St. Mary's University
School of Graduate Studies

PUBLIC SECTOR PHARMACEUTICAL LOGISTICS MANAGEMENT INFORMATION SYSTEM: A CROSS-SECTIONAL ASSESSMENT IN SELECTED ANTI-RETROVIRAL SERVICE PROVIDING INSTITUTIONS

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ID Number – SGS1/0072/2004

May, 2015

Addis Ababa

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A THESIS SUBMITTED TO ST.MARY'S UNIVERSITY, SCHOOL OF GRADUATE STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION (MBA)

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APPROVED BY BOARD OF EXAMINERS

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ENDORSEMENT

This thesis has been submitted to St. Mary's University, School of Graduate Studies, for examination with my approval as a university advisor.

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Advisor Signature

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LIST OF ABBREVIATIONS/ACRONYMS

AIDS -	Acquired Immuno-deficiency Syndrome
ARV -	Antiretroviral Drugs
ART -	Anti Retroviral Treatment
EFY -	Ethiopian Fiscal Year
EPI -	Expanded Program for Immunization
FMOH -	Federal Ministry of Health
FP -	Family Planning
HC -	Health Centre
HAPCO -	HIV/AIDS Prevention and Control Office
HIV/AIDS -	Human Immuno-deficiency Virus
IFRR -	Internal Facility Requisition Report
IPLS -	Integrated Pharmaceutical Logistics System
IT -	Information Technology
LMIS -	Logistic Management Information System
MCH –	Maternal and Child Health
MSH -	Management Sciences for Health
NGOs -	Non Government Organizations
PFSA -	Pharmaceutical Fund and Supply Agency
RDF -	Revolving Drug Fund
RHB -	Regional Health Bureau
RRF -	Report and Requisition Form
SCM -	Supply Chain Management
SCMS -	Supply Chain Management System
SDPs -	Service Delivery Points
SKR -	Stock Keeping Records
SKU-	Stock Keeping Unit
SOPs -	Standard Operating Procedures
TB -	Tuberculosis
WHO -	World Health Organization

WoHO - Woreda Health Office

ZHD - Zonal Health Department

ABSTRACT

There are indications that the use of the paper-based LMIS system in the Ethiopian public health system is limited only to some health program commodities; there are also reported challenges with regards to the timeliness and quality of the reports collected from the health facilities. This assessment identified gaps between the way the LMIS is designed to work and how it actually works in anti-retroviral treatment (ART) service providing facilities. Non-experimental, descriptive cross-sectional assessment was conducted to gather both qualitative and quantitative data from April 13 to 24, 2015 using semi-structured questionnaires and standardized checklists. Using primary and secondary data collected from the study units, relevant indicators were calculated, descriptive statistics generated and qualitative findings were thematically analysed and summarized. The findings indicate that significant progresses have been made in terms of the system coverage and implementation while there are still gaps to be addressed. The LMIS is well designed for the purpose it is intended to serve; the basic logistics data items are clearly identified and defined in the IPLS SOP which also defines the processes and the roles and responsibilities of stakeholders. Training and support to the facilities is encouraging. The formats are found to be simple to use by the end users and their availability and utilization rate was found to be good. Reporting rate is also 100% and 86% of the facilities received their resupply from PFSA within two weeks after reporting. Completeness and arithmetic accuracy of reports was also satisfactory with some room for improvement. Products order fill rate and product availability for tracer ARV drugs by the time of visit was high. Of the visited 14 sites, only sixty four percent of the visited sites are using electronic LMIS (HCMIS) for inventory control and reporting purpose. Health facilities reported inadequacy of staffing, training and support amongst other challenges. The study also identified gaps in terms of providing feedback to the health facilities. Provision of formats is also found to be donor/partner dependent that poses a challenge for sustainability. Based on the findings, it is recommended that PFSA and respective RHBs/ZHDs/WoHOs assess their staffing, training, format provision, feedback and supportive supervision strategies and plans for future improvement. It is also proposed that PFSA should expand the LMIS (including electronic system) implementation to cover more program products and health facilities. Considering the need to collect additional data for better decision making, revision of the RRF is recommended while investigating potential linkages with other data collection systems.

CHAPTER ONE: INTRODUCTION

1.1. Background of the Study

Most leading causes of death and disability in developing countries can be prevented, treated or at least alleviated with cost effective essential drugs. Despite this fact, literally hundreds of millions of people do not have access to essential drugs (MSH, 2012). The above two sentences indicate that nations have to work toward ensuring sustainable availability of good quality drugs to their citizens if they are to have a healthy and productive society.

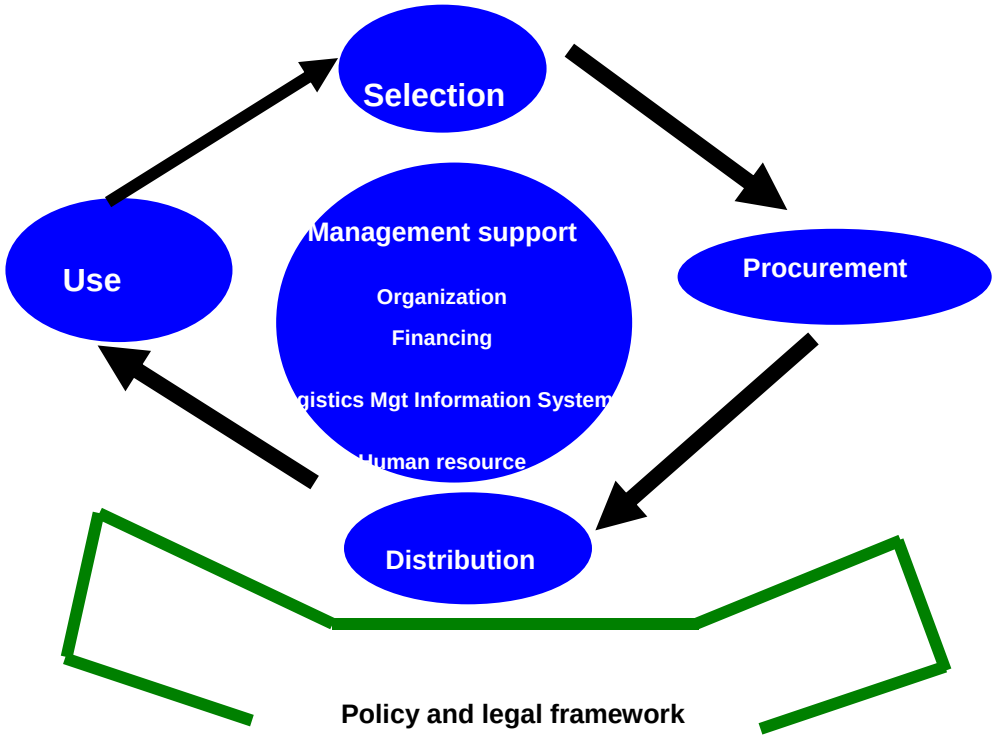

Figure 1: The Drug Supply Management Cycle

Source: Managing Access to Medicines and Health Technologies (MSH, 2012)

The above figure shows the four basic functions of the drug management system: selection procurement, distribution and use (figure 1).

However, managing drug supply is a very complex process that requires strong organizational structure, sound strategy and clearly defined processes. It involves a number of interrelated logistics functions complemented by appropriate support functions under the umbrella of sound policy and legal framework.

The drug management process is truly a cyclic: each major function builds on the previous function and leads logistically to the next. Selection should be based on the actual experience with health needs and drug use; procurment requirements follow the selection decision, and so forth.

As can be seen from the above diagram, the Logistics Management Information System (LMIS) is at the heart of the cycle, along with other support functions, creating this important linkage between the different interrelated functions. Failure in the LMIS will cause an incoherent cycle with disjointed functions resulting in shortages of drugs, high cost to the system and so forth.

Therefore, it is imperative to have a well-designed and practical LMIS if the whole drug supply management cycle is to function effectively and efficiently. Cognizant of this fact, the government of Ethiopia has designed and implemented a pharmaceutical logistics management information system in 2009 (PFSA, 2014).

This assessment is aimed at the current system in terms of its design, implementation and use of the final results for decision making.

1.2. Statement of the Problem

The pharmaceuticals fund and supply agency (PFSA) has been engaged in immense undertakings throughout the past years to improve the national pharmaceutical supply chain system through expansion of its distribution network and modernization of its infrastructure and processes. The regional distribution centres have increased from six in 2006 to 11 in 2014 with a plan to have 18 branches by mid-2015 throughout the country (PFSA, 2014). Modern distribution vehicles and warehouse handling equipment have been purchased and are operational. The stock and

inventory management at the different levels of the supply chain has also improved significantly through introduction of computerized tools accompanied by relevant trainings.

