



**ADDIS ABABA UNIVERSITY
SCHOOL OF COMMERCE**

DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

**THE PRACTICE AND IMPLEMENTATION OF HEALTH COMMODITY
MANAGEMENT INFORMATION SYSTEM IN PUBLIC HOSPITAL OF
ADDIS ABABA, ETHIOPIA**

BY

HABIB AHMED (B.Pharm)

**A THESIS SUBMITTED TO SCHOOL OF COMMERCE, DEPARTMENT
OF LOGISTIC AND SUPPLY CHAIN MANAGEMENT, ADDIS ABABA
UNIVERSITY, IN PARTIAL FULFILMENT OF THE REQUIRMENT FOR
MASTER OF ART IN LOGISTIC AND SUPPLY CHAIN MANAGEMENT
(MA)**

JUNE, 2021

ADDIS ABABA, ETHIOPIA

THE PRACTICE AND IMPLEMENTATION OF HEALTH COMMODITY
MANAGEMENT INFORMATION SYSTEM IN PUBLIC HOSPITAL OF
ADDIS ABABA, ETHIOPIA

BY

HABIB AHMED (B.Pharm)

Approved by Board of Examiners:

Advisor

Signature

Date

Internal Examiner

Signature

Date

External Examiner

Signature

Date

Letter of Certification

This research paper has been submitted to Addis Ababa University, School of Commerce, Department of Logistics and Supply Chain Management for examination with my approval as a University Advisor.

Advisor: Mengistu Bogale -PhD

Date

Acknowledgements

All praise is due to Almighty Allha, who accomplishes all things in His own time.

Dr Mengestu Bogale, my advisor, for his direction and help in performing this work.

Thank you to the store managers, pharmacy directors, and DSM officers who took time out of their busy schedules to provide information and point me in the correct route.

To my wife, Kederia Bederu, I'd want to express my gratitude for her support and patience with me throughout my education, particularly this thesis.

Finally, I'd like to express my gratitude to my coworkers for their unwavering support and encouragement.

Contents

Acknowledgements	4
List of Annexes	7
List of Tables	8
List of Abbreviations	9
Abstract.....	10
1.1. Background	11
1.2. Statement of the Problem	13
1.3. Research question	15
1.4. Objectives	15
1.4.1. General objective of the study.....	15
1.5. Significance of the study	15
1.6. Scope of the study	16
1.7. Limitation of the study	16
1.8. Operational definition of concepts and terms	16
CHAPTER TWO: LITERATURE REVIEW	17
2.1. Theoretical Literature.....	17
2.2. Health Commodity Management Information System (HCMIS).....	19
2.2.1. Objectives of the HCMIS	19
2.2.2. Users of the HCMIS	20
2.3. Empirical frame work	20
CHAPTER THREE: METHODOLOGY	22
3.1. Study Site	22
3.2. Research Approach	22
3.5. Selection of study subjects and source of data.....	22
3.6. Data collection method.....	23
3.7. Ethical considerations of the study	23

3.8.	Data Analysis and process	23
3.1.	Inclusion and exclusion.....	24
CHAPTER FOUR: Data Presentation and Analysis & Interpretation.....		25
Introduction.....		25
4.1.	Implementation status of HCMIS	25
4.1.1.	Report Generating from the HCMIS (Report & requisition Form).....	25
4.1.2.	Physical count and HCMIS count	27
4.1.3.	Document and system Survey.....	28
4.1.4.	Last Manual Bin card transaction and HCMIS count	28
4.1.5.	Similarity of Voucher (Model-19 Received Date and HCMIS Received Date)	29
4.1.6.	Timely update of HCMIS	30
4.2.	Challenges for the implementation of HCMIS	30
4.3.	Outcomes of implementation of HCMIS	31
CHAPTER V: Conclusion and Recommendation.....		33
5.1.	Conclusion.....	33
5.2.	Recommendation	33
Annex 1. Self-Administered Questionnaire to Store Manager.....		38
Annex 2. Check List For HCMIS, Documents & Voucher Review (System Implementation).....		46
Annex 3 Consent Form for in depth interview.....		48
Annex 4. In-depth interview guide.....		50

List of Annexes

Annex 1. Self-Administered Questionnaire

Annex 2. check list for HCMIS, Documents & Voucher review

Annex 3. Consent Form for in depth interview

Annex 4. In-depth interview guide

List of Tables

Table 1 Hospitals produce Report & Requisition Form using HCMIS

Table 2 Level of satisfaction of store managers with HCMIS with different parameters

Table 3 Comparison of physical count and HCMIS count

Table 4 the whole hospitals list of drugs inserted (customized) in HCMIS

Table 5 Comparison between last bin card transaction & HCMIS count

Table 6 Comparison between Voucher and HCMIS received date

Table 7 Timely update of the HCMIS

(Table 8a) The Biggest Challenge This Facility Face in maintaining HCMIS in eleven Hospitals

(Table 8 b) The Biggest Challenge This Facility Face in maintaining HCMIS in eleven Hospitals

Table 9 a) The Biggest Benefit This Facility received from HCMIS

(Table 9b) The Biggest Benefit This Facility received from HCMIS

List of Abbreviations

DSM	Drug Supply Management
eLMIS	Electronic Logistic Management Information System
FEFO	First To Expire, First Out
FMOH	Federal Ministry Of Health
HCMIS	Health Commodity Management Information System
HCMIS FE	Health Commodity Management Information System facility Edition
HIS	Health Information System
HMIS	Health Management Information System
HSDP	Health Sector Development Plan
HSTP	Health Sector Transformation 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
SOH	Stock On Hand
SPSS	Statistical Package For Social Sciences
USAID	United state Agency For International Development
vLMIS	Vaccine Logistics Management Information Systems

Abstract

The major goal of this study is to assess the current state, outcomes, and obstacles of HCMIS implementation at public hospitals in Addis Ababa. A combined strategy combining both quantitative and qualitative methodologies is used to develop a facility-based cross-sectional study. This study took place in eleven HCMIS-compliant hospitals. Eleven pharmacy directors, store managers, and DSM officers were interviewed in depth. Eleven pharmacy store managers were given a self-administered questionnaire. The RRF, HCMIS, Manual Bin Cards, Vouchers, and HCMIS are all examined. In-depth interviews were summarized and evaluated based on their subject areas, and quantitative data was input and analyzed using SPSS version 20. The HCMIS implementation is going well. A hundred percent of the eleven reports (RRF) issued by the system in a year are accurate. Using the system through various reports for better stock management were linked to the list of pharmaceuticals added (customized) in HCMIS. In 65.5 percent of hospitals, the comparison result for the physical count and the HCMIS count for the selected tracer medications shows that five items are identical. Similarly, none of the tracer medications date of receipt is identical between the voucher and the HCMIS in 91% of hospitals. Because the qualitative and quantitative data findings indicate that the system is very useful and ideal, despite the fact that the evaluation shows that the implementation status of HCMIS is good, I recommend that FMOH fully implement HCMIS in all health facilities in Ethiopia, including all health centers.

