



ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

DEPARTMENT OF INFORMATION SCIENCE AND SCHOOL OF PUBLIC HEALTH

DRUG LOGISTICS MANAGEMENT INFORMATION SYSTEM

AT PUBLIC HEALTH FACILITIES IN ADDIS ABABA

BY

SEGID MOLLA

ADVISOR : ASSEFA SEME (MD,MPH)

A Thesis Submitted to the Department of Health Informatics, Addis Ababa University in Partial fulfillment of the Requirement for the Degree of Masters of Science in Health Informatics.

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Addis Ababa

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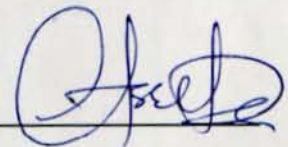
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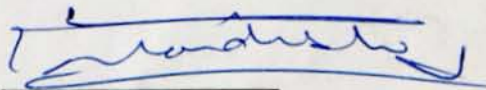
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DEDICATION

This work is dedicated to my brother Abdurahman Molla who has died on December 13, 2008.

I would like to express my sincere thanks to my father, Mr. Abdurahman Molla, for his continuous support and encouragement during the course of writing this paper. He gave me support to work on this paper and encouraged me to work on it. His support and encouragement were very valuable to me.

Special appreciation goes to my beloved wife, Mrs. Fatma Molla, for her love and support.

I am also indebted to my friend, Mr. Ali Molla, for his help in giving me an idea of the project and assisting me in the research.

And finally, I thank Allah for this opportunity, for the help given me by my family and friends for their support.

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I would like to pass a sincere thanks to JSI/DELIVER-Ethiopia for their continuous assistance and support in providing me publications, which greatly helped me to enrich my thesis work.

Special appreciation goes to my beloved wife Ekram Shafi for her love and support.

I am also Indebted to my friend Ermias Wondie for his help in giving me an idea in the process of conducting the research.

And finally, I thank Allah for this opportunity that he has given me for remaining alive and my family and friends for their warmth.

ABSTRACT

In most developing countries the research showed that the public health facilities do not have sufficient health commodities prescribed by the physician. Hence the patients required to buy medicines in the private pharmacies with high prices and others who couldn't afford to buy forego the treatment. There are various reasons for unavailability of drugs in a given country.

The study aims to assess how the drug management information system function in the public health facilities administered by Addis Ababa City Administration Health Bureau.

The assessment was done between February and April, 2010 in the health facilities of Addis Ababa City Administration. The performance of the logistics system was measured using quantitative and qualitative research instruments at the Addis Ababa City Administration Health Bureau, Sub City Health departments all the 5 hospitals and 10 health centers administered by Addis Ababa City Administration Health Bureau. The management and distribution of essential drugs was also studied. The various stakeholders for the programs were identified and interviewed using a semi structured interview guide.

The result of the finding shows that there is no integrated LMIS for all essential drugs. The current LMIS serves only two vertical programs that are ARV drugs and Contraceptives. The essential logistics data is not collected for all essential drugs. There is no logistics management unit responsible for all health products. 86.67 % of the health facilities studied does not have a daily transaction records. Stock cards are not used in 73.33 % of the health facilities. Supervision of the health facilities is not adequately covered. All the store heads are not trained in basic store keeping procedures.

The current LMIS design is not fully address all essential drugs, instead it is designed for two vertical programs which are influenced by the donors and have been built around the concerns of donors. The current LMIS practice focuses only on the above stated drugs by neglecting the importance of addressing the basic and critical public health concerns.

This study therefore, is intended to assess LMIS application and forward appropriate recommendations particularly emphasizing on the development of logistics management information system for all health commodities with stake holders participation.

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LIST OF ACCRONYMS

ARV	Antiretroviral Virus
DLMIS EPIINFO	Drug Logistics Management Information Epidemiological information
FP	Family Planning
FEFO	First-to expire-first-out
HSDP III	Health Sector Development Program phase III
ICT	Information and Communication Technology
JSI/DELIVER	John Snow Inc./deliver project
LIAT	Logistics Indicators Assessment Tool
LMIS	Logistics Management Information System
LSAT	Logistics System Assessment Tool
MSH	Management Sciences for Health
MOH	Ministry of Health
NGO	Non Governmental Organization
PFSA	Pharmaceuticals Fund and Supplies Agency
RPM/Plus	Rational Pharmaceutical Management /Plus
SPS	Strengthening Pharmaceutical System
SPSS	Statistical Packages for Social Sciences
TB	Tuberculosis
UNFPA	United Nation Population Fund
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WHO	World Health Organization

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

Logistics Management Information System (LMIS) is important support tool in the management of health care services delivery. A well organized LMIS is vital for identifying the health needs of population as well as for effective planning, implementation, monitoring and evaluation of health commodities. LMIS is a system developed to ensure a continuous drug supply and to provide reports on: a) drugs dispensed to patients, b) drug stock balances, c) stock losses, d) stock adjustments, e) drugs received.

1.2. STATEMENT OF THE PROBLEM

The improvement of the people in any given nation is measured by taking health status of its population as an important indicator. The availability and affordability of health facilities of developed and developing nations are in almost extreme cases, the general public in the developed world have access to both public and private health care facilities, typically the common citizens in the developing world are largely dependent on the public health care services. In Ethiopia it is common for patients not to get the medicines prescribed by the physicians in the pharmacies of public health facilities.

An assessment conducted in Ethiopia by the Ethiopian Pharmaceutical Agency in 2003 G.C. revealed that the national average for availability of key essential drugs in health facilities was 70 %, 85 % and 91 % for public health facilities, regional drug stores and private drug retail outlets, respectively. The figures are lower than the ideal value of 100 % and the 100 % target set in Health Sector Development Program III. For instance based on the data collected, 41.2 % responded that absence of the required medicine in public health facilities was the major reason for not getting the prescribed medicines and 35.3 % responded lack of money on the part of the patients [1].

If the overall availability of medicines in the public health facilities is low, consequently the patients are forced to pay for drugs at higher prices in private pharmacies or go to informal sector or abstain from treatment.

Different factors could be responsible for such problems. The desire to know why the medicines are not adequately available in the public health facilities is the basis for proposing this study. I hope that the findings of this study will help the decision makers in the area to reduce the problem by identifying some of the reasons for this and suggesting some recommendations.

1.3.2. LOGISTICS MANAGEMENT INFORMATION SYSTEM

The purpose of a logistics management system is to

provide a means of managing the flow of goods and services from the point of origin to the point of consumption.

A logistics management information system (LMIS) is a computerized system that provides the necessary information for the management of the supply chain. It is a system that provides the necessary information for the management of the supply chain. It is a system that provides the necessary information for the management of the supply chain. It is a system that provides the necessary information for the management of the supply chain.

1.3 LITERATURE REVIEW

1.3.1. HEALTH INFORMATION SYSTEM

Sound health statistics are essential for health decision-making at all levels of the health system, whether for individual patient care, for the management of specific health programs or at the policy level where strategic decisions are made. The World Health Organization (WHO) has defined the health information system as an integrated effort to collect, process, report and use health information and knowledge to influence policy making, programs action and research [2].

Health information is much more than collecting figures. Data alone have no value; value and relevance come when they are analyzed, transformed into meaningful information and used. The ultimate objective of a health information system is to produce information for taking action in the health sector. Performance of such a system should therefore be measured not only on the basis of the quality of data produced, but on evidence on the continued use of these data for improving health systems operations and health status [3].

A health information system is thus, not a static entity but a process whereby health-related data are gathered, shared, analyzed, and used for decision-making in health – information is transformed into knowledge for action [3].

1.3.2. LOGISTICS MANAGEMENT INFORMATION SYSTEM

The purpose of a logistics system is to get the:

Right quantities of the right goods to the right places at the right time in the right condition at the right cost.

A strong logistics management information system (LMIS) allows programs to manage and monitor the flow of health commodities, explanation for products in the supply chain, make available all the drugs equally, and improve cost-effectiveness. Information that is derived from a strong LMIS is valuable resources for evaluating how programs and supply chain are working.

When programs first establish LMIS, managers tend to use it only to schedule and manage the flow of supplies and to deal with supply problems. Then, as programs gain experience with the LMIS, managers use it to anticipate and prevent problems. In Kenya's family planning program, for example, the long-standing LMIS includes an automated system that collects data when supplies are delivered to district stores. Managers use this information to calculate the quantities needed to maintain a six-month supply, to schedule deliveries so as to prevent under stocks, to reserve the appropriate-sized transport, and to plan an efficient travel route [14].

The LMIS is a central part of any logistics system. A strong LMIS provides data to:

- Improve client service by accurately forecasting contraceptive demand, procuring the products and quantities in demand, and monitoring to maintain adequate stocks;
- Lower costs by reducing loss, damage, and waste of supplies;
- Improve policy decisions and program management through better reporting and analysis;
- Identify when immediate supervisory action is required—for example, in the event of stock outs or losses;
- Ensure accountability for the use of supplies purchased with public funds or provided by donors [14].

Designing an effective and sustainable supply chain system for drugs and other commodities is important and can be complex. A correctly run distribution system should also keep drugs in good condition, rationalize drug storage points, use transport as efficiently as possible, reduce theft and fraud and provide information for forecasting needs. This requires a good management of the system along with a simple but well-designed information system in place [4].

Supply chain management consists of a series of functions that are interdependent and must be routinely performed. A good supply chain is customer driven and all logistics functions within the supply chain must work

effectively to ensure commodity availability. Logistics information available through the Logistics Management Information System drives all decisions in the supply chain, and enables managers to operate supply chain functions including forecasting, quantification, and inventory management [4].

1.3.3. ESSENTIAL LOGISTICS DATA

1.3.3.1. DATA COLLECTION

Only a few kinds of data are essential for managing the supply system, but they must be available for every product, at every level, all the time. The five essential types of data for logistics are: ***stock on hand, consumption by clients, losses and adjustments, date of orders and receipts, and amounts on order.***

These data comprise the core of LMIS. Together, they provide the information required for the key logistics functions—forecasting, procurement, and distribution. The first three—stock on hand, consumption by clients, and losses/adjustments—are recorded on local stock records and aggregated or reported to higher levels periodically.

The others—dates of orders/receipts and amounts on order—are integral parts of individual transaction records. These are not routinely reported to higher levels but are valuable for special analysis, such as calculating how long it will take for drugs orders to arrive [14].

- **Stock on hand.** Supply chain managers must know exactly what products and how much of each item are in stock and where the stock is located. Data about stock on hand provide this information. At the service delivery level, data on stock on hand guide decisions such as when to place a new order.

A well-designed LMIS converts data on quantities of each product (stock on hand) into data on how long supplies will last (months of stock on hand). To do so, managers compare available supplies with average rates of use. This calculation simplifies decisions about when to order supplies.

- **Drug supply consumption.** A top priority for every LMIS is to collect and report accurate information about clients' consumption, or use, of drugs and other supplies. In LMIS terminology, this information is termed "dispensed-to-client" data. Program managers use the data to determine how many supplies to order and to project needs.

- **Losses and adjustments.** Even the best logistics systems experience some supply losses due to expiration, theft, damage, or mishandling. Losses and any other adjustments in supplies—such as transferring supplies from overstocked to under stocked locations—must be recorded and reported separately from data on consumption. The separate records allow managers both to deal with the causes of losses and adjustments and to develop more accurate forecasts of client demand.
- **Date of orders/receipts and amounts on order.** Dated transaction records, usually called “issue vouchers” or “requisition and issue vouchers,” govern the flow of supplies from one point in the supply chain to the next. To prevent drugs from being lost during shipment, both the facility sending a shipment and the facility receiving it must track the amount requested and the dates that the supplies were ordered and received. The interval between ordering and receiving products is known as “lead time” [14].

When managers know how long it will take drugs to arrive, they can set maximum and minimum inventory levels and can calculate when to reorder. Managers who wait too long to reorder risk stock outs. Those who order too soon waste money on transportation and other supply functions and have more supplies on hand than they need, risking losses due to product expiration [14].