PFSA also designed and implemented a distribution mechanism whereby health facilities receive their drugs on a bi-monthly cycle based on their need. To facilitate informed decision making, a paper-based pharmaceutical Logistics Management Information System (LMIS) has been designed and implemented throughout the public sector health facilities as part of the IPLS. The LMIS is one of the major components of the Integrated Pharmaceuticals Logistics System (IPLS), which was developed by PFSA to improve the supply chain functions of the country (Shewarega, Abiy, Paul Dowling, Welelaw Necho, Sami Tewfik, and Yared Yiegezu, 2015).

As is the case in any management process, information is a critical input for decision making. Likewise, LMIS is essential component of the drugs supply management cycle that helps to connect the different functions in such a way that they complement each other to achieve the major objectives of the overall effort. It is only when there is a functional LMIS that provides accurate and timely data that there can be a functioning supply chain system. Accordingly, supply chain managers gather information about each activity in the system and analyse that information to coordinate future actions. For example, information about inventory levels and consumption must be gathered to ensure that a manager knows how much more of a product to procure (John Snow Inc./DELIVER, 2004).

However, in Ethiopia, the use of the paper-based LMIS system is limited only to some health program commodities. In fact, while the LMIS is rolled out to the majority of the public health facilities, ART service providing facilities take the lead in the actual implementation as they were the first to be engaged in the process starting in 2011 (Shewarega Abiy, Paul Dowling, et.al, 2015). There have also been reported problems with regard to the timeliness and quality of the reports collected from the health facilities. Moreover, the system has never been formally evaluated against the three basic parameters of an information system: design, operation and use – at least the investigator could not find one at the time of the proposal preparation.

This assessment seeks to determine if there is any gap between the way the LMIS is designed to work and how it actually works in anti-retroviral treatment (ART) service providing facilities. Moreover, it tries to identify if there are problems with the design of the system, its actual implementation (operation), and its use by the intended decision makers. Subsequently, practical solutions will be proposed based on the findings for future improvement.

1.3. Basic Research Questions

This study is conducted to answer the following basic questions based on the statement of the problem.

1. What are the basic features of the current paper-based pharmaceuticals LMIS design?
2. What is the status of the LMIS implementation?
3. What are the major challenges associated with the current paper-based pharmaceuticals LMIS?
4. What can be improved at PFSA and health facility level?

1.4. Objectives of the Study

1.4.1. General Objective:

The objective of this study is to assess the design, implementation and use of the current public sector pharmaceutical logistics management information system (LMIS).

1.4.2. Specific Objectives:

- To assess the design of the paper-based LMIS regarding its completeness and comprehensiveness.
- To assess the implementation of the LMIS at the different levels of the supply chain.
- To assess the level of use of the logistics data that is generated through the LMIS.

1.5. Definition of key terms and indicators

1.5.1. Definition of Key Terms

The following are the working definitions of the key words that are used in this proposal.

Public sector pharmaceutical supply chain: For this assessment, public sector pharmaceutical supply chain is operationally defined as and limited to the pharmaceutical supply chain system that is primarily managed by the pharmaceuticals fund and supply agency (PFSA).

Logistics Management Information System (LMIS): is a system that generates basic logistics information, which is needed to make logistics decisions. Note: For this assessment, while electronic system is briefly discussed for completeness, LMIS is limited to paper-based system currently rolled out in the public sector ART service providing facilities.

Program commodities: These are pharmaceuticals that are procured for effective implementation of specific health programs such as HIV/AIDS, Malaria, Tuberculosis (TB), Family Planning, immunization, etc. Moreover, these products are provided 'free' of charge by PFSA to health facilities and ultimately to end users.

Revolving Drug Fund (RDF) commodities: These are products that are supplied by PFSA to health facilities through a revolving drug fund scheme whereby the cost of the pharmaceuticals is covered through either a cost-sharing or cost-recovery mechanism.

ART service providing health facilities: These are facilities that provide anti-retroviral treatment service to clients that are tested HIV positive. While the service that these facilities provide is broad, only those facilities that provide treatment and patient follow up are considered in this study.

The terms drug, pharmaceuticals, medicine, and medicament are used interchangeably by many organizations and individuals. However, the definitions given to each one of these terms might vary in breadth and depth amongst some of the organizations depending on their core objectives and the context of the documents.

Some of the definitions given by prominent international organizations are given below.

> A drug, broadly speaking, is a substance that, when absorbed into the body of a living organism, alters normally functions (Dictionary.com Unabridged (v 1.1), 2015).
>
> In pharmacology, a drug is "a chemical substance used in the treatment, cure, prevention, or diagnosis of disease or used to otherwise enhance physical or mental well-being" (FDA, 2015).
>
> A pharmaceutical drug, also referred to as medicine, medication and medicament, can be loosely defined as any chemical substance intended for use in the medical diagnosis, cure, treatment, or prevention of diseases (EU, 2004).
>
> WHO (1975) defined essential drugs as those drugs that meet the health needs of the majority of the population.

In this document, the terms drugs and pharmaceuticals will be used interchangeably and with similar meaning. The terms product and commodity are also used in this document to mean drug and pharmaceutical.

Note: in this document, "health facility" and "service delivery point (SDP)" are also used interchangeably but meaning the same thing.

1.5.2. Definition of Logistics Indicators

While these indicators can be defined in various ways depending on the purpose of their intended use and availability of data, the below definitions apply for this assessment.

Stock out rate: This is the percentage of total number of Stock Keeping Units (SKUs) stocked out by the time of visit, out of the total number of SKUs expected to be in stock in the visited facilities (SCMS, 2011).

Percentage of Facilities That Receive the Quantity of Products Ordered (Order Fill Rate): this indicator measures the difference between the amount ordered in the last order period (or other defined period of time) and the amount received for that period (USAID | DELIVER PROJECT, Task Order 1, 2008).

Reporting Rate: This is defined as the percentage of health facilities that have reported complete LMIS data on-time to their supplying PFSA branch (SCMS, 2014).

Accuracy of Logistics Data for Inventory Management: This indicator measures the accuracy of logistics data as the percentage of discrepancy between physical stock count and stock record count (USAID | DELIVER PROJECT, Task Order 1, 2008).

1.6. Significance of the Study

An effective supply chain system needs to have a well-designed and implemented information system that can effectively document and communicate relevant data for informed-decision making. Cognizant of this fact, the government of Ethiopia has designed and implemented a pharmaceutical logistics management information system since 2009. Understanding the potential problems the current system might have in its very design or in its implementation is critical to take corrective actions and improve the process.

Accordingly, the final report is shared with the Pharmaceuticals Fund and Supply Agency (PFSA) and the visited health facilities so that they can use the information as an input to take appropriate actions. It is the investigator's belief that, despite the small number of sites that are visited, the assessment identifies specific strengths to further build upon, and challenges that suggest improvements and/or initiate a wider assessment.

1.7. Scope of the Study

This assessment focused only on the public sector pharmaceuticals supply chain Logistics Management Information System (LMIS) and thus does not address the private and NGO sector. The assessment is also limited to Anti-Retroviral Treatment (ART) service providing health facilities, and focusing only on HIV/AIDS commodities managed by these facilities, which makes its generalization to the overall public sector pharmaceuticals LMIS difficult.

While electronic tools and systems that the public sector employs are mentioned for completeness, the report will focus mainly on the paper-based recording and reporting system. Data was collected from the study sites at one point in time.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

Based on review of related literatures, this chapter provides a summary of documented particulars and background facts about the Ethiopian public sector health and pharmaceutical system in line with the major area of this study – logistics management information system.

2.1. Logistics Management Information System (LMIS)

Logistics Management Information System (LMIS) is a system that generates information, which is needed to make logistics decisions (John Snow Inc./DELIVER, 2004). The logistics decisions include selection, forecasting, procurement, training, re-supply, disposal, supervision, monitoring, and management.

Managing Access to Medicines and Health Technologies (MSH, 2012) provides a broader definition of Pharmaceutical Management Information System (PMIS): The PMIS integrates data collection and the processing and presentation of information that helps staff at all levels of a country's health system make evidence-based decision to manage pharmaceuticals services (MSH, 2012).