CHAPTER: Introduction

1.1. Background

The health of a country is one of the most crucial factors of its development. (Obiri.YH et al, 2015). The provision of comprehensive health care demands the constant availability of safe, effective, and inexpensive medications and related supplies in sufficient quantities. (USAID | DELIVER PROJECT Final Country Report). Every person's access to medication is critical, and the logistical system's performance has a big impact on it (Kar et al., 2010). Countries are expanding health-care programs and bolstering the supply chains that keep them running. There is a growing demand for user-friendly tools and software packages to assist the timely and correct collecting and reporting of logistics management data (John Snow Inc./DELIVER, 2012).

Only a few developing nations have sophisticated and effective health information systems in place to meet all of these different data needs. New technologies can aid in data collection, compilation, and exchange, but only if specific data quality standards are in place (Belesti.M.A, 2008). One method for improving an internal logistics system is automation. The year 2011 (Anna GR) Automation of a Logistics Management Information System (LMIS) might make the job of supply chain managers considerably easier by allowing for faster data collection, transfer, and aggregation, as well as reducing human error in calculations and enabling data visibility up and down the supply chain. Reduced data collection, transmission, and aggregation time means data is available more quickly for timely decisions and actions, ensuring products are available where and when they are needed (John Snow Inc./DELIVER, 2012).

For the administration of efficient and effective warehouses, whether large or small, operational and automation technologies that support and enhance daily activities are essential. When volume is large, automation is often required to keep track of the countless transactions that occur on a daily and monthly basis, as well as to ensure that management and employees are always aware of what they have and what they require. (Source: PFSA, 2014).

The Health Commodity Management Information System, Facility Edition (HCMIS FE) was introduced by the USAID|DELIVER PROJECT in 2009 to enable health facilities effectively manage health commodities in their stores. The HCMIS is a user-friendly, locally developed software tool that helps hospitals manage all important pharmaceuticals, as well as medical and laboratory supplies. The HCMIS automatically collects and distributes reports and orders, controls inventory, and creates a variety of commodity data for store managers, supply managers, and facility heads. (John Snow Inc., 2012, DELIVER). IPLS is used by over 2500 health facilities, with over 500 of them adopting an automated system (HCMIS), which enhances procedures, customer service, and data visibility (PFSA, 2014).

An HCMIS is a system of records and reports used to aggregate, analyze, validate, and present data (from all levels of the logistics system) that may be utilized to make logistics decisions and manage the supply chain, according to the definition. A well-functioning LMIS provides decision-makers throughout the supply chain with accurate, fast, and relevant data, such as stock on hand, losses and adjustments, consumption, demand, issues, and information on the cost of commodities controlled in the system. (John Snow Inc., 2012, DELIVER).

Analytical tools give reports on cost, price solely (value per batch to calculate charge to the dispensary), inventory value, expiries, and near expiries to users and managers. The HCMIS Facility also oversees processes for issuing commodities to dispensing units within the facility, including documenting consumption, stock balances, and losses, as well as calculating issue quantity. All of the information is compiled into a single Report and Requisition Form (RRF), which facilities can create electronically and use to place orders with PFSA (John Snow Inc. /DELIVER, 2010). HCMIS is used by a primary user to handle health commodities on a daily basis, such as store managers and HCMIS officers who use it to keep track of their inventory. Pharmacy directors, supply managers, and Health Facility Administrators/Management Units, as well as PFSA for replenishment choices and stock out/wastages monitoring, are secondary users who use HCMIS results for decision making (HCMIS, 2017). The HCMIS Program intends to improve health-care facilities' ability to handle all aspects of health-care commodities management, pharmaceutical, medical, and laboratory services MSH/HCSM focuses on improving governance in the pharmaceutical and laboratory sectors, as well as strengthening

resource allocation management systems and financing mechanisms, for transparency and accountability, and to bring integrated work performance and prioritization of needs, for transparency and accountability (PFSA, 2014).

Because HCMIS Facility allows facility managers to see every health commodity in their store, including donated items and RDF purchases, they can now present stakeholders with real-time information on expirations, pricing, and inventories. Users and managers may be able to respond more quickly to inventory changes and make better decisions about which commodities and how much of each are required to get any facility up to adequate stock levels, reducing the number and duration of stock outs (John Snow Inc./DELIVER, 2010). The system must ensure the correct products, in the right quantity, of the right quality, in the right place, at the right time, and for the right price, as well as the six rights of supply chain management, in order to be successful. (USAID | DELIVER PROJECT, 2015)

1.2. Statement of the Problem

Ethiopia's Ministry of Health (MOH) prioritizes the development of the Health Information System (HIS), which incorporates the standard Health Management Information System (HMIS). The government has devised a policy of "one plan, one budget, and one report," with HMIS serving as the primary information system for managing the health system. In its five-year strategic plans – the completed Health Sector Development Plans – the Ministry of Health recognized HMIS and M&E as the backbone of effective health care delivery in Ethiopia (HSDP). (MOH,2013)

In the city of Wukro in Ethiopia's Tigray region, the supply of essential medicine and other vital health supplies was a severe concern before the introduction of HCMIS. The availability at the hospital was less than 40%. Simultaneously, 400,000 ETB (about 20,000 dollars) was squandered each year owing to deterioration and expiration. The lack of logistical data, such as stock status and consumption, played a crucial role in this. With the implementation of HCMIS, there has been a significant reduction in waste and an increase in availability. However, its practicability is on/off, according to the August site status national report, and HCMIS does not transmit RRF prints. According to the study more than half of hospitals do not use HCMIS as a reporting system, (John Snow Inc./DELIVER, 2010). The current Ethiopian Health Sector