1.3.3.2. RECORDING AND REPORTING DATA

A good LMIS records and reports data from all facilities in the supply chain. In general, LMIS data are recorded on stock-keeping records (store ledgers, inventory control cards, bin cards), transaction records (requisition and issue vouchers, packing slips), and consumption records (service records, daily activity registers)

Recording and reporting data are often difficult, especially where programs lack modern information technologies. In the Philippines in 1991, for example, data on consumption of contraceptives either were not available at all or were not put in the hands of supply chain managers. Instead of being allocated on the basis of clients' use, contraceptives were allocated to provinces in equal amounts, causing widespread supply imbalances. In 1997, after an LMIS had been developed as one step in strengthening the logistics system, data collection and record keeping improved. The program could allocate contraceptives on the basis of client consumption, reallocate overstocks to under stocked areas, and monitor and evaluate performance better [14].

In many developing countries LMIS reports move from the service delivery level to more central levels on a fixed timetable. A better approach is to link reporting to resupply—such as when the LMIS report is also the request for new supplies. In Ghana, for example, contraceptive resupply is based on the dispensed-to-client data submitted through the LMIS. Because resupply depends on receipt of these reports, reporting rates come close to 100 %, and stocks are adequately resupplied [14].

Another effective strategy to gather LMIS data is when supplies are delivered. In Bangladesh, for example, staff from service delivery points pick up monthly supplies from their sub-district stores and submit a monthly consumption report at that time. The sub-district stores can use these data to determine the quantities of supplies that service delivery points need [14].

In Turkey a “topping up” delivery system simultaneously gathers logistics data and delivers the right amount of contraceptive supplies. In this system a distribution officer with a fully stocked vehicle visits each health facility every four months. The officer makes a physical count of supplies on hand, calculates the average monthly consumption based on the total supplies on hand at the previous delivery visit, calculates a new maximum stock level, and then “tops up” the clinic stocks to that level. This system has substantially reduced stock outs and in some cases has eliminated them [14].

1.3.4. BENEFITS OF LOGISTICS MANAGEMENT INFORMATION SYSTEM

Lots of researches have been conducted in many parts of the world and recommended that effective utilization of logistics management information systems will provide immense benefits.

An assessment conducted in Nepal indicates key achievements of LMIS as a nationwide LMIS producing reliable logistics data for decision making at all levels of the health system (forecasting, inventory management, pipeline monitoring, and prevention of stock outs). Policymakers accept LMIS data as credible and use them to make nationwide policy and operational decisions. LMIS reporting has improved storage practices, thus reducing waste and expiry of commodities. LMIS made possible the successful introduction of the pull system for essential drugs in half of the districts of Nepal. LMIS expanded from

only tracking contraceptives to include 17 key commodities (including ORS, iron tabs, vitamin A, malaria drugs, and vaccines) [5].

And the result shows there is an integrated LMIS system and includes commodities for nine different programs. These include:

- Family planning (five contraceptives)
- Expanded Program on Immunization (EPI) (six vaccines plus immunological agents).
- Malaria/ Kalazar Program (seven malaria drugs).
- Tuberculosis Program (ten TB drugs as well as glass slide and sputum container).
- Control of Diarrheal Disease (CDD) Program (ORS and Zinc Sulphate).
- Acute Respiratory Infection (ARI) Program (Cotrim-P 100/20 mg, and Cotrim-P 200/40 mg).
- Nutrition Program (vitamin A, iron tablets, and Albendazole).
- Leprosy Program (four leprosy drugs).
- Essential drugs (56 standard plus other essential drugs) [5].

An assessment of logistics systems conducted by JSI/DELIVER in Malawi [6] identifies the improvements gained through logistics system of health commodity as:

- Increasing contraceptive availability
- Improving logistics systems performance
- Developing a strategy for achieving commodity security and
- Strengthening the HIV/AIDS supply chain system [6].

1.3.5. RESEARCH ON LMIS IN ETHIOPIA

The Logistics Systems of Health Commodities research in Ethiopia has been conducted in 2006 and 2007. The Ethiopian Logistics System which was assessed by JSI/DELIVER in 2007 has identified the following challenges:

- Many physical and climatic extremes
- Ethiopia's geography provides numerous challenges for the physical movement of drugs and health commodities
- Reaching much of the population is a considerable challenge for both the government and other development organizations working with in the health sector in Ethiopia [8].

Regarding health commodity logistics the assessment indicated that :

- The public sector's system suffers from a lack of a formal system design
- Experience of a haphazard distribution system
- A limited and often worn-out transport resources
- Inadequately designed, managed, and maintained warehouses
- Little useful logistics information, such as consumption data or stock-on-hand data, poor stock management and inventory control systems and procedures [8].

Hassen Mohammed 2006, in his study of assessment of contraceptive logistics management information system in Addis Ababa City Administration indicated the existence of a well-designed contraceptive logistics system with trained personnel, distributed standard LMIS formats and established inventory control procedures through support for those activities from JSI/DELIVER [9].

Although it was designed to operate in a pull system it was actually found operating predominantly as a push system. Majority of the facilities (56.72%) were stocked out for at least one contraceptive they manage in their facilities and the highest stock out rate was for mini pills. Expired contraceptives were found in six of the sub cities and the RHB in big quantities. Only 24 facilities (35.82%) had stock cards or bin cards for at least one contraceptive managed in

their facilities. Keeping quality records and reports are very low mainly due to lack of supervision and follow up from higher levels. Availability of separate stores for sub cities, training of personnel managing contraceptives and supportive supervision are among the major recommendations. [9]

1.3.6. PHARMACEUTICALS SUB SECTOR OF ETHIOPIA

The sector is regulated by the *"Drug Administration and Control Proclamation No. 176/199*, which was promulgated on 29 June 1999 G.C. This proclamation has superseded the former regulation called *"Pharmacy Regulation No. 288/1964"*, which formed the legal basis for official establishment of drug regulation in Ethiopia. *"The Pharmacy and Laboratory Department"* was the first drug regulatory body established under the Ministry of Health by the Pharmacy Regulation No. 288/ 1964. The department performed drug regulatory activities as well as the registration of pharmacy personnel. Following the passage of proclamation No 176/ 1999, the pharmacy department was transformed to an independent drug control authority named *"Drug Administration and control Authority (DACA)"* which became operational on September 2001 G.C [1].

The Ethiopian government identifies the pharmaceutical problems as the main components of HSDP III, which describes the plan to increase the availability of drugs as described in the next paragraph.

A well functioning pharmaceutical service is the corner stone for any worthwhile health service. Thus, this intervention aims at ensuring regular and adequate supply of effective, safe and affordable essential drugs, medical supplies and equipment in the public and the private sector and ensuring their rational use. A comprehensive Logistic Master Plan will be developed and implemented during HSDP-III. The plan is to increase availability of essential drugs from 75% to 100% in all public health facilities; to scale up the supply of imported and locally produced drugs; increase safety, efficacy and quality investigation from the present 40% to 100 %; and to reduce the overall drug wastage from 8% to 1% [10].

When it was established in 2007, PFSA had its mandate, mission, and objectives outlined for clarity. These are listed below:

Mandate:

- Sole provider of forecasting, procurement, storage, inventory management and distribution of pharmaceuticals to the public health sector in Ethiopia.

PFSA Mission:

- To ensure availability and affordability of quality pharmaceuticals to all public health facilities by using a revolving drug fund (RDF)

PFSA Objectives:

1. Improve availability of program and non program pharmaceuticals nationwide from 55% to 100%
2. Reduce wastage rate from 8% to less than 2%
3. Reduce cycle time (forecasting, procurement, storage and delivery to public health facilities) from 491 days to 165 days on average
4. Establish a quality complaint system and ensure rational use of pharmaceuticals
5. Improve customer satisfaction in terms of availability and quality of service at public health facilities from 51% to 100% [26].

1.4. SIGNIFICANCE OF THE STUDY

The study will identify the strength and weakness of LMIS in government owned hospitals and health centers found in Addis Ababa with respect to informed decision making in procurement, distribution, transportation, warehousing, inventory control, LMIS implementation, in addition the study reviews the adequacy of facilities and equipments, staff availability, training, and supervision in the drug supply chain of the public health facility in Addis Ababa.

The findings and recommendations of the study will contribute towards the ongoing efforts of developing better logistics management information system in the country. Specifically the findings of the study will benefits the studied hospitals and health centers by helping them to improve their LMIS. MOH and PFSA it helps them to get timely information from the facilities that enable them for decision making.

1.5. OBJECTIVES OF THE STUDY

1.5.1. GENERAL OBJECTIVE

- The main objective of the study is to undertake an assessment of Logistics Management Information Systems for Essential Health Commodities distribution and supply in Government owned health institutions in Addis Ababa.

1.5.2 SPECIFIC OBJECTIVES:

- To assess the availability of essential drugs in stores and pharmacies of hospitals, health centers in Addis Ababa.
- To assess essential drugs distribution and supply chain, hospitals, health centers in Addis Ababa.
- To assess the usage of logistics information for decision making at all level of the health system.
- To assess the human resource capacity for LMIS in facilities.
- To identify the problems of the current Ethiopian Drug Logistics Management Information System.

1.6. METHODS AND MATERIALS

The assessment is carried out from February to April, 2010. The performance of the logistics systems was measured using open ended interview questions and quantitative research instruments and Facility visits of hospitals, health centers and stores run by Addis Ababa Health Bureau.

The management and distribution of essential health commodities in the health facilities has been studied. Responsible stakeholders in the health commodity supply chains namely, Addis Ababa Health Bureau, Sub-city Health Departments, 5 Hospitals, 10 Health Centers and 15 Stores run by Addis Ababa Health Bureau were selected for the study.

1.6.1. STUDY AREA

The Federal Democratic Republic of Ethiopia consists of nine autonomous regions and two cities (Addis Ababa and Dire Dawa) with further division in to zones and woredas (districts).

The study area is Addis Ababa City Administration. Addis Ababa is subdivided in to 10 sub-cities and 99 kebeles with a total population of 3,059,00. There are 35 hospitals in Addis Ababa of which 10 are owned by government while the rest 25 are NGOs and Private owned. In addition, there are 29 health centers, 37 health posts. Moreover, there are 94 special, 99 higher, 146 medium and 103 lower level private owned clinics found in Addis Ababa [11].

1.6.2. SOURCE POPULATION

The source population for the study includes Health Bureaus, and health facilities working in Addis Ababa.

1.6.3. STUDY POPULATION

The study population is those responsible for the supply chain of health commodities mainly; Addis Ababa Health Bureau, Sub-city Health Departments, 5 Hospitals, 10 Health Centers, 15 ART sites and 15 stores run by Addis Ababa Health Bureaus.

Overall 45 respondents were contacted for data collection through questionnaire with those who are responsible for managing medical supplies in the health facilities. Besides, an interview had also been conducted to 11 participants, one from Addis Ababa health bureau and 10 individuals from each sub-cities of Addis Ababa who are in charge of distribution of medical supplies to the respective health facilities.

1.6.4. DATA COLLECTION TECHNIQUES

Three methods were employed for data collection to realize the study.

Qualitative

Key Informant interview with those stakeholders responsible for the health commodity supply chains namely; Addis Ababa Health Bureau, Sub-city health departments has been interviewed using interview guide used to produce a supply chain map for distribution of these commodities to the facility level (Annex 3).

Quantitative

Structured questionnaires which are originally developed by JSI/DELIVER [13] Logistics Indicators Assessment Tool (LIAT) adapted to local use is used as a quantitative data collection instrument to assess the health commodity logistics system performance and commodity availability from 5 hospitals and 10 health centers run by Addis Ababa Health Bureau were selected for the study and 3 individuals from each health facilities that makes a total of 45 respondents were contacted (Annex 2).

Facility visits: Visual inspection of the storage conditions using checklists was conducted in the selected health facilities stores (Annex 2A).

The availability of 12 key essential drugs selected for Ethiopia at a national level in 2003 G.C were checked at the store of the health facilities.

The following are the list of twelve key essential drugs which are used to treat the most common health problems in the country were selected in 2003 G.C. at a national level [1].

