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ADDIS ABABA UNIVERSITY
CHALLENGES IN IMPLEMENTING INTEGRATED
PHARMACEUTICAL LOGISTICS SYSTEM AT
ALERT HOSPITAL –ADDIS ABABA

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**CHALLENGES IN IMPLEMENTING INTEGRATED PHARMACEUTICAL LOGISTICS
SYSTEM (IPLS) AT ALERT HOSPITAL –ADDIS ABABA**

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DECLARATION

I the undersigned, hereby declare that the work which is presented in this thesis entitled ***“CHALLENGES IN IMPLEMENTING INTEGRATED PHARMACEUTICAL LOGISTICS SYSTEM (IPLS) AT ALERT HOSPITAL –ADDIS ABABA”*** is the original work of my own efforts and done under the guidance of Matiws Ensermu (PhD).

And that all the sources of materials used for the study have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other university for the purposes of earning any degree.

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Endorsement

This thesis has been submitted to Addis Ababa University School of Commerce Graduate Studies for the examination with my approval as a university adviser

Advisor: Matiwos Ensermu (PhD)

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List of Acronyms & Abbreviations

AIDS	Acquired Immune Deficiency Syndrome
EHSTG	Ethiopian Hospital Services Transformation Guideline
EPSA	Ethiopian Pharmaceutical Supply Agency
FMOH	Federal Ministry of Health
IFRR	Internal Facility Report and Resupply Form
HCIMS	Health Commodities Information Management system
HIV	Human Immuno Virus
ICT	Information Communication Technology
IPLS	Integrated Pharmaceutical logistics system
IT	Information Technology
JSI	John Snow Inc.
LIAT	Logistics Indicator Assessment Tool
LMIS	Logistic Management Information System
MCH	Maternal and Child Health
MSH	Management Science for Health
NCD	None Communicable Diseases
PFSA	Pharmaceutical Fund and Supply Agency
RDF	Revolving Drug Fund
RHB	Regional Health Bureau
RRF	Report and Requisition Form
SCMS	Supply Chain Management System
SD	Standard Deviation
SOP	Standard Operation Procedure
STG	Standard Treatment Guideline
TB	Tuberculosis
USAID	United States Agency for International Development
WHO	World Health Organization

Abstract

Access and availability of essential pharmaceutical services play significant role in ensuring better health for the population. Implementation of integrated pharmaceutical logistics systems (IPLS) requires use of LMIS forms and records. The study aims at assessing challenges in IPLS implementation at ALERT hospital.

The study used eight research questions that are answered as a result the study. In this study descriptive type of research was used with mixed method approaches where qualitative and quantitative data were collected in relation with challenges of implementing IPLS at hospital level using structured questionnaires and different secondary records and documents. The collected data were analyzed using descriptive statistics and secondary documents and records were also reviewed and analyzed. Detailed results presented in this paper on key IPLS implementation indicators. This study assessed challenges about the availability and use of quality LMIS formats and records. The study explored barriers in human resources management including improving staff capacity, on how to complete the forms and records and use technology. This study assessed the challenges related with infrastructure, finance, and application of regulatory policies and procedures in IPLS implementation. The study looked in to challenges associated with stock availability and storage conditions of pharmaceutical commodities and supplies at ALERT hospital. Human resources found to be one of the critical challenge in the IPLS implementation that include shortage of staff, lack of training on pharmaceutical logistics, and there is no mechanism in place to address attrition and enhance motivation. More efforts and resources should be geared towards addressing financial, infrastructural and technology related challenges that affect IPLS implementation. ALERT hospital still using paper based LMIS and pharmaceutical logistics efforts are not yet linked with health information management system that captures and reports services data. More attention should be given to improve LIMS data use and its quality. It was also found that the management of the hospital should address infrastructural issues around the store rooms including renovations and expansion.

Key words: *pharmaceutical logistics, implementation, challenges, technology, infrastructure*

CHAPTER ONE

1. INTRODUCTION

This chapter introduces what has been done around pharmaceutical logistics and how IPLS supports the health system and the reason why this research is important.

1.1 Background of the study

The Federal Ministry of Health (FMOH) has been working to ensure an efficient and high-performing healthcare supply chain that ensures equitable access to affordable medicines for all Ethiopians. Recently, significant progress has been made, although various challenges remain, including an inadequate supply of quality and affordable essential pharmaceuticals, poor storage conditions, and weak stock management, which has resulted in high levels of waste and stock outs. To address these challenges, the FMOH initiated a comprehensive supply chain strategic planning process; this led to the creation of the Pharmaceuticals Fund and Supply Agency (PFSA) in 2007 (PFSA 2014). To address these challenges, the FMOH initiated a comprehensive supply chain strategic planning process, emphasizing the integration of all products into one supply chain. In late 2006, the Ministry approved the Pharmaceutical Logistics Master Plan (PLMP); in 2007, the PFSA was established by proclamation. The agency mandate is to “avail affordable and quality pharmaceuticals sustainably to all public health facilities and ensure their rational use.” PFSA began active implementation of its new mandates in early 2009. In 2009, to execute this mandate, PFSA, in partnership with its support partners—the USAID | DELIVER PROJECT, Supply Chain Management Systems (SCMS), and others in the sector— developed and began implementing the Integrated Pharmaceuticals Logistics System (IPLS). Prior to the beginning of IPLS, various health programs—including family planning, HIV and AIDS, tuberculosis (TB), and malaria—used their own vertical logistics systems to deliver medicines.

While individual programs helped in the short term, gaps remained and the vertical systems were not sustainable. With the introduction of IPLS, PFSA established an integrated health commodity supply chain that would include all health program commodities; it would also connect all levels with accurate and timely data for decision making. To prepare health facilities for implementing the IPLS, PFSA—in collaboration with partners— developed a standard training curriculum for the new process. Through training-of-trainers (TOTs), 200 technical staff from PFSA, the Regional Health Bureaus (RHBs), and other logistics partners learned how to deliver the IPLS training; to date, almost 10,000 health professionals, from all nine regions and two city administrations, have been trained by PFSA and its partners. (Shewarega Abiy, Paul Dowling et. al, 2015)

To reinforce the training, supportive supervision visits were made to health facilities; essential reference materials, including standard operating procedures (SOPs) and standard recording and reporting forms, were printed and distributed (PFSA 2015). PFSA with the USAID|DELIVER PROJECT and the Systems for Improved Access to Pharmaceuticals and Services (SIAPS) project

jointly upgraded nearly 450 health facility stores with shelving and warehouse equipment, while SCMS supported PFSA with racking and equipment for 10 newly constructed warehouses. Using a phase-based approach, IPLS is now implemented in most of the public health facilities in the country. Phase I-antiretroviral sites started implementing the IPLS in FY2011; phase II facilities—preventing mother-to-child transmission sites, in FY2012; and phase III facilities-smaller health centers-started IPLS in FY2013. Routine monitoring reports show that IPLS is improving information recording and reporting, storage and distribution systems, as well as the availability of essential commodities at SDPs (Shewarega Abiy, Paul Dowling et. al, 2015)

Still more has to be done to implement and improve IPLS at hospital level in the country. Assessment done in 2014, in 17 Federal and Addis Ababa City Government hospitals, which are supposed to give tertiary level of care, revealed that the availability of key medicines varies significantly among hospitals. The performance of both public and private importers in supplying medicines in response to hospital requests was poor (44.7%). The availability of key medicines at the dispensaries of these hospitals at the time of visit ranged from 33.3% to 100%. This shows the need to work hard to ensure the continuous availability of needed pharmaceuticals at these referral hospitals, including pharmaceuticals used for the management of Non-Communicable Diseases (NCD) (FMOH 2015). This study assesses the challenges on IPLS implementation at hospital level in ALERT and proposes possible strategies to overcome the challenges.

1.2 Statement of the problem

Effective supply chains must be flexible and responsive to the changing dynamics in the marketplace, in manufacturing and technology, and in consumer expectations. This is also true for public health supply chains, which must respond and adapt to dynamic environments. But, change must be planned and based on today's demands and tomorrow's opportunities and risks. (USAID DELIVER 2009). The Federal Ministry of Health (FMOH) has been working to ensure an efficient and high performing healthcare supply chain that will ensure equitable access to affordable medicines for all Ethiopians. In past years, significant progress has been made, although various challenges remain— an inadequate supply of quality and affordable essential pharmaceuticals, poor storage conditions, and weak stock management—resulted in high levels of waste and stock outs. To address these challenges, the FMOH initiated a comprehensive supply chain strategic planning process, which led to the Pharmaceuticals Fund and Supply Agency (PFSA) being established in 2007, now it is called Ethiopian Pharmaceutical Supply Agency (EPSA). In 2009, as part of a major intervention to improve the supply chain situation in the country, EPSA, in partnership with its support partners—the USAID | DELIVER PROJECT, Supply Chain Management Systems (SCMS) –Management Sciences for Health (MSH), and others in the sector—developed and began implementing the Integrated Pharmaceuticals Logistics System (IPLS). To help health facilities effectively implement IPLS, EPSA and partners designed various interventions, including (1) designing and implementing electronic- and paper-based logistics management information systems (LMISs), (2) building the logistics capacity of FMOH and EPSA staff at all levels, (3) supporting facilities and warehouses through improved infrastructure, (4) monitoring, and (5) evaluation and

supportive supervision for facilities. Still more has to be done to implement and improve IPLS at hospital level in the country. Assessment done in 2014, in 17 Federal and Addis Ababa City Government hospitals, which are supposed to give tertiary level of care, revealed that the availability of key medicines varies significantly among hospitals. The performance of both public and private importers in supplying medicines in response to hospital requests was poor (44.7%). The availability of key medicines at the dispensaries of these hospitals at the time of visit ranged from 33.3% to 100%. This shows the need to work hard to ensure the continuous availability of needed pharmaceuticals at these referral hospitals and this study will identify key challenges and possible strategies to overcome them that can be maintained and used to improve IPLS implementation at hospital level.

Proper implementation of IPLS helps to reduce stock outs, delay in delivery, drugs expiry, and also improves product availability. IPLS fulfills the six rights of supply chain management, which are availing the right products to patients, in the right quantity, of the right quality, at the right place, at the right time and for the right cost and hence better service. (PFSA 2015). Studying IPLS implementation is critically important to identify challenges, lessons learned and develop strategies to overcome the challenges.

According to USAID/DELIVER, 2015 survey in Ethiopia, with IPLS implementation though there are improvement in medicine availability, but still there is a need to further study and identify challenges about stock outs. Generally the following key areas are important:

- Human resource is key in IPLS implementation; the study will assess challenges and practices around availability of staff, training of staff in pharmaceutical logistics and related supervision.
- There is lack of standard system needed for documenting and reporting expiry data from facilities (*Shewarega Abiy, Paul Dowling et. al, 2015*). This study will assess the challenges and related practices about tracking expiry information at the health facility-level.
- IPLS implementation in Ethiopia needs more focused financial, managerial, technical and infrastructural supports (*Shewarega Abiy, Paul Dowling et. al, 2015*). There are challenges that should be identified and addressed in the area of infrastructure, financial allocation and utilization as well as use of technology to enhance IPLS implementation.
- The IPLS implementation requires use of LMIS forms and records. This study assessed challenges about the availability and use of quality LMIS formats and records. The study looks at barriers in improving staff capacity, on how to complete the forms and records and use technology.
- The study looks in to challenges associated with stock availability and storage conditions of pharmaceutical commodities and supplies at ALERT hospital

1.3 Basic Research Questions

This study is designed to answer the following research questions:

- What are human resources challenges in Integrated Pharmaceutical Logistics System (IPLS) implementation at ALER hospital?
- What are financial barriers that affect IPLS implementation of the hospital?
- What are infrastructural related bottlenecks that affect the hospital's IPLS implementation?
- What are the technology related challenges in IPLS implementation at ALERT hospital?
- What are policy and procedure related challenges in IPLS implementation at the ALERT hospital?
- What are the challenges in applying Logistics Management Information system (LMIS) at ALERT hospital?
- What are the challenges of storage conditions and stock availability?
- What are the logistics management practices are applied in Integrated Pharmaceutical Logistics System (IPLS) at ALERT hospital.