Transformation Plan (HSTP) established strategic objectives based on evidence for reforming the existing M&E system. This necessitates an effective data collecting, sharing, analysis, interpretation, reporting, and decision-making cycle - the process of converting data into actionable information and knowledge. As a result, one of the strategic objectives of the transformation plan is to transform data into information and information into action. (MOH, 2015)

Creating and implementing a paper-based integrated pharmaceutical logistics management information system (IPLS) and an electronic version of IPLS is one of the interventions carried out by the PFSA and partners in the country to help health institutions adopt IPLS more efficiently (HCMIS) .(USAID | DELIVER PROJECT, 2015). Improvement of supply chain and logistics management is one of the Performance Measures and Strategic Initiatives of the Ethiopian Health Sector Transformation Plan (HSTP) for the 2008-2012 EFY, but automation of the logistics management system and inventory control is not included in this and previous five-year HSDPs, as well as on the Pharmaceutical Supply Transformation Plan. Since 2008, the Ethiopian Health Management Information System (HMIS) has gathered and provided core monitorable indicators that are used to improve the provision of health services and, as a result, the population's health status. Since then, the Health Sector Transformation Plan has made significant progress in the areas of planning, budgeting, decentralization, research and development, plan and progress reviews, partner involvement, and the use of data in decision-making. HMIS is a vital source of information for monitoring and adjusting policy implementation and resource allocation (MOH, 2015). Procurement officers and store managers inefficient inventory control practices have always been a big issue in health facilities. (Obiri.YH, et al, 2015)

The absence of system institutionalization, data quality, and data utilization for decision making are the country's key challenges, according to the integrated pharmaceutical logistic system's five-year country report from 2014. Stock outs, overstocks, expiry, real-time data, and inadequate inventory management remain concerns for the country, despite the fact that HCMIS can help minimize these issues. With the exception of a few health institutions, the majority of them are still refilling their stock using the manual report and requisition format (RRF) rather than producing the report from the HCMIS. As a result, nothing is known about the practice of the automated logistic management information system, also known as HCMIS, and the goal of

this research is to fill that gap by assessing the practice and implementation of HCIS throughout the country.

1.3. Research question

1. What is the status of HCMIS implementation in public hospitals?
2. What are the advantages of implementing the HCMIS?
3. What are the difficulties in implementing the HCMIS?

1.4. Objectives

1.4.1. General objective of the study

The study's overall goal is to evaluate the use of the Facility Edition Health Commodity Management Information System (HCMIS) in all public hospitals in Addis Ababa, Ethiopia.

1.4.2. Specific Objectives

- 1) To determine the status/level of implementation of HCMIS in the selected public health facilities
- 2) To explain the outcome of a successful HCMIS implementation.
- 3) To identify issues that is preventing the HCMIS from being implemented.

1.5. Significance of the study

The purpose of this research is to gain a better knowledge of how to create competitive pharmaceutical management systems through automation. The findings of this research will help health care facilities reap the benefits of system automation. In particular, hospitals' drug supply management teams should increase demand by demonstrating the benefits of adoption on pharmaceutical availability and strengthening their Drug Supply Management system, as well as stakeholders such as the federal and regional health offices to visualize factors affecting the system's implementation status and enforce system implementation, pharmaceutical fund, and a supply agencies to improve the effectiveness and efficiency of the country supply chain management system, and partners working with these stakeholders, particularly USAID to strengthen the system. It will also serve as a starting point for future research in the field. It will provide important information for health system managers to take the necessary steps to improve the health commodities management information system's practice.

1.6. Scope of the study

This research was carried out in Ethiopia's Addis Ababa public hospitals. The facility edition and warehouse edition HCMIS are the two types of automated systems, and the focus of this study is on the facility edition at the hospitals indicated. Health-care facilities are not covered.

1.7. Limitation of the study

Despite the fact that this study made significant advances, it also had several drawbacks. One of the study's shortcomings is the lack of appropriate literatures in this field of study. The study could not be applied to other cities because it was limited to Addis Ababa. As a result, more research on a big scale is needed, taking into consideration more hospitals and health facilities around the country.

1.8. Operational definition of concepts and terms

Stock out: a lack of usable product in the store or a zero balance on the Bin cards at the store

Stock on hand: products that may be used in the store.

Over stock: More than the required quantity of stock was discovered at the store.

Report and requisition form: document created by the store manager to inform the purchasing department of the things that need to be ordered, as well as the amount and delivery timeframe..

Inventory control: Stock control is the process of employing one integrated system to manage all parts of a company's inventory: purchasing, shipping, receiving, tracking, warehousing or storage, and recordkeeping.

CHAPTER TWO: LITERATURE REVIEW

2.1. Theoretical Literature

Pharmaceutical data collection, processing, and display are all integrated in the Pharmaceutical Management Information System, allowing personnel at all levels of a country's health system to make evidence-based decisions about how to manage pharmaceutical services. (MSH) A good pharmaceutical management information system will give you the information you need to make informed pharmaceutical decisions. (MSH)

Prior to 2007, there were a number of challenges with Ethiopia's pharmaceutical supply chain management system, including non-availability, unaffordability, poor storage and stock management, and illogical use. The designated agency is responsible for addressing these issues in a timely and effective manner. The PFSA designed and is actively implementing an integrated pharmaceuticals logistics system (IPLS). (Source: PFSA, 2014) IPLS is a system with three basic logistics functions:

2.1.1 Inventory Control System (ICs) ,

2.1.2 Logistics Management Information System (LMIS) and

2.1.3 Storage of Pharmaceuticals

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

2.1.1. Inventory Control System (ICS)

The stock of pharmaceutical products kept on hand to meet future demand in pharmacy operations is referred to as inventory. The strategy aims to cut procurement and carrying costs while maintaining enough product inventories to suit the needs of customers and prescribers. (Ayad KA, 2011)

An effective inventory control system can help optimize resource consumption and, as a result, improve patient care by ensuring the availability of vital items and reducing stock-outs. (Vania G.2016)

The goal of an inventory control system is to tell people when and how much of a medicine they should order, as well as to keep a reasonable stock level to meet patient needs. With a well-

designed and well-operated inventory control system, pharmaceutical shortages, oversupply, and expiration can all be prevented. (Christiana Y, JULY, 2014)

Inventory management seeks to protect stored goods from loss, damage, theft, or wastage while also assuring the most cost-effective conveyance of supplies from the source to the end user.