Health problem

Key essential drugs

<i>Acute Respiratory Tract infection</i>	<i>Amoxicillin capsule or tablet Cotrimoxazole tab.</i>
	<i>Procaïn penicillin injection</i>
<i>Diarrhea</i>	Oral Rehydration Salt (ORS) Co-trimoxazole
<i>Malaria</i>	Chloroquin ,Sulphadoxine-Primethamine tablet
<i>Worm infestations</i>	Mebindazole tablet
<i>Conjunctivitis</i>	Tetracycline eye ointment
<i>Skin disinfection</i>	Denatured alcohol
<i>Anemia</i>	Ferrous salt + Folic Acid
<i>Pain</i>	Paracetamol tablet
<i>Scabies</i>	Benzyl benzoate lotion

In order to collect the required data on physical availability of these drugs in the stores of the studied hospitals and health centers physical count was conducted to assess data quality by comparing the actual counts with the available records. Ten data collectors were trained to make the data collected is of a good quality.

Fourteen Checklists were used for recording of information obtained from the visual inspection of the stores in the health facilities (Annex 2A).

1.6.5. DATA QUALITY MANAGEMENT

Various efforts were made to assure the data quality. Data collectors were trained for the purpose of handling data collection through questionnaires for two days, that is, about nature of the questionnaire, how to count the number of selected drugs in the store, filling the questionnaire based on the format of the

questionnaire and verifying the amount against the bin card of each drug. Personal supervision was conducted to ensure the quality of the data collected during the process of data collection. The questionnaire was pre tested with a similar study population in hospitals and health centers a week before deployment for data collection which helped to make final corrections of the questionnaire.

Short briefings were given to the informants before going to the questionnaires to make sure the respondents well understood what the researcher wanted to investigate. The researcher attempted to carefully enter and analyze the data collected. Notes were taken on issues demanding further clarification by revisiting the study health facilities when necessary.

1.6.6. DATA ANALYSIS PROCEDURES

The data entry process was accomplished with Epi Info Version 3.5.1. The analysis of the data using frequency, tables, proportions, percentages and with the use of Statistical Package for the Social Sciences (SPSS) version 15.0 software were used to analyze the quantitative data collected through questionnaire survey while descriptive analysis was used to analyze the information collected through open ended interview and physical observation.

1.6.7. ETHICAL CONSIDERATION

The study was carried out after getting approval from the ethical clearance committee of Addis Ababa University, through Health Informatics Program. Data collection was preceded after securing written consent from Addis Ababa Health Bureau and Department of Health Informatics. The informants involved in the study were also pre informed about the purpose of the study and proceed to providing information after getting their willingness. (Annex 1). The privacy of informants was highly maintained. The respondents were encouraged to ask questions and clarification during the interview.

1.6.8. ASSESSMENT TOOL

Logistics System Assessment Tool (LSAT) and Logistics Indicators Assessment Tool (LIAT) developed by JSI/DELIVER helps to measure the performance of

logistics management information system. LSAT tools are useful to get detail information on the strengths and weakness of the logistics management information system.

1.7. SCOPE OF THE STUDY

The study is restricted to Addis Ababa in the 5 hospitals and 10 health centers administered by Addis Ababa Health Bureau.

1.8 OPERATIONAL DEFINITIONS

Consumption record: Records kept on products consumed by clients.

Dispensed to user (client) data: Information on the quantity of products actually given to customers by a provider. Sometimes referred to simply as dispensed or consumption data.

Essential drug (medicines) list: A defined list of drugs/medicines focused on satisfying the priority health care needs of the population as defined in the Essential Health Care Package for Ethiopia and corresponding Standard Treatment Guidelines.

First-to-expire, first-out (FEFO): A method of managing drugs, contraceptives, and other medical supplies in a storage facility to ensure that the stock with the closest expiry date is issued before stock that will expire later.

Pull system :A distribution system in which personnel at the facility that will receive the supplies determines the quantities to order.

Push system: A distribution system where the quantities to be shipped to a health institution are determined by a higher level (e.g. RHB)

Vertical system: A logistics system that supplies and manages products for only one program.

1.9 ORGANIZATION OF THE THESIS

The Chapter following the introductory chapter, Chapter 2, presents the findings of the research. Chapter 3 presents the discussion of the findings , followed by the concluding remarks and recommendation Chapter 4.

CHAPTER 2: RESULTS

This Chapter of the paper deals with the presentation of data collected using questionnaire, interview and observation from target health centers and hospitals concerned with managing of medical supplies.

2.1. Respondents Composition

The following table shows the list of health facilities which are found in Addis Ababa city Administration selected for the study with the respondents position.

Table 1: Number and type of health facilities and health personnel involved in LMIS assessment in each sub-city of Addis Ababa City Administration. April, 2010.

Sub-City	Health Facility Type		Persons Contacted		
	Health Center	Hospital	Chief Pharmacist	Store Head	ART Pharmacist
Addis Ketema	1	0	1	1	1
Akaki/Kality	1	0	1	1	1
Arada	1	2	3	3	3
Bole	1	0	1	1	1
Gulele	1	0	1	1	1
Kirkos	1	2	3	3	3
Kolfe/Keranio	1	0	1	1	1
Lideta	1	0	1	1	1
Nefas Silk	1	0	1	1	1
Yeka	1	1	2	2	2
TOTAL	10	5	15	15	15

As table 1 shows the total number of respondents was 45. Fifteen Chief Pharmacist, 15 Store Head, 15 ART Pharmacist who are directly responsible for medical supplies. 10 out of 29 health centers found in Addis Ababa City Administration, by selecting 1 health center from 10 sub cities using a lottery technique and 5 (100%) of the hospitals administered by Addis Ababa City Administration Health Bureau.

Similarly the result indicated that the average month of work experience of the respondents was found to be 32.2 months which is above 2 years and 8 months.

2.1.1 Current LMIS Scenario in Health Facilities

The following table shows the product categories that currently covered by LMIS in public health facilities found in Addis Ababa.

Table 2: LMIS Scenario in Health Facilities Addis Ababa City Administration, April, 2010.

		<i>Product or Drug Categories</i>				
No	Health Facilities	ARV	Contraceptives	STI.	TB	Vaccines
1.	Addis Ketema H.C.	√	√	X	X	X
2	Akaki H. C.	√	√	X	X	X
3	Arada H.C.	√	√	X	X	X
4	Asra Sebat H. C.	√	√	X	X	X
5	Selam H. C.	√	√	X	X	X
6	Kazanchis H. C.	√	√	X	X	X
7	Kolfe H. C.	√	√	X	X	X
8	Teklehaimanot H. C.	√	X	X	X	X
9	NefasSilk Kutir1 H.C.	√	√	X	X	X
10	Entoto Kutir 1 H. C.	√	√	X	X	X
11	Menelik Hospital	√	X	X	X	X
12	Gandhi Hospital	√	√	X	X	X
13	Ras Desta Hospital	√	X	X	X	X
14	Yekatit Hospital	√	√	X	X	X
15	Zewditu Hospital	√	√	X	X	X
TOTAL		15	12	15	15	15

As it is indicated in the above table product categories of ARV drugs 15 (100%) and Contraceptives 12 (80 %) of the health facilities having LMIS for the mentioned products, there are no LMIS implementation for other drugs like STI

drugs, TB drugs, Vaccines and other essential drugs in all health facilities visited.

2.2. Human Resources Development Program

Respondents were also asked if there is a logistics management unit in the health facilities. Accordingly, all responded that currently there is no logistics management unit in the health facilities.

It was also disclosed during an interview with the Addis Ababa Health Bureau Head of Pharmaceutical Supply and Assuring Sustainability Sub Process as:

“There is no a logistics management unit responsible for the supply of drugs even at the national, regional health bureaus, zonal health offices, and also at the health facility level”.

The interviewee explained the reason for not having logistics management unit as ::

“There is no a professional logistician at all level of the drug supply chain all the work is carried out by pharmacists and druggist the reason for this is that in our country the Health Science Universities or Colleges does not train logisticians .”

2.2.1. Managing of Medical Supplies

The respondents were asked who is the principal person responsible for managing medical supplies in the health facilities. Their response is summarized in the following table.

Table3. Responsibility for managing medical supplies in health facilities, Addis Ababa City Administration. April, 2010.

Category	Number of Respondents	Percent
Pharmacist	20	44.44%
Druggist	25	55.56%
Total	45	100%

Table 3 shows that the principal person responsible for managing medical supplies in the health facilities 25 (55.56%) are druggists followed by 20 (44.44%) pharmacists.

2.2.2 .Training

Respondents were asked if they had a chance ever to attend a training in the area of drug logistics. Accordingly data collected from respondent disclosed that 33 (73.33%) confirmed that they have received formal training in logistics of ARV drug and contraceptives. However, the remaining 12 (26.67%) respondents replied that they never received any formal training in drug logistics.

Those respondents who have been trained in logistics were also asked to describe the component of the training area covered. The response in this regard has been summarized in table 4 below.

Table 4. Logistics components of the training in health facilities of Addis Ababa City Administration. April, 2010.

Logistics components	Number of Respondents	Percent
Completion and submission of LMIS reports	45	100%
Proper storage of health products	0	0
Maintaining proper stock levels	45	100%
Determining order quantities	45	100%
Determining issue quantities	45	100%
Estimating annual needs	30	67%
Reviewing reports and records	45	100%
Providing feedbacks and inputs	0	0
Total	45	100%

None of the respondents replied that *proper storage of health products*, and *providing feedbacks and inputs*, which are the main components of the logistics are covered by the training.

In order to know the available human resources in the health facilities is sufficient to perform all the activities of the drug logistics management or not the respondents replied as 25 (55.56%) responded that the available human resource is not sufficient and the remaining 20 (44.44%) of the respondents replied that the available human resource is enough to perform all the activities of the drug logistics management. Fifteen (100%) store heads are not trained in basic storekeeping procedures.

2.3. LMIS Recording and Reporting Formats

The following table shows the logistics recording and reporting forms used by the visited health facilities.

Table 5. Logistics recording and reporting forms in health facilities of Addis Ababa City Administration. April, 2010.

Recording and reporting form	Number of Health facilities using	Percent
Daily register	2	13.33%
Stock card	4	26.67%
Bin card	12	80%
Model 19	15	100%
Model 20	15	100%
Model 22	15	100%
LMIS for ARV drugs	15	100%
LMIS for contraceptives	12	100%

In the health facilities the forms that are used for recording and reporting are: Daily Registers (to register the daily transactions), Stock Cards, Model 20 (to request drugs from store).

Four pharmacies out of 15 are having stock cards, only 2 out of 4 pharmacies have updated their stock cards. Twelve out of 15 stores are using bin cards , only 3 out of 12 have updated their bin cards.

Recording and reporting forms used by stores are: Bin cards, Model 19 (receiving drugs from PFSA), Model 22(issuing forms of drugs to departments). Fifteen and 12 health facilities use LMIS forms for ARV drugs and contraceptives respectively.

2.3.1. LMIS for ARV drugs and FP Contraceptives

The study found that none of the health facilities have LMIS report forms for essential drugs. The following table shows that LMIS forms for ARV drugs and contraceptives includes the essential logistics data which are: Stock on hand, Quantities used, and losses and adjustments.

Table 6. Number of health facilities with LMIS reports for ARV drugs and contraceptives that includes essential logistics data in Addis Ababa City Administration. April, 2010.

LMIS reports	Yes	No	Total
Stock on hand, Quantities dispensed to users and Losses and adjustments for ARV drugs.	15	0	15
Stock on hand, Quantities dispensed to users and Losses and adjustments for contraceptives.	12	0	12
Stock on hand, Quantities dispensed to users and Losses and adjustments for other essential drugs.	0	15	15

All health facilities responded that they use the information collected on the LMIS forms for the purpose of: calculating use, calculating needs, reporting use and requesting supplies from the Pharmaceuticals Fund and Supply Agency, Addis Ababa City Administration Health Bureau and Addis Ababa City Administration Sub-City Health Departments.