1.4 Objectives of the study

1.4.1 General Objective of the study

To assess the challenges in the implementation of the Integrated Pharmaceutical Logistics System (IPLS) at ALERT hospital in Ethiopia

1.4.2 Specific objectives of the study

The specific objectives of the study are:

- To assess human resources challenges in IPLS implementation of ALERT hospital
- To describe the hospitals' financial challenges of IPLS implementation
- To analyses infrastructural challenges that affect IPLS implementation at ALERT hospital
- To examine the hospitals' technology challenges in IPLS implementation
- To assess challenges affecting LMIS application at ALERT hospital
- To describe challenges of the hospital in the IPLS related policy and procedures
- To assess challenges in relation to stock availability and storage conditions of the hospital
- To identify the most important practices of pharmaceutical of logistics in relation to IPLS implementation

1.5 Definition of Terms and Concepts

The Integrated Pharmaceutical Logistics System (IPLS)- is one of the major interventions to create a strong, unified, healthcare supply chain, to connect all levels of the supply chain, and to provide accurate and timely data for decision making. (PFSA 2009)

Implementation- is the carrying out, execution, or practice of a plan, a method, or any design, idea, model, specification, standard or policy for doing something, in this case to rollout IPLS at the hospital level

Challenges- is something that needs great mental or physical effort with additional inputs in order to be done successfully and therefore tests abilities and scans internal and external factors.

Human resources challenges – are those challenges including, number of staff required for a task, lack of training to accomplish tasks with the required quality and on time, lack of supervision or coaching supports, lack of motivation and retention mechanism

Infrastructure challenges – barriers associated with a structure; material, or economic base of a society or an organization.

Financial challenges – bottlenecks in relation with availability, accessibility and proper utilization of financial resources to accomplished planned activities.

Technology challenges – barriers in relation with availability, skill development and utilization of technology in the implementation of a program

Legislative challenges – bottlenecks associated with availability and application of regulatory policy and procedures in relation with pharmaceutical logistics

A logistics management information system (LMIS)- is a **system** of records and reports – whether paper-based or electronic – used to aggregate, analyze, validate and display data (from all levels of the **logistics system**) that can be used to make **logistics** decisions and **manage** the supply chain. (USAID/DELIVER ,2011)

Pharmaceutical logistics- is the task of placing the right drugs and medical supplies, in the right quantities, in the right conditions, at the right health service delivery points, at the right time, for the right patients/users and for the right cost. (USAID/DELIVER, 2011)

1.6 Significance of the study

This study is critically important for hospital’s pharmaceutical management, its staff and most importantly for the senior leadership of the hospital as well as policy makers at different level of the Ethiopian health system. The outcomes of this study will help those in the field recognize challenges in relation to IPLS implementation at hospital level that needs the attention of all concerned.

This study assessed challenges and practices in applying IPLS at hospital level and identifies key issues to improve IPLS implementation for those who work on pharmaceutical logistics supply chain and policy makers within the pharmaceutical sector in Ethiopia.

1.7 Scope of the Study

This study focuses on identifying challenges with some key practices in applying IPLS at ALERT hospital. Pharmacy services at ALERT hospital is one of the core services which is responsible in providing medications with standardized pharmacy service and ensure the accessibility of safe, efficacious and quality pharmaceutical products to the public as well as protecting their interest via enforcement of relevant legislations, and ensuring rational use of medicines by both healthcare

providers and patients. IPLS implementation considered important to improve access, availability and quality of pharmaceutical services at the hospital.

IPLS challenges are studied based on recent trends in pharmaceutical logistics taking five challenge categories proposed by the UN Commission on Life-Saving Commodities for Women and Children (September 2012), as well as Neil(2011). The logistic practices will be also studied and classified into five constructs that are adapted from Frazelle (2002) and USAID DELIVER (2011).

CHAPTER TWO

2. REVIEW OF RELATED LITERATURES

2.1 Introduction

This research focuses on challenges on implementation of an initiative, named as Integrated Pharmaceutical Logistics System (IPLS), to help improve the effectiveness and efficiency of the pharmaceutical logistic performances at facility level. Specifically, the main objective of this research is to assess the challenges in the implementation of the (IPLS) at ALERT hospital in Ethiopia. It has also an objective to review pharmaceutical logistics practices at tertiary hospital level, by taking ALERT hospital as an example. IPLS is an Ethiopian initiative and getting more specific research articles seems to be a bit challenging. This research will consequently be using literatures on the general pharmaceutical logistic systems and some other IPLS literatures, even though they are small in number.

The snapshot assessment for the literature indicated that more IPLS related research have been done in the form of rapid assessments involving facilities, but not necessarily tertiary level health care outlets like ALERT comprehensively and also focused on specific vertical programs like HIV/AIDS related pharmaceutical logistics. This research will look the literatures on key issues on healthcare supply chain management and integrated logistics practices and capacity building of health staff in pharmaceutical logistics.

2.2 Theoretical Researches

2.2.1 Healthcare Supply Chain Management

During the last decade, the health care sector has changed rapidly. Due to increased competition, the growing influence of patient-associations and a necessity to deliver health services in a more efficient and effective way, many health care organizations have started projects in the area of patient logistics, clinical pathways, data interchange and vertical integration (J. de Viries & R. Huijsma 2011). Moreover, the redesign of hospital services and the implementation of integrated care programmes are frequently addressed as being critical strategies to decrease resource utilization and improve health care quality. Clearly, not only in practice but also from a theoretical point of view the area of health service operations has changed significantly. During the last ten years an impressive number of studies originated in different disciplines like economics, organizational behavior and logistics have drastically enlarged our knowledge regarding the health care sector. From a supply chain management perspective; however, our body of knowledge regarding the health care sector still seems to be rather fragmented (J. de Viries & R. Huijsma 2011). Although many health care organizations have recognized the importance of adopting supply chain management practices, the application of techniques, methods and best practices originally developed in an

industrial setting clearly is often problematic. Without doubt, the complexity of the technologies being used, the existence of multiple stakeholders, a dynamic internal and external environment and distinctive characteristics of health service operations often impede a straight forward application of industrial oriented supply chain management practices. The many problematic projects aiming at implementing integrated planning systems regarding patient flows and establishing partnership relationships between different health service organizations are a clear indication of the difficulties health care organizations are facing when adopting a supply chain management philosophy. (J. de Viries & R. Huijsma 2011)

Providing quality of health care service at a reasonable cost and rationalizing resources should never be at the expense of a quality performance, which requires efficiency at both the planning and executing phases, personal and professional competency and finally an internally structured philosophy to deal with external parties. More accurately, the search for more resources requires the development of public relations with the health sector as a whole. This personal relation requirement is evident in the vague and complicated administrative organizations. The health system, in general, is vague and complicated, requiring tremendous effort for the promotion of administrative quality. This demonstrates the great importance of supply chain management and its role in ensuring the quality of medical services. (Omer R, *et al* 2013). African Journal of Business Management, 4(12), 486-499.) also stated that supply chain management (SCM) includes the management of product, information, and financial flow from the source of supplies to the manufacture and assembly of the product right to the delivering of the final product to consumers. The majority of research on SCM is from the traditional manufacturing sector; however, there have been several attempts to examine its applicability in the services sector (African Journal of management cited on Omer R, *et al* 2013) . Hence the study focused on the impact of supply chain management on the quality of health services through an applied study on the sector of private hospitals in Jordan and through review of theoretical literature which dealt with the subject on the one hand, and to explore the views of those concerned in this regard, officials from the supply and procurement Jordanian private hospitals on the other. The healthcare supply chain is composed of three major players at various stages, namely, producers, purchasers, and healthcare providers. Producers include pharmaceutical companies, medical surgical products companies, device manufacturers, and manufacturers of capital equipment and information systems. Purchasers include grouped purchasing organizations (GPOs), pharmaceutical wholesalers, medical surgical distributors, independent contracted distributors, and product representatives from manufacturers. Providers include hospitals, systems of hospitals, integrated delivery networks (IDNs), and alternate site facilities (Toba S. *et al* 2008). Within

healthcare sectors, quality management initiatives have been raised and hospitals focus on how quality care can be delivered in order to influence outcomes with respect to hospital performance and patient satisfaction . A developing trend in the healthcare industry is the outsourcing of supply data management to professional supply data service providers (Toba S. *et al* 2008) it is really important to have a comprehensive study to identify key challenges and opportunities in relation to health care supply chain and pharmaceutical logistics at hospital level, has addressed some issues in hospital supply chains and provided suggestions to overcome the challenges.

2.3 Empirical Researches

2.3.1 Integrated Logistics Systems

Logistics is defined as the process management of movement of goods and / or persons and activities supporting these processes in systems in which they occurred. It follows that the essence of logistics management is to link the processes of movement. That is why logistics is now included in the core business as for example factors of value added. Efficiency of movement processes, use of modern IT tools in controlling these processes, economics of operation and cost reduction are necessary conditions to maintain the market position. The most important task of logistics at the operational level is optimization of the five basic factors: time, space, quantity, size range and information. Thus, regardless of the substance of the concept of logistics, it should be able to answer for a string of questions: what? To whom? Where? When? How much? How? The answers of these questions about the client - manufacturer, are in fact essential for the success of any enterprise (J. Fras' , P. Romanow 2014).

Logistics, which have been started, it is development of the configuration: production transportation-storage-stocks, constantly expanding the sphere of their interests. Today - on the basis of logistics - you can now build an integrated business management system and determine the strategic directions of the growth of its effectiveness. Logistics also entered into the field of quality and reliability. Now also increasingly unites its objectives with the strategic and operational management of the company (Slowinski B. 2009)

ILS is exponentially more complex than managing various supply chains vertically; it may take some time before commodity availability can be guaranteed in the new system. A study conducted in Nicaragua showed that, the supply chain is strengthened throughout the integration process; commodity availability may not automatically improve because of the integrated system is exponentially more complex than managing various supply chains vertically (Oslon N , *et al* 2008) . In contrast another study conducted in Tanzania on integrated logistic system (ILS) evaluation conformed that 75% of the respondents confident to in their ability to implement the system. Among the 1,181 participants which were trained on the ILS each hospital were send up to 4 participants and each health center also send up to 3 participants. 82% & 67% of facilities had stock cards/bincards and updated regularly respectively (Johnnie A. *et al* 2005)

2.3.2 Human Resources in Logistics Management

Globally the logistics industry has emerged as a significant growth sector in most countries (Bowersox *et al*, 2002; Kam *et al*, 2010). The purpose of logistics is the supply of service/product to the demander / demanding unit at the right time, with the right quantity, in the right quality, with the right cost and at the right place (Bowersox and Closs, 1996; Lin and Hui, 2009). It deals with strategy and coordination between marketing and production as well as factors relating to demand management and forecasting. At its essence, logistics deals with satisfying the customer needs (Lin and Hui, 2009). Although effective Human Resources Management policies have been emphasized internationally as a key element for the success of an organization' s goals, its importance has been frequently undermined even in thriving logistics and supply chain service markets.

The present scenario of Logistics & Supply Chain Management sector is in dire need of a vision and strategic leadership. Many human resources issues and challenges, haunting the sector, could be addressed by connecting its scattered structure and by growing awareness of supply chain occupations, and working with educational institutes at all levels and Schools of Business Management to develop supply chain programming that addresses the sector's growing needs; current and future human resources challenges. These institutions need to assess technologies, innovations and conditions that have the utmost impact on the Logistics & Supply Chain Management sector, and to develop a planned human assets action plan for industry and academia. An analysis of the Human Resources issues in the Supply Chain Management reveals that there is a limited stock of skilled employees; there is need to develop skill sets to manage evolving technologies; there is need to overcome a common lack of awareness and understanding of the Supply Chain Management. Students, new entrants and those in career shift do not enter the Supply Chain Management by choice, usually by accident, simply because they are not aware of its existence. In order to draw, cultivate and preserve the talent, in the logistics and Supply Chain Management, it must race for attention in an atmosphere where other services and industries have already, pledge awareness and recruitment campaigns to address their talent deficiency. Attraction and retention of talent, particularly knowledgeable workers, are important to logistics management ability to focus on improvements. This is of paramount importance, as logistics performance directly influences the costs and effectiveness of industry on a national and global scale (Bowersox and Closs, 1996; Lin and Hui, 2009).

In recent years Ethiopia has been making a concerted effort to address the need for developing health supply chain management. For example, the country has established an infrastructure and developed and implemented education and training within the area, for example a curriculum review of the undergraduate pharmacist program to include Health Supply Chain (HSC) management and standardized in-service training. This finding is consistent with analyses of human resources-related activities conducted by Gavi, the Global Fund and the World Bank, whose most commonly supported activity in developing countries is short-term and in-service training (Marko Vujicic, *et al* 2011). Studies conducted in other countries show that pre-service training is cost effective, and often structured and sustainable; investing in expanding pre-service training and institutionalizing it in the curriculum of the country has been shown to alleviate the shortage of adequately trained supply chain management professionals or practitioners due to attrition and migration (USAID/DELIVER, 2013). Perhaps most importantly, this study shows that there appears to be a change of attitudes in

Ethiopia on all levels including in government, where human resources in HSC management is a focus and its importance acknowledged. However, the results of this study point to several important factors and areas that are essential for further development and sustainability. There would appear to be a continuing lack of a strategy to improve the job and career structures necessary for sustaining the engagement of currently employed personnel. Staff mobility is reported to be high in many areas, for example moving from public to private sectors and from rural to urban areas.