(Dr. Kenneth N. et al, July 2012) The IPLS' inventory management system is a Forced Ordering Maximum/Minimum inventory management system. This means that all facilities must report on all items on a regular basis (monthly at health posts, every other month at health centers and hospitals). In addition, every time a report is completed, all items are re-supplied.

2.1.2 Logistics Management Information System (LMIS)

A Logistics Management Information System (LMIS) gathers, organizes, and reports data to various levels of the system in order to make decisions. The major goal of the LMIS is to help with the management of important drugs. In order to run a logistics system, the LMIS must capture three essential data items. These are:-

2.1.1.1 Consumption Data: The total amount of medications consumed over the reporting period.

2.1.1.2 Stock on Hand: Available quantities of usable stock at a given point in time.

2.1.1.3 Losses/Adjustments: Losses are the amounts of products taken from your stock for reasons other than providing services to patients or issuing to another facility (e.g., expiration, lost, theft, or damage), and they are recorded as negative (-) figures. Adjustments are product quantities obtained from sources other than PFSA or issued to recipients other than your health facility. An adjustment can also be a correction for a mathematical inaccuracy. A negative (-) or positive (+) number can be used as an adjustment.

Some of the LMIS instruments used for recording and reporting are the bin card, stock record card, Internal Facility Report and Resupply Form, Health Post Monthly Report and Resupply Form, and Report & Requisition Form. Those tools are supposed to be filled out by hand, which takes time and is prone to error, which is why the HCMIS was created to address those issues and deliver real-time data. (Christiana Y., 2014)

2.2. Health Commodity Management Information System (HCMIS)

The HCMIS, an electronic inventory management system, collects and distributes reports and orders in real time, regulates inventory, and creates a variety of commodity reports for store managers, pharmacists, and facility heads, all while increasing data visibility. (John S, 2010)

Ethiopia's health commodity management information system (HCMIS) is unique open source software solution designed for the country's health commodity supply chain. The Pharmaceuticals Fund and Supply Agency (PFSA) updated it in 2010 for usage in its network of distribution hubs after it was first developed and deployed in 2009 to manage inventories in health facility pharmaceutical stores (Facility Edition).

The HCMIS Facility manages and accounts for all health commodities maintained by facilities, including donated items and commodities purchased with the revolving pharmaceutical fund (RDF). (2017, HCMIS Training Workbook). In Ethiopia, maximum months of stock, minimum months of stock, and an emergency order point have been established for each health facility in the system in order to maintain acceptable supply levels.

2.2.1. Objectives of the HCMIS

HCMIS was developed with the following objectives in mind: to improve the country's pharmaceutical supply chain management system and to improve the country's to make the pharmaceutical logistics management information system better, In order to set up a good inventory management system in a health care facility; the following steps must be taken. Health facilities will be able to make better use of their medicine budgets by lowering expiry and improving stock management, and by enabling health facilities to collect trustworthy and quality data on a timely basis.

2.2.2. Users of the HCMIS

One of the key users who use HCMIS on a daily basis to handle health commodities is the Store Manager, who uses it to manage their inventory and LMIS. Secondary users who use HCMIS results for decision making include Health Facility Administrators/Management Units and PFSA for resupply decisions and stock out/wastages monitoring. (H. Ejigu et al., 2012)

2.3. Empirical frame work

Pharmacists have more time to provide pharmaceutical treatment and other pharmaceutical services to patients and customers because to automation in pharmacy inventory management. (2008, HEALTH INFORMATION SYSTEMS). All items at a community pharmacy were prioritized and forecasted using the unique tool Medz. (Vania G. 2016)

Inventory management and distribution have long been viewed as a low-value area in the health-care industry. Recent studies have demonstrated, however, that better distribution and inventory management can result in significant cost savings and income opportunities. (Dr. Kenneth N. et al, July 2012.)

Pharmacists in the United States, for example, have been able to broaden their jobs to become more clinical as drug distribution roles have been taken over by pharmaceutical automation. (USAID | DELIVER PROJECT, Health logistic quarterly volume 2, No.2 page1) .According to a study conducted at Kenyatta National Hospital, "poor employee capacity resulted in a factor of 0.981 drop in service quality," while "inadequate technology adoption for health service resulted in a factor of 0.917 decrease in service quality.(USAID | DELIVER PROJECT, Health logistic quarterly volume 2, No.2 page1)

According to a USAID case study in the Amhara region, the implementation of HCMIS Facility Edition and Proper Warehouse Management Practices improved the store management system in 11 hospitals in 2001. (2015, USAID | DELIVER PROJECT) Following the implementation of Artimathe in Japan, inventory management efforts in each department of the Pharmacy Department as well as clinical units were dramatically reduced, allowing pharmacists to focus on developing new clinical services. (MSH)

Regardless of the information supplied by the HCMIS, a proper storeroom with trained personnel is required for the paper system to be properly implemented, just as automation is required for the paper system to be successfully implemented. (USAID DELIVER PROJECT ,2012)

2.4. challenges of implementation of HCMIS

- Inadequate storage space and conditions
- Poor inventory management
- Government distribution systems with limited ability or capability to create incentives
- Lack of capacity in SCM activities
- Limited number of staff in SCM activities
- Little use of procurement flexibilities (e.g., framework contracts)
- Inadequate storage space and conditions

2.5. Conceptual frame work

Government related factors

- The National Essential Medicines List (NEML)
- Resupply

Health facility related factors

- Selection method
- Forecasting
- Procurement
- LMIS
- Inventory management
- Budget

Capacity related factors

- Capacity in SCM activities
- Number of staffs
- Supportive supervision

CHAPTER THREE: METHODOLOGY

3.1. Study Site

All of Addis Ababa's public hospitals were investigated for this study. Gandhi Memorial Hospital, Minilik Memorial Hospital, Ras Desta Damtew Memorial Hospital, Tirunesh Bejing hospital, Yekatit 12 hospital, and Zewditu hospital are all federal hospitals, while Alert hospital, Amanuel hospital, Black lion specialized Hospital, St.Paul hospital, and St.Peter hospital are federal hospitals,

3.2. Research Approach

A mixed strategy involving both quantitative and qualitative methodologies was used. It assists in the testing of hypotheses, as well as the exploration of ideas and experiences, by carefully collecting and assessing data.