As it is clearly observed from the above table 2 and table 6 that the essential logistics data, stock on hand, quantities dispensed to users, and losses and adjustments are known and collected only for ARV drugs and contraceptives.

With regard to contraceptives LMIS all of the sub-city pharmaceuticals supply heads disclosed that:

'LMIS form is not properly filled by the health facility and the data collectors and pharmacist in the health facilities makes error in calculating the amounts of consumption, stock on hand and losses and adjustments.'

In an interview held with the Addis Ababa Health Bureau Head of Pharmaceutical Supply and Assuring Sustainability Sub Process, he replied as follows:

"The other essential drugs ordered and reported to the local supplier (PFSA) by writing a letter listing the drugs needed the list consists of only the type of drugs, amounts they need".

"The health facility receives the available drugs. If drugs are not available in the PFSA store, health facilities will be provided with the clearance letter stating that the requested drugs are not available in the stock of the local supplier to enable the health facilities to purchase the drugs from other supplier. The health facility presents the clearance letter to the health facilities Drug and Therapeutic Committee. If LMIS was implemented to all essential drugs the problems as to the stock out of drugs at the PFSA will be minimized".

2.3.2 Ordering and Receiving of Drugs

To address the issue of understanding how ordering and receiving essential drugs, respondents were asked to provide feedback on average how long does it take between ordering and receiving of essential drugs.

Table 7. Number of health facilities with different lead time for various essential drugs in Addis Ababa City Administration. April, 2010.

Lead Time	ARV drugs	Contraceptives	Other essential drugs
Less than a week	15	12	3
2 weeks to 1 month	0	0	8
Between 1 & 2 months	0	0	4
More than 2 months	0	0	0
Total	15	12	15

As indicated in table 7, the lead time for ARV drugs is less than one week for all health facilities while 80 % of health facilities have lead time of less than one week for contraceptives.

For other essential drugs the lead time varies. Majority of the health facilities 8 (53.3%) have lead time of 2 weeks to 1 month while only 3 (20%) of the health facilities reported having the lead time of less than a week for other essential drugs.

Fifteen chief pharmacist & 15 ART pharmacist were asked what channels of communication is used in the health facilities with the higher level of the supply chain namely : *telephone calls, reports, meetings, supervisory visits*. Fifteen ART pharmacist replied that they communicate by telephone with the PFSA hub for ARV drugs. None of the respondents replied as they communicate through reports, meetings, and supervisory visits. The remaining 15 (50%) of the respondents replied that there is no any communication mechanisms in place to channel logistics information from the service delivery points to the higher level delivery.

2.4 Flows of Information and Drugs

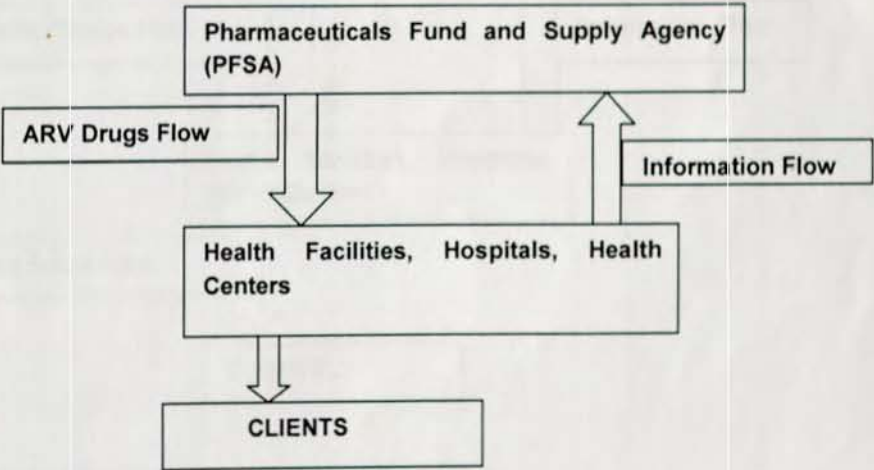


Fig.1 ARV drugs and information flow

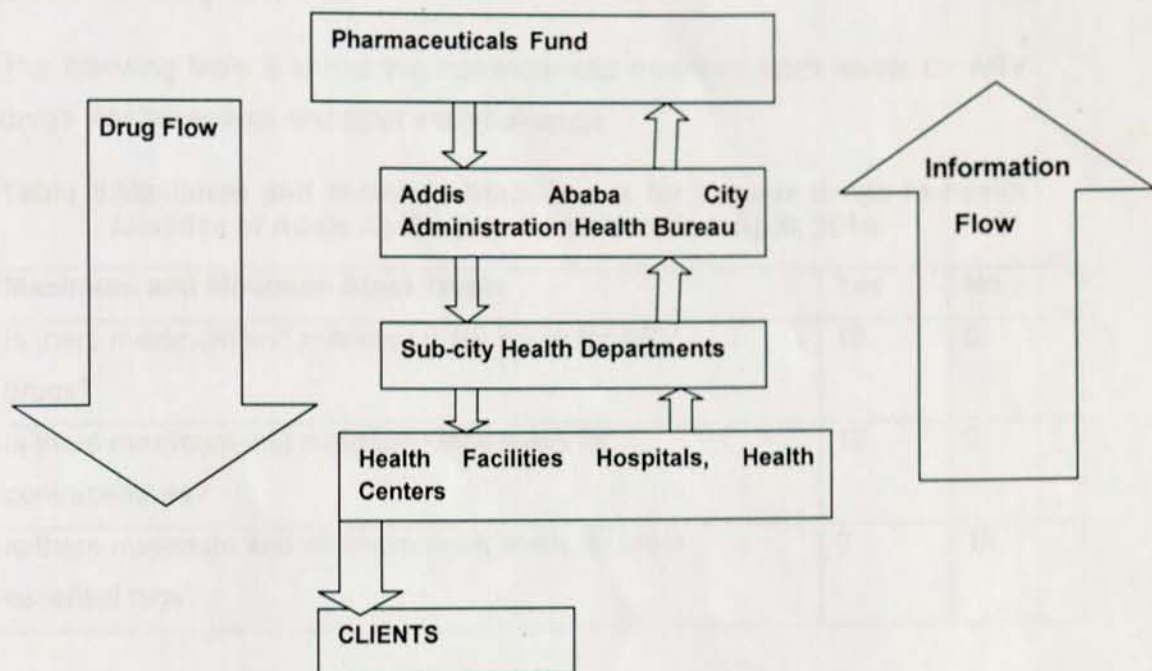


Fig.2 Contraceptive and information flow

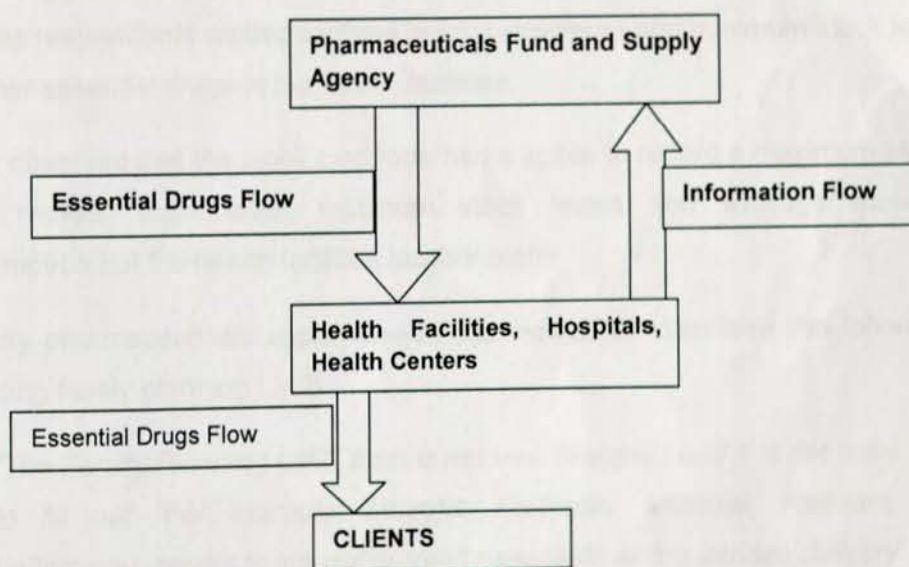


Fig. 3. Other essential drugs and information flow

2.5. Inventory Control

The following table 8 shows the maximum and minimum stock levels for ARV drugs contraceptives and other essential drugs.

Table 8.Maximum and Minimum Stock levels for various drugs in health facilities of Addis Ababa City Administration. April, 2010.

Maximum and Minimum Stock levels	Yes	No
Is there maximum and minimum stock levels for ARV drugs?	15	0
Is there maximum and minimum stock levels for contraceptives?	12	0
Is there maximum and minimum stock levels for other essential rugs?	0	15

Table 8 shows that 15 ART pharmacist (100%), 12 (100%) of the respondents from health facilities replied as there is a maximum and minimum stock level for ARV drugs and contraceptives respectively. In all 15 (100%) of the health facilities respondents replied as there is no a maximum and minimum stock level for other essential drugs in the health facilities.

It was observed that the stock card form has a space to record a maximum stock level, reorder stock level, minimum stock levels and average monthly consumption but the health facilities leave it blank.

Sub-city pharmaceuticals supply heads interviewed all disclosed the following regarding family planning LMIS:

“The Family Planning LMIS form is not well designed and it is not easy to fill out. For example: Microlut, Eugynon, Microval, Norplant, Loffemenal, products are not currently available at the service delivery points but they are listed on the form When the data collectors fill the form by mistake they fill the column of other unavailable product types. We observed that there are always incorrect calculations when the LMIS form for contraceptives arrived at the Sub-city Health departments”.

"Reporting, requisition, issue, and receipt section is not clearly indicated on the form".

"There are contraceptives that are directly distributed to the service delivery points with out notifying the sub-city health departments for example: Jadelle distributed by an international NGO called Engender Health and the amount of this product distributed , stock on hand, dispensed to users are not available on the LMIS form for FP Contraceptives.

In addition to the above the Sub-city Pharmaceuticals Supply heads told that:

Implanol and Post Pill products are available at the service delivery points but they are not listed on the LMIS form for Contraceptives.

Forty five (100%) of the respondents replied that they don't have a written provisions for the redistribution of overstocked supplies. In 15 (100%) of the stores there are 125 items of drugs listed as expired drugs and these products are not physically separated from other drugs and they are not removed from the bin cards on the day of visit.

2.6. Supervision

The graph at figure 4 describes the number of respondents how supervision is conducted by the higher level (PFSA, Addis Ababa City Administration Health Bureau, Addis Ababa Sub City Health Departments, RPM/Plus, JSI/DELIVER).

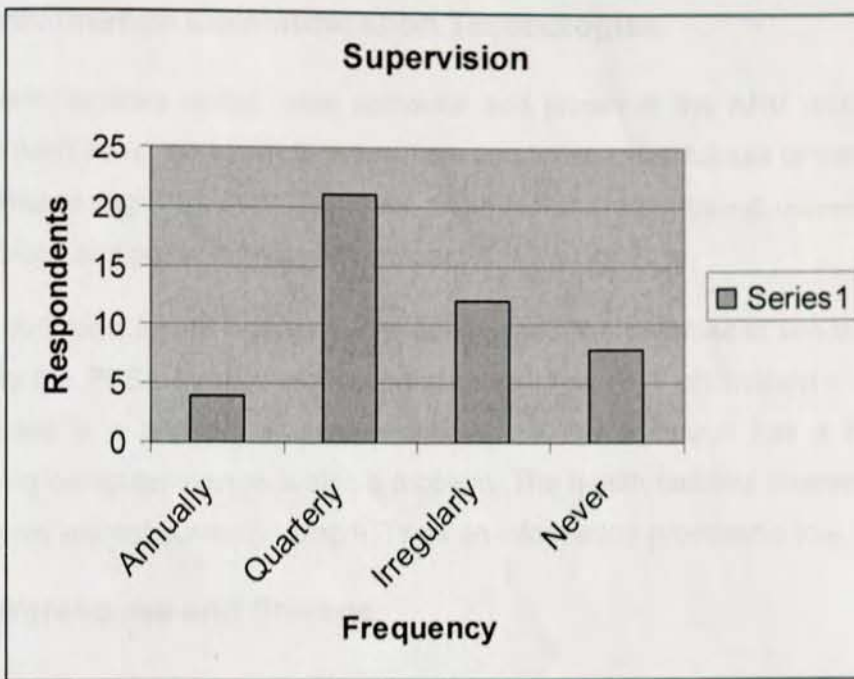


Figure 4. The frequency of Supervision

The above figure shows that supervision is conducted by the higher level to the health facilities and the majority of the respondents 21(46.67%) replied as they receive supervision on quarterly basis, 12 (26.67%) replied in the category of others (choices other than the stated in the questionnaire) and they specify that the supervision is conducted irregularly.