Although the opportunities for training and education have increased in Ethiopia, the question remains as to whether these approaches are in fact efficient. In particular, the fact that pharmacists who are apparently not adequately trained in HSC management hold HSC management positions at higher levels is cause for concern. This means that people specifically trained in supply chain management, but not necessarily knowledgeable about medicines, are not filling strategic positions. These developments have raised the question of 'who' should be managing HSCs. On the one hand, joint FIP/WHO good pharmacy practice outlines that pharmacists have a role in obtaining, procuring, storing and distributing and ensuring rational use of medicines (FIP/WHO 2011). On the other hand, the International Association of Public Health Logisticians and People that Deliver advocate that the supply chain should be professionalized. Depending on the local context, those who are engaged in the actual work should be equipped with the right competency for the HSC management activities they undertake. The recent expansion of local health centers in Ethiopia makes in-service training of staff with different backgrounds important and a priority intervention. (Sporrong S.K., *et al* , 2016)

2.3.3. Infrastructure Related Barriers in Health Care Logistics

Infrastructure is defined as part of a structure, material, or economic base of a society or an organization. Therefore, infrastructure can be seen as the basic structure that fosters the good performance of services like health care. In this sense, for an institute to have a good logistics infrastructure system, constant investments from both public and private sectors are needed (Madu O.,2017).

Despite there is a great potential for healthcare logistics to grow, there are a few areas where gaps do exist and which ends up as a challenge for its advancement. Some of the major challenges that are faced by the healthcare industry are as follows: One of the biggest challenge that healthcare industries are facing is distribution of time dependent and temperature sensitive drugs such as dermatological therapies, birth control pills, anti-depression drugs, neuro stimulating drugs and others are mostly heat sensitive by nature and may cause adverse reaction if consumed. Hence develop a temperature controlled carrier maintaining a temperature range of 2 °C to 8 °C has become little difficult. Weak distribution infrastructure is another challenge in healthcare logistics. The distribution network is high unorganized and the infrastructure employed is not having sufficient facilities to store and distribute the required drugs on time and on requirement basis. (Shetty A. 2015)-

A poorly understood and often unappreciated process, logistics accounts for a sizeable portion of a hospital's operating budget. Studies have shown that from 30% to 46% of hospital expenses are invested in various logistical activities, and that almost half of the costs associated with supply chain processes could be eliminated through the use of best practices. (Étienne Poulin 2007)

In hospitals, logistics cover not just support services such as purchasing, stores and the pharmacy, but also health care services such as patient care units and operating rooms. Many activities that could be carried out by support personnel are often on the list of duties performed by health care personnel. The result is that the internal supply chain within a hospital is often highly fragmented. (Étienne Poulin 2007).

A study in Singapore identified that hospitals have at least one in-house central warehouse. These hospitals have implemented System Application Products (SAP) systems to monitor the stock levels between individual storage areas and the central warehouse. The study also found that seven hospitals do not share a common central warehouse for pharmaceutical and non-pharmaceutical products. A reason for this could be that pharmaceutical and non-pharmaceutical products need to be handled differently and are generally managed by different departments. Logistics in hospitals: a case study of some Singapore hospitals-(Xiong Z. and Pokharel S. 2007)

According to Frazelle (1996), warehousing adds up 2%-5% of the cost of sales in a corporation. Bloomberg *et al.* (1998) estimate that warehousing contributes to about 10 percent of total integrated logistics costs. As a result, the efficiency of warehousing operations in terms of cost and service becomes a crucial element of effective logistics management.

In general, higher IT investments mean better logistics services. A Singapore case study indicated that almost half (47%) of the warehouses spend 5-10 % of their annual revenues for IT investment. In addition, 13% of the warehouses spend more than 10% of their annual revenues on IT. These findings are closely related to Rayner (1995) who found that IT expenditure accounts for as much as 9% of the revenues in some industries. (Nanang *et al* 2003)

Globally, there is a growing concern in the medical and environmental protection communities regarding the current handling and disposal methods for pharmaceutical waste and other waste materials from health facilities. For example, in Ghana, one study reported that pharmaceutical waste that is of the hazardous waste class in the hospital was mostly collected together with general hospital waste) (Sasu *et al.*, 2011). Proper pharmaceutical waste management is a highly complex new frontier in environmental management for healthcare facilities. It needs trained persons and equipment for collecting, treating and disposal of pharmaceutical wastes. Practically, however, pharmacists and nurses generally do not receive training on hazardous waste management during their academic studies and safety and environmental services managers may not be familiar with the active ingredients and formulations of pharmaceutical products (Practice Green Health, 2008). Another survey made in South Sudan showed that only 19% of health facilities have pharmaceutical waste disposal equipment (GH Tech, 2011)

2.3.4 Technology Challenges in Logistics Management

All logistics providers have to maintain efficient handling of orders and the information, financial and material flows. Handling of information and orders had been largely a paper-based practice until the early eighties (Handfield and Nichols 1999). This was mostly due to the lack of competent technologies of efficient processing of large data. It is obvious a paper-based system is slow, costly and error-prone and thus should be improved by introducing IT. The proper use of IT in logistics industry not only facilitates the information flow but also improves payments and real time access to data in parallel to products' movement. Gattorna and Berger (2001 cited on Nanang *et al* 2003) have reported that, if IT can be adopted, there would be a potential saving as high as 50% on logistics costs. This is the driving force for logistics companies to implement IT according to their specific work nature.

Hospital flows have also benefited from the technological progress of information systems and the emergence of new IT tools with high benefit (Radio Frequency Identification, Enterprise Resource Planning, mobile application, etc.). Health organizations have tried to seize the opportunity offered by ICTs to move towards a new management based on the control of financial, administrative and medical aspects. Healthcare organizations oftentimes cannot access supply chain data to develop actionable steps to increase efficiency. The lack of health IT to gather and analyze supply chain data can lead to billions in wasteful spending. (LaPoint J. 2017)

In relation to inventory management system, even though the current market is working in the modern era of computerization, still there are many healthcare centers and institutes which are not configured towards integrated system of supply chain management. They don't have a proper tracking mechanism to detect the consumption and expiry of products. Which is making the healthcare industry weak in its inventory management and inefficient in reaching customers on right time (Shetty A. 2015).

According to Yury Popov , developing and implementing systems are perceived to be expensive and time consuming preventing small/medium companies from investing in technological development. He also added that Unwillingness to adopt new technologies is another key challenge, in some industries, management may not be ready to adapt to the changing technological environment. Some companies continue to use manual processes for managing logistics processes where technology solutions can help. Implementing technology often means changing employee habits which can be difficult. Experience shows that majority of companies can't monitor their logistics costs or are locked into contracts or systems that prevent them from choosing the best providers for particular needs or destinations. It's not surprising with mountains of data from numerous shipments, and without the right skills in the team, it's hard to analyze the data, the options and take the appropriate action. The industrial revolution has been replaced with the technology revolution. To be competitive and win future market share, companies must be part of this revolution. The first step is to recognize that there are barriers to overcome for small/medium businesses and start examining the options to be more cost effective and efficient. (Popov Y. 2018)

2.3.5 Legislative and logistics management

Policies and procedures are critically important for pharmaceutical logistics to deliver medicines in the correct quantity, with the specified quality but the currently available literature have hardly discussed the quality aspects during pharmaceutical distribution management. (Jaberidoost M. 20016).

According to Vipula R., the medication waste disposal via normal sewage systems was the main method practiced in most of the countries and that the situation was much worse in developing countries. Return of unused medicines to pharmacies, which is considered to be the best method, was successfully practiced in some developed countries with established systems. Lack of proper mechanism to handle medication waste seems to be the main reason behind substandard medication waste management in developing countries. A simple model for the disposal of medication waste taking into consideration the unique challenges and infra-structure issues in developing countries. International level policy and funding support, national level policy and unbiased financial allocations, institutional level comprehensive programmes according to the local requirements and most importantly the public support will make medication waste management programme a success. (Vipula R 2003)

2.3.6 Logistics management information system

Countries need to have a reliable and effective logistics management system for managing medicines, vaccines and other health commodities like gloves or malaria nets. A supply chain system should make sure that health commodities can be effectively managed, distributed and kept in a good condition. A reliable system can also minimize the waste of commodities and prevent stock outs at health facilities.

A Logistics Management Information System (LMIS) is an information system that handles data collection for the management of a logistics system, for example data about health commodities (USAID DELIVER PROJECT, Task Order 4, 2014). Thus, while an HMIS is built to collect and report on health service routine data, an LMIS handles health logistics data with the purpose of managing a health commodity supply chain.

Because a pharmaceutical logistics system cannot function effectively without timely, accurate LMIS data, the LMIS is an essential tool. It provides personnel responsible for pharmaceutical logistics with the information they need to react or, more important the information they need to anticipate demand (Shawkey & Hart, 2003). To be effective, LIMS should be equipped with adequate trained staff, forms, equipment, and facilities. However, some studies showed that there is a problem in this regard (MOHSW, 2008; GH Tech, 2011). LMIS is an important tool in inventory management, therefore accurate record keeping is essential. A study in Tanzania reported 8% and 72% recorded balance that was less and greater than the physical count (Kagashe & Massawe 2012). Another study done in Tanzania showed that often neither minimum nor maximum levels were defined (MOHSW, 2008). To the worst, in South Sudan, only 27% of the assessed health facilities were reported to fill forms accurately (GH Tech, 2011).

2.3.7 Logistics Practices in Pharmaceutical Sector

2.3.7.1 Serving customers:

Everyone who works in logistics must remember that they select, procure, store, or distribute products to meet customer needs. Storekeepers do not store drugs just for the purpose of storing; they store products to ensure that commodity security exists for every customer to obtain and use the health commodities when they need them. In addition to serving the needs of the end customer the customer seeking health services—each person in the process is also serving the needs of more immediate customers. Storekeepers provide customer service when they issue medicines to the health facility, and the central medical stores provide customer service when they issue commodities to the district. The logistics system ensures customer service by fulfilling the six rights. Each activity in the logistics cycle, therefore, contributes to excellent customer service and to ensuring commodity security. (USAID/DELIVER, 2011). The federal ministry of health developed hospital service standard guidelines that require hospitals to conduct regular client surveys and identify areas that the hospital management should act up on. These surveys should also be complemented and confirmed by other client surveys to be done by team of experts from FMOH and RHBs bi annually or annually at each hospital (FMOH’s HSTG, 2016).

2.3.7.2 Product selection:

Careful selection of a limited range of essential medicines results in a higher quality of care, better management of medicines (including improved quality of prescribed medicines), and more cost-effective use of health resources (WHO 2002). In any health logistics system, health programs must select products. In a health logistics system, a national formulary and therapeutics committee, pharmaceutical board, board of physicians, or other government-appointed group may be responsible for product selection. Most countries have developed essential medicine lists patterned on the World Health Organization (WHO) Model List. Products selected for use will impact the logistics system, so the logistics requirements must be considered during the product selection (USAID/DELIVER, 2011).

2.3.7.3 Quantification:

After products have been selected, the required quantity and cost of each product must be determined. Quantification is the process of estimating the quantity and cost of the products required for a specific health program (or service), and, to ensure an uninterrupted supply for the program, determining when the products should be procured and distributed. See the suggested reading list at the end of the handbook for sources of additional information about quantification of health commodities. (USAID/DELIVER, 2011)

2.3.7.4 Procurement:

Procurement is the process of acquiring drugs from private or public suppliers. Drug availability and costs are very much dependent on the effectiveness of a procurement system. Strong procurement processes ensure that selected drugs are purchased at reasonable prices, are of acceptable quality and in the right quantity. Procurement strategies vary widely, but most models include the following critical activities; drug needs quantification, bid management, supplier selection and drug quality

assurance (MSH 1997). After a supply plan has been developed as part of the quantification process, quantities of products must be procured. Health systems or programs can procure from international, regional, or local sources of supply; or they can use a procurement agent for this logistics activity. In any case, procurement should follow a set of specific procedures that ensure an open and transparent process that supports the six rights. (USAID /DELIVER 2011)

Inventory management: storage and distribution: After an item has been procured and received by the health system or program, it must be transported to the service delivery level where the client will receive the products. During this process, the products must be stored until they are sent to the next lower level, or until the customer needs them. Almost all businesses store a quantity of stock for future customer needs. (USAID/DELIVER, 2011).