3.3. study design

A facility-based cross-sectional descriptive study approach was employed to investigate, monitor, and measure the level of application of the HCMIS FE, which is used to manage inventory in health facility pharmaceutical stores.

3.4. Population

The source population was all Addis Ababa public hospitals, as well as all health workers involved in the logistical administration of health commodities in those facilities. Those hospitals were picked based on the inclusion criteria, which included hospitals that have been utilizing the system for at least a year, DSM members, store managers, and pharmacy directors. A total of 33 sample

3.5. Selection of study subjects and source of data

Responsible bodies, such as DSM members, were carefully selected for the study, and pharmacy leaders were involved in the in-depth interview. Six tracer medications are then selected from a list of tracer drugs provided by the hospitals. Those tracer medications should be readily available at all times in hospitals. For those tracer medications, the HCMIS, manual bin cards, report & requisition form, and receiving voucher (model -19) have been chosen for review.

3.6. Data collection method

Questioning and observation were the primary techniques of obtaining raw data for this study, with data being analyzed and interpreted using SPSS software to produce tangible information. The questioner was written in English for data collection since I assumed that all workers at a health center are educated and understand English.

3.7. Ethical considerations of the study

The research was taking place in the city of Addis Ababa. In order to investigate the effectiveness of the health commodity management information system in public hospitals. After the proposal has been approved, the school of commerce's Ethics Review Board will provide ethical clearance. The Logistic and Supply Chain Department will then write an official support letter to the Addis Ababa Health Bureau and Ministry of Health, requesting authorization to undertake the study. The ministry of health and the Addis Ababa City Administration Health Bureau will next write official letters to the designated health facilities. Data collectors will explain the study's goal and significance to each health facility's management. After discussing the study's goal, study participants will give their informed consent. The participants will respond to the questions and are willing to present the store and computer documents to the questioner. The information gathered will be kept private and used solely for research purposes.

3.8. Data Analysis and process

Data analysis is a method for drawing conclusions and putting a study's findings into words. Using descriptive statistics in the Statistical Package for Social Sciences, raw quantitative data is obtained, displayed, and evaluated (SPSS). (John S, 2010). Descriptive statistics are a way of organizing, summarizing, and presenting data in a clear and understandable manner. It will be used to assess the health commodities management information systems implementation.

The findings will be summarized using SPSS frequency tables. The information will be examined and categorized into several themes. Each of the various positions will be summarized, and the information will be arranged into major themes. Data will be obtained from a purposely chosen head pharmacist utilizing an in-depth interview guide, and findings will be reviewed through documentation (BC, model-19, RRF, and HCMIS). Will be examined in this manner.

3.1. Inclusion and exclusion

3.1.1. Inclusion

Those hospitals that are currently using the system and have been doing so for at least a year. And they are volunteers working in a public hospital in Addis Ababa, Ethiopia.

3.1.2. Exclusion

All employees in a hospital or health facility who were not connected to the system and refused to answer the questions.

3.2. Quality Assurance

These studies were completed in order to fulfill the requirements for a master's degree. The norms and regulations of research requirements, as decided by the Addis Ababa University School of Commerce's assessment committee and remarked on by my adviser, shall govern all of the study's methods and procedures.

CHAPTER FOUR: Data Presentation and Analysis & Interpretation

Introduction

The data gathering phase of the research will be described in this chapter. In a variety of circumstances, data can be gathered in a variety of ways and from a variety of sources. In this study, the raw survey response from the structured questionnaire survey and the interview response were used to learn about the current status of HCMIS implementation. As a result, the data from the questionnaire, in-depth interview, and document review will be presented and analyzed in this chapter.

4.1. Implementation status of HCMIS

According to the HCMIS working book (USAID | DELIVER PROJECT, 2010), the following are lists of outcome area tasks that should have been performed every time HCMIS is deployed. The status of report production, voucher comparison, manual bin card and HCMIS ending balance, physical count, and HCMIS count were all evaluated.

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

As specified in the integrated pharmaceutical logistic system's standard operating procedure and the HCMIS working book, all automated health facilities are supposed to generate their bi-monthly report and request form from the system. In a given fiscal year, they are expected to generate six RRFs. (USAID | DELIVER PROJECT, 2010) .The findings on eleven hospitals, based on the aforesaid benchmark, demonstrate that all of them produced the expected six reports in the year. Furthermore, these numbers show that they are only using the system to update once the traction is completed. Aside from that, the qualitative report shows that the pharmacy directors stated that HCMIS is one of the top goals for all hospitals in the study since the system saves time in generating various reports and also improves real-time data and data quality. However, as the results of the structured questionnaire show, the level of generating the bi-monthly report is extremely high (100%), which could be due to the high level of management

support for the implementation and the frequent turnover rate of the store manager, as both the qualitative and quantitative data indicated.

Table 1 Hospitals produce Report & Requisition Form using HCMIS

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	33	100	100	100
No	0	0	0	100.0
Total	33	100.0	100.0	

(HCMIS implementation survey report 2021)

Another method used by the researcher to assess the system's implementation status was to assess the level of satisfaction of store managers, the system's primary user, in terms of whether the system is comfortable, user-friendly, easy to generate reports, beneficial to both the facility and the store manager, and the facility's and store manager's confidence in the system's future performance.

Table 2 Level of satisfaction of store managers with HCMIS with different parameters

Variables	N	Mean	Std. Deviation
the current status of the HCMIS	33	4.03	.174
conformability of the HCMIS	33	4.03	.174
Is the HCMIS user friendly	33	5.00	.000
How easy is it to produce reports using HCMIS as compared to the previous manual system	33	5.00	.000
benefit of HCMIS to medicine management to the facility	33	5.00	.000
level of support from USAID for HCMIS implementation	33	5.00	.000

Variables	N	Mean	Std. Deviation
level of confidence to maintain HCMIS in use by the facility without help of USAID	33	4.79	.415

(HCMIS implementation survey report 2021)

4.1.2. Physical count and HCMIS count

The physical count and the HCMIS count must be equal, according to the HCMIS standard manual working book, and the same is true for the next results between the manual bin card and the HCMIS count, as well as the date between the received voucher and the HCMIS. As a result, 62.5 percent of hospitals have physical counts for five of the specified tracer medications, and the HCMIS count is similar, indicating that they are just using the system to update after transactions.