A well designed LMIS involves collecting, organizing, and reporting relevant and quality logistics data on timely basis and to the right recipient. The timeliness and quality of logistics data depends on the arrangement of the sources of data according to a certain procedure (system). Possible sources of a logistics data include stock movement cards, transaction vouchers, purchase/procurement vouchers, returning records, etc. (John Snow Inc./DELIVER, 2004).

No single system will work for every country, but applying a consistent approach to building LMIS that takes into consideration the local context and engages stakeholders at multiple levels in the data flow system improves the probability of sustainability (Michael P. Rodriguez, 2009). The LMIS design and implementation is dependent on the intended purpose and resource availability. While a comprehensive set of data provides accurate information, a statistically representative data set can provide equally good information for less cost and in a shorter time.

For efficient use of resources, it is also important to integrate the LMIS with other data collection systems. For huge volume of data and depending on the required complexity of the analysis, computerization of the LMIS is advisable (MSH, 2012).

To make logistics decisions, a logistics manager needs at least three essential data items: stock on hand, rate of consumption, and losses and adjustments. Although one may make good use of other data items in logistics, these three data items are absolutely required to run a logistics system (John Snow Inc./DELIVER, 2004):

1. Stock on hand (SOH): This is the amount of usable stock available at a certain point in time, usually at the end of a defined regular period. Knowledge of what one has in stock will in turn inform re-supply, forecasting, procurement, and/or redistribution decisions of the item. The main sources of data for SOH can be stock movement cards (stock card and bin card) and physical inventory.
2. Rate of consumption: This is the average amount of the item being consumed during a certain period of time and reported usually at the end of defined regular period. Knowledge of how much is being consumed within a certain period of time and informs re-supply, forecasting, procurement and/or redistribution decisions of the item. The sources of data for consumption can be stock movement cards (stock card and bin card), dispensing registers and issue vouchers, depending on the design of the LMIS system.
3. Losses and adjustments: These include all adjustments that need to be made for changes in the amount of products recorded in the stock movement cards; adjustments are usually recorded anytime when there is a difference between the recorded quantity and the actual amount available in stock. The main sources of data for SOH can be stock movement cards (stock card and bin card) and physical inventory.

2.2. The Ethiopian Public Health System

The health care delivery system in Ethiopia is guided by a National Health Policy (NHP) which was issued in September 1993 and a Health Sector Development Program (HSDP) which was implemented in four subsequent phases from 1997/98 to 2014/2015 (WHO, FMOH, 2010).

Currently, the Federal Ministry of Health (FMOH) has designed and is implementing the Health Sector Transformation Plan (HSTP) that will be running from 2015/16 through 2019/20 (FMOH, 2015).

The Ethiopian health care delivery system has three-tiers that are characterized by a first level of a Woreda/district health system comprising a primary hospital (with population coverage of 60,000-100,000 people), health centres (serving 15,000-25,000 people) and their satellite health posts (serving 3,000-5,000 people) that are connected to each other by a referral system. The primary hospital, health centre and health post form the primary health care unit (PHCU) with each health centre having five satellite health posts. The second level in the tier is a General Hospital with population coverage of 1-1.5 Million people; and the third tier is a Specialized Hospital that covers population of 3.5-5 Million (FMOH, 2010).

The Ethiopian health care system is augmented by the rapid expansion the private for profit and NGOs sectors playing a significant role in boosting the health service coverage and utilization thus enhancing the public/private/NGOs partnership in the delivery of health care services in the country. Offices at the different level of the health sector from the Federal Ministry of Health (FMOH) to Regional Health Bureaus (RHBs) and Woreda Health Offices (WoHO) share the decision making processes while Woreda's have basic roles in managing and coordinating the operation of a district health system under their jurisdiction (FMOH, 2010).

Under the Federal Ministry of Health (FMOH), there are four agencies of which the Pharmaceuticals Fund and Supply Agency (PFSA) is one. PFSA is established to contribute to the success of the health sector development program by leading the pharmaceuticals logistics and services for the public sector.

2.3. The Pharmaceutical Sector

The National Drug Policy (NDP) which was issued in 1993 in line with the NHP guides the pharmaceutical sector. The sector is regulated by the Food, Medicine and Health care

Administration and Control Proclamation N0. 661/2009 that resulted in the re-establishment of the Ethiopian Food, Medicine and Health care Administration and Control Authority (EFMHACA) by regulation No. 189/2010 with expanded responsibilities (WHO, FMOH, 2010).

The pharmaceutical supply Chain management system of the country had several problems including non-availability, unaffordability, poor storage, stock management and irrational use. To address these challenges the Federal Ministry of Health developed a Pharmaceuticals Logistics Master Plan (PLMP) in 2006 with the main objective of improving the health status of the Ethiopian peoples through provision of adequate and optimum quality of promotive, preventive, basic curative and rehabilitative health services to all segments of the population (FMOH, 2015).

As a result of the PLMP, the Pharmaceuticals Fund and Supply Agency (PFSA) was established in 2007 by Proclamation No. 553/2007. The Agency is mandated to avail affordable and quality pharmaceuticals sustainably to all public health facilities and to ensure their rational use (Shewarega Abiy, Paul Dowling, et.al, 2015).

The 1993 Health Policy of the Transitional Government of Ethiopia has put Availability of Drugs, Supplies and Equipment as one of its general strategies (Transitional Government of Ethiopia, 1993). Availability and regulation of the pharmaceutical products has also been one of the major focus areas in all the four phases of the HSDP multi-year plans (from 1997/98 to 2014/15), confirming the government commitment towards improving the health status of the peoples of Ethiopia. The current strategic plan, the Health Sector Transformation Plan (HSTP), also aims at assuring uninterrupted supply of essential pharmaceuticals that are of assured quality, safety, efficacy and cost-effective with their proper use. Of the seven key components that the HSTP identifies to achieve this goal, LMIS - integrated information management system for pharmaceutical supply and services – is one (FMOH, 2015).

2.4. Integrated Pharmaceuticals Logistics System (IPLS)

PFSA is responsible for the procurement and distribution of pharmaceuticals for the public sector. To successfully achieve its main objective, which is to ensure that patients get pharmaceuticals that they need, PFSA designed and implemented the Integrated Pharmaceuticals Logistics System (IPLS). IPLS is the term applied to the single pharmaceuticals reporting and distribution system based on the overall mandate and scope of PFSA (PFSA, 2014).

The IPLS is the primary mechanism through which all public health facilities obtain products that are included on the National Pharmaceuticals Procurement List (NPPL). The list includes essential pharmaceuticals including the following that used to be managed vertically: HIV/AIDS, Malaria, TB and Leprosy, EPI, MCH (PFSA, 2014).

The IPLS defines the reporting and re-supply schedules. Accordingly, health facilities (hospitals and health centers) are expected to complete the Report and Requisition Form (RRF) every two months for program pharmaceuticals, the data of which will be used to determine re-supply quantity. To help maintain adequate stock levels, the maximum months of stock, minimum months of stock and an emergency order point have been established for each health facility in the system. For Revolving Drug Fund (RDF) pharmaceuticals, health centers and hospitals will complete the RRF as per the facilities review period which can be every two month, every quarter or every six months and collect products from affiliated PFSA branches (PFSA, 2014).

The ‘Standard Operating Procedures (SOP) Manual for the Integrated Pharmaceuticals Logistics System in Health Facilities of Ethiopia’ (herein after referred to as the IPLS SOP) defines the roles and responsibilities of the relevant stakeholders that are involved in the supply chain. The system also lists out the basic logistics data that are required to make logistics decisions with the accompanying definitions and data sources. All the relevant recording and reporting forms are also included with detailed instructions for use.

CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

The following research design and methodology was applied to address the objectives of the study.

3.1. Study Area

The study was conducted in the Eastern part of Ethiopia both at PFSA and health facility level. The assessment gathered data from PFSA with respect to the LMIS design, perceived implementation status and use of data for decision making. Data was collected from the Central PFSA and Dire Dawa PFSA branch. Primary data secondary were also collected on the actual implementation of the system from 14 selected facilities found in four regions of the country that are served by the Dire Dawa branch: Dire Dawa City Administration, Harari, Somali, and Oromia regional states.

3.2. Study Design

This study is a non-experimental, descriptive, cross-sectional assessment employing both qualitative (in-depth interviews) and quantitative methods of data collection at a certain time period from April 13 to 24, 2015. The different strategies that were used for the qualitative and quantitative methods of data collection are discussed below.

3.3. Quantitative and Qualitative Method

Quantitative data was collected to describe the current performance of the logistics system by employing standard logistics indicators. Qualitative data was collected from service providers and PFSA staff to gather information on the challenges with the implementation of the current LMIS system.