8 (17.77%), 4 (8.90%) reported that supervision is: never conducted, conducted annually respectively.

The supervision was conducted by MSH RPM PLUS an international NGO funding ARV drugs, JSI/Deliver an international NGO funding contraceptives and sub-city health departments.

Thirty seven (82.22%) of the respondents reported that the supervision includes the following activities: checking stock cards, checking reports, removing the expired stocks, and checking the storage conditions.

It was also observed that no visitors book is available in 14 health centers only 1 health center (Entoto kutir 1 health center had a visitors book which was conducted on November 30, 2009).

2.7. Information Communication Technologies

All health facilities visited have computer and printer in the ARV units, while stores don't have. All health facilities have computerized database to handle the ARV Dispensing Tool (ADT) used for recording and aggregating dispensing of ARV drugs and patients related information.

The LMIS form for ARV drugs is not automated. The pharmacist sends a hard copy to the PFSA hub for requesting of drugs. The ART pharmacist disclosed that there is a problem of maintenance when the computer has a problem including computer viruses is also a problem. The health facilities pharmacy and the stores are not currently using ICTs as an information processing tool.

2.8. Warehouse and Storage.

Table 9. Warehouse and storage of health facilities in Addis Ababa City Administration. April, 2010.

Warehouses and storage	Yes	No	Total
Are there written guidelines for storage and handling of all products?	0	45	45
Is the existing storage adequate to handle the current quantities of products?	5	40	45

Table 9 above shows that all of the respondents 45 (100%) replied that there is no written guidelines for storage and handling of all products. Five (11.11%) said that the existing storage is adequate to handle the current quantities but the majority of the respondents 40 (88.89%) replied that the existing storage is not adequate to handle the current quantities.

Based on visual inspection result of warehouses and storage conditions in reference with the 14 checklists outlined in Annex 2A, the following results were identified.

- In Bole Sub-city Kebele 17 health center warehouse fulfills (85.71%) of the criteria;
- Gulele Sub city Selam health center warehouse fulfills 78.57% of the criteria;
- Arada health center, Akaki health center and Ras Desta Hospital warehouses each fulfill 50% of the criteria outlined.

The rest of the health facilities warehouses are not in line with the criteria indicated in the checklist.

2.9. Transport and Distribution

As to the transportation and distribution mechanisms of ARV drugs, contraceptives and other essential drugs the respondents response presented in the following table.

Table 10. Transport and Distribution of various drugs in health facilities of Addis Ababa City Administration. April, 2010.

Transportation mechanisms	Local supplier	Higher level delivers	The facility collects	Others	Total
ARV drugs	15	-	-	-	15
FP contraceptives	-	12	-	-	12
Other essential drugs	-	-	15	-	15

For ARV drugs, local supplier, Pharmaceuticals Fund and Supply Agency directly delivers to the facility. MSH RPM Plus is an international NGO who is responsible to distribute ARV drugs from the PFSA Hub to the health facilities. All the health facilities replied that for ARV drugs there are no transportation and distribution problems.

All pharmacists and store heads interviewed adds the following comments:

ARV drugs flow through the PFSA system products are directly provided to the ART sites. The provision of transportation by the PFSA significantly reduced the channel and ensured a stable availability of ARV drugs at the ART sites.

For Family Planning contraceptives the transportation and distribution is provided by the respective Sub-city health departments for each health facilities.

Out of the 12 health facilities 7 (58.33%) replied that there is inconvenience with the transportation and distribution system provided by the Sub-city health

departments and the remaining 5 (41.67%) replied as there is a scheduled transportation system and they have no problem as to the current transportation and distribution mechanisms for FP contraceptives.

It was also disclosed during an interview with the Addis Ababa Health Bureau Head of Pharmaceutical Supply and Assuring Sustainability Sub Process that:

“There are problems related with transportation as the bureau do not have enough cars to make the transportation as smooth as it should be “

The above table 10 shows that the responsibility of transportation and distribution for other essential drugs from Pharmaceuticals Fund and Supply Agency is the responsibility of each health facilities.

Respondents were asked how they transport essential drugs from the Pharmaceuticals Fund and Supply Agency to their respective health facilities 10 (66.67%) replied as they rent car to transport drugs and 5 (33.33%) replied that they use the facility car, and ambulances .

2.10. Availability of Drugs

The availability of 12 essential drugs is checked in two ways.

1. By asking the respondents their experience in stock out of 12 essential drugs
2. Counting physically the availability of 12 essential drugs against the bin card.

The respondents were asked which drugs they experience stock out during the last 6 months and their response is presented in the following figure.

Duration of Stock Out for 12 Essential Drugs, In Public Health Facilities, Addis Ababa, April 2010

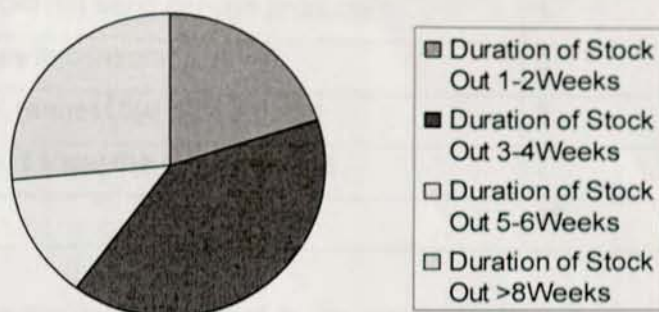


Fig.5 Stock Out of 12 essential drugs.

As Fig.6 above shows the majority of the respondents 6 (40%) of the health facilities were out of stock for 12 essential drugs for 3-4 weeks, 4 (26.67%) of the health facilities were out of stock of the 12 essential drugs for greater than 8 weeks, 3 (20%), 2 (13.33%) of the health facilities replied that the health facilities were out of stock for the 12 essential drugs were 1-2 weeks and 5-6 weeks respectively.

Out of 15 stores 10 (66.67%) of them experience stock out for the 8 out of 12 essential drugs. The drugs were: **1. Amoxicillin capsule, 2. Cotrimoxazole, 3. Denatured alcohol, 4. Chloroquine tablet, 5. Tetracycline eye ointment, 6. Ferroussalt + Folic acid, 7. Benzyle benzoate lotion, 8. Sulhpadoxine Primethamin.**

Oral Rehydration Salt (ORS) is overstocked in 15 (100%) of the stores. The respondents replied that the reason for ORS overstock is because of the outbreak of Acute Diarrheal Disease the drug distributed to all health facilities in huge quantities.

Table 11. Stock out of essential drugs in health facilities of Addis Ababa City Administration. April, 2010.

Reason for stock out of essential drugs	Number	Percent
Could not go to pick up products	4	26.67 %
PFSA did not send enough products	1	6.67%
Increase in consumption	0	0 %
Did not request the right amount	3	20 %
We don't know the stock on hand	7	46.66%
Total	15	100 %

Not knowing the stock on hand in the health facilities is the main reason for stock out of essential drugs 7 (46.66%) followed by 4 (26.67%) the reason is they could not go to pick up products that is due to lack of transport at the service delivery points 3 (20 %) did not request the right amount and 1 (6.67%) the higher level were out of stock for the products and the health facilities are not provided the amount of drugs needed.

The respondents were also asked when they experience stock out what they do and their response were 10 (66.67%) of the health facilities replied that they refer clients to go to the private pharmacies, 5 (33.33%) of the health facilities said that they go to the higher level for re-supply.

12 stores bin card of essential drugs were checked against physical counting on the day of visit and the result is presented in the following table.

Table12. Percentage discrepancy between balance on bin card and from physical inventory in health facilities of Addis Ababa City Administration. April, 2010.

Balance between Bin Card and Physical Counting	Number	Percent
Bin card and Physical counting is the same	3	25 %
Bin card is less than the Physical counting	4	33.33 %
Bin card is greater than the Physical counting	5	41.67 %
Total	12	100 %

CHAPTER 3 : DISCUSSION

Health commodity security is now a world wide concern. Particularly developing countries are constrained by resources to meet the growing demands of their population. Health commodities in developing countries are not available in abundance hence public health facilities couldn't satisfy the demands of the clients.

The Ethiopian government realizes the problem in HSDP III 2005/2006-2010 the Ministry of Health plan is to increase the availability of essential drugs from 75% to 100% in all public health facilities [10].

When drugs are received in public health facilities there should be a proper management. The proper management of health products ensures that they reach to the intended clients.

As scarcity of resources combined with increased awareness and use of products, creates uncertainties over the coming years, with supply failing to meet demand. Proper management of health products when they are received, and then ensuring that they reach the end users for whom they are intended, are key elements in meeting the challenge of providing commodity security [12].

I now discuss some of the key points identified as a result in chapter 2. The problem of the Ethiopian Drug Logistics Management Information System were identified based on the various interviews conducted with the health facilities chief pharmacists, ART drug pharmacists, store heads, Sub-city heads for pharmaceutical supplies and the Addis Ababa Health Bureaus.

3.1. LOGISTICS MANAGEMENT INFORMATION SYSTEM

As shown from the findings, currently LMIS forms for drugs are available only for ARV drugs and Contraceptives. The 5 essential logistics data are : Stock on hand , consumption by clients, losses and adjustments, dates of orders and receipts, and amounts on order [14] are not being collected at all health facilities visited with the exception of the two vertical programs i.e. ARV drugs and Contraceptives.

Similar studies conducted in Tanzania [19] by JSI/DELIVER stated that logistics data are not being collected at the health facilities with the exception of a few vertical programs.

Sowed, Musingo [21] in his study integration of drug logistics conducted in Uganda identified that at district level all products are managed separately by each respective program manager the District TB and Leprosy Supervisor (DTLS) for Tb and Leprosy Drugs, The Cold Chain Assistants (CCA) for Vaccines , the Storekeeper for ED Kits and medical supplies and the District Health Visitor (DHV) for Contraceptives and Vaccines. LMIS is still vertical by product category.

Rather than working with a single unit that manages a single supply chain, as in the past, supply chain managers now must coordinate the efforts and information needs of multiple vertical logistics systems or large integrated systems [15].

Many resource poor countries are scaling up their health commodities supply chains to enhance the quantity and types of products they provide either through individual vertical programs, or through an integrated commodity supply chains.

For the period of 1980's and 1990's the typical country reproductive health program was a vertical program that managed between 6-10 contraceptives, supply chains were comparatively easy to set up and sustain as programs generally worked with a distinct entity.

Presently, country health programs are working with supply chains that deal with 600 products or more. In most cases, the increase in the number and types of commodities has been incremental [15].

So the current practice of LMIS implementation in Ethiopia should start to add with the already started LMIS that is ARV drugs and Contraceptives, supply chains with those of other essential drugs, STI drugs, Vaccines, TB/Leprosy, Malaria, Laboratory supplies etc...

With better logistics, essential drugs can be more available, the quality of care will be improved and to help to achieve the clients need by stretching the available limited resources a little further.

A strong supply chain helps to reduce program losses by minimizing waste and damage and preventing products from expiring on the shelves [14].

3.1.1. LMIS RECORDING AND REPORTING

The finding shows that out of 15 pharmacies only 2 of them have a daily register of essential drugs dispensed to clients. Imagine a pharmacy with out a record of what amount of drugs is sold daily or monthly there is no any reporting mechanisms to the higher levels and the higher level do not know how much is sold what remains on the stock. The chief pharmacist do not have any record as to the proper usage of the drugs. What are the basis to allocate budget to health facilities with out presenting the report that clearly states how they used the previous year drug budget.