Table 3 Comparison of physical count and HCMIS count

Response	Frequency	Valid Percent
one items	3	37.7
Valid Five items	8	65.5
Total	11	100.0

(HCMIS implementation survey report 2021)

4.1.3. Document and system Survey

All drugs utilized by a health facility whose store uses the HCMIS should be customized and managed by the system, according to the IPLS standard operating procedure and the HCMIS working book. In this case, the findings show that all hospitals have all of their commodities listed, which is 100%.

Table 4 The whole hospitals list of drugs inserted (customized) in HCMIS

Responses	Frequency	Valid Percent
Valid Yes	11	100
No	0	0
Total	11	100.0

(HCMIS implementation survey report 2021)

4.1.4. Last Manual Bin card transaction and HCMIS count

The manual bin card and the HCMIS count must always be balanced, as stated in the HCMIS standard operating procedure. In light of this, a comparison of the last bin card transaction and the HCMIS count for the selected six tracer medications reveals that four items have comparable status on both the manual bin card and the electronic bin card at the five hospitals (HCMIS).

Table 5 Comparison between last bin card transaction & HCMIS count

Variables	Frequency	Valid Percent
two items	5	45.45
one items	3	27.27
no items	3	27.27
Total	11	100.0

(HCMIS implementation survey report 2021)

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

The receiving date on the voucher (model-19) and the receiving date on the HCMIS must be same, according to the HCMIS working book and the standard operating procedure for the IPLS (PFSA, 2014). The results of the comparison between model-19 and HCMIS received date of the items demonstrate that four of the selected six tracer medications had similar received dates in one hospital. This result suggests that 90% of hospitals update their systems in a timely manner during the receiving date.

Table 6 Comparison between Voucher and HCMIS received date

Response	Frequency	Valid Percent
one items	1	9
no items	10	91
Total	11	100.0

(HCMIS implementation survey report 2021)

4.1.6. Timely update of HCMIS

As stated in the HCMIS working book, in order for the system to be functioning, it must be updated on a regular basis. According to this survey, 100% of hospitals used the system before every transaction, indicating that HCMIS is strictly employed before the actual transaction.

Table 7 Timely update of the HCMIS

Variables	Frequency	Valid Percent
Valid use HCMIS sometimes before and sometimes after the actual transaction	11	100
use HCMIS only to update after manual transaction	0	0
Total	11	100.0

(HCMIS implementation survey report 2021)

4.2. Challenges for the implementation of HCMIS

Training/human capacity, Too much work /too busy to maintain the system, Hardware (e.g. computer, printer) problems/breakdowns, Software problems (e.g. system crashes, doesn't have specific functionalities), Infrastructure problems – loss of electricity, Too difficult to use the system/not friendly, Staff turnover, Low level of support from the management, the result of the finding shows that, the major challenges are too much work to maintain the system and training/human capacity .and low level of support from the management which accounts 97% and 51.5% respectively. In addition to the aforementioned conclusion, the in-depth interview reveals that one of the challenges for the system's poor implementation is the lack of a legal framework that enforces its execution.

(Table 8a) The Biggest Challenge This Facility Face in maintaining HCMIS in eleven Hospitals

Variables	Frequency	Valid Percent
Valid Too much work/too busy to maintain the system	32	97
not selected	1	3
Total	33	100.0

(HCMIS implementation survey report 2021)

(Table 8 b) The Biggest Challenge This Facility Face in maintaining HCMIS in eleven Hospitals

Variables	Frequency	Valid Percent
Valid Training/human capacity	17	51.5
not selected	16	48.5
Total	33	100.0

(HCMIS implementation survey report 2021)

4.3. Outcomes of implementation of HCMIS

The expected benefits of successful implementation of the Health commodity management Information system (John Snow Inc./DELIVER,2012) 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 Product availability has improved, as has inventory control. The majority of the benefits derived from the system, according to both the in-depth interview and the structured questionnaire findings, are reduced wastage and assistance with forecasting.

Table 9 a) The Biggest Benefit This Facility received from HCMIS

Variables	Frequency	Valid Percent
Valid Reduced wastage	33	100
Valid not selected	0	0
Total	33	100.0

(Table 9b) The Biggest Benefit This Facility received from HCMIS

Variables	Frequency	Valid Percent
Valid Helps forecasting	33	100
Valid not selected	0	0
Total	33	100.0

(HCMIS implementation survey report 2021)

CHAPTER V: Conclusion and Recommendation

5.1. Conclusion

The hospitals in this study implemented HCMIS with little variation in implementation status as a function of years of experience. The more hospitals that use the system, the better the results are in terms of data quality, saving time when preparing reports, improved stock management, real-time data access, and making educated decisions. Despite the fact that all indicators are full field in the research population, the implementation status of the HCMIS is in good shape, as both quantitative and qualitative findings demonstrate.

- The bi- monthly report (RRF) is generated from the HCMIS in eleven hospitals from the total study population.
- Other pertinent reports which help to monitor the stock properly also generated from the HCMIS
- The physical count and the HCMIS ending balance is almost equal except those hospital TB care isn't apriority
- The received date of model-19 and the received date of the HCMIS is not similar
- The last transaction on the manual bin card and the HCMIS is not similar
- The HCMIS is timely updated.

In general, the results of both the quantitative and qualitative reports demonstrate that the HCMIS implementation status is good, as planned; five years after the program began.

5.2. Recommendation

- It is strongly suggested that the Health Commodity Management Information System (HCMIS) be adopted in all Ethiopian hospitals and health institutions. Because, as this study's findings reveal, the application of HCMIS is improving, with benefits such as reduced waste and improved forecasting.
- The level of support from management is strong, as the findings reveal the support is consistent from the management bodies.
- Additional Pharmacy people should be trained to tackle the store's turnover difficulty.
- The USAID-DELIVER program should be updated to allow hospitals to personalize all things they utilize, as some customizations are proving difficult.

- As indicated in the in-depth interview report, too much work/too busy to maintain the system, as well as a lack of training and human capacity, are important hurdles for the successful deployment of the HCMIS.
- Because the HCMIS deployment is currently being cascaded and managed primarily by USAID-Deliver in partnership with PFSA and AARHB, those government bodies with FMOH should give over the system and work closely with USAID/Deliver to ensure its success.
- To completely deploy HCMIS, policymakers should include it as one of their strategic plan initiatives, just like the other automated system found in the health sector, HMIS.