3.4 Conceptual Framework for the Study

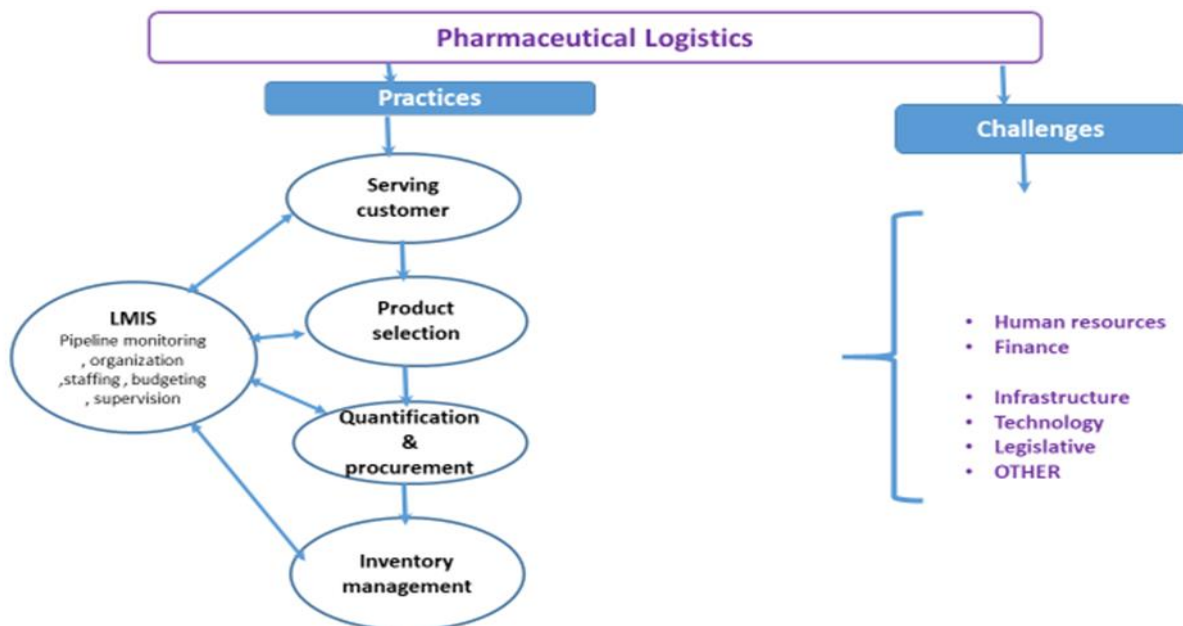


Figure 1 Conceptual framework adapted from World Health Organization & Management Sciences for Health 1997 and further updated by USAID DELIVER 2011

As indicated in the model, this study is assessing the challenges in the five areas with main practices of integrated pharmaceutical logistics. It is noted that according to a document by USAID/DELIVER, 2011, the logistic cycle is circular, which indicates the cyclical or repetitive nature of the various elements in the cycle. Each activity serving customers, product selection, quantification and procurement, and inventory management depends on and is affected by the other activities. For example, product selection is based on serving customers. What would happen if, for a medical reason, we select a product that is not authorized or registered for use in a country program? We would need to rethink our decision and order a product that is authorized and registered for use. This decision would, in turn, affect our procurement and storage, two other activities in the logistics cycle. The activities in the center of the logistics cycle represent the management support functions that inform and impact the other elements around the logistics cycle. (USAID Deliver, 2011).

CHAPTER THREE

3. METHODS OF THE RESEARCH

3.1 Introduction

This research is designed to describe the challenges with key practices around the application of Integrated Pharmaceutical Logistics Systems (IPLS) at ALERT hospital. It involved identifying all relevant departments and units which has stake on pharmaceutical logistic activities. It also included the health workforce whose duties and responsibilities linked with pharmaceutical logistics services. The research applied mixed method where qualitative information and quantitative data solicited from staff interviews, and from pharmaceutical records and documents were analyzed.

3.2 Description of the Study Area

This study was conducted at ALERT hospital. ALERT was Initially a leprosarium established by the Sudan interior Mission(SIM) in 1934. The Hospital was given high attention by the emperor H/Selassie I and named it after his daughter Princess Zenebework Memorial Hospital. As a result of an increase in the Magnitude of Leprosy and its Impact in Africa, the idea of establishing a leprosy training center was conceived by many international donor agencies which were the basis for Princess Zenebework Memorial Hospital to be converted to ALERT on December 11, 1965.

ALERT is the highest Level of Referral Hospital for Leprosy Complications and also a WHO recognized international Leprosy Training Centers. Few years after its establishment ALERT was accepted as training center for Africa by head of state of African Union. After ALERT was recognized as a WHO collaborating center for Leprosy training ALERT has managed the field program effectively and many operational research findings have been published in the past with the implementation of multiple Drug therapy (MDT) in 1988.

Since 1995 Ethiopia had adopted a leprosy tuberculosis control combined program that has to be integrated in to the basic health services. ALERT has been administrated by the Federal Democratic Republic of Ethiopia's Ministry of Health since 2002. ALERT is organized with 240 beds and 1343 staff.

3.3 Design of the Study

In line with its objectives of describing the challenges in the implementation of integrated pharmaceutical logistics at ALERT hospital, the study is descriptive and applied mixed methods. It was held using structured and semi- structured questionnaires for interview with staffs who are involved in pharmaceutical logistics work in the facility as well as senior staff at different level.

It is important to note here that the research started with consulting with the senior leadership of the hospital, including the Chief Executive Officer and senior management team members and those who are in charge of pharmaceutical logistics. The principal investigator facilitated all process to get the buy in for the research on IPLS from the hospital and in the data collection process. After the data collection, data were organized for quantitative and qualitative analysis. The quantitative data

were analyzed using SPSS version 20 and the contents and thematic analysis were done for the qualitative data. In rolling out of this research, the principal investigator closely worked with his supervisor and received appropriate feedback to nurture the research undertaking, report writing and presentation.

3.4 Unit of Analysis

The unit of analysis for this study is different unit of ALERT hospital and unit of observation is the staff who are in charge of pharmaceutical logistics identified in the target population of the study.

3.5 Sampling Design

3.5.1 Target Population

The study involved several departments and units of the ALERT hospital and health workers who deal with pharmaceutical logistic management. The units and departments include the main pharmacy, different dispensary units and departments that are responsible for pharmaceutical logistics system.

3.4.2 Sampling Frame

List the sampling units from which sample is drawn include units/departments like dermatology, Tuberculosis (TB), HIV/AIDS and other units within ALERT were represented. Health workers whose role is related with pharmaceutical logistics also involved. The research involved interviews with senior leadership members of ALERT hospital to get better sense of the challenges and practices in the implementing IPLS at ALERT.

3.4.2 Sampling Technique, Sample size and sampling procedures

Purposive sampling method was applied to include 34 staff who are working on pharmaceutical logistics at ALERT and were available during the time of the visit. All the ten dispensaries and four stores are represented.

For the key informants I interviewed five senior leaders from the hospital.

3.4.3 Pretesting of the data collection tools

Data collection tools were pretested prior to commencing the study. Pretesting was done with staff at the main pharmacy of the hospital. After pre-testing, necessary modifications to the tools was done as appropriate.

3.6 Sources of Data

3.6.1 Primary source

The primary sources of data for this research were the information collected from the interviews held with health workers from deferent units of the hospital. The research continued to get information from key informant interviews with the members of the senior management team of the hospital as primary sources.

3.6.2 Secondary Source

The secondary sources of data for this research included records, other reports and relevant documents that were reviewed. Other secondary data sources included journals, articles along with different related study on pharmaceutical logistics. The study used Anti TB medicines as tracer products with thirteen items. Inventory data collection forms, stock records like bin card, RRF, stock out data collection forms were used.

3.7 Data Collection Methodology

The principal investigator collected all data. The data obtained through questionnaire and interviews are primary data of this study. Secondary data were records, reports, journals, articles along with different related study on pharmaceutical logistics. The secondary sources are important in the identification problem, literature review and development of questionnaires.

Data on storage condition was collected though observing the general storage condition in the facility store area and marking against the specific storage criterion on the checklist. Data on LMIS related challenges and practices were checked during data collection.

3.8 Data collection instrument

The data are collected through review of records, observation and structured questionnaires with staff and senior managers. The questionnaires designed simple and clear for analysis and tabulation of responses and consequently it is designed with having both open and closed ended questions.

In the mixed method, we have quantitative and qualitative approaches. The quantitative approach explains phenomena according to numerical data which are analyzed by means of mathematically based methods, especially statistics. From a broader perspective, it can be defined as a type of empirical research into a social phenomenon or human problem, consisting of variables which are measured with numbers and analyzed with statistics in order to determine if the theory explains or predicts phenomena of interest (Creswell, 1994; Gay & Airasian, 2000 cited on Yilmaz K. 2013).

As stated by Creswell and Miller (2000 cited on Yilaz K. 2013), in a questionnaire there may be open and closed questions. Closed questions are considered to be quantitative and open-ended questions are considered to be qualitative in questionnaires (Denscombe, 2007). The closed questions, which are the one where responses are restricted to small set of responses that generate precise answer, were used to develop the empirical study. Whereas the open ended questions allow the respondents in order to not miss the important challenges. By using open-ended questions, the respondents are given enough space to express their own point of view (Denscombe, 2007).

The questionnaires are designed to meet the objectives of the study. It is adopted from previous assessments of USAID/DELIVER and MSH and the studies from Frazelle (2002) was also taken. It is important to mention here that the researcher modified it to align with the objective of the study.

Pre testing the tools were held to make sure that the objectives are being met.

A five point likert-type scale applied in this study. A Likert item is simply a statement that the respondent is asked to evaluate by giving it a quantitative value on any kind of subjective or objective dimension, with level of agreement/disagreement being the dimension most commonly used. The likert-type scale applied here in order to provide the extent of the respondents' feelings or opinions on the challenges and practices in the implementation of IPLS at the ALER hospital. In this scale a scale of one implies strong disagreement with an issue or statement while a scale of five implies a strong agreement in that order (Dawes, John (2008). The questionnaire consisted of three sections and 54 questions representing (Part I) the demographic characteristics of the respondents, and (Part II) the challenges and part III practices related with challenges of IPLS implementation. The questionnaires of the study focused on challenges in IPLS implementation and logistics practices of IPLS including LMIS activities. Challenges focused on human resources, financial, infrastructure, technology and legislatives on regulatory policies and procedures.

Qualitative research is based on the epistemological assumption that social phenomena are so complex and interwoven that they cannot be reduced to isolated variables, so it is not appropriate to use the term variable when defining qualitative research (Patton, 2002, pp. 39–41). According to Yilmaz K. 2013 qualitative approach is as an emergent, inductive, interpretive and naturalistic approach to the study of people, cases, phenomena, social situations and processes in their natural settings in order to reveal in descriptive terms the meanings that people attach to their experiences of the world.

Key informant interviews are qualitative in-depth interviews with people who know what is going on in the community. The purpose of key informant interviews is to collect information from a wide range of people—including community leaders, professionals, or residents—who have firsthand knowledge about the community. These community experts, with their particular knowledge and understanding, can provide insight on the nature of problems and give recommendations for solutions. In this study 3 senior managers will be interviewed to solicit more insight about IPLS challenges at ALERT hospital.

3.9 Data Analysis Methods

The quantitative data are checked for completeness daily after field visit. The data were entered in to SPSS for analysis. Data cleaning was done by running frequency tables and then analyzed. Data collected using forms and checklists were entered into excel sheet. Most of the quantitative data in this research are descriptive. For descriptive the investigator aggregated, described and presented associations of constructs of interest for both challenges and related practices. Standard deviation computed to assess respondents' experiences in the challenge areas as well as in their logistics practice to implement IPLS. Thematic and contents analysis were done on the qualitative data collected. Data from secondary sources like records, Inventory data collection forms, stock records like bin card, RRF, stock out data collection forms, journal articles, reports and other documents were also reviewed.

3.10 Validity and Reliability

As indicated above the instruments used to collect information are designed based on standard tools and guidelines developed by Management Sciences for Health (MSH) as well as DELIVER project of USAID and the UN Commission on Life-Saving Commodities for Women and Children (September 2012). The instruments are also adapted from Neil 2011 and Frazelle (2002). Data triangulation was done to validate information collected by quantitative methods with that of qualitative methods, and data collected from staff were triangulated with data collected from the senior leadership through the key informant interviews using structured questionnaires. It is also good to mention that journals, reports, inventory records, store cards, storage status checklists and other documents were also reviewed.

3.11 Research Ethics

The principal investigator secured permission from the ALERT hospital management team. Participants of the study were provided with a consent form that confirm they are involved in the study voluntarily and with their full knowledge about the importance and outcomes of the study.

CHAPTER FOUR

RESULTS AND INTERPRETATIONS

4.1 Introduction

The data gathered from primary sources using structured questionnaires and secondary data sources are presented. Thirty-four pharmacy department staff are interviewed representing all case teams of the pharmacy department of the hospital. For the qualitative data collection, five senior management members including the Chief Executive Officer (CEO) of the hospital have also been interviewed. This chapter presented the findings of the study that address the key research questions in relation to challenges of IPLS implementation at ALERT hospital.