3.4. Study Population

As per the Federal Ministry of Health 2006 EFY report, there are 3,447 health facilities in the country (FMOH, 2014) of which 1,047 provide ART service (HAPCO, 2014). All these facilities are supplied with pharmaceuticals and supplies through the public sector supply chain system that is managed by the Ethiopian Pharmaceuticals Fund and Supply Agency (PFSA). PFSA has a central warehouse in Addis Ababa and 11 functional branches distributed throughout the country.

For this study, the source populations are the Dire Dawa PFSA warehouse and the 61 public health facilities that are providing ART service and served by the branch.

3.5. Source of Data

The management of PFSA and the pharmacy section heads of the ART service providing health facilities served as a primary source of data to measure the logistics performance of the public sector logistics system through quantitative data collection. LMIS recording and reporting forms were reviewed by the data collectors to verify data gathered through interview. Key personnel involved in LMIS design, implementation, and use were covered in the assessment to gather qualitative data.

3.6. Sample Size Determination

PFSA Central was selected for this study as it is at the centre of the pharmaceutical supply chain system with a legal mandate to design and implement a functional LMIS throughout the country. The Dire Dawa branch was selected purposefully due to the fact that it serves health facilities found in four different regions, which is more than the number of regions that any of the other branches serve; the investigator believes that data collected from facilities found in different regions will be more representative than facilities found in only one region.

The health facilities are selected following cluster sampling method. First, the ART service providing public health facilities are categorized in to four clusters based on the respective regions where they are located (Table 1). Then, the Dire Dawa cluster is purposefully selected

considering resource constraint and all the ART service providing facilities are considered for the study. Then, for comparison purpose, one facility is selected from each of Harari and Somali regions while two facilities are selected from Oromia region; the specific health facilities that are found on the main road were selected purposefully considering resource constraint.

Sr. No.	Cluster (Region/City Administration)	Total Number of ART sites	# by type of facilities		# of selected study units		Total number of study units
			Hospitals	Health Centers	Hospitals	Health Centers	
1	Dire Dawa	10	1	9	1	9	10
2	Harari	6	2	4	1	0	1
3	Oromia	34	5	29	1	1	2
4	Somali	11	4	7	1	0	1
Total		**61**	**12**	**49**	**4**	**10**	**14**

Table 1: Sampling procedure and summary

The list of facilities that are covered in this study is attached as Appendix F.

3.7. Data Collection Instruments

This study employed three types of data collection instruments to collect primary and secondary data through an in-depth interview and structured checklist.

The first tool is a semi-structured questionnaire (Tool 1) for in-depth interview with the PFSA management with questions focusing on the overall pharmaceutical supply chain system of the country, the LMIS design and its application.

The second one is a checklist (Tool 2), which was used to collect secondary quantitative data on logistics performance that will be used to calculate logistics indicators. A standard data

collection tool is modified for this specific purpose (USAID | DELIVER PROJECT, Task Order 1, 2008).

The third is a semi-structured questionnaire (Tool 3) that as used to collect both qualitative and quantitative information from service providers (health facility staff) through an in-depth interview. The researcher used the findings to identify perceived challenges and proposed solutions for improved LMIS.

3.8. Data Collection

Data was collected using the tools that are mentioned above from all study units by the main investigator and trained data collectors. The data collectors were pharmacy professionals, who reside in Dire Dawa city administration and who are working on pharmaceuticals supply chain management area. Prior to data collection, the data collectors received one-day training on how to complete the tools that included practical data collection simulation sessions. The principal investigator supervised the data collection process and provided on-site and remote advice.

The in-depth interview with central PFSA and Dire Dawa branch management was conducted by the principal investigator.

3.9. Data Entry and Analysis

Quantitative data collected by the checklists were edited and checked for missing items and consistency prior to generation of descriptive summary statistics (mean, percentages) and analysis. Appropriate indicators were calculated and discussed against perceived logistics system performance and the national targets. The contribution/linkage of the LMIS to the calculated results is discussed in detail in this report.

Data from qualitative method was analysed systematically in such a way that the major issues were identified. Thematic analysis of responses was performed to identify recurrent plausible challenges of the LMIS as perceived by service providers and PFSA.

CHAPTER FOUR: RESULTS & DISCUSSION

The response rate for this study was 100% where all the sites visited provided the required primary and secondary data. This chapter documents the major findings of the assessment and discusses them against national targets and findings of similar studies.

4.1. The Pharmaceutical Distribution System

The current pharmaceutical distribution system for public health facilities in Ethiopia is a mix of pull and push systems depending of the type of health programs addressed. Pull system, which is re-supply of products based on health facilities' request, is used for the majority of health products while informed push system is applied for pharmaceuticals that are used for newly initiated health programs.

The distribution system is governed by the Integrated Pharmaceuticals Logistics System (IPLS) with a regular bi-monthly refill schedule for program commodities (eg. ART, TB and FP). There are defined refill schedules for other health programs; for instance anti-malaria pharmaceuticals are refilled quarterly while vaccines are distributed on monthly bases. However, essential medicines (RDF products) do not have defined resupply schedules and they are refilled solely based on the request from the facilities'.

4.2. LMIS Design

According to the information gathered through in-depth interview, PFSA has designed and implemented both paper based and electronic LMIS in public health facilities. The paper based LMIS is rolled out and being implemented in more than 2,500 health facilities while the electronic system, Health Commodities Management Information System (HCMIS), is rolled out in more than 500. The paper and computerized HCMIS are used for informed logistics decision making; however, neither system is linked with national Health Management Information System (HMIS) that captures and reports service data.

The LMIS collects the basic logistics data elements as defined in the IPLS SOP (consumption, stock on hand and Losses/adjustment, days out of stock) which are essential to make proper logistics decisions. While the data collected through the current LMIS is adequate to make distribution decisions, there are additional data elements that are required for quantification and forecasting decisions, specifically for HIV/AIDS and TB programs. For instance, the decision making capacity will significantly improve if patient related information is captured by the RRF on a regular basis along with the other data items. Moreover, data on expiry dates of products and batch numbers are not captured by the RRF except that there is a section in the RRF to report those products with less than 6 months shelf life. This information would be very useful in the event of product re-call and to facilitate re-distribution.

The 'Standard Operating Procedures (SOP) Manual for the Integrated Pharmaceuticals Logistics System in Health Facilities of Ethiopia' provides guidance on data generation and reporting for the paper based LMIS. The SOP also describes the roles and responsibilities of the different actors in the sector. According to PFSA, the professionals who are trained on the IPLS SOP can easily fill all the required formats to generate and report logistics data on a regular basis. Respondents from the visited health facilities also confirmed that the recording and reporting formats are easy to complete and aggregate. However, interview respondents reported the paper-based LMIS takes considerable proportion of their time considering under-staffing and the time it takes to update and complete the different recording and reporting formats.

4.3. Training and Support

According to PFSA, health facility professionals are trained on the IPLS SOP before the facility starts implementing the system. To date, 196 professionals from PFSA, RHBs and partners are trained as trainers on the SOP while more than 12,000 health facility professionals received the training – at least 2 professionals trained from each facility. This study also found that 43.2% (N 81) and 96.8% (N 31) of staff are trained from the visited hospitals and health centres, respectively. More than 92% (N 65) of the visited facilities staff working on IPLS received formal training while five of the facilities reported that they have staffs who are engaged in LMIS but who have not received the training. A recent IPLS survey (Shewarega Abiy, Paul Dowling, et.al, 2015) reported that, for all facilities assessed, more than 84 percent of hospitals and

69 percent of health centre pharmacy personnel received training through the national IPLS training program. These findings show that, while the training coverage is very good, there is still a gap that needs to be filled; this is even more important considering the reported high rate of staff attrition at facility level.