A country like ours with a meager resources available and the health facilities with out a formal record and reporting mechanisms to the higher level and no one is accountable and it opens the door for some individuals to abuse or miss-use the scarce resource.

Good record Keeping can minimize theft and leakage of drugs in public health facilities. In the study conducted by Lewis, Maureen [25] shows drugs and supplies are among the most commonly "leaked" products. Drugs in particular fetch a high price in the private market. Lack of drugs has been repeatedly shown to discourage utilization of public facilities.

In China various studies indicate that on average about 30 percent of public drug supplies are expired or counterfeit, attributed to minimal public budgets, graft and no accountability. The average leakage rate for drugs in rural public facilities in Uganda was estimated at 73 percent, ranging from 40 to 94 percent [25].

Contraceptives: Logistics Report and Order Form-LMIS-LR-(Field Test Version), July 2003 indicates that : Maximum stock level at Service delivery points = 2 months, Woreda=4 months, Zones=4 months, Regions=5 months.

The LMIS form for ARV drugs and planning contraceptives needs revision. There are drugs distributing to the health facilities but they are not listed on the form and there are drugs which are not currently available but they are still on the list. The list is not up to-date.

3.2 HUMAN RESOURCES:

The findings of the study shows that the majority of the respondents (55.56%) replied that the available human resources in the health facilities is not sufficient to perform all the activities of drug logistics management. The problems pertained to various facets of human resource constraints including inadequate number of personnel being involved in the supply chain is also identified in the study conducted by Waako, Paul J. et.al. [18]. Another study conducted in Nepal showed that the number of staff at the districts and service delivery points seem sufficient to manage the logistics system.

The serious problem identified in the study is that there is no logistics management unit responsible for the supply of drugs from the Ministry of Health down to the health facilities in the Ethiopian Health system.

Things could have been not in the same way as today if logistics management unit responsible for the supply of drugs were available in the organizational structure of the Ethiopian Health System. The works to be performed by this unit are : managing and using LMIS, forecasting quantities needed, procurement, inventory management, storage and distribution, product selection, staffing of logistics positions, budgeting for the logistics system, supervision and logistics staff development.

The finding shows that there is no full time logistics officer responsible to perform the above stated activities. It was described during an interview conducted with the concerned body that the logistics activities are performed by druggist or pharmacist. The reason for these could be logisticians are not trained or graduated in the Ethiopian Health Science Colleges or Universities.

The study shows that 100 % of the storekeepers are not trained in basic store keeping procedures. The result is in line with the study conducted in Uganda by Raja, Sangeeta [20].

The study conducted by Waako, Paul J. et.al. [18] identified that few workers had received training on HIV/AIDS pharmaceuticals management. Most of the staff do not have training in logistics in Uganda [20]. A study conducted in Mozambique showed that the current logistics system is extremely weak in providing training and support [17].

In a similar study conducted by Sowedi, Muyingo [21] the results identified that many of the district level staff have not had any formal training in logistics management very few service delivery points staff have received formal training in logistics management .

A study conducted in Addis Ababa Showed that majority of persons responsible for managing contraceptives in the facilities reported to have taken training in the Ethiopian Contraceptives Logistics System (53.7%) [9]. The finding of this study shows that 33 (73.33%) of persons responsible for managing health commodities has got training in logistics of ARV drugs and Contraceptives. The reason for the higher number of the trained persons could be that this study involves all individuals responsible for all essential drugs including contraceptives.

The Drug logistics management information system of Ethiopia should include training and support for the persons who are responsible for the functioning of the supply chain.

The findings of the study as shown in table 4 indicates that from the logistics components of the training no one has been trained in the proper storage of health products and in providing feedbacks and inputs. The reason for this may be the trainer included these two components with other components of the training or these training components was not clear by the trainees. When the trainer conducts a training there should be a checklist of the main points to be covered and the trainer should check whether the trainee grasped what has been told or shown.

3.3. SUPERVISION

The findings of the study showed that there is no regular monitoring and supervision conducted to the health facilities by the higher level. The higher levels are the City Administration Health Bureau, the sub-city health departments, the program managers of the two vertical programs (for ARV drugs RPM/PLUS and JSI/DELIVER for FP contraceptives). When the program managers conducts supervision what they supervise is only the drugs they provided to the health facilities. The sub-city or Addis Ababa City Administration Health Bureau irregularly supervises the health facilities. When supervision is conducted there is no regular time table and the researcher has got only one supervisors feed back in one health

facility. The supervisors' feedback as to what is supervised will give the chance of improvement to the health facility if told what is wrong and right.

3.4 INVENTORY CONTROL

The assessment showed that most facilities had inadequate inventory control and management. As it is clearly seen from 15 pharmacies selected for the study only 4 has a stock cards for drugs from these 4 only 2 have updated their stock cards, and 12 out of 15 stores are using bin cards, but only 3 out of 12 have updated bin cards.

Studies conducted in Addis Ababa have shown that 60% of the health facilities did not have or did not know the maximum and minimum stock levels for contraceptives [9]. The findings of this study shows that 100% of the health facilities know the maximum and minimum stock level for contraceptives and ARV drugs. The reason for this could be that all health facilities use the LMIS form for contraceptives and ARV drugs. The LMIS form for ARV drugs and Contraceptives shows the maximum stock level at service delivery points.

The stock card form has a place to record a maximum stock level, reorder stock level, minimum stock levels and average monthly consumption it was found that no health facility is using this information by entering the appropriate data on it.

3.5. TRANSPORT AND DISTRIBUTION

One of the major problems discussed in the findings was the limited availability of transport in the drug logistics system which leads to drugs not being provided in a timely manner to the health facilities.

ARV drugs are distributed from PFSA hub to the health facilities by RPM/PLUS and Contraceptives are transported by using cars provided from their respective sub-city health departments. The rest of essential drugs transportation and distribution is the responsibility of the health facilities.

As to the transportation of drugs there are lots of problems. Especially other essential drugs are not delivered to the health facilities in a timely manner since most of the health facilities do not have their own cars. Those facilities which have car is a multipurpose assigned for different functions and other health facilities use the patients ambulance and if all this is not possible they go to rent a car. All these processes are consuming lots of time and enable the patients to get the required

drugs on time. If the problem with the transportation and distribution of drugs solved, hence the lead time, the availability of drugs, the stock out periods related with the transportation problem will be minimized.

3.6. WAREHOUSES AND STORAGE

The majority of health facilities warehouse and storages were not a purpose built buildings in addition to this they are not maintained in a good condition. The visual inspection was conducted to know the status of the health facilities stores and the result shows that, some stores leak water when it rains, the lighting is not sufficient, no ventilation, there is no functional fire extinguishers, it was observed that the drugs are placed on the floor, there is no enough shelf to place drugs. Products are not placed in a manner accessible for First to Expire First Out (FEFO). The same products are placed in different locations, no label is written on the shelves.

In all the health facilities visited there is no written guidelines for the storage and handling of all products. Majority of the respondents (88.89%) replied that the existing storage is not adequate to handle the current quantities of products. Out of 10 Health Center stores visited, Kebele Asra Sebat Health Center (Bole Sub-City), Selam Health Center (Gulele Sub-City), are in a good conditions followed by Arada Health Center (Arada Sub-City), Akaki Health Center (Akaki / Kality Sub-City). From the visited hospitals relatively Ras Desta Hospital can be said in good conditions all the other 4 visited hospitals the warehouses and storage conditions is not appropriate to store drugs.

The findings of the study is in agreement with other studies conducted in Uganda by Raja, Sangeeta et al. [20]. No basic shelving in most of the stores in the districts visited difficult for the store keeper to organize and distribute products. A study conducted in Tanzania by JSI/DELIVER identifies that as there is excessive product loss due to expiry and poor storage practices, in adequate storage space and conditions at lower levels of the system [19].

A study conducted by Sowedi, Muyingo et al. [21] identifies that most of the stores were not adequate in terms of space and storage conditions some had supplies scattered all over the floor, untidy and poorly ventilated. Others lacked shelves and thus the orderly placement of drugs was not possible. In appraising quality of

storage conditions 1 of 9 (11.1%) Hospitals and 2 of 60 (3.33%) Health centers were rated as having good storage.

Drugs and others health commodities needs an appropriate storage conditions since the storage conditions influence the drugs shelf life, safety and efficacy.

To provide clients with high quality products, all the health facility must have safe, protected storage areas to help prevent damage and ensure efficient handling of health products.

3.7. STOCK OUT OF DRUGS.

An inadequate stock of commodities in the service delivery points is the main cause of stock outs of health commodities.

As to the availability of the 12 essential drugs the assessment showed that 8 essential drugs out of 12 were out of stock in the health facilities for more than 2 months. The availability of essential drugs was 66.7%.

The findings of the study also show that 66.67 % of the health facilities replied that they refer clients to go to the private pharmacies. Other study shows that 33.3% of the health facilities refer their clients to other private or public health facilities [9]. The reason for this could be the product is only contraceptives and other health commodities are not covered.

Studies conducted at Addis Ababa have shown the mechanisms they usually employ at times of drugs shortage are going to the next higher facility for re-supply 58.2 % [9]. The findings of this study show that 33.33 % of the facilities are going to the next higher facility for re-supply. The reason for less number as compared to the earlier study is that the respondents are drawn from health facilities chief pharmacists, ART pharmacists, and store unlike the previous study that includes only contraceptives supply [9].

The findings of this study shows that 100% of the facilities reported to have surplus of (ORS) Oral Rehydration Salt. The reasons was asked for this amount of surplus of ORS in all public health facilities and it was disclosed that the surplus was due to the out break of Acute Diarrheal Disease in the city all public health facilities provided huge amounts of ORS. [9] 26.9% of the facilities reported to have surplus of some FP contraceptives.

The findings of this study also shows that 46.67 % of the respondents replied that the reason for the stock out of essential drugs were health facilities do not know the stock on hand followed by 26.67 % of the respondents replied the reason for the stock out of essential drugs, as problems related with transport the health facilities couldn't pick up the health commodities on time.

If there was a strong LMIS there will not be a problem of knowing the stock level of each health commodities

3.8. LIMITATION AND STRENGTH OF THE STUDY

Limitation of time and resource with regard to this study makes the field study of this research to be restricted to public health facilities. The study only addresses the 5 hospitals and 10 health centers administered by Addis Ababa City Administration Health Bureaus. Hospitals administered by MOH, NGOs, Addis Ababa University (Black Lion Hospital), privately owned hospitals, clinics and health posts of public health facilities are not included in the study that could help to make meaningful comparisons.

I wish I could have visited hospitals and health centers from regional states to understand in greater depth the problems of drug logistics management and to make comparison with the capital city public health facilities logistics management of drugs. But as I mentioned before the time and resource constraints did not allow me to do so. The limitations of the study could be a source for further research in Ethiopia regarding the health commodities supply chain problems in hospitals and health centers found in different regional states.

The strength of the study is that, it uses both qualitative and quantitative method of data collection and analysis which increases the quality of information received and it uses the Logistics System Assessment Tool as an evaluation tool and probably a new research in Drug Logistics Management Information System of Ethiopia and it serves as a baseline for future studies to be conducted in the area.

CHAPTER 4

CONCLUSION AND RECOMMENDATION

4.1. CONCLUSION

The conclusion of this thesis was drawn to answer the research objectives. Those are:

- 1. The first research objective is to assess the availability of essential drugs in stores and pharmacies of hospitals and health centers in Addis Ababa.***

The availability of essential drugs in the health facilities is not satisfactory. The health facilities studied experienced a stock out of 8 out of 12 essential drugs from the period of 1 week up to 8 weeks. The problem with the unavailability of essential drugs in the health facilities is that the health facilities do not know the amount in their stock and lack of transport to collect the health commodities from the supplier.