4.2 Respondents' Profile

The study captures different demographic characteristics of the respondents as indicated in the table below (table 1). In terms of gender of the respondents, this study included 62% male and the remaining 38% female respondents. About 35% of the respondents have work experiences of less than 5 years and majority of them, (56%) of the respondents have work experiences of between 5 and 10 years. And only 3% of the respondents have more than 10 years' professional experiences. Majority of the respondents, (62%) for the quantitative data collection are between 25 and 30 years old and only 13 % are between 30 and 35 years old. Regarding respondents' educational background 76% of the respondents have first degree, 21% of the respondents qualified with advanced (second) degree and only 3% have (a level IV) diploma.

Demography	Characteristics	Frequency	%
Gender	Male	21	62%
	Female	13	38%
	Total	34	
Experience	Less than 5 years	12	35%
	5 to 10 years	19	56%
	Greater than 10 years	3	9%
	Total	34	100%
Education	Two Years diploma	1	3%
	First Degree	26	76%
	Advanced Degree	7	21%
	Total	34	100%
Age	Under 25	-	-
	25-30 years	21	62%
	30-35 years	13	38%
	35-40 Years	-	-
	Above 40	-	-
	Total	34	100%

Table 4.1: Demographic characteristics of respondents

The study sought to determine the different demographic characteristics of respondents in order to determine their knowledge and understanding of questions posed to them in the questionnaire.

4.3 Analysis of Responses

Respondents level of agreement on the challenges and practices of pharmaceutical logistics are measured on a five scale Likert type scale. (1= Strongly Disagree and 5 Strongly Agree).

4.3.1 Human Resources Challenges

The first objective of this study is to assess human resources related challenges in the implementation of IPLS at ALERT hospital. Lack of Staff training on pharmaceutical logistics, staff turnover, lack of supervision with feedback, low level of motivation among staff to accomplish logistic tasks are measured under this category. Respondents were asked to rate their opinion from 1 (strongly disagree) to 5 (strongly agree). The mean of their opinion score for each variable indicates the level of human resources challenges where as standard deviation (SD) indicates the deviation from the central value.

		Strongly Disagree (1)	Disagree (2)	Indifferent (3)	Agree (4)	Strongly Agree (5)	Total	Mean	Standard Deviation (SD)
HR1	Do you agree that lack of training is one of the challenges in IPLS implementation at your facility?	0	2	1	17	14	34	4.26	0.79
HR2	High turnover of staff affected IPLS implementation in your facility	1	4	5	12	12	34	3.88	1.12
HR3	There is lack of supportive supervision with feedback	1	2	5	16	10	34	3.94	0.98
HR4	There is low motivation among staff to accomplish logistics tasks such as reporting	0	0	1	22	11	34	4.29	0.52
					Aggregate Mean			4.1	
					Aggregate SD				0.85

Table: 4.2 Human resource challenges in IPLS implementation at ALERT hospital March 2019

Table 4.2 shows respondents' responses on the human resources challenges of IPLS implementation at ALERT hospital. It is indicated 91.2% of the respondents agreed or strongly agreed that lack of training on pharmaceutical logistics is one of the key challenges in IPLS implementation at their hospital.

As indicated in the table 4.2 that 70.6 % of the respondents agreed or strongly agreed that staff turnover is another important challenge in IPLS implementation. 76.5% of the respondents at ALERT agreed or strongly agreed that lack of supportive supervision with feedback considered important factor in IPLS implementation. The assessment disclosed that 97.1 % of the respondents agreed or strongly agreed that there is low motivation among staff to accomplish logistic tasks such

as reporting. It is noted that the majority of respondents agreed that Human resources related factors affect IPLS implementation with aggregate mean of 4.10.

During the interview with senior managers and experts it is noted that ALERT hospital has 37 pharmacists. Shortage of pharmacist still exists in the hospital and there is a plan to hire 7 pharmacists. During the discussion it was remarked that staff need training on integrated pharmaceutical logistics management. According to one of the interviewee it was almost two years since a formal training organized for all staff. There is a plan to approach ministry of health and other partners like Chemonics and John Snow Inc (JSI) , management sciences for health for training and mentorship of staff to improve their pharmaceutical logistics skills and practices. Moreover, from the observation and interviews, it was noted that 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.

Regarding supervision of staff with feedback, even though the majority of staff feels that they do not receive adequate supervision and support from FMOH and partners, the senior managers believe that the staff are adequately provided with supervision and support by the internal managers. Supportive supervision by FMOH and partners like JSI needs to improve. But still more support and supervision are required in the area of inventory control, drug store management, and LMIS records. They recommended that the ministry to have adequate visits of the facilities like ALERT, because so far supervisory visits are often brief and are not thorough enough.

During the discussion it was indicated that staff turnover is one of the key challenges that the hospital faces. it was also indicated that they will try their best possible to improve staff retention not only at the pharmacy department but also at all levels of the hospital. Some of the doable plans they have are as much as possible hiring the right people with the right skills, improving the work climate for staff to work in the hospital like providing different recognitions for better performances, encouraging team work and trust among staff and having plan for staff to see career path including further education. It was also indicated that there is no standardize assessment to know why staff leaving.

4.3.2 Financial Challenges in IPLS Implementation at ALERT Hospital

		Strongly Disagree (1)	Disagree (2)	Indifferent (3)	Agree (4)	Strongly Agree (5)	Total	Mean	Standard Deviation (SD)
FN1	Do you agree that inadequate budget allocation is one of the key constraints in pharmaceutical logistics implementation in your facility?	1	5	4	6	18	34	4.03	1.24
FN2	There is poor or incomplete understanding of pharmaceutical logistic costs with a tendency to affect budget planning & utilization	0	1	4	17	12	34	4.18	0.76
						Aggregate Mean		4.11	
						Aggregate SD			1

Table 4.3 Financial challenges of IPLS implementation at ALERT hospital March 2019

As noted in table 4.3, majority of the respondents, 70.5% of this study agreed or strongly agreed that inadequate financial allocation is one of the key constraints in pharmaceutical logistics system implementation at ALERT hospital. Meanwhile 85.3% of the respondents agreed or strongly agreed that there is poor or incomplete understanding of pharmaceutical logistics costs with a tendency to affect budget planning and utilization. Generally, majority of the respondents agreed with the opinion that IPLS implementation are affected by lack of adequate financial inputs with aggregate mean of 4.11.

During the discussion with the key personnel's it was noted that there is no as such challenges in allocating financial inputs to run the business of the hospital, rather limited absorption capacity is sometimes a challenge. Regarding the pharmaceutical logistics, their financial challenges lies where there is no supply from Ethiopia Pharmaceutical Supply Agency (EPSA), a state owned supply agency. It was further indicated that at the beginning of each fiscal year, the hospital allocates budget based on price for the items received from EPSA, and in the middle of the fiscal year, the required product might not be available from EPSA's stores and consequently they should buy some products from the market with double or triple price quote compared with what is budgeted to get the product from EPSA. This continues to challenge their financial capacity in availing essential drugs in the hospital. The key informants indicated that the management will continue to work and improve coordination among the finance team and the pharmacy staff during annual planning and utilization of financial resources.

4.3.3 Infrastructure and Technology Challenges

		Strongly Disagree (1)	Disagree (2)	Indifferent (3)	Agree (4)	Strongly Agree (5)	Total	Mean	Standard Deviation (SD)
WIT1	The warehouse is designed with inadequate storage spaces	3	0	2	9	20	34	4.26	1.19
WIT2	The warehouse/stores does not fulfil cold chain requirements and other conditions for some temperature sensitive commodities	1	1	0	9	23	34	4.53	0.9
WIT3	The warehouse system is not designed properly to improve services and eliminate errors in warehouse operations	0	0	1	10	23	34	4.65	0.54
WIT4	Staff are not trained well to use computers and other technologies to perform their activities	0	4	3	15	12	34	4.03	0.97
WIT5	Most warehouse /storage activities are not automated								
						Aggregate Mean		4.41	
						Aggregate SD			0.88

Table 4.4: Infrastructural and technology challenges at Stores of ALERT hospital, March 2019

As noted in the table 4.4, majority (85.3%) of the respondents agreed or strongly agreed that inadequate storage spaces affected IPLS implementation at ALERT hospital. It is further indicated that 94.1% of the respondents agreed or strongly agreed that the stores do not fulfil cold chain requirements and other conditions for some temperature sensitive commodities. Regarding the operation at the stores 97% of the respondents agreed or strongly agreed that the system is not designed to improve services and eliminate errors in its operations. It is also indicated that 79.4% of the respondents agreed or strongly agreed that staff are not well trained to use computers and other technologies. The findings disclosed that 88.2% of the respondents agreed or strongly agreed that the storage activities are not automated to facilitate performances. Generally, most of the respondents agree that poor infrastructure and lack of technologies at the warehouse and storage spaces affected IPLS implementation at ALERT hospital with aggregate mean of 4.41.

From the observation and discussions about infrastructure related challenges narrow spaces of the stores become one of the constraints at ALERT hospital. It was indicated by the interviewees that ALERT hospital has four stores namely drug store, medical supply store, ART store, eye department store. All storage activities are manual and there is lack of technology to network the inventory management activities at ALERT. The principal investigator's observation and responses from interviewees indicated that the stores are not well equipped to store temperature sensitive products. Due to lack of well trained staff and appropriate operational processes, it seems difficult for the management to get warehouse data for decision making. From the discussion with staff narrow spaces for storage can sometimes result in wastage of drugs. Another challenge includes

maintenance of the store rooms. Some shelves not sturdy and racking set up should be improved to store products in a well-organized manner.

4.3.4 Challenges in Utilization of Technology for Planning and Tracking

		Strongly Disagree (1)	Disagree (2)	Indifferent (3)	Agree (4)	Strongly Agree (5)	Total	Mean	Standard Deviation (SD)
TPT1	The facility does not apply technology to use up-to date data for forecasting internal pharmaceutical needs and consumptions for its different units	0	4	2	11	17	34	4.21	1.01
TPT2	The facility does not apply electronic communications for joint planning among its different units	0	5	3	15	11	34	3.94	1.01
TPT3	The facility does not apply standard system to track expiry information at the health facility level	9	10	4	8	3	34	2.59	1.35
TPT4	Stock outs of medicines in your facility are common	1	4	4	11	14	34	3.97	0.99
						Aggregate Mean		3.68	
						Aggregate SD			1.09

Table 4.5: Technology utilization challenges at ALERT Hospital, March 2019

As noted on the table 4.5; Majority (82.4%) of respondents agreed or strongly agreed that their facility does not apply technology to use up-to-date data for forecasting internal pharmaceutical needs and consumptions for its different units. The finding discloses that 76.5% of the respondents agreed or strongly agreed that their facility does not apply electronic communications for joint planning. Meanwhile 55.9% of the respondents disagreed or strongly disagreed with the opinion that the facility does not apply standard system to track expiry information. This assessment indicated that 73.6 % of the respondents agreed or strongly agreed that stock outs of medicines are common phenomena in their facility. Generally regarding use of technology for planning and tracking (monitoring) purposes majority of participants are between neutral and agree with an aggregate mean of 3.68.

From the interviews with senior leaders including the CEO of the hospital, it was indicated that most of the pharmaceutical logistics activities are manual unlike some similar level hospitals (Black Lion, and St. Paul) in Addis Ababa . It is not also clear that when ALERT will move into electronics LMIS rollout. The interviewees believe that it is important to computerize most of the hospital activities including pharmaceutical logistics. ALERT does not apply virtual and electronic communications for planning, updating utilization of stock items, and tracking items and interventions among different departments of the hospital. During the discussion it was noted that due to lack of information technology, it is difficult to track accurate stock levels at ALERT hospital. There is also lack of modern computers available to be used by its staff and most staff working on

pharmaceutical logistics need to be trained to use different software and to become more literate in using information technologies. During visit and in the interview with senior staff it was noted that, there is no linkage of LMIS with other data collection systems like health information management system (HMIS). The Reporting and Requisition Form (RRF) is still not computerized and more importantly it does not capture service data and patient data, which are very relevant for forecasting and budgeting exercises.