HR information	**Type of facility**	
	Hospital (N 5)	Health Centre N 9)
Average no. of pharmacy staff	16.2	3.4
%age staff trained on IPLS	43.2% (N 81)	96.8% (N 31)
%age staff trained on IPLS and work on IPLS	91.4% (N 35)	96.7% (N 30)

Table 2: Human resource and training information based on data collected from visited facilities

Moreover, supportive supervision is conducted in the health facilities with the main aim of improving quality and timeliness of the reports through provision of on-site support on the system. The hub based team (composed of professionals from PFSA, RHB/ZHD/WoHO, and partners) are responsible for this activity. Following IPLS training, HF will be supervised on monthly bases until they are matured and self-sufficient. To support this effort, IPLS Orientation and Supportive Supervision trainings were organized for management staff and officials from ZHDs, WoHO and facilities with a total of 5,880 covered so far. Data gathered from the facilities indicated that 57.1% (N 14) of then have benefited from quarterly supportive supervision while 21.4%, 7.1% and 14.3% of the facilities receive monthly, bi-monthly and semi-annual support. This finding is in conflict with the reported monthly schedule set and reported by PFSA. Ninety three percent of the facilities reported that they are supported by PFSA and RHBs while 86% confirmed support from other partners as well. On a scale of 1 to 5 (3 being Good and 2 being Fair), 64% (N 14) of the facilities rated the support ‘Good’ while the remaining 36% (N 14) consider the support ‘Fair’. This information is a critical input for PFSA and its partners to revisit their supporting strategy and/or mechanism.

4.4. Recording and Reporting Formats

The main recording and reporting formats used in the LMIS implementation are bin cards, Internal Facility Report and Resupply Form (IFRR), and Report and Requisition Form (RRF). PFSA prints and distributes these forms to the health facilities but mainly through funding secured from its partners. The data from this assessment found that all the visited 14 health facilities had all the formats by the time of visit with no difference between hospitals and health centres (Table 4). However, the result from a recent national survey indicated that the availability of blank recording and reporting formats is high at hospitals (above 90 percent), but declines farther down the supply chain (close to 80 percent at health centres) (Shewarega Abiy, Paul Dowling, et.al, 2015).

Facility type	**%age of facilities using (N 14)**		**%age availability by facility (N 14)**	
	SKR	Transaction records	SKR	Transaction records
Hospital	100%	100%	100%	100%
Health centre	100%	100%	100%	100%

Table 3: Availability and utilization of formats based on data collected from visited facilities

Utilization of these records has also been very high at all the visited facilities with reported 100% (N 14) use of at least one of the Stock Keeping Records (SKR) and all the four transaction records (receiving voucher, issue voucher, IFRR and RRF). This finding is different from the result in the national IPLS survey from February, 2015 which found only 73% and 64% of bin card use at hospitals and health centres, respectively (Shewarega Abiy, Paul Dowling, et.al, 2015).

4.5. Reporting Rate

All the visited health facilities had a specified reporting schedule which is within 10 days after the end of the reporting period, which is every two months as per the IPLS SOP. Record reviews confirmed that all the sites prepared and submitted their reports within the time period for the last reporting period and retained a copy for their files.

Unlike the finding from the recent national survey, this study found a very high figure regarding completeness and accuracy of data reported by the facilities; this difference might be due to the tracer items used in the study and the possible difference in definitions and calculation. All the visited fourteen health facilities had reported the three basic logistics data with an average of 85.7% (N 14) of arithmetic accuracy and close to 93% (N 14) completeness.

Assessment criteria	**Percentage of facilities meeting criteria (N 14)**
Basic logistics data reported	100.0%
Arithmetic accuracy	85.7%
Completeness	92.9%

Table 4: Report completeness and data accuracy in visited facilities

When it comes to the accuracy of logistics data as the percentage of discrepancy between physical stock count and stock record, there was 90% accuracy for the tracer drugs.

No.	Tracer products	Percentage of health facilities With accurate record (N 10)
1	Abacavir-Lamivudine 60+30MG Tablet	100%
2	Atazanavir-Ritonavir 300+100MG Tablet	100%
3	Efavirenz-Lamivudine-Tenofovir disoproxil fumarate 600+300+300MG/tablet	70%
4	Lamivudine-Zidovudine-Nevirapine 150+300+200MG/tablet	80%
5	Lamivudine-Zidovudine-Nevirapine 30+60+50MG/tablet	90%
6	Lopinavir-Ritonavir 80+20MG/ml solution	100%
7	Tenofovir disoproxil fumarate-Lamivudine 300+300MG/tablet	80%
8	Nevirapine,100ml, 10MG/ml suspension	100%

Table 5: Percentage of visited health facilities with Accurate recorded stock

- *The calculation for this indicator excludes the 4 health facilities that did not update their stock keeping records by the time of visit.*

4.6. Use of Data

Data collected through the RRF are used to make a number of important logistics decisions. Mainly, annual quantification and forecasting and regular product refill/resupply decisions are based on the RRF data. Eighty six percent (N 14)) of the facilities reported that they had received their refill within two weeks after report submission while the remaining 2 received in a week and three weeks' time each. This finding is consistent with the IPLS survey result that documented, regardless of the type of product, more than 80% of both hospitals and health centres say they usually receive products requested within one month or less (Shewarega Abiy, Paul Dowling, et.al, 2015).

The order fill rate by product – the percentage of products that were resupplied with the quantity that was requested by the facilities in the last period – is on average 99.6% (N 16,814), ranging from the lowest 45% (N 111) for a product to 104.6% (N 861) for another. The over 100% refill rate indicates that PFSA resupplied more than what was requested by facilities for some of the products.

Figure 2: Order fill rate by product based on data from visited facilities

The order fill rate by facility – the percentage of products that were resupplied in the quantities that the facilities requested in their last reporting period per facility – ranges from the minimum 84.3% (N 127) for Haramaya Primary Hospital to the highest 104.9% (N 815) for Dire Dawa health centre. The over 100% refill rate indicates that, the health facility had received more units of products compared to its request. In contrast to this finding, the recent national IPLS survey (Shewarega Abiy, Paul Dowling, et.al, 2015) documented that only 37% of the facilities reported usually receiving the quantity they ordered for program commodities, which includes the ARV drugs.

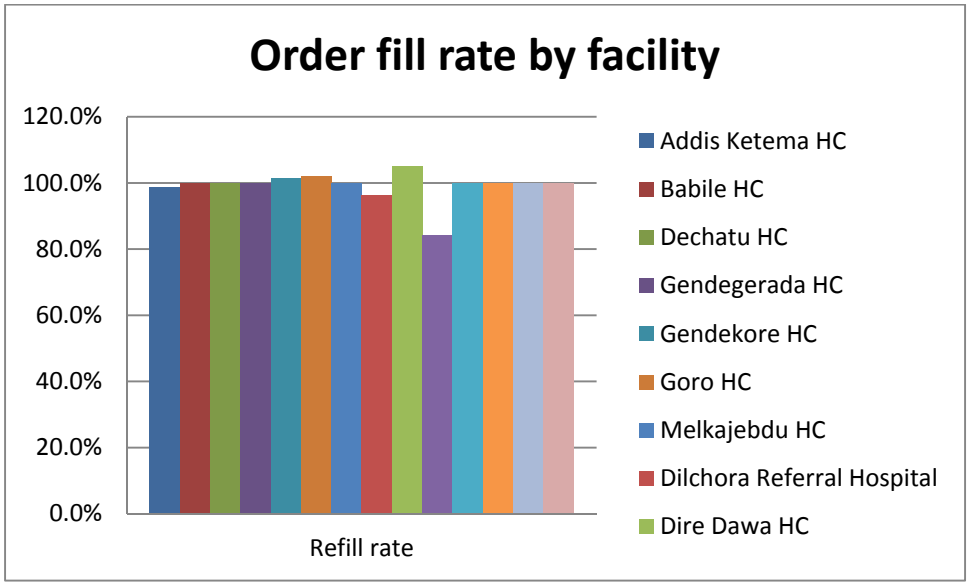

Figure 3: Order fill rate of products by facility based on data from visited facilities

Moreover, PFSA and RHBs use the information from the RRF to identify report quality issues, such as incompleteness and/or arithmetic errors, to suggest additional support to the facilities. As envisaged by the IPLS SOP, identified problems in the reports are communicated to the health facilities through verbal and written feedback though it was difficult to find copies in all the sites visited.

4.7. Availability of Products by the Time of Visit

Out of the 81 stock keeping units (SKUs) that the visited facilities are expected to have in stock, 79 of them were available by the time of visit; this is 97.5% availability. While the number

seems very high, there is a room for improvement here as it is important to note that these products need to be available at all times in order to avoid any treatment interruption, which, if it happens, will have a serious health impact to both the individual patient and to the public.

In other words, the stock out rate by the time of visit (considering only the current reporting period) was 2.5% (N 81) as indicated in the below graph.