PFSA as a sole provider of forecasting, procurement, storage, inventory management and distribution of pharmaceuticals to the public health sector in Ethiopia, to ensure availability and affordability of quality pharmaceuticals to all public health facilities by using a revolving drug fund (RDF), to improve availability of program and non program pharmaceuticals nationwide from 55 % to 100 %, and Improve customer satisfaction in terms of availability and quality of service at public health facilities from 51 % to 100 % this ambitious plan set by PFSA when established in 2007 was not yet achieved [26].

- 2.) The second research objective is to assess essential drugs distribution and supply chain to hospitals and health centers.***

The current essential drugs supply chains has a two vertical stand alone logistic systems (ARV drug & Contraceptives).

1. ARV drugs flow through the PFSA system, the PFSA hub directly provides the ARV drug to the ART sites by its own transport. ARV drugs procurement, forecasts, transportation, training of ART pharmacists, designing and implementation of LMIS forms all the activities required in the supply chain for ARV drugs are Funded by RPM plus. Each ART stock keepers stock for a

maximum of four months. The pharmacies or Stores are expected to have a minimum of two weeks stock, and are obliged to call to the PFSA hub for emergency delivery. The ART stock keepers' assess their stock status every two months. The Bi-monthly LMIS report and request form for ARV drugs are sent to the PFSA hub.

2. Contraceptives: flow through the PFSA system. The Addis Ababa Health Bureau receives contraceptives and other program health commodities those are: Vaccines, Anti TB drugs, HIV test Rapid Test, funded by UNICEF, Global fund and UNFPA. From all the above program commodities contraceptive is the only commodity having LMIS form with the help of this LMIS, service delivery points maintain a maximum stock level for 2 month. Each service delivery points fill and send the logistics report and order form to the respective sub city health departments monthly, each sub city health department transports the contraceptives to the service delivery points.

3.)The third research objective is to assess the usage of logistics information for decision making at all levels.

The decision making on what quantities of drugs to be purchased annually by the health facility should be based on the information collected as to the stock on hand dispensed to user, losses and adjustments and other essential logistics data.

If the health Facility pharmacist knows this information in advance he can make a good decision as to the amount of drugs required, if he has the consumption data of drugs in his facility by the clients he can easily convince the higher body to increase the budget based on real figures. But what observed in the health facilities was that the pharmacist can't defend himself since he has no information as to the amounts of drugs sold at the pharmacy.

Almost all pharmacies do not have a daily register that indicates the amounts of drugs sold per day, if the person in charge has this information; it enables him to know that drugs are not miss-used, abused or taken from the pharmacies illegally by others than the clients intended for it. In the health facilities the researcher saw bundle of prescription forms which are not tallied. If they tallied they can tell as to the number of drugs properly sold. In the majority of the health

facilities not knowing the stock on hand is the main reason for stock out of essential drugs 7 (46.66%).

Since they do not have the data how they used the last year budget they are not in a position to convince the higher body. The Addis Ababa City Administration health bureau allocates the budget for drugs with out a formal feed back or reporting mechanisms (essential logistics data is not reported) from the health facilities as to how they efficiently used the last year drug budget. The PFSA are not in a position to know the health facilities demand of drugs since PFSA is not provided with an accurate data about their demand.

So PFSA is forced to make the decision as to the forecasting and procurement of essential drugs nationally with out knowing the demands of health facilities, since the forecasted amount of drugs is not based on the consumption data of the health facilities undoubtedly there is a problem of out of stock in the PFSA store. There are drugs which are out of stock at the PFSA warehouse, if health facilities empower themselves with accurate and reliable data and they provide to the PFSA, based on the information provided out of stock of essential drugs will be minimized in the central warehouses.

In general it can be said that only LMIS of ARV drugs and Contraceptives are used with varying degrees of effectiveness as a source of information for decision making.

4. The fourth research objective is to assess the human resource capacity for LMIS in facilities.

The current human resources available in the health facilities are not enough to perform the LMIS activities since there is no data clerk which has a professional capacity to collect analyze and present the information to the decision makers. The value of information is not clearly understood in many of the health facilities.

5. The fifth research objective is to identify the problems of the current Ethiopian drug logistics management information system.

The Ethiopian drug logistics management information system has many problems. Currently there are no LMIS forms for all essential drugs, but LMIS

forms exist for ARV drugs and contraceptives. The Ethiopian National Drug List includes ARV drugs and contraceptives as essential drugs for Ethiopia, as a country the argument is that all categories of essential drugs are important. It is difficult to support individual or other vertical programs vigorously than others since all essential drugs are addressing the vital and significant public health concerns, interest groups, donors, funders, have been built around the concerns of their interest.

The routine availability of ARV drugs is managed by RPM/Plus and contraceptives by JSI/DELIVER.

With the exception of ARV drugs and contraceptives supplies for which a pull system has been implemented, supply chain is mostly a "push" as demand of the health facilities a precondition for a "pull" model are not known. There is no LMIS forms for all other drugs. Since the PFSA receives no data from the health facilities indicating their status as to the stock on hand, quantities dispensed to clients, losses and adjustments, dates of orders/receipts and amount on order.

It was identified in the findings that health facilities were out of stock of essential drugs. If there were LMIS for all drugs, the manager at the PFSA use the information to: estimate the quantities required to maintain a yearly supply, to plan the delivery of drugs to avoid stock outs and arrange the appropriate sized transportation and to plan a well-organized travel route.

The current drug logistics management information system has also a problem of qualified human resources, lack of inventory control system, poor warehousing and storage conditions, uncoordinated transport and distribution system of drugs, and the health system from the MOH to the health facility level there is no full time logistics officer in charge to see the overall drug supply in the system.

4.2. RECOMMENDATION

Based on the Findings of the study to improve the performance of the existing drug logistics management information system, at the health facilities level, the following additional recommendations are forwarded:

1. LMIS implementation in Ethiopia should start to add with the already started LMIS that is ARV drugs and Contraceptives by developing a functional logistics management information system for all health commodities with stakeholders' participation.
2. Logistics management unit in the supply chain responsible for handling of all health commodities should be established.
3. Data clerk should be assigned to each health facilities who is responsible for data collection and data analysis functions hence it encourages the culture of information use at the health facility level.
4. Integrate distribution of ARV drugs and other essential drugs from PFSA to health facilities.
5. Provide a dedicated transport system to be used by the health facilities to collect drugs on time from the supplier.
6. Explore computerization, since the use of ICT improves the availability and use of information as a vital role in the continuing expansion and improvement of the supply chain of the health commodities.
7. Chief pharmacist of the health facility should oversee the daily registers, stock cards, bin cards and other activities are appropriately registered.
8. There should be national supervision guidelines' for intergraded supervision of logistics functions for all commodities rather than for individual vertical programs.
9. To ensure efficient handing of health commodities the storage conditions and practices should be improved.
10. Provide in service training for the persons responsible for managing health commodities on a quarterly basis.

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6. ANNEXES

Annex 1: Consent

Dear respondent: My name is _____ I am working my MSc Thesis. I am interested to assess the performance of the Drug Logistics Management Information System in Addis Ababa City Administration.

Your name will not be written in this form and will never be used in connection with any information you tell us. All information given by you will be kept strictly confidential. Your participation is voluntary and you are not obligate to answer any question you do not wish to answer. If you feel discomfort with the interview, please feel free to drop it any time you want.

The result of the study will hopefully serve as an important input to intervention programs that aims at improving the health system of the country.

This interview will take about 30 minutes.

I thank you in advance for taking your time. And if you are willing to participate, please confirm us by putting your signature.

Signature_____

Annex 2. Questionnaire

Drug Logistics Management Information System Assessment Questionnaire for Service Delivery Points, Sub-city and Regional Warehouses. February 2010 Federal Democratic Republic of Ethiopia , Addis Ababa City Administration.

Interviewer's Guide

Facility Identification Record the name of the facility and location. Using the codes provided for each question, place all other responses in the boxes on the right.

Information about Interview Record the date the interview took place and list the names of the interviewers.

Questions 01 to 04 Receive permission to conduct the interview and record information regarding the interviewee.

Questions 05 to 41 Record responses by clearly circling the number that corresponds to the interviewee's response.

Table 1: Quantity ordered and Quantity Received

Record the quantity ordered and received from the logistics recording form

Table 2: Stock Status Table for Key essential Drugs

Record the maximum months of stock, minimum months of stock, and order interval. To fill in the cells, follow the instructions above the table.

Table 3: LMIS Data Quality: Usable Stock on Hand at Time of Most Recent LMIS Report

Record each essential drug available and compare the records with the actual counts.

Table 4: Percentage Difference between Quantity Ordered and Quantity Received

Complete the table for all or for a selection of products.

End Interview Ask the interviewee/s if they want to ask you any questions. Thank them for their time and cooperation.

INFORMATION ABOUT INTERVIEW

Date:

DAY ____ MONTH ____ YEAR ____

Interviewer/s:

Introduce all team members and ask facility representatives to introduce themselves.

Explain the objectives of this survey:

Good day. My name is ____ My colleague and I are representatives of this research team.

We are conducting a survey regarding the health commodity logistics system. We are looking at the availability of essential drugs and information about how you order and receive those products. We are visiting 11 Warehouses, 5 Hospitals and 10 Health Centers, in Addis Ababa City Administration ; this facility was selected to be in the survey. The objectives of the survey are to collect current information on logistics system performance and stock status of key health products. This is not a supervisory visit and the performance of individual staff members is not being evaluated.

The results of this survey will provide information to make decisions and to promote improvements. We would like to ask the supply manager a series of questions about the products and supplies available at this facility. In addition, we would like to actually count selected products you have in stock today and observe the general storage conditions.

Do you have any questions?

☐ Hospital

☐ Health Center

☐ Store

No.	Question	Code Classification
01.	Can we continue?	Yes ____ 1 No ____ 0
02.	Position of person interviewed for this survey	_____
03.	Number of years and months you have worked at this facility?	Year: ____ Months ____

04.	Is There a logistics management Unit responsible for all drugs?	Yes____ 1 No____ 0
05.	Which product categories covered with the current LMIS?	1. STI Drugs 2. Contraceptives 3. ARV Drugs 4. Vaccines 5. TB/Drugs 6. Others Please specify_____
06.	Do you trained in basic storekeeping procedures?	Yes____ 1 No____ 0
07.	Do you track the number and types of drugs dispensed using appropriate recording form (Typically called a "daily activities register?"	Yes____ 1 No____ 0
08.	Who is the principal person responsible for managing medical supplies at this facility?	Nurse__ 1. Clinical Officer__ 2. Pharmacy Technician__ 3. Pharmacy Assistant__ 4. Pharmacist__ 5. Druggist__ 6. Other__ 7 (Specify)_____
09.	Is supplies/stock management the primary role of this person at this facility?	Yes____ 1 No____ 0
10.	Have you ever received formal training in logistics? 1. Yes 2. No If No go to Question No.12. If Yes when was the last training?	Date of Last training _____ _____ _____ _____ _____
11.	What were the logistics components of the training (e.g.) Completion and submission of LMIS reports?____ 1 Proper storage of health products?____ 2	Category 1.____ 2.____

	Maintaining proper stock levels? _____	3	3. _____
	Determining order quantities? _____	4	4. _____
	Determining issue quantities? _____	5	5. _____
	Estimating annual needs? _____	6	6. _____
	Reviewing reports and records? _____	7	7. _____
	Providing feedbacks and inputs? _____	8	8. _____

12.	Do you use the following stock keeping logistics forms to manage health products in this facility?	
	A. stock cards	Yes__1 No__0
	B. /bin card/	Yes__1 No__0
	C. inventory control card	Yes__1 No__0
	D. stock ledger	Yes__1 No__0
	E. other _____	Yes__1 No__0

13.	What LMIS forms do you use for reporting/ordering? Essential drugs	
	A. Stock ledger/registration book/note book	A)Yes__1 No__0
	B. Government receiving note model 19	B)Yes__1 No__0
	C. Government requesting note model 20	C)Yes__1. No__0
	D. Government approval note model 21	D)Yes__1. No__0
	E. Government distributed note model 22	E)Yes__1. No__0
	F. Logistics recording forms	F)Yes__1. No__0
	G. Facility requisition paper	G)Yes__1. No__0
	H. Other	H)Specify _____