Reference

- # Anna GR. (2011) competitive internal logistics systems through automation.
- # April (2017) Health Commodity Management Information System Training Workbook Facility Edition For Supervisors, store managers & IT /HIT persons
- # Ayad KA.(2011) Inventory Management in Pharmacy Practice: A Review of Literature. Archives of PharmacyPractice.; 2(4) pp 151-156.
- # Belesti.M.A(2008). Toolkit on monitoring health systems strengthening Health Information Systems
- # Christiana Y. (JULY, 2014) Assesment of supply chain management in hospitals: A case study of greater accra regional hospital –Ridge. University of Ghana <http://ugspace.ug.edu.gh>.
- # Creswell, J.W.(2009), Rsearch design: quantitative, qualitative and mixed methods approaches“, 3rd edn, Sage Publications, California
- # Dr. Kenneth N. et al. (July 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, Vol. 2 No. 13;Nairobi, Kenya.
- # USAID DELIVER PROJECT (2012) empowered with real time logestics data, health facilities improved access to medicines; Ethiopia Task order 1
- # E. Ejigu H. Tadege N. Mekonnen (December 2012)Establishment of Medicines Waste Management and Disposal System in Ethiopia: a Report on Progress and Achievements
- # Health Commodity Management Information System, (2017). Training Workbook Facility Edition For Supervisors, store managers & IT /HIT
- # HEALTH INFORMATION SYSTEMS(June 2008).*Toolkit on monitoring health systems strengthening*

- # John S .2010. *THE VALUE OF AN ELECTRONIC LOGISTICS MANAGEMENT INFORMATION SYSTEM: eLMIS SELECTION GUIDE*:Eastern and Southern African Management Institute.
- # John Snow Inc./DELIVER,(2010) Task Orders 4. Elmis-selection-guide-electronically-managing-supply-chain-information
- # John Snow Inc./DELIVER,(2012). Task order 1 empowered with real time logistics data, health facilities improved access to medicines; Ethiopia
- # Kar et al., 2010; John Snow Inc./DELIVER, 2004.
- # Ministry of Health Federal Democratic Republic of Ethiopia.(May 2013).HMIS Information Use Guide: Technical Standards Area 4: Version 2.Addis Ababa.
- # Ministry of Health (August 2015). Health Sector Transformation Plan. Addis Ababa.
- # MSH. Management support system. Pharmaceutical management information system
- # Obiri.YH, David A, Makafui RA. (August 2015) Assessing the Impact of Efficient Inventory Management in on Organization. International Journal of Advanced Research in Computer Science and Software Engineering.Volume 5, Issue 8, Page (86-102)
- # 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 manual for the integrated pharmaceuticals logistics system in health facilities of Ethiopia.1st ed. Addis Abaab;2014.
- # Takehiro Yamada, Yoshikazu Tasaki et al. (June 2005) Automation in Drug Inventory Management Saves Personnel Time and Budget. Yakugakuzasshi journal of the Pharmaceutical Society of Japan .
- # USAID | DELIVER PROJECT Final Country Report)
- # USAID | DELIVER PROJECT, Health logistic quarterly volume 2,No.2 page1

- ✚ USAID | DELIVER PROJECT, (2015) Task Order 4, and Pharmaceuticals Fund and Supply Agency (PFSA). National Survey of the Integrated Pharmaceutical Logistics System. Ethiopia:
- ✚ USAID | DELIVER PROJECT, (2016). Task Orders 4 and 7. Final Country Report: Ethiopia..
- ✚ USAID | DELIVER PROJECT, (2010.) Task Orders 4. Elmis-selection-guide-electronically-managing-supply-chain-information.
- ✚ Vania G. (2016) Hospital pharmacy management: Australian and Indonesian perspectives. vania.gones@sydney.edu.au. Sydney

Annexes

Annex 1. Self-Administered Questionnaire to Store Manager

My name is Habib Ahmed. I'm conducting a survey for the Facility Edition of the Health Commodity Management Information System.

The goal of this assessment is to gather information on the HCCMS FE's implementation status. The data will aid in a better understanding of the system's overall operation and will aid in the improvement of both the system and its implementation.

The researcher wants to ask you a few questions concerning the facility's use of HCMIS. The assessment's findings will aid in the enhancement of the system and its implementation. The questionnaire will take less than an hour to complete, and the researcher will examine the system to determine whether or not it has been implemented. Your responses will be kept private and only the investigator will have access to them. On the questionnaire or in the report, neither your name nor any other identifiable information will be visible. You have the option of declining to participate in the survey, but we hope you will since your opinions are valuable.

Respondent agrees to be interviewed \longrightarrow Continue the interview

Respondent does not agree to be interviewed \longrightarrow End the interview

Section 1: Background Information

Background Information

Facility name: _____

Position _____

Date of Interview _____

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: Store Manager/Main HCMIS user)

No.	Question	Code Classification	
1	For how long does the facility used HCMIS to manage health commodities	a) 6 month to 1 year b) 1 year – 2 years c) 2 years 3years d) 3 years – 4 years e) 4 years – 5 years f) 5 years – 6 years	
2	How long have you been using HCMIS (the respondent)?	1. < 1 month 2. 1-2 months 3. 3-5 months 4. 6 months – 1 year 5. More than 1 year	
3	Who currently is the primary HCMIS user (who operates) in this facility? (Select only one.)	1. Store Manager 2. Pharmacy head 3. Dispensary 4. HIT/IT Others (Specify)_____	
4	Who else (title) at this facility is able to operate the system? (Multiple responses are possible.)	a. Store Manager b. Pharmacy head c. Dispensary d. Facility head e. HIT/IT f. No one Other (Specify)_____	
5	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	

No.	Question	Code Classification				
		5. Every quarter 6. More than three months Other (Specify)_____				
6	How often do you share reports produced using HCMIS to the PFSA/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)_____				
Statements		Scale				
		1=Strongly Disagree	2=Disagree	3=Neutral	4=Agree	5=Strongly Agree
7	How would you rate the current status (system is up-to-date, and facility can use system independently with minimal support) of HCMIS in this facility?	1	2	3	4	5
8	How comfortable are you in using the system?	1	2	3	4	5
9	Is the system user friendly is HCMIS?	1	2	3	4	5
10	How easy is it to produce reports using HCMIS as compared to the previous manual	1	2	3	4	5