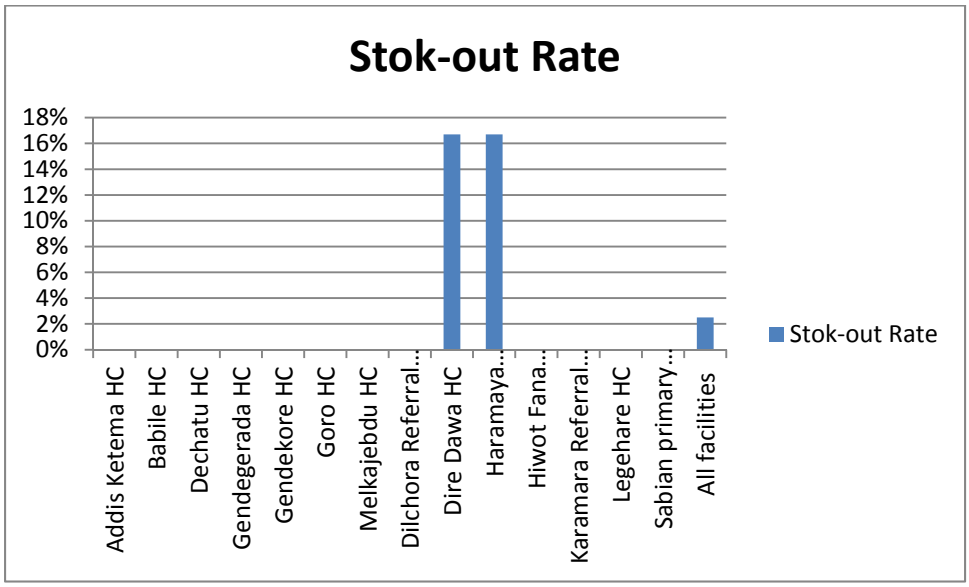

Figure 4: Stock out rate for tracer ARVs based on data from visited facilities

4.8. Computerized LMIS

Nine out of the fourteen facilities visited (64%, N 14) had a computerized LMIS (Health Commodities Information Management System/HCMIS) which they use for inventory control and reporting purpose. All the facilities that use HCMIS reported that they benefit significantly from the computerized system as it makes inventory control and reporting easier, saving them time they otherwise spend to manage the system manually. PFSA also reported that they have a plan to roll out the HCMIS to more facilities in the future, with a long term plan of implementing a comprehensive and broader integrated MIS.

CHAPTER FIVE: SUMMARY, CONCLUSIONS & RECOMMENDATIONS

The findings of this assessment indicate that, in the past years since IPLS launched in 2009, significant progress has been made in terms of the system coverage and implementation while there remains a lot to be done. This chapter summarizes the major strengths and drawbacks that are identified by this study, with proposed practical recommendations.

5.1. Summary and Conclusions

The IPLS is found to be well designed for the purpose it is intended to serve; all the basic logistics data items, as defined by PFSA, are clearly identified and defined in the IPLS SOP with their sources and accompanying instructions. In addition to the recording and reporting formats that the system introduces, the process and roles and responsibilities of stakeholders are summarized in the SOP that facilitates training on the system and serves as easy reference.
The recording and reporting formats are comprehensive and they are designed to collect data on all types of products that are supplied by PFSA. It is also found that the formats are simple to use by the end users with 100% response from the visited sites.

However, the reporting and requisition form (RRF) does not capture service data and patient data, which are very relevant for forecasting and budgeting exercises. Moreover, expiry dates and batch numbers of products are not captured adequately by the system. It is also found that there is no linkage of the LMIS with other data collection systems such as the Health Management Information System (HMIS).

The implementation of the LMIS is found to be well designed with all the steps followed strictly: training to health facility staff, follow-up supportive supervision, provision of the required formats, ad hoc supportive supervision based on report reviews, and feedback mechanism.
With each facility having trained staff on LMIS and with 92% (N 65) of those trained engaged in the system, training coverage is satisfactory. However, inadequate staffing and high attrition rate forced facilities to assign non-trained staff on IPLS implementation; those not-trained are oriented on the system only by their colleagues at facility level. Moreover, facility interviewees claimed high work-load considering inadequate staffing and the time it takes to update and complete all the recording and reporting forms. These two challenges pose a potential risk of poor data quality and subsequent failure of the system.

Post-implementation support is also found to be good with 85.6% (N 12) of the facilities receiving supportive supervision visits at least every quarter. The fact that PFSA trained RHB, ZHD and WoHO staff on the system and supportive supervision skills promoted ownership as evidenced by 86 % of facilities receiving their supportive supervision from these units. However, there is room for improvement on the adequacy/quality of the supervision as 100% (N 14) of the respondents rated it 2 and 3 (on a scale of 1 to 5, 5 being most useful).

Availability and utilization of the recording and reporting formats is encouraging with 100% score for both criteria; however, the fact that the printing cost of the formats is supported by partners needs to be addressed in terms of sustainability. Most importantly, even if all types of products were not covered in this assessment, all the visited facilities submitted their report on time for the HIV/AIDS commodities. While there is room for further improvement, accuracy of stock keeping records, report completeness, and arithmetic accuracy are encouraging in the visited sites and for the tracer list of ARV pharmaceuticals.

As envisaged in the IPLS SOP, the data collected through the RRF is used to make a number of logistics decisions such as quantification, refill and additional support to the facilities.
The assessment confirmed that HIV/AIDS commodities are refilled to the majority of the facilities within two weeks after receipt of the report. Except for one specific product (45% refill rate for Abacavir-Lamivudine 60+30MG Tablet) , order fill rate is also found to be encouraging

for the tracer drugs with the average of 99.6% (N 16,854) of the requested products refilled in full. Prompt response in terms of product resupply and high percentage of refill rate are important factors that encourage facility staff to adhere to reporting timeliness.

The ultimate goal of a supply chain system in general, and that of LMIS in particular, is to ensure product availability at all times. This study found 97.5% (N 81) availability of products for the tracer ARV drugs by the time of visit. While this figure is very high, there is a need for improvement as one cannot afford stock out of these lifesaving drugs considering the potential serious health impact of treatment interruption both to the individual patient and the public at large.

Despite the fact that there are reports of verbal and written feedback to the facilities, no documented evidence was found during the site visit.

Some of the challenges reported by PFSA and the health facilities include inadequate infrastructure and staffing. Specifically, the storage facility at health facilities is sub-standard and it hampers proper management of the pharmaceuticals which in turn affects the recording and reporting system.

While the facilities are not reportedly adequately staffed, the situation is worsened by the high human resource attrition rate and especially of those who are trained on the system. Information gathered from the health facilities also revealed that there are some professionals who are working on the system without receiving the proper training; this could have significant impact on the quality of the data leading to wrong logistics decisions.

It is also reported by PFSA that there is a significant challenge in terms of ownership of the system at all levels, which, if not addressed on time will pose a threat to future implementation. This study also determined that data visibility is a challenge, with development of computerized dash board still underway. The main challenge reported by PFSA, however, is the quality of the data from the facilities.

5.2. Limitations of the Study

This assessment is limited in terms of geographic and product/program coverage which makes generalization of the findings difficult. While there are some consistent findings, some of the results of this study are found to be different from a similar recent survey, which can be explained by the difference in the scope and design of the studies. However, this difference warrants additional and thorough investigation by PFSA and other stakeholders.

5.3. Recommendations

While most of the findings of this assessment are encouraging, there are some identified gaps that need to be addressed for system improvement. Based on the findings of this assessment, the following recommendations are forwarded for action by the relevant stakeholders.

- Revise/update the reporting form (RRF) in such a way that helps to capture additional information such as service/patient data, product expiry date and batch numbers.
- Assess the possibility of linking the LMIS with HMIS and other data collection systems that exist currently.
- This assessment found encouraging results in terms of LMIS implementation for the ARV drugs; PFSA needs to expand the implementation to cover more program areas and facilities.
- Roll out the electronic LMIS (HCMIS) in to more health facilities to reduce work burden and improve data quality.
- Re-examine the supportive supervision strategy that is already in place to provide better support to the health facilities and increase its acceptance rate.
- The coordinated effort by all the stakeholders needs to be strengthened in the future with more involvement by logistics professionals from RHB/ZHD/WoHO to support the health facilities and provide on-time feedback on their performance.
- RHBs/ZHD/WoHO should revisit their staffing policies at the facility level and ensure adequate professionals are assigned for effective implementation of the system.

- PFSA and RHBs/ZHD/WoHO need to have training plans to cover the identified gaps and put in place a practical skill transfer mechanism at facility level to manage the impact of attrition.
- PFSA and RHBs/ZHD/WoHO should develop a sustainable mechanism for formats provision to avoid dependency on partner funding.
- Standardize the feedback mechanism to the health facilities and enforce mandatory feedback provision by PFSA and RHB/ZHD/WoHO.
- Identify the root cause for the very low refill rate for Abacavir and take appropriate action.