4.3.5 Legislative Related Challenges

		Strongly Disagree (1)	Disagree (2)	Indifferent (3)	Agree (4)	Strongly Agree (5)	Total	Mean	Standard Deviation (SD)
L1	Your facility does not have clear guideline for procurement of pharmaceuticals	16	10	3	4	1	34	1.94	1.15
L2	Your facility does not have an internal policy for disposing damaged or expired stock	5	14	6	8	1	34	2.59	1.1
L3	Standard operating procedures and job aids are not available and utilized in your facility	15	10	4	4	1	34		
							Aggregate Mean	2.18	
							Aggregate SD		1.13

Table 4.6: Legislative related challenges at ALERT hospital March 2019

As noted on the table 4.6, majority (76.5%) of the respondents disagreed or strongly disagreed that their facility does not have clear guideline for procurement of pharmaceuticals. And 55.9% of the respondents disagreed or strongly disagreed with the opinion that the facility does not have an internal policy for disposing damaged or expired stock. It is also indicated that 73.5 % of the respondents disagreed or strongly disagreed that standard operating procedures and job aids are not available and used in their facility. Generally, most of the respondents disagreed that legislative related challenges affected IPLS implementation at their facility with an aggregate mean of 2.18.

From the discussions with senior staff, it is noted that they did not see any challenge regarding availability of guidelines, policies and regulations. It was indicated that the hospital has different Standard Operating Procedures (SOP) available to be implemented at the hospital. The respondents indicated that availability of the SOPs cannot address all the issues to improve their performances, what is important according to the respondents is effective implementation of the SOPs. The challenge in SOP implementation is staffs are not well trained and internalize the SOPs to implement them properly. They also remarked that staff should be trained and, retrained on different SOPs important to improve their pharmaceutical logistic practices. Some of the SOPs available during the

visits includes SOP for Extemporaneous Preparation, SOP for Pharmaceutical products procurement, SOP for Counseling, SOP for Drug Supply Management, SOP for Emergency Dispensing, SOP for Drug Information Service, SOP for medication dispensing, and SOP for Follow up of chronic Condition

4.3.6 Pharmaceutical Logistics and LMIS Challenges and Practices

		Strongly Disagree (1)	Disagree (2)	Indifferent (3)	Agree (4)	Strongly Agree (5)	Total	Mean	Standard Deviation (SD)
LM1	LMIS not automated in your facility	1	5	4	6	18	34	4.44	0.75
LM2	LMIS forms (like bin card, report and resupply formats) are not designed easy to use	8	15	5	4	2	34	2.32	1.15
LM3	LMIS forms sometimes are not available in your facility	11	16	4	2	1	34	2	0.98
						Aggregate Mean		2.92	
						Aggregate SD			0.96

Table 4.7: Availability and utilization of LMIS tools, March 2019

As indicated on table 4.7, about 70.5% of the respondents agreed or strongly agreed that LMIS being still not automated is one of the challenge in IPLS implementation in their facility. Meanwhile 67.6% of the respondents disagreed or strongly disagreed with the opinion that LMIS forms are not designed easy to use. It is also indicated that 79.5 % of the respondents disagree or strongly disagree with the opinion that LIMS forms are not available in their facility. Generally, most of the respondents disagree that availability of LMIS tools related challenges affected IPLS implementation at their facility with aggregate mean of 2.92. one of the key challenge here is that the LMIS is not automated at ALERT hospital.

According to the information gathered through in-depth interview, PFSA has designed and implemented both paper based and electronic LMIS in public health facilities. Unlike other hospitals in Addis ALERT hospital still using paper based LMIS. From the interviews held with staff and senior management team it was noted that having the paper based LMIS affected informed logistics decision making at ALERT. It was also reported that the paper based LIMS has not been linked with health information management system that capture and reports services data.

From interviews with staff and observations at the time of visit it was clear that 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. Respondents indicated that they need more training on integrated pharmaceutical logistics. According to the information collected through

the interviews, staff training on IPLS Standard Operating Procedures (SOP) can help them easily fill all the required formats to generate and report logistics data on a regular basis.

4.3.6.1 Availability and Utilization of Bin Cards

From interviews with staff, it was noted that bin cards are available and easy to use. When we look at the consistent and accurate utilization of bin cards as an important inventory management practice some practical challenges are observed. Table –table 4.8 below show that availability and status of update of bin cards for 13 TB medicines at ALERT hospital. The finding disclosed that 69% percent of the bin card updated and 31% not found updated at the time of the visit. Stock records serve as a key source of information that is used by health facilities in estimating their needs for pharmaceuticals. Inaccurate records pose increased risk for problems of stock outs, leaks and expiry. (Dick M., Farai C. & Joseph N. ,2011).

In a study conducted at national level in Ethiopia in 2015 by USAID/DELIVER, it was noted that consistent and accurate use of bin cards is essential for inventory management. Thus, availability and utilization of the bin cards was further assessed for selected essential pharmaceuticals. Across all facility levels, availability of bin cards for the selected products was reasonable.

Ser NO	Description of products	Bin card used	Bin card updated
1	Kanamycin Injection, 1gVial	Yes	Yes
2	Levofloxacin Tablet, 250mg	Yes	Yes
3	Levofloxacin Tablet, 500mg	Yes	Yes
4	Moxifloxacin Tablet, 400mg	Yes	No
5	Pyrazinamide Tablet 500mg	Yes	Yes
6	Amikacin Injection, 1gVial	Yes	Yes
7	Capreomycin Injection, 1gVial	Yes	No
8	Ethambutol Oral liquid, 25mg/ml	Yes	Yes
9	Ethambutol Tablet, 100mg	Yes	Yes
10	Isoniazid (H) 300	Yes	No
11	Pyrazinamide Tablet, 400mg	Yes	Yes
12	Rifampicin+ Isoniazid + Pyrazinamide+ Ethambutol Tablet, 150mg +75mg + 400mg +275mg	Yes	Yes
13	Streptomycin Powder for injection, 1gm	Yes	No

Table 4.8: Availability and utilization of bin cards for TB medicines at ALERT hospital March 2019

On the days of the visit in addition to checking the use and updating of bin cards, quality of data was checked for accuracy for the anti TB medicines. This includes checking the accuracy of the bin card balance with physical count of the anti TB medicines. According to the national survey conducted in 2015 by USAID/DELIVER, it is good to note that having less than a 10 percent discrepancy between the bin card and the physical count is considered near to accurate. Out of the 13 drugs 10 (76.9%) have accurate balance on the bin card while the remaining three items namely Moxifloxacin Tablet, 400mg, Pyrazinamide Tablet 500mg and Ethambutol Tablet, 100mg, the balance recorded on the bin card is not accurate with respect to the physical count taken during the day of visit. This is somehow better off compared to the national study at hospitals level which has average level of accurate balance of 73% (Shewarega Abiy, Paul Dowling et. al, 2015). And this is still a challenge as IPLS meant to address issues in data quality as it will affect evidence based decision making regarding planning and forecasting of pharmaceutical supplies.

Ser NO	Description of products	Accurate Balance	Near Accurate (+/-10%)
1	Kanamycin Injection, 1gVial	Yes	
2	Isoniazid (H) 300	Yes	
3	Levofloxacin Tablet, 250mg	Yes	
4	Levofloxacin Tablet, 500mg	Yes	
5	Moxifloxacin Tablet, 400mg	No	Yes
6	Pyrazinamide Tablet 500mg	No	Yes
7	Amikacin Injection, 1g Vial	Yes	
8	Capreomycin Injection, 1g Vial	Yes	
9	Ethambutol Oral liquid, 25mg/ml	Yes	
10	Ethambutol Tablet, 100mg	No	Yes
11	Pyrazinamide Tablet, 400mg	Yes	
12	Rifampicin+ Isoniazid + Pyrazinamide+ Ethambutol Tablet, 150mg +75mg + 400mg +275mg	Yes	
13	Streptomycin Powder for injection, 1gm	Yes	

Table 4.9: Accurate or Near-Accurate Balance Entries for Anti TB medicines

4.3.6.2 Level of Accuracy and Completeness of Reporting and Requisition Form (RRF) Reports

The data quality of RRF reports was also checked by comparing the balance of stock on hand reported in the RRF with the balance on the bin card on the date that the RRF report was completed. As you can see on the table 4.10, below only 3 products that is 23% namely Kanamycin Injection, 1gVial, Levofloxacin Tablet, 500mg and Amikacin Injection, 1g Vial indicated accurate data on the bin card however all the remaining products (77%) found to have different data on Stock on hand reported in the RRF and stack balance documented on the bin card. This is a critical challenge in IPLS implementation. A study conducted in South Sudan among the total health facilities included in the study 73% of them experienced inaccurate logistics records. This assessment also indicated that among the total health facilities and stores included in the study 27 % of them experienced accurate logistics records that shows good LMIS data quality (Dick M. ,Farai C. & Joseph N. ,2011).

Ser NO	Description of products	Stock on hand reported in the RRF- 30/4/2011	Stock balance documented on the bin card at the time of the most recent RRF Report
1	Kanamycin Injection, 1gVial	149	149
2	Isoniazid (H) 300	1229	1283
3	Levofloxacin Tablet, 250mg	231	280
4	Levofloxacin Tablet, 500mg	200	200
5	Moxifloxacin Tablet, 400mg	165	140
6	Pyrazinamide Tablet 500mg	390	500
7	Amikacin Injection, 1g Vial	147	147
8	Capreomycin Injection, 1g Vial	100	143
9	Ethambutol Oral liquid, 25mg/ml	980	1200
10	Ethambutol Tablet, 100mg	1200	1500
11	Pyrazinamide Tablet, 400mg	1300	1380
12	Rifampicin+ Isoniazid + Pyrazinamide+ Ethambutol Tablet, 150mg +75mg + 400mg +275mg	1208	1300
13	Streptomycin Powder for injection, 1gm	1370	1170

Table 4.10: Completeness and level of accuracy of RRF reports

4.3.6.3 Availability of Anti TB Medicines on the Day of the Visits:

During the discussions with senior staff it was indicated that they have 3% stock out of essential drugs within the last six months. In this study 73.6% of the respondents agreed that stock out is a common phenomenon and a critical challenge in IPLS implementation at ALERT hospital. During the time of the visit most Anti TB medicines were available, however, Levofloxacin tablet 250 mg and Ethambutol tab 100 were stocked out with average availability of the Anti TB medicines 85%. this is in line with the national survey result that show that overall, the majority of the health facilities had most of the essential pharmaceuticals in stock on the day of the visit: average availability was 89 percent. (Shewarega Abiy, Paul Dowling et. al, 2015).

Ser NO	Description of products	Availability Yes / No
1	Kanamycin Injection, 1gVial	Yes
2	Isoniazid (H) 300	Yes
3	Levofloxacin Tablet, 250mg	No
4	Levofloxacin Tablet, 500mg	Yes
5	Pyrazinamide Tablet, 400mg	Yes
6	Pyrazinamide Tablet 500mg	Yes
7	Amikacin Injection, 1g Vial	Yes
8	Capreomycin Injection, 1g Vial	Yes
9	Ethambutol Oral liquid, 25mg/ml	Yes
10	Ethambutol Tablet, 100mg	No
11	Moxifloxacin Tablet, 400mg	Yes
12	Rifampicin+ Isoniazid + Pyrazinamide+ Ethambutol Tablet, 150mg +75mg + 400mg +275mg	Yes
13	Streptomycin Powder for injection, 1gm	Yes

Table 4.11: Availability of anti TB medicines at the time of the visit

4.3.6.4 Anti TB Medicines Stocked out within the last Six Months Prior to the Visits

Data were also collected on the availability of the Anti TB medicines throughout the six-months prior to this study. It focuses on how many times facilities had stocked out and for how many days. This information is useful in determining whether facilities chronically or intermittently stock out. In this study it was noted that Levofloxacin tab 250mg and Amikacin 1 g vial were stocked out, which is about 15% of the anti TB drugs scrutinized under this study. The average stock out period is 18% of the time . More over the stock out duration for Levofloxacin 250mg was 35 days and for that of Amikacin 1g vial was 31 days. This is somehow similar challenge indicated at the national survey finding that show that stock outs for artemether + lumfanthrine, ceftriaxone, ciprofloxacin, dextrose, and gentamycin were relatively high compared to other products, with a stock out at least once in more than 30 percent of facilities in the six months prior to the survey. (Shewarega Abiy, Paul Dowling et. al, 2015). Meanwhile in an assessment conducted in Ethiopia in 2010, it was noted that the national average for availability of essential drugs in public health facilities was 70% (30 % stock outs) and the average duration for stock out is 99.2 % days which are higher figures when compared with the result of this study. (WHO, 2010)

Ser NO	Description of products	Was there any stock out within the last six months? Yes /no	Number of stock out	Duration of stock out in days
1	Kanamycin Injection, 1gVial	No		
2	Isoniazid (H) 300	No		
3	Levofloxacin Tablet, 250mg	Yes	1	35 days
4	Levofloxacin Tablet, 500mg	No		
5	Pyrazinamide Tablet, 400mg	No		
6	Pyrazinamide Tablet 500mg	No		
7	Amikacin Injection, 1g Vial	Yes	2	31 days
8	Capreomycin Injection, 1g Vial	No		
9	Ethambutol Oral liquid, 25mg/ml	No		
10	Ethambutol Tablet, 100mg	No		
11	Moxifloxacin Tablet, 400mg	No		
12	Rifampicin+ Isoniazid + Pyrazinamide+ Ethambutol Tablet, 150mg +75mg + 400mg +275mg	No		
13	Streptomycin Powder for injection, 1gm	No		

Table 4.12: Anti TB medicines stock out within the last six months

4.3.6.5 Anti TB Medicines Identified as Expired during the Visit at ALERT Hospital March 2019

Though majority of respondents (55.9%) disagreed or strongly disagreed that their facility has not applied standard system to track expiry information at the health facility, during the time of the visit, it was found that some Anti TB medicines were expired as noted on table (4.13). In a study conducted in Tanzania, the amount of medicines and supplies that expired in 2006 at the central store was 3.7% of supplied for the year. (MHSW Tanzania 2006). Another study conducted in South Sudan indicated that expired family planning commodities as well as other pharmaceuticals were observed as a result of poor storage conditions that were found in the majority (65%) of the facilities assessed (Dick M., Farai C. & Joseph N. ,2011).