14.	Does a completed LMIS report for ARV and FP Contraceptive drugs include the following?	
	A. stock on hand	Yes__1 No__0
	B. quantities used	Yes__1 No__0
	C. losses and adjustments	Yes__1 No__0

15.	How do you use the information that you collect on the forms?	Calculating use _____1
	(Circle all that apply.)	Calculating needs _____2
		Reporting use to the above _____3

		Requesting supplies from above__4 Other please explain_____5
16.	How often are these LMIS reports for ARV and FP Contraceptive drugs sent to the higher level?	Monthly__1 Quarterly__2 Semi-annually__3 Annually__4 Other__5
17.	What are the problems that you encounter because of the non existence of LMIS for other essential drugs? (Circle all that apply.)	Stock on hand , Consumption data, Looses and adjustments is not known__1 Expiry details of the stocks is not known__2 Dates of orders/ receipts and amounts on order is not known_____3 No reporting mechanisms to the supplier__4 There is no accountability of drugs_____5
18.	How did you learn to complete the forms/records for essential drugs used at this facility? (CIRCLE ALL THAT APPLY.)	During a logistics workshop__1 On-the-job training_____2 Never been trained_____3 Other (specify)_____4
19.	For which types of drugs you experience in placing an emergency orders?	ARV drugs_____1 FP contraceptives_____2 Other essential drugs_____3
20.	Who determines this facility's re-supply quantities for essential drugs?	The facility itself__1 Higher-level facility__2 Other__3. Please specify_____
21.	What mechanisms are in place to channel logistics information from health facility to the drug supplier?	Telephone calls_____1 Reports_____2 Meetings_____3 Supervisory visits_____4 None_____5 Other(Specify)_____6

22	How are the facility's re-supply quantities determined?	Formula (any calculation)___1 The Facility determine___2 Don't know___3 Other means___4
23	Which data elements are used to calculate SDP's re-supply quantities? (Circle all that apply.)	Beginning of reporting period___1 End of reporting period stock___2 Quantity received___3 Quantity dispensed___4 Losses and adjustments___5 Other Please specify___6
24	Who is responsible for transporting ARV , FP Contraceptive and Essential Drugs to your facility? (CIRCLE ALL THAT APPLY.)	Local supplier delivers___1 Higher level delivers___2 This facility collects___3 Other (specify)___4
25	What type of transportation is most often used?	By Facility vehicle___1 By PFSA Vehicle___2 By Sub city___3 Motorcycle___4 Bicycle___5 On foot___6 OTHER (SPECIFY)___7
26	On average, approximately how long does it take between ordering and receiving of essential drugs?	Less than a weeks___1 2 weeks to 1 month___2 Between 1 and 2 months___3 More than 2 months___4
27.	Are there guidelines and established policies for maximum and minimum stock levels at which full supply products should be maintained at the service delivery point level of the supply chain?	Yes___1 No___0

28.	Do you carry out physical inventories once per quarter and enter the results in to the stock cards?	Yes___1 No___0
29	How often supervision is conducted at the service delivery points? <i>Check visitors book, if necessary.</i>	Never___1. Weekly___2 Monthly___3. Quarterly___4 Annually___5 Other (specify)___6
30	Which categories of drug management your last supervision visits include ?	Stock Cards Checked___1 Reports Checked___2 Expired Stocks Removed___3 Storage Conditions Checked___4
31	Are the 12 Essential drugs supplied in short? (If yes which products stock out most frequently? List them.	Yes___1 No___0 1.____2____3____4____5____6____7____ 8____9____10____11____12____
32.	Are there written provisions for the redistribution of overstocked supplies?	Yes___1 No___0
33.	Are there expired drugs? (If no go to the next question) If Yes How Many items? _____	Yes___1 No___0

34.	For how many weeks or (months) during the past 6 months have you been out of stock of essential drugs?	1-2 weeks _____ 1 3-4 weeks _____ 2 5-6 weeks _____ 3 >8 weeks _____ 4
35.	If you run out of drugs, what do you do?	Go to the next higher level for resupply _____ 1 Buy from the open market _____ 2 Refer clients to go to private pharmacies _____ 3 Borrow from near by health facilities _____ 4 Other means please specify _____ 5
36.	What is the reason for stock out of essential drugs?	Could not go to pick up products _____ 1 PFSA did not send enough products _____ 2 Increase in consumption _____ 3 Did not request the right amount _____ 4 We don't know in advance the amount of drugs that we have in the shelf _____ 5 Other please specify _____ 6
37	Are there written guidelines for storage and handling of all products?	Yes _____ 1 No _____ 0
38	Is the existing storage capacity adequate to handle the current quantities of products?	Yes _____ 1 No _____ 0

39.	Are you using computers as an information processing tool?	Yes _____ 1 No _____ 0
40.	Is there sufficient professional human resources to perform all the activities of drug logistics management?	Yes _____ 1 No _____ 0

Do you have any question?

Annex 2A

Items 1–14 should be assessed for all facilities for products that are ready to be issued or distributed to clients. Place a check mark in the appropriate column based on visual inspection of the storage facility; note any relevant observations in the comments column. **To qualify as “yes,” all products and cartons must meet the criteria for each item.**

No	Description	No	Yes	Comments
01.	Products that are ready for distribution are arranged so that identification labels and expiry dates and/or manufacturing dates are visible.			
02.	Products are stored and organized in a manner accessible for first-to-expire, first-out (FEFO) counting and general management.			
03.	Cartons and products are in good condition, not crushed due to mishandling. If cartons are open, determine if products are wet or cracked due to heat/radiation (fluorescent lights in the case of condoms, cartons right-side up for Depo-Provera®).			
04.	The facility makes it a practice to separate damaged and/or expired products from usable products and removes them from inventory.			
05.	Products are protected from direct sunlight.			
06.	Cartons and products are protected from water and humidity.			
07.	Storage area is visually free from harmful insects and rodents. (Check the storage area for traces of bats and/or rodents [droppings or insects].)			
08.	Storage area is secured with a lock and key, but is accessible during normal working hours; access is limited to authorized personnel.			
09.	Products are stored at the appropriate temperature according to product			

	temperature specifications.			
10.	Roof is maintained in good condition to avoid sunlight and water penetration.			
11.	Storeroom is maintained in good condition (clean, all trash removed, sturdy shelves, organized boxes).			
12.	The current space and organization is sufficient for existing products and reasonable expansion (i.e., receipt of expected product deliveries for foreseeable future).			
13.	Fire safety equipment is available and accessible (any item identified as being used to promote fire safety should be considered).			
14.	Products are stored separately from insecticides and chemicals.			

THANKYOU FOR YOUR TIME AND INFORMATION. YOU HAVE BEEN VERY HELPFUL.

Table 1. Quantity ordered and Quantity Received

EOP (Months) _____ Maximum stock(Months) _____ Order interval(Months) _____

NO.	ESSENTIAL DRUGS	Quantity Ordered for the Last Order that has been delivered	Date Order Placed	Quantity Received in Last Order
1	Amoxicilin capsule		___/___/___ D D/ M M /Y Y	
2	Procain penicillin injection		___/___/___ D D/ M M /Y Y	
3	Oral Rehydration Salt (ORS)		___/___/___ D D/ M M /Y Y	
4	Co-trimoxazole		___/___/___ D D/ M M /Y Y	
5	Chloroquin tablet		___/___/___ D D/ M M /Y Y	
6	Sulphadoxine-Primethamine tablet		___/___/___ D D/ M M /Y Y	
7	Mebindazole tablet		___/___/___ D D/ M M /Y Y	
8	Tetracycline eye ointment		___/___/___ D D/ M M /Y Y	
9	Denatured alcohol		___/___/___ D D/ M M /Y Y	
10	Ferrous salt + Folic Acid		___/___/___ D D/ M M /Y Y	
11	Paracetamol tablet		___/___/___ D D/ M M /Y Y	
12	Benzyl benzoate lotion		___/___/___ D D/ M M /Y Y	

Ask the person/people you interviewed if they want to ask you any questions. Comments or general observations on products management:

Thank the person/people who talked with you. Reiterate how they have helped the program achieve its objectives, and assure them that the results will be used to develop improvements in logistics system performance.

Table 2. Stock Status Table for Key essential Drugs

ESSENTIAL DRUGS	Types of Drugs	Amounts Received During months	Amounts Distributed 3 During 3 months	Losses and Adjustments	Present Stock on hand
Amoxicilin capsule					
Procain penicillin injection					
Oral Rehydration Salt (ORS)					
Co-trimoxazole					
Chloroquin tablet					
Sulphadoxine-Primethamine Tablet					
Mebindazole tablet					
Tetracycline eye ointment					
Denatured alcohol					
Ferrous salt + Folic Acid					
Paracetamol tablet					
Benzyl benzoate lotion					

Table 3. LMIS Data Quality: Usable Stock on Hand at Time of Most Recent LMIS Report

Essential Drug List	Usable Stock on Hand (at time of most recent LMIS report)			
	According to most recent LMIS report	From stock ledger or stock cards from time of LMIS report	% Discrepancy (col.3–col.2/col.2) *100	Reasons for discrepancy
1	2	3	4	5
Amoxicilin capsule				
Procain penicillin injection				
Oral Rehydration Salt (ORS)				
Co-trimoxazole				
Chloroquin tablet				
Sulphadoxine-Primethamine tablet				
Mebindazole tablet				
Tetracycline eye ointment				
Denatured alcohol				
Ferrous salt + Folic Acid				
Paracetamol tablet				
Benzyl benzoate lotion				

Table 4. Percentage Difference between Quantity Ordered and Quantity Received

Essential Drug List	Quantity Ordered Last Order Period	Date Order Placed	Quantity Received In Last Order/Procurement	Date Order Received
1	2	3	4	5
Amoxicilin capsule				
Procain penicillin injection				
Oral Rehydration Salt (ORS)				
Co-trimoxazole				
Chloroquin tablet				
Sulphadoxine-Primethamine tablet				
Mebindazole tablet				
Tetracycline eye ointment				
Denatured alcohol				
Ferrous salt + Folic Acid				
Paracetamol tablet				
Benzyl benzoate lotion				

Annex 3: Interview guide questions

Interview guide with persons responsible in managing medical supplies in Addis Ababa Health Bureau to the health facilities.

Part One : Addis Ababa Health Bureau

1. Overview of the Ethiopian Logistics Management System ?
2. Is the logistics system a pull or a push system?
3. What Is your over all assessment of the Ethiopian Health Commodities Logistics Management System?
4. Can you explain how Drugs, Contraceptives, and Other Medical Supplies Get to Clients? How Does Information Get to the Logistics Managers?
5. Logistics Management Responsibilities Who Plays a Key Role in the LMIS?

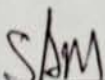
Interview guide with persons responsible in managing medical supplies in Sub-city Health Departments.

What Are Your Logistics Management Responsibilities? How are forecasts developed?

1. Are the data collector staff aware about LMIS?
2. Are you using a uniform report format to hospitals and health centers? What is your experience regarding this?.
3. How do you receive feedback/supervision on LMIS? From whom? In what interval?
4. Are you satisfied for the work of LMIS process?
5. Can you tell me how LMIS is conducted in the hospital? In terms of flow of information, human resource, quality of information produced, do you use the report produced at hospital level, any documents/guidelines in use developed at national level etc.
6. Is there any program review and feedback system on LMIS/ M and E of LMIS?
7. Does the hospitals and health centers have the technical capacity to produce reliable information without a lot of external assistance?
8. How does your organization support training of staff in skills for collecting data, generating quality report and using information?
9. What are the existing challenges/ problems in connection with LMIS in general?

DECLARATION

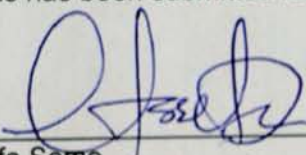
This thesis is my original, has not been presented for a degree in any other university and that all sources of material used for the thesis have been duly acknowledged.



Segid Molla

June, 2010

The thesis has been submitted for examination with my approval as a university advisor.



Dr. Assefa Seme