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APPENDICES

APPENDIX A

Data collection tool 1 - In-depth Interview Guide with Central and Brach

PFSA Management

Name of the interviewer: _____

Date: _____

Prior to the interview, the support letter from St. Mary's University should be presented and permission should be secured from the relevant official of the organization. The principal investigator should describe to the respondent about the purpose of the study, the duration, the activities to be undertaken and all other relevant information; it is only possible to proceed with the data collection after securing permission from the relevant official. Most importantly, the investigator should inform the respondent about the de-briefing on the study findings and secure a suitable date and place accordingly.

Expected interview period: 90 to 120 minutes.

Interview with the PFSA management

1. Please describe the type of the distribution system you run to supply public health facilities. Probes: Is it pull, or push (informed push) or a mix of them? And how frequently do you do distribution? Does it vary by product category/program type.

   _____

   _____

   _____

   _____

2. I understand you have implemented a paper based LMIS system; would you kindly tell me about its current implementation status including coverage in terms of number of

health facilities and product categories? Probes: Are there multiple systems or only one standardized system for all programs? Is the LMIS standalone or integrated with other reporting systems such as HMIS? What program(s) is/are consistently using the regular reporting forms and timeline? Which programs are lagging behind and why?

_____

_____

_____

_____

3. What types of data do you collect through the system? Probes: check is consumption, stock on hand and Losses/adjustment data are collected. Ask about relevance of the data for decision making; are they all relevant? Are there missing data items that need to be collected?

_____

_____

_____

_____

4. Do you believe that the records and forms are adequately/properly designed to address the needs of the system? Who is responsible to print and distribute the forms to the health facilities? Probes: Do the forms capture the required data items? Are they simple to use at facility level? Are they available in adequate quantity at all times?

_____

_____

_____

_____

5. Do you have documents that guide the LMIS? Probes: Do you have standard procedure for data generation and collection? Does it include roles and responsibilities of the different actors in the system? Does it clearly mention timelines/frequency for reporting?

_____

_____

_____

_____

6. Do you train health facility professionals on LMIS? What are the challenges and your suggestions to address them? Probes: Number of people trained so far (if possible get average number of professionals trained per facility).

_____

_____

_____

_____

7. What kind of post-training support do you provide to the health facilities to ensure data quality? Probes: Who else involved in providing support to the health facilities? Do you think the support is adequate? Do you have suggestions to improve the quality of the support?

_____

_____

_____

_____

8. What kinds of decisions are made based on the LMIS reports? And who makes these decisions? Probes: Could these decisions be made without the system? And what would be the impact if the system fails? Is the reporting cycle consistent with the timing of decisions that need to be made?

_____

_____

_____

_____

9. Would you please tell me about the challenges with regards to the implementation of the paper based LMIS? Probes: Challenges regarding training, design of the forms, printing

and dissemination of the forms, data collection, completeness of the reported data, timeliness of reports, accuracy of reported data, relevance of captured and reported data, etc.

_____

_____

_____

_____

10. What do you suggest to address these issues? I would be very grateful to know if there are already plans to address some of the challenges you mentioned above. Probes: Remind the respondent to make sure that recommendations are put forward for all the challenges mentioned above.

_____

_____

_____

_____

11. Have you implemented an electronic LMIS system? If yes, would you please let me know what their purposes are and what their implementation status is?

_____

_____

_____

_____

12. What are the challenges with regards to electronic/computerized LMIS implementation, if any? Probes: Make sure response addresses design and processes.

_____

_____

_____

_____

13. What is the plan to computerize the LMIS in the future?

_____

_____

_____

_____

APPENDIX B

Data collection tool 2 - Structured questionnaire to collect data from ART service providing facilities

Date (dd/mm/yyyy): _____

Name of interviewer: _____

Facility Identification

- Name of the health facility: _____
- Region/City Administration: _____
- Serving PFSA branch: _____

Informant

- Years of Experience: _____
- Level of education: 2 years diploma ____
  First degree ____
  Advanced degree ____
  Other: specify ____

HR information

1. How many staff do you have who are working in the pharmacy unit/pharmaceuticals supply chain? _____
2. How many of them are trained on paper based LMIS/IPLS? _____
3. How many of the trained staff are engaged in IPLS recording and report generation? _____
4. Are there staff who are involved in LMIS who are not trained? Yes _____ No _____
5. If yes, how do they learn to fill out the forms? _____

Technical assistance and support

1. Do you receive supportive supervision? Yes _____ No _____

a. If yes, how often?
    i. Every month: Yes _____ No _____
    ii. Every quarter: Yes _____ No _____
    iii. Twice a year: Yes _____ No _____
    iv. Other: specify _____
b. If yes, who provides the support?
    i. RHB or Woreda Health Office: Yes _____ No _____
    ii. PFSA: Yes _____ No _____
    iii. Partners: Yes _____ No _____
    iv. Other: specify _____

2. When was the last time you received supportive supervision on LMIS? Specific date: _____

3. How do you rate the level of support you receive ?

1. Very good 2. Good 3. Fair 4. Poor 5. Very poor

LMIS related questions

1. Do you have stock keeping records?
    a. Bin card: Yes _____ No _____
    b. Stock card: Yes _____ No _____
    c. Other : specify _____

    For interviewer please verify availability: Yes _____ No _____
2. Which transaction records do you use on a regular basis?
    a. Receiving voucher: Yes _____ No _____
    b. Issue voucher: Yes _____ No _____
    c. Internal facility report and resupply(IFRR)form: Yes _____ No _____
    d. Other : specify _____
3. In how many days did you usually receive your refill for the last reporting period after you submitted the RRF?
    a. One week: Yes _____ No _____
    b. Two weeks: Yes _____ No _____

c. Three weeks: Yes _____ No _____

d. One month: Yes _____ No _____

e. Other: specify _____

For interviewer: Please check the dates of the last report and the date of resupply from PFSA (date from receiving voucher) and document duration gap between report and receipt: _____

4. Are all the recording and reporting forms well designed and easy to fill out? Yes _____ No _____
5. Are the recording forms easy to aggregate in to the RRF? Yes _____ No _____
6. Are the forms available all the time in your facility? Yes _____ No _____
7. Do you receive feedback on your reports? Yes _____ No _____
8. Who receives your reports on regular basis?
    a. RHB or Woreda Health Office: Yes _____ No _____
    b. PFSA: Yes _____ No _____
    c. Other: specify _____
9. If yes, who provides the feedback?
    a. RHB or Woreda Health Office: Yes _____ No _____
    b. PFSA: Yes _____ No _____
    c. Other: specify _____

    For the interviewer: Please check for evidence of written feedback and take note:

    _____

10. Did you receive the HIV/AIDS commodities that you requested at the last reporting period exactly as per the complete list and quantities indicated in your RRF? Yes _____ No _____

    For interviewer: Please check the last report and reconcile request with receipt document; is the response from interviewee correct? Yes _____ No _____ (also included in the checklist)
11. Please let us know if you have any challenge with regards to the LMIS design, forms availability, support from other units, training gaps, or anything related with LMIS?

    _____

    _____

_____

_____

_____

12. What do you suggest to be done to address the challenges you mentioned above?

_____

_____

_____

_____

_____

For the interviewer: for questions 11 and 12, please probe the interviewee o get as much detail as possible and document their response using their own words if possible. Use Amharic and take extra notes on a separate sheet as required.

APPENDIX C

Structured checklist for quantitative data on LMIS performance

Date data collected:
_____

Name of Health facility:
_____

Reportinfg period (MM-MM/YYYY):
_____

Report due date as per schedule:
_____

Report submission date:
_____

No.	List of tracer HIV/AIDS commodities	Unit of measure	Request Vs Resupply during last reporting period		Availability by the time of visit		Available stock by time of visit	
			Requested Quantity	Received Quantity	Yes	No	From SKR	From physical count
1	Abacavir-Lamivudine 60+30MG Tablet							
2	Atazanavir-Ritonavir 300+100MG Tablet							
3	Efavirenz-Lamivudine-Tenofovir disoproxil fumarate 600+300+300MG/tablet							
4	Lamivudine-Zidovudine-Nevirapine 150+300+200MG/tablet							
5	Lamivudine-Zidovudine-Nevirapine 30+60+50MG/tablet							
6	Lopinavir-Ritonavir 80+20MG/ml solution							
7	Tenofovir disoproxil fumarate-Lamivudine 300+300MG/tablet							
8	Nevirapine,100ml, 10MG/ml suspension							

Note to the interviewer: SKR (Stock keping records): Stock or bin cards. Fr report submission date, please refer to the actual delivery date to PFSA. Please do also take notes for any additional information.

