame work which enforce and create accountability for the successful implementation of the HCMIS as this is mentioned as one of the factor for the poor implementation in depth interview report.

✓ Just like the other automated system, HMIS, found on the health sector to implement HCMIS success fully the policy makers should include it as one of their strategic plan initiative.

✓ Currently as the HCMIS implementation is cascaded and monitored majorly by the USAID-deliver in collaboration with PFSA & AARHB, those government bodies with FMOH should handover the system and should work strongly with USAID/Deliver for the successful implementation.

References

Addison, D., Miller. R, and Goredema. W. (2013). *Analysis of the Angolan Public Health Supply Chain System.* Arlington, VA: Management Sciences for Health.

Adeoti-Adekeye,W.B, (1997). *the importance of management information system.* vol. 46 pp 318-327

Ayad, K.A. (2011). *Inventory Management in Pharmacy Practice*: A Review of Literature. Archives of PharmacyPractice.;

Becta, D. (2005). *What automation is and its impact on job marketing.*

Belesti.M.A(2008). *Toolkit on monitoring health systems strengthening* Health Information Systems

Christiana, Y. (2014). *Assessement of supply chain management in hospitals: A case study of greater accra regional hospital –Ridge*. University of Ghana.

Creswell, J.W.(2009), Rsearch design: quantitative, qualitative and mixed methods approaches", 3rd edn, Sage Publications, California

Dr. Kenneth, N. et al. (2012). *Factors Affecting Provision of Service Quality in the Public Health Sector. A Case of Kenyatta National Hospital;* Jomo Kenyatta University of Agriculture & Technology International Journal of Humanities and Social Science, Nairobi, Kenya.

Ejigu, E., Tadege. H, Mekonnen. N. (2012) *Establishment of Medicines Waste Management and Disposal System in Ethiopia:* a Report on Progress and Achievements

Emelia, D.A., Meshach, A.G., Irene, A., Prince, A.D. (2014).*Assessment of health commodities management practices in health care delivery; a supply chain perspective. The case of selected hospitals in Ashanti region-Ghana.* European Journal of Business and Social Sciences

Eyerusalem, B, Gebremedhin. B and Teferi, G .F. (2013) HIV/*AIDS related commodities supply chain management in public health facilities of* Addis Ababa, Ethiopia.

Foster, D.R. (2012). *Review of Developing Country Health Information Systems.*

Health Commodity Management Information System, (2017). *Training Workbook Facility Edition For Supervisors, store managers & IT /HIT persons*

Humphries.D, (2003). *Management support system. Pharmaceutical management information system*

Hertzman, C. (2013). *Health and Human Society. American Scientist.*

John Snow Inc./DELIVER,(2010) *Task Orders 4. Elmis-selection-guide-electronically-managing-supply-chain-information*

John Snow Inc./DELIVER,(2012). Task Order 4.*Computerizing Logistics Management Information Systems A Program Manager's Guide.*

John Snow Inc./DELIVER,(2012). Task order 1 *empowered with real time logestics data, health facilities improved access to medicines;* Ethiopia

John Snow Inc./DELIVER,(2016). *Task Orders 4 and 7. Final Country Report*: Ethiopia.

John Snow Inc./DELIVER,(2017). *Health Commodity Management Information System Training Workbook Facility Edition.* Addis Ababa.

Karthikeyan. K., Santhi. G. (2016). *Pharmaceutical Inventory Models* International Journal of PharmTech Research.

Kagashe, G. A, & Massawe T. (2012). *Medicine Stock Out and Inventory Management Problems In Public Hospitals In Tanzania*: A Case Of Dar Es Salaam Region Hospitals.

Mezid, M (2014) *Assessment of Pharmaceutical Logistics System in Health Centers* of Addis Ababa, Ethiopia.

Mengesha, T. (2011) *Electronic Solutions For Ethiopian Health Sector Electronic medical record (EMR) system*, in *Business Information Technology*. Oulu University of Applied Sciences

Mengiste, S.A. (2010). *Analysing the Challenges of IS implementation in public health institutions of a developing country: the need for flexible strategies.* Journal of Health Informatics in Developing Countries.