Product Name	Quantity Expired	Date expired
Kanamycin Injection, 1g Vial	167	1/19
Isoniazid (H) 300	283	11/18
Levofloxacin Tablet, 250mg	311	12/18
Amikacin Injection, 1g Vial	130	09/17

Table 4.13: Anti TB medicines found expired during the time of the visit

4.3.6.6 Order Fill Rate

From the interview with staff order fill rate at ALERT seems to be reasonable. Specifically, for anti TB medicines the average different dispensaries indicated that they will get their refill request between 1-3 weeks. But still we have two products namely Ethambutol Oral liquid, 25mg/ml and Pyrazinamide Tablet, 400mg received lesser than what was ordered. IPLS SOPs recommend that, for program commodities including anti TB medicines, PFSA resupplies facilities with the requested quantities within one month of receiving the request. For products procured through the revolving drug fund (RDF), if the product is not available at the PFSA store, facilities can buy products from PFSA or other vendors anytime without a specific resupply schedule. (PFSA 2014)

Description of products	Quantities orders during the recent request period	Quantities received	Order fill rate
Kanamycin Injection, 1gVial	153	153	100%
Isoniazid (H) 300	660	660	100%
Levofloxacin Tablet, 250mg	200	200	100%
Levofloxacin Tablet, 500mg	278	278	100%
Moxifloxacin Tablet, 400mg	220	220	100%
Pyrazinamide Tablet 500mg	500	500	100%
Amikacin Injection, 1g Vial	750	750	100%
Capreomycin Injection, 1g Vial	260	265	102%
Ethambutol Oral liquid, 25mg/ml	230	200	87%
Ethambutol Tablet, 100mg	300	300	100%
Pyrazinamide Tablet, 400mg	1500	1260	84%
Rifampicin+ Isoniazid + Pyrazinamide+ Ethambutol Tablet, 150mg +75mg + 400mg +275mg	1400	1400	100%
Streptomycin Powder for injection, 1gm	1480	1480	100%

Table 4.14 order fill rate for anti TB medicines March 2019

4.3.6.7 Storage Conditions of anti TB Medicines at ALERT Hospital

To assess the storage conditions 12 standard criteria were applied . It does not look that the stores at ALERT keep cartons and products in good conditions. Some store rooms need maintenance to be clean, remove all trashes. In all four store rooms there is narrow space for storing existing products. The problem of storage conditions in the stores has been reported in an assessment conducted in South Sudan, that only 35% of health facilities assessed were able to meet the acceptable standard conditions. (Dick M., Farai C. & Joseph N. ,2011).

SerNo	Descriptions	Yes/No	Remarks
1	Products ready to distribution/dispensing are arranged so that identification labels and expiry dates and/or manufacturing dates are visible.	Yes	
2	Products are stored and organized in a manner that facilitate first-to-expire, first-out (FEFO), counting and general management.	Yes	
3	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/gloves) and cartons are put right-side u	No	
4	The facility separate damaged and/or expired products from usable products and removes them from inventory.	Yes	
5	Products are protected from direct sunlight at all times of the day and during all seasons.	Yes	
6	Cartons and products are protected from water and humidity during all seasons.	Yes	
7	Storage area is visually free from insects and rodents. (Check the storage area for traces of rodents [droppings or insects].)	Yes	
8	Products are stored at the appropriate temperature during all seasons according to product temperature specifications.	No	
9	Roof is always maintained in good condition to avoid sunlight and water penetration at all times.	Yes	
10	Storeroom is maintained in good condition (clean, all trash removed, shelves are sturdy, boxes are organized)	No	
11	The current space and organization is sufficient for existing products and reasonable expansion (i.e., receipt of expected product deliveries for foreseeable future).	No	
12	Fire safety equipment is available and accessible (any item identified as been used to promote fire safety should be considered).	No	On the day of the visit , It does not look easily accessible

Table 4.15: Storage condition observation check list

4.3.7 Supervision and support on pharmaceutical logistics

It was disclosed that 56% of the respondents indicated that they have training on IPLS organized by EPSA, and partners. The major providers of the supportive supervision to the staff are FMOH and partners and 58% of the respondents indicated that they get their recent supervision 3- 6 months ago. All of the respondents replied that the supervision includes pharmaceutical logistics.

4.3.8 Customer services Practices

Respondents were asked to rate their opinion from 1 (strongly disagree) to 5 (strongly agree). The mean of their opinion score for each variable indicates the level of customer services as a practice, whereas standard deviation (SD) indicates the deviation from the central value (mean).

		Strongly Disagree (1)	Disagree (2)	Indifferent (3)	Agree (4)	Strongly Agree (5)	Totals	Mean	Standard Deviation (SD)
CS1	There is a well –developed tool to check customer satisfaction	18	9	5	1	1	34	1.76	1.02
CS2	Staff share technical information with clinicians/other customers when required	1	4	3	21	5	34	3.74	0.96
CS3	Orders from different units and clients are filled on time	8	13	5	8	0	34	2.38	1.1
						Aggregate Mean		2.63	
						Aggregate SD			1.03

Table 4.16: Customer Services

As indicated in the tale 4.16, Majority (79.4%) of the respondents disagreed or strongly disagreed that there is a well –developed tool to check customer satisfaction. It is also noted that more than 76.5% of the respondents agreed or strongly agreed that the pharmaceutical logistics staff share technical information with clinicians. Regarding order fulfilment 61.7% of the respondents disagreed or strongly disagreed that order from different units are filled on time. Here the challenges lie on lack of well-developed tools to check customer satisfaction and delays in order fulfilment. During the discussions with senior staff it was remarked that the facility does not have a regular customer satisfaction survey except that what they do as per the requirement of EHSTG for the whole hospital using generic formats.

4.3.9 Product Selection Practices and Challenges

		Strongly Disagree (1)	Disagree (2)	Indifferent (3)	Agree (4)	Strongly Agree (5)	Totals	Mean	Standard Deviation (SD)
PS1	The medicines available at your facility are relevant to the local disease patterns	0	2	1	27	4	34	3.94	0.63
PS2	The facility has an information communication technology and data base to facilitate product selection	3	13	10	4	4	34	2.79	1.15
						Aggregate Mean		3.37	
						Aggregate SD			0.89

Table 4.17 practices and challenges in product selection

As indicated on the table 4.17 that 91.2% of the respondents agreed or strongly agreed that medicines available in their facility are relevant to the local diseases pattern. But still 67.6% of the respondents disagreed or indifferent with the availability of information technology and data base to facilitate product selection. From these data it becomes clear that the facility does not use technology and do not have data base that can facilitate selections based on diseases patterns confirmed by the essential medical list.

4.3.10 Quantification and procurement

		Strongly Disagree (1)	Disagree (2)	Indifferent (3)	Agree (4)	Strongly Agree (5)	Totals	Mean	Standard Deviation (SD)
QP1	Consumption method is used to estimate pharmaceutical needs in your facility	0	2	3	19	10	34	4.09	0.79
QP2	Morbidity method is used to estimate pharmaceutical needs in your facility	3	6	8	14	3	34	3.24	1.13
QP3	There is collaborative planning between quantification and procurement	11	9	3	9	2	34	2.47	1.35
QP4	There is effective implementation of purchase order processing in your facility	8	13	4	7	2	34	2.47	1.24
						Aggregate Mean		3.1	
						Aggregate SD			1.13

Table 4.18: Practices of quantification and procurement

As indicated on the table 4.18 that 85.3 % of the respondents agreed or strongly agreed that their facility uses consumption methods to estimate needs. About 50% the respondents agreed or strongly

agreed that Morbidity method is used to estimate pharmaceutical needs in their facility. Another challenge they have is about collaborative planning, 58.9% of the respondents disagreed or strongly disagreed that there is collaborative planning between quantification and procurement functions within their facility. It was noted that 61.7% of the respondents disagreed or strongly disagreed that there is effective implementation of purchase order processing in their facility. From these data it is clear that the facility has challenges on lack of collaborative planning that in fact affects pharmaceutical planning to address issues around consumption data as well as financial management and planning .

4.3.11 Inventory Management practices and challenges

		Strongly Disagree (1)	Disagree (2)	Indifferent (3)	Agree (4)	Strongly Agree (5)	Totals	Mean	Standard Deviation (SD)
IM1	Your facility disposes damaged /expired stock as per national medicine waste management and disposal directive	1	4	4	22	3	34	3.65	0.92
IM2	Your facility stores products according to recommended storage guidelines	13	10	6	4	1	34	2.12	1.15
IM3	Ensuring the stock levels within the established maximum stock levels and emergency order point/ optimal inventory positioning	2	7	3	17	5	34	3.47	1.16
IM4	In your facility distribution of pharmaceutical products is based on needs received from different units of the hospital	1	2	6	14	11	34	3.94	1.01
							Aggregate Mean	3.30	
							Aggregate SD		1.06

Table 4.19 Inventory management practices

As indicated in the table 4.19 that 73.5% of the respondents agreed or strongly agreed that their facility disposes damaged or expired stock as per the national medicine waste management guideline. meanwhile 67.6% of the respondents disagree or strongly disagree that the facility stores products according to the recommended storage guideline. The finding of this study disclosed that 64.7% of the respondents agree or strongly agreed that there is a practice that ensures the stock levels within the established maximum stock level and emergency order point. Majority (73.6%) of the respondents agreed or strongly agreed that distribution of pharmaceutical products is based on

needs. From this data we can understand that the facility does not store products according to recommended storage guideline as it is confirmed by the observation checklist applied for this research.

4.4 Discussions

Several variables are presented and analyzed under different IPLS implementation challenges and practices. This part of the study discusses the results and findings of study based on the research questions presented. The discussion reflects the findings both from the questionnaire and data collected from the interviews with senior staff of ALERT hospital. More over the discussion links the findings of this study with other relevant literatures in the field of pharmaceutical logistics.

4.4.1 Human Resources Challenges

Majority (91.2%) the respondents have the opinion that lack of training on IPLS is one of the key challenges affecting IPLS implementation. During the discussions with the senior staff it was also indicated that it has been more than two years since a formal pharmaceutical logistics training organized for all staff. And consequently it is imperative to have training for staff through the support from partners and FMOH. This is in line with analyses of human resources-related activities conducted by Gavi, the Global Fund and the World Bank, whose most commonly supported activity in developing countries is short-term and in-service training (Marko Vujicic, *et al* 2011).

Although the opportunities for training and education have increased in Ethiopia, the question remains as to whether these approaches are in fact efficient. In particular, the fact that pharmacists who are apparently not adequately trained in Health Supply Chain (HSC) management and pharmaceutical logistics hold HSC management positions at higher levels is cause for concern. This means that people specifically trained in supply chain management, but not necessarily knowledgeable about medicines, are not filling strategic positions. These developments have raised the question of 'who' should be managing HSCs. On the one hand, joint FIP/WHO good pharmacy practice outlines that pharmacists have a role in obtaining, procuring, storing and distributing and ensuring rational use of medicines (FIP/WHO 2011). On the other hand, the International Association of Public Health Logisticians and People that Deliver advocate that the supply chain should be professionalized. Depending on the local context, those who are engaged in the actual work should be equipped with the right competency for the HSC and pharmaceutical logistics management activities they undertake. The recent expansion of local health centers in Ethiopia makes in-service training of staff on pharmaceutical logistics and HSC management with different backgrounds important and a priority intervention. (Sporrong S.K., *et al* , 2016)

The other challenges at ALERT in relation with human resources is high turnover of staff. As indicated in the result part of this paper 70.6% of the respondents have agreed or strongly agreed

with the opinion that high turnover of staff affected IPLS implementation at their facility. Similarly, during the interview the senior leaders indicated it as a major challenge not only at the pharmacy department but also across the hospital. This is in line with (Shewarega Abiy, Paul Dowling et. al, 2015) study which recommended more investments in pre and in-services training to alleviate the shortage of adequately trained supply chain management professionals or practitioners due to attrition and migration. It is also noted that there is no as such standard study by the hospital to identify factors contributing for high staff attrition and low level of staff satisfaction.