No.	Question	Code Classification				
	system?					
11	Overall, how beneficial has HCMIS been to medicine management to your <u>facility operations</u> ?	1	2	3	4	5
12	Overall, how would you rate the level of support you get from the USAID DELIVER PROJECT for HCMIS Implementation?	1	2	3	4	5
13	How confident are you that your facility can maintain HCMIS independently into the future without assistance from DELIVER/ others?	1	2	3	3	5

Benefits

No.	Question	Code classification
14	What benefits has HCMIS brought to your facility? Probe for more answers.	<ul style="list-style-type: none"> a. Reduced wastage b. Helps forecasting c. Helps informed decision-making for routine decisions like resupply d. Planning/budgeting medicine requirements e. Helped to easily produce reports and Improved reporting quality, and consistency

No.	Question	Code Classification	
		f. Improved product availability g. Improved inventory control h. Nothing Other (Specify)_____	
15	Do you produce reports other than RRF using HCMIS to monitor your stock?	1. Yes 2. No	
16	For what purpose do you use reports produced using HCMIS? Probe for more answers.	a. Forecasting b. Estimating quantities to order c. Annual budgeting d. Managing stocks e. For report and resupply (RRF) Other (Specify)_____	
17	For whom do you share reports? multiple responses are possible)	a. Pharmacy Head b. Facility Head c. RHB d. PFSA Other (Specify)_____	
Section 3 Challenges			
18	What are the challenges this facility faces in maintaining HCMIS? multiple responses are possible Probe for more answers.	a. Training/human capacity b. Too much work /too busy to maintain the system c. Hardware (e.g. computer, printer) problems/breakdowns d. Software problems (e.g. system crashes, doesn't have specific functionalities) e. Infrastructure problems – loss of electricity	

No.	Question	Code Classification	
		f. Don't see benefits of HCMIS g. Too difficult to use the system/not friendly h. Staff turnover i. Low level of support from the management j. Low level of support from DELIVER Other (Specify)_____	
19	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?	Record the # of times /_____/	If no skip the rest questions
20	If ability to use HCMIS was interrupted in the past six months, what was the main problem? Multiple response are possible are possible	a. Hardware problems/breakdowns (e.g. computer, RAM, power, hard disk failure etc) b. Non-HCMIS software problems (e.g. virus, computer system corruption etc) c. HCMIS related system failure d. Don't know/Not sure Other (Specify)_____	
21	Were you able to fix this problem yourself or did you need outside help?	1. I fixed the problem 2. Received support from somebody in facility 3. Seek support from DELIVER - Field IT 4. Seek support from DELIVER - HCLA 5. Received support from HIT/IT	

No.	Question	Code Classification	
		6. Solved through 8773 Other (Specify) _____	

	<p>mach with model 19.</p> <ul style="list-style-type: none"> ○ TB- kit ○ Magnesium sulfate inj ○ Dexamethson inj ○ Oral Rehydration Salt ○ Amoxicillin ○ H-cort inj 		
5.	Is HCMIS used before or after each receiving and issuing transaction?		<p>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</p>
6.	Does the health facility produce RRF using HCMIS and send it every two months?(0 to 5 points)		<p>a. Every two month b. After two month</p>
7.	Does the Pharmacy Head know how to use HCMIS (especially reports)? a. Yes b. No		Ask the pharmacy head him/her self or ask him/her to show us some reports from HCMIS.
8.	Does the Store manager provide HCMIS reports to the Pharmacy head? a. Yes b. No		Ask the store manager when was the last time he/she gives report to the pharmacy head..
9.	Does the Pharmacy Head provide any HCMIS reports to the CEO or Medical Director?		Ask the Pharmacy Head when was the last time he/she give report to the CEO/ Medical Director

Thank-you for your cooperation and time!!

Annex 3 Consent Form for in depth interview

Research project title: Assessment on the Practice and implementation of Health Commodity Management Information System (HCMIS) in public hospital Hospitals of Addis Ababa

Research investigator: Habib Ahmed

Research Participants name: _____

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 interview should take less than an hour. We don't anticipate that there are any risks associated with your participation, but you have the right to stop the interview or withdraw from the research at any time.

I will be taping the session because I don't want to miss any of your comments. Although I will be taking some notes during the session, I can't possibly write fast enough to get it all down. Because we're on tape, please be sure to speak up so that we don't miss your comments.

This consent form is necessary for me to ensure that you understand the purpose of your involvement and that you agree to the conditions of your participation. Would you therefore read and sign this form to certify that you approve the following:

- I have been informed of and understand the purpose and procedures of this study and the purpose and procedures of these interviews.
- The interview will be recorded and a transcript will be produced.

- This means that your interview responses will only be shared with research team members and we will ensure that any information we include in our report does not identify you as the respondent.
- All responses will be kept confidential.

By signing this consent form, I am indicating that I fully understand the above information and agree to participate in this study.

Participant's signature _____

Date: _____

Data Collector's signature: _____

Date: _____

If you have any questions about this study, please contact the investigator, Habib Ahmed (nhabahmed@gmail.com) or + 251 913731930)

Annex 4. In-depth interview guide

The information provided by all respondents will be treated confidentially. The information given is for the sole use of research on HCMIS status of implementation, and secondly, implementation ,challenges and outcomes will be analyzed by the investigator and will not be given to any third parties without the expressed consent of the respondent. Semi structured interview guide for pharmacy head .

Introductory Question

- How do you assess the overall Pharmacy supply chain and pharmacy service at this Hospital?
 - How do you assess the overall implementation of IPLS
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 warehouse management and delivery of services in your hospital? *Please explain how the identified feature has helped you or impeded your work* – in terms of:
 - time,
 - resource,
 - service quality,
 - report timeliness and quality
 - client satisfaction,
 - decision making in forecasting, procurement and distribution,
 - proper storage management including tracking of commodities by batch number and expiry date
 - what else
 5. How has the HCMIS affected communication and information sharing among the different units of the facility? Please give specific examples.
 6. Is there a legal frame work which enforces the implementation of the system?

What do you think?

7. How the hospital management does have the HCMIS?
 - A. Are they happy and demanding?
 - B. Did the management support the implementation in terms of
 - C. Availing necessary supplies like printer, hardware, and stationary, follow-up. Any other_____?

8. Would you tell me please the implementation status of HCMIS in comparison with HMIS? -
If there is a difference? What is the reason?

Do you have anything to add? _____

Thank you for your cooperation and time!