Ministry of Health, (2012) F.D.R.o.E., Ministry of Finance and Economic Development, *National Health Information System Road Map.*

MSH, (2011). *managing access to medicines and other health technologies.* Arlington

Ng'ang'a, K.J. (2013) *Assessment of the Factors Influencing Effectiveness of Inventory Control; Ministry of State for Provincial Administration and Internal Security.*

Obiri.YH, David A, Makafui RA (2015). *Assessing the Impact of Efficient Inventory Management in on Organization.* International Journal of Advanced Research in Computer Science and Software Engineering.

Pharmaceuticals fund and supply agency, (2014). *Five years IPLS Implementation Report: Integrated Pharmaceutical Logistics System: Changing the Supply Chain System of Ethiopia to Impact the Health Outcomes.* Addis Ababa.

Pharmaceuticals fund and supply agency SOP, (2014). *manual for the integrated pharmaceuticals logistics system in health facilities* of Addis Ababa; Ethiopia.

Sam MaCarty,(2015) *Purchasing and Supply Chain Management* European Journal of Logistics

Takehiro. Y, Yoshikazu. T et al. (2005). *Automation in Drug Inventory Management Saves Personnel Time and Budget.* Yakugakuzasshi journal of the Pharmaceutical Society of Japan.

Vania, G. (2016) *Hospital pharmacy management. Australian and Indonesian perspectives*.

Annexes

Annex 1. Self-Administered Questionnaire to DSM members

My name is Seada Abrar I'm conducting this research for the fulfillment of Thesis II of Masters of Business Administration- General Management at St Mary's university.

The purpose of this assessment is to collect information on the implementation status of the HealthCommodity Management Information System Facility Edition (HCMIS FE).

The finding of the assessment will help to improve the systems implementation. All the answers you provide will be confidential and will not be shared with anyone other than the investigator. You need not write your name or any other personal information anywhere on the questionnaire.Your cooperation to answer the questions important for data analysis on the HCMIS FE.

Section 1: Background Information

Background Information

Name of the hospital:_____

Position: _____

Sex

☐ Male   ☐ Female

Age

☐ 21-25   ☐ 26-30   ☐ 31-35   ☐ 36-40   ☐ 40-45   ☐ >46

Educational Background

☐ Diploma   ☐ Degree   ☐ Masters

Section 2: LEVEL OF IMPLEMENTATION (Respondent: DSM members)

No.	Question	Code Classification	Go To
1.	How long have you been using HCMIS	1. < 1 month 2. 1-2 months 3. 3-5 months 4. 6 months – 1 year 5. More than 1 year	
2.	Who titled at this facility is able to operate the system? **(Multiple responses are possible.)**	1. Store Manager 2. Pharmacy head 3. Procurement officer 4. HCMIS officer 5. No one Other (Specify)_____	
3.	How often do you share reports produced using HCMIS to the **facility management**?	1. Every week 2. 2 – 3 weeks 3. Every month 4. Every two months 5. Every quarter 6. More than three months Other (Specify)_____	
4.	How often do you share reports produced using HCMIS to the **PFSA and RHB management**?	1. Every week 2. 2 – 3 weeks 3. Every month 4. Every two months 5. Every quarter 6. More than three months Other (Specify)_____	

Please indicate how you rate with each of the following questions by circling the number that best represents your opinion; 1 indicates "strongly disagree" (SD), 2 indicates "Disagree" (D), 3 indicates "Neutral" (N), 4 indicates "agree" (A) and 5 indicates "Strongly Agree" (SA).

	Benefits Statements	Scale				
		1=SD	2=D	3=N	4=A	5=SA
5	HCMIS is up-to-date at each transaction	1	2	3	4	5
6	facility can use system independently with minimal support	1	2	3	4	5
7	The HCMIS system is user friendly	1	2	3	4	5
8	I'm comfortable in using the system	1	2	3	4	5
9	HCMIS easily produce reports as compared to the previous manual system	1	2	3	4	5
10	The purchase request of pharmaceuticals generated by HCMIS is important and accurate quantities of pharmaceuticals	1	2	3	4	5
11	HCMIS has been beneficial to your facility operations of medicine management	1	2	3	4	5
12	We get support from the	1	2	3	4	5

	USAID|DELIVERPROJECT for HCMIS Implementation					
13	I'm confident that my facility can maintain HCMIS independently into the future without assistance from DELIVER/ others?	1	2	3	4	5
14	HCMIS benefits the facility to Reduced wastage	1	2	3	4	5
15	HCMIS Helps to forecast medication for procurement	1	2	3	4	5
16	HCMIS Helps to inform decision-making for routine decisions like resupply	1	2	3	4	5
17	HCMIS helps for Planning/budgeting medicine requirements	1	2	3	4	5
18	HCMIS benefit to Improve reporting quality, and consistency	1	2	3	4	5
19	HCMIS helps to Improve product availability	1	2	3	4	5
20	HCMIS benefit for Improved inventory control	1	2	3	4	5
21	HCMIS benefit for Nothing other than workload	1	2	3	4	5