Structured checklist to collect data on report completeness and data accuracy

No.	Name of Health facility	Are the forms filled properly?		Are the following data items reported?			Is the arithmetic correct?		Is the report complete and accurate?	
		Yes	No	Consu.	SOH	Losses/adj.	Yes	No	Yes	No
1	Addis Ketema HC									
2	Babile HC									
3	Dechatu HC									
4	Gendegerada HC									
5	Gendekore HC									
6	Goro HC									
7	Melkajebdu HC									
8	Dilchora Referral Hospital									
9	Dire Dawa HC									
10	Haramaya Primary hosp.									
11	Hiwot Fana Hospital									
12	Karamara Referral Hosp.									
13	Legehare HC									
14	Sabian Hospital									

Instructions to the data collector

Collect data for this checklist from the last repport submitted by the facility.B3

Put a tcik mark for the "yes" and "No" colums where appropriate.

Put a tick mark under data items reported on the last report.

HC: Health center

APPENDIX D

ART service providing public health facilities served by Dire Dawa PFSA branch

Sr N	Facility name	Region	Type	Ownership
1	Addis Ketema Health Center	Dire Dawa	Health Center	Public
2	Amirnur Health Center	Harari	Health center	Public
3	Asebot health center	Oromia	Health Center	Public
4	Awubeker Health center	Harari	Health Center	Public
5	Aysha Health center	Somali	Health Center	Public
6	Babile Health center	Oromia	Health Center	Public
7	Bedeno Health center	Oromia	Health Center	Public
8	Boke Health center	Oromia	Health Center	Public
9	Chelenko Health center	Oromia	Health Center	Public
10	Dechatu Health Center	Dire Dawa	Health center	Public
11	Doba Health center	Oromia	Health Center	Public
12	Gendegerada Health Center	Dire Dawa	Health Center	Public
13	Gendekore Health center	Dire Dawa	Health Center	Public
14	Girawa Health Center	Oromia	Health Center	Public
15	Goro Health Center	Dire Dawa	Health Center	Public
16	Gursum health center	Oromia	Health Center	Public
17	Harar Arategna health center	Harari	Health Center	Public
18	Hartieck Health Center	Somali	Health Center	Public
19	Harwacha health center	Oromia	Health Center	Public
20	Hirna health center	Oromia	Health Center	Public
21	Jarso/Ejersa Goro Health Center	Oromia	Health Center	Public
22	Jijiga Health Center	Somali	Health Center	Public
23	Jinela Health Center	Harari	Health Center	Public
24	Karamile Health Center	Oromia	Health Center	Public
25	Kersa Health Center	Oromia	Health Center	Public
26	Kuni Health Center	Oromia	Health Center	Public
27	Melkajebdu health center	Dire Dawa	Health Center	Public
28	Mesela Health Center	Oromia	Health Center	Public
29	Fedis Bokko Health Center	Oromia	Health Center	Public
30	Finkile Health Center	Oromia	Health Center	Public
31	Kamona health center	Oromia	Health Center	Public
32	Kara Health Center	Oromia	Health Center	Public
33	Kurfachele health center	Oromia	Health Center	Public
34	Midega Health Center	Oromia	Health Center	Public
35	Wachu Health Center	Oromia	Health Center	Public
36	Soqa Health Center	Oromia	Health Center	Public
37	Burka health Center	Oromia	Health Center	Public

Sr N	Facility name	Region	Type	Ownership
39	Bisidimo Zonal hospital	Oromia	Hospital	Public
40	Chinagsen Health center	Oromia	Health Center	Public
41	Chiro Zonal hospital	Oromia	Hospital	Public
42	Deder District hospital	Oromia	Hospital	Public
43	Degehabur District Hospital	Somali	Hospital	Public
44	Dilchora Referral hospital	Dire Dawa	Hospital	Public
45	Dire Dawa health center	Dire Dawa	Health Center	Public
46	Erer Gota Health center	Somali	Health Center	Public
47	Garamuleta District Hospital	Oromia	Hospital	Public
48	Gelemso Zonal hospital	Oromia	Hospital	Public
49	Gode Zonal hospital	Somali	Hospital	Public
50	Haramaya health center	Oromia	Health Center	Public
51	Hiwotfana Specialized University Teaching hospital	Harari	Hospital	Public
52	Jugol General hospital	Harari	Hospital	Public
53	Karamara referral hospital	Somali	Hospital	Public
54	Kebridahre Zonal hospital	Somali	Hospital	Public
55	Kelafo Health Center	Somali	Health Center	Public
56	Kombolcha health center	Oromia	Health Center	Public
57	Legehare health center	Dire Dawa	Health Center	Public
58	Micheta health center	Oromia	Health Center	Public
59	Sabian health center	Dire Dawa	Health Center	Public
60	Togochale Health Center	Somali	Health Center	Public
61	Warder District Hospital	Somali	Health Center	Public

APPENDIX E

List of tracer drugs used for the assessment

S.N	Item Description
1	Abacavir-Lamivudine 60+30MG Tablet
2	Atazanavir-Ritonavir 300+100MG Tablet
3	Efavirenz-Lamivudine-Tenofovir disoproxil fumarate 600+300+300MG/tablet
4	Lamivudine-Zidovudine-Nevirapine 150+300+200MG/tablet
5	Lamivudine-Zidovudine-Nevirapine 30+60+50MG/tablet
6	Lopinavir-Ritonavir 80+20MG/ml solution
7	Tenofovir disoproxil fumarate-Lamivudine 300+300MG/tablet
8	NVP,100ml, 10MG/ml suspension

APPENDIX F

List of visited facilities by regions

No.	**Name of Health facility**	**Region/City Administration**
1	Addis Ketema HC	Dire Dawa
2	Babile HC	Oromia
3	Dechatu HC	Dire Dawa
4	Gendegerada HC	Dire Dawa
5	Gendekore HC	Dire Dawa
6	Goro HC	Dire Dawa
7	Melkajebdu HC	Dire Dawa
8	Dilchora Referral Hospital	Dire Dawa
9	Dire Dawa HC	Dire Dawa
10	Haramaya Primary hosp.	Oromia
11	Hiwot Fana Hospital	Harari
12	Karamara Referral Hosp.	Somali
13	Legehare HC	Dire Dawa
14	Sabian primary Hospital	Dire Dawa

APPENDIX G

Sample Stock Keeping Record: Bin Card

Name of Health Facility: _____

Product Name, Strength and Dosage Form: _____

Unit of Issue: _____ **Location:** _____

Maximum Stock Level: _____ **Emergency Order Point:** _____

Average Monthly Consumption (AMC):_____

Date	Doc. No. (Receiving or Issuing	Received from or Issued to	Quantity				Price		Expiry Date	Remarks
							Unit Price			
			Received	Issued	Loss/Adj	Balance	Birr	Cent		

APPENDIX H

Sample Transaction Record: Report and Requisition Form for Program Commodities

B. Report and Requisition Form for Program Drugs

Health Facility: _____

Region: _____ Zone:_____
Woreda:_____

Supplying Branch:_____

Maximum Stock Level = 4 Months of Stock

Reporting Period: From:_____To: _____

Emergency Order Point = 0.5 Months of Stock

SN	Product Description	Unit of Issue	Report Part							Requisition Part		
			Beginning Balance	Quantity Received	Losses/ Adjustments	Ending Balance		Calculated Consumption	Days Out of Stock	Maximum Stock Quantity	**Quantity Needed to Reach Max**	Quantity Ordered
						DU	Store					
			A	**B**	**C**	**D**	**E**	**F = A + B +/- C – D –E**	**F**	**G = (120*F) /(60 – F)**	**H= G-D-E**	
1												

Products with shelf life ≤ 6 months (S/No, Quantity and Expiry date):

Remarks:

Completed by:_____ Signature:_____
Date:_____

Verified by:_____ Signature:_____
Date:_____

Approved by:_____ Signature:_____
Date:_____

DECLARATION

I, Daniel Taddesse Teklemichael, hereby submit my MBA Thesis for oral defence, entitled **Ethiopian public sector pharmaceutical logistics information management system: a cross-sectional assessment in selected anti-retroviral service providing institutions** and truthfully declare that the above thesis is a product of my original research investigation. I further confirm that it has not been submitted either in part or in full for any Degree.

Signed on this day of _____.

Daniel Taddesse