22	Did you take training related to HCMIS	a. Yes b. No
23	Do you produce reports other than RRF using HCMIS to monitor your stock?	a. Yes b. No
Section 3 Challenges		
24	based on their level of difficulty (1 the most difficult to 5 the least difficult challenge); **Rank five of the following challenges** that this facility faces in maintaining HCMIS	o Knowledge gap or lack of Training o Staff turnover o Hardware (e.g. computer, printer) problems/ breakdowns o Software problems (e.g. system crashes, doesn't have specific functionalities) o Infrastructure problems – loss of electricity

Thank you!!!

Annex 2.Check List for HCMIS, Documents &Voucher Review (System Implementation)

Section 4. SYSTEM IMPLEMENTATION check list filled by the researcher		

1. For how many of the items does the physical count (SOH) match the HCMIS count?
  o TB- kit
  o Ferrous Salt plus Folic Acid
  o Mebendazole Tablet
  o Oral Rehydration Salt
  o Amoxicillin
		- Tick on those items match.

2. For how many of the items does the last bin card transaction match the electronic bin card transaction?
  o TB- kit
  o Ferrous Salt plus Folic Acid
  o Mebendazole Tablet
  o Oral Rehydration Salt
  o Amoxicillin
		• Tick on those items match

3. For how many of the items does the HCMIS bin card received transaction match with model 19.
  o TB- kit
  o Ferrous Salt plus Folic Acid
		• Tick on those items match

	o Mebendazole Tablet o Oral Rehydration Salt o Amoxicillin		
4.	Is HCMIS used before or after each receiving and issuing transaction?		A, use HCMIS before every transaction B, use HCMIS sometimes before and sometimes after the actual transaction C, they use HCMIS only to update after manual transaction
5.	How frequent Does the health facility produce RRF using HCMIS		a. Every two month b. After two month c. Never
6.	Do the Pharmacy Head and procurement personnel know how to use HCMIS (especially reports)?		a. Yes b. No

Annex 3 In-depth interview guide

Research project title: *Assessment on the Practice of Health Commodity Management Information System (HCMIS) on Hospitals under Federal and Addis Ababa Regional Health Bureau.*

Research investigator: Seada Abrar

I want to thank you for taking the time to meet with me today and agreeing to be interviewed as part of the above research project. Ethical procedures for academic research undertaken from institutions require that interviewees explicitly agree to being interviewed and how the information contained in their interview will be used. I would like to talk to you about the implementation status of health commodity management information system in your hospital. I am Assessing the system implementation in order to capture lessons that can be used in future interventions.

The information provided by all respondents will be treated confidentially. The information herein is for the sole use of research on HCMIS status of implementation, and secondly, implementation and challenges, report generation will be analyzed by the investigator and will not be given to any third parties without the expressed consent of the respondent. Semi structure interview guide for: **pharmacy heads and medical directors**

If you have any questions about this study, please contact the investigator, Seada Abrar (sudisweeti@gmail.com) or + 251 911824399)

1. When did you start using HCMIS? And how did you get it? Is it an opportunity (advantageous) or not?
2. For what purposes do you usually use the HCMIS system? Please explain.
3. In the past days, did you seek any information from HCMIS? When? Please give a specific example.
4. Can you tell us how the use of HCMIS affected your store management and delivery of services in your hospital? in terms of:
   - time,
   - resource,
   - report timeliness and quality
   - decision making in forecasting, procurement and distribution,
   - proper storage management including tracking of commodities by batch number and expiry date
   - what else
5. When you are asked a purchase request approval of pharmaceuticals, how do you know how important and how accurate are the quantities of these pharmaceuticals?
6. What are the challenges for proper implementation of HCMIS in your hospital?
7. What do you recommend to solve the challenges of HCMIS implementation in your hospital?
8. How the hospital management does have the HCMIS?
   A. Are they happy and demanding?
   B. Did the management support the implementation in terms of availing necessary supplies like printer, hardware, and stationary, follow-up.

Do you have anything to add? _____

Thank you for your cooperation and time!