The study indicated that 76.5 % of the respondents agreed or strongly agreed that lack of supportive supervision with feedback considered an important factor that affect IPLS implementation at ALERT. The senior staff; however, indicated that supportive supervision provided regularly for the staff, but supportive supervision from FMOH, EPSA and partners is limited. Majority (58%) of the respondents indicated they get their recent supervision 3- 6 months ago. This finding is in conflict with what is scheduled to conduct monthly and quarterly supportive supervision at facilities, reported by FMOH, RHB or EPSA (Shewarega Abiy, Paul Dowling et. al, 2015).

4.4.2 Financial Challenges

Majority of the respondents (70.5%) of this study agreed or strongly agreed that inadequate financial allocation is one of the key constraints in pharmaceutical logistics system implementation at ALERT hospital. It was also noted that incomplete understanding of pharmaceutical logistics costs affects budget planning and utilization. During the interview with senior managers, it was remarked that budget allocation is not their major challenge but their financial challenges lies where there is no supply from Ethiopia Pharmaceutical Supply Agency (EPSA) stores and the hospital obliged to buy products from local markets with higher prices. It was also associated with incomplete understanding of the market dynamics to have appropriate budget planning. This analysis is in line with a study conducted in Uganda in 2018, addressing skills gaps in budgeting and expenditure management is critically important. The study further indicated that for better understanding of financial and budgetary issues, it is important to provide supervision in budgeting and expenditure management for health commodities with well-coordinated planning with supply agencies. (Oteba M. *et al* 2018).

4.4.3 Infrastructure and Information Technology Challenges

Observation by the principal investigator and during interviews with staff it was indicated that the stores have inadequate storage spaces. In this study 84.3% of the respondents confirmed that inadequate storage spaces are critically affect IPLS implementation of ALERT hospital. The stores at ALERT hospital do not also fulfil cold chain requirements for some temperature sensitive commodities. All the activities at the stores were manual and there is no system designed properly to improve services and operations at the stores. This finding is similar with a study conducted by USAID/DELIVER in 2015 at facilities in Ethiopia which shows that, the storage condition for a significant percentage of health facilities did not meet the standard criteria. Observations by

principal investigator and during the discussions with the staff, it was noted that protection from sunlight and keeping storage areas locked are important conditions met which is consistent with USAID/DELIVER survey of 2015. These two conditions are met most often by facilities of all levels however the least satisfied were products are stored in good conditions—clean, no trash, sturdy shelves, and boxes well-organized—and storage area is visually free from harmful insects and rodents (Shewarega Abiy, Paul Dowling et. al, 2015).

One of the major issues in pharmaceutical logistics is the lack of information for decision making. Information technology plays the vital role in enabling decision making. Some of the key ingredients of information technology in pharmaceutical logistics are use of internet and web based service portals and other technologies important to have decision support systems that utilize proven algorithms for various strategic and planning problems. (Chandra C. Kachal S.K. 2006)

In this study it was disclosed that 82.4 % respondents disagreed or strongly disagreed that the facility applies technology to generate data for decision making and during the interview with senior staff, it was also indicated that ALERT as a facility does not have the capacity to use technology that can generate up-to-date data for forecasting internal pharmaceutical needs and consumptions for its different units. Furthermore, the facility does not apply electronic communications for joint planning among its different units. During the interview with senior staff, it was noted that there is a plan to implement electronic LMIS, Human Resources Information System (HRIS) and other technologies as part of the ‘information revolution’ of the national health sector transformation agenda.

Though 65.9% of the respondents disagreed or strongly disagreed with the opinion that the hospital has not applied standard system to track expiry information. And during the visits at the store, it was found that some anti TB medicines, namely Kanamycin Injection, 1g Vial, Isoniazid (H) 300, Levofloxacin Tablet, 250mg and Amikacin Injection, 1g Vial, found expired. During the interview with senior staff, it was noted that they need to build standard and functional systems to track expiry information. This is in line with the USAID/DELIVER national survey of 2015 in Ethiopia, which recommended facilities to have standard system for documenting and reporting expiry data (Shewarega Abiy, Paul Dowling et. al, 2015).

4.4.4 Legislative Challenges

During the visit at different units of the pharmacy department, it was noted that several standard operating procedures are available. During the interview with the senior staff it was noted that they have all the SOPs important for improved pharmaceutical services, however staff are not well trained and aware for enforcement of the SOPs. Different job aids are also available and on use in most of the dispensaries. This is in line with the findings of national IPLS survey by USAID/DELIVER project in Malawi, that different SOPs and job aids with clear guidance and on

the job training should institute for effective implementation of IPLS at facility level (USAID/DELIVER, 2013).

4.4.5 LMIS Challenges and Practices

Unlike other hospitals in Addis, ALERT hospital has not yet started with applying electronic LMIS. It was indicated during the interview that this is a real gap in IPLS implementation at ALERT. For the manual use, LMIS forms are available and confirmed to be easy to use by 67.6% of the respondents. During the interview with the senior staff, it was noted that data is not easily available for reporting as they use paper based LMIS and this is consistent with the findings of the survey in Malawi in 2013 that data is less accessible with the paper based system. (USAID/DELIVER, 2013). It was also noted that though the LMIS records and formats are available, still printing cost are found to be high and so far ALERT hospital and its support provider EPSA, are relying on partners and donors to get the records and formats are printed and ready to use. It is urged that the hospital needs to allocate resources to sustain availability of the formats.

4.4.5.1 Availability and Utilization of Stock Records and Reports

Stock records serve as a key source of information that is used by health facilities in estimating their needs for pharmaceuticals. Inaccurate records pose increased risk for problems of stock outs, leaks and expiry. (Dick M., Farai C. & Joseph N. ,2011).

In a study conducted at national level in Ethiopia in 2015 by USAID/DELIVER, it was noted that consistent and accurate use of bin cards is essential for inventory management. Thus, availability and utilization of the bin cards was further assessed for selected essential pharmaceuticals. Across all facility levels, availability of bin cards for the selected products was reasonable. However, a discrepancy was observed by level of facility and product types—ranging from approximately 97 percent for amoxicillin at the hospitals to 15 percent for ferrous sulphate/folic acid at the health-post level. Again, for the products assessed, the average availability of bin cards is lower at the health post-level (24 percent) compared to hospitals (73 percent) and health centers (64 percent). (Shewarega Abiy, Paul Dowling et. al, 2015)

To consider bin cards up-to-date, they had to be updated within the previous 30 days. In addition, if the bin card was last updated with the balance of 0 and the facility has not received any of that product since the date of that entry, it is also considered updated. The percentage with updated bin card is calculated only for facilities that use bin cards for the products assessed. Although a higher percentage of hospitals and health centers utilized bin cards for the assessed products, the percentage of updated bin cards was found to be similar across all health facility levels. Almost two-thirds of the bin cards that had been used were updated. (Shewarega Abiy, Paul Dowling et. al, 2015).

In this study, quality of data was checked for accuracy for the anti TB medicines and out of the 13 TB medicines taken as tracer for this study 10 (76.9%) found to have accurate balance on the bin

card with that of physical count, this is somehow better off compared to the national study at hospitals level which has average level of accurate balance of 73% (Shewarega Abiy, Paul Dowling et. al, 2015). And this is still a challenge as IPLS meant to address issues in data quality as it will affect evidence based decision making regarding planning and forecasting of pharmaceutical supplies.

Data quality of RRF reports was checked by comparing the balance of stock on hand reported in the RRF with the bin card on the data that the RRF report was completed. Three products that is 23%, namely Kanamycin Injection, 1gVial, Levofloxacin Tablet, 500mg and Amikacin Injection, 1g Vial indicated accurate data on the bin card however all the remaining products (77%) found to have different data on Stock on hand reported in the RRF and stock balance documented on the bin card. This is a critical challenge in IPLS implementation. A study conducted in South Sudan among the total health facilities included in the study 73% of them experienced inaccurate logistics records. This assessment also indicated that among the total health facilities and stores included in the study 27 % of them experienced accurate logistics records that shows good LMIS data quality (Dick M. ,Farai C. & Joseph N. ,2011).

4.4.5.2 Stock Availability

During the discussions with the senior staff, it was noted that the facility has 3% stock out of essential medicines. In this study 73.6% of the respondents agreed that stock out is a common phenomenon and a critical challenge in IPLS implementation at ALERT hospital. During the time of the visit most Anti TB medicines were available, however, Levofloxacin tablet 250 mg and Ethambutol tab 100 were stocked out with average availability of the Anti TB medicines 85%. this is in line with the national survey result that show that overall, the majority of the health facilities had most of the essential pharmaceuticals in stock on the day of the visit: average availability was 89 percent. (Shewarega Abiy, Paul Dowling et. al, 2015). Data were also collected on the availability of the Anti TB medicines throughout the six-months prior to this study. It focuses on how many times facilities had stocked out and for how many days. This information is useful in determining whether facilities chronically or intermittently stock out. In this study it was noted that Levofloxacin tab 250mg and Amikacin 1 g vial were stocked out, which is about 15% of the anti TB drugs scrutinized under this study. More over the stock out duration for Levofloxacin 250mg was 35 days and for that of Amikacin 1g vial was 31 days. This is somehow similar challenge indicated at the national survey finding that show that stock outs for artemether + lumfanthrine, ceftriaxone, ciprofloxacin, dextrose, and gentamycin were relatively high compared to other products, with a stock out at least once in more than 30 percent of facilities in the six months prior to the survey. (Shewarega Abiy, Paul Dowling et. al, 2015). Meanwhile in an assessment conducted in Ethiopia in 2010, it was noted that the national average for availability of essential drugs in public health facilities was 70% (30 % stock outs) and the average duration for stock out is 99.2 % days which are higher figures when compared with the result of this study. (WHO, 2010). In a study conducted in Malawi, it was remarked that Anti TB medicines were out of stock 5.04% of the time at Ntcheu

District Hospital; 2.11% of the time at Salima District Hospital; and 0.3% at QECH. The long stock out of ethambutol 100 mg in Salima and Ntcheu accounted for the high stock out rate for both hospitals. (Robert C. Chana ,2011). An assessment for stock status and logistics conducted in 2006, in Kenya, found that average percent of time out of stock for malaria products was 51.7% in district stores, 40% in health centers and 36% in dispensaries (Bende E. *et al* 2007). Also an assessment that was done in Tanzania mainland found that average percent time out of stock of some medicines in the surveyed facilities was 33.3% (Norman N. *et al* 2007). All these studies highlight the fact that performance of many pharmaceutical logistics systems especially in sub-Saharan Africa is not good. During the interview with staff at dispensaries that they will get their orders filled within 1-3 weeks and this is also applied for Anti TB medicines. Ethambutol oral liquid 25mg/ml, levofloxacin 250mg pyrazinamide tab 500 and Pyrazinamide 400mg tab were found received lesser than the requested amount, which means orders for 67% of the Anti TB medicines have been met. A study conducted in South Sudan shows that only 24% facilities received the quantity of medicines they ordered (Dick M. ,Farai C. & Joseph N. ,2011). A national survey in Ethiopia show that for most products assessed, the percentage of facilities resupplied with the quantity ordered was about 60 percent, both at the hospital- and health center–level. This study further documented that only 37% of the facilities reported usually receiving the quantity they ordered for program commodities, which includes the anti TB medicines. (Shewarega Abiy, Paul Dowling, et.al, 2015).

IPLS SOPs recommend that, for program commodities including anti TB medicines, PFSA resupplies facilities with the requested quantities within one month of receiving the request. For products procured through the revolving drug fund (RDF), if the product is not available at the PFSA store, facilities can buy products from PFSA or other vendors anytime without a specific resupply schedule. (PFSA 2014)

The January 2014 survey in Ethiopia tried to assess the perceptions of facility staff on the timeliness and the resupply of products, as per their request. Regardless of the type of product, more than 80 percent of both hospitals and health centers say they usually receive products requested within one month or less. Only 4 percent of the facilities reported waiting for more than two months to receive products after placing orders. (Shewarega Abiy, Paul Dowling, *et.al*, 2015). This is in line with the finding of this study that staff at dispensaries replied that they will get their orders filled within 1-3 weeks and this is also applied for Anti TB medicines.

The distribution system is governed by the 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. (PFSA 2014).

4.4.5.2.1 Monitoring Expiry Information

Though majority of respondents (55.9%) disagreed or strongly disagreed that their facility has not applied standard system to track expiry information at the health facility, during the time of the visit, it was found that some Anti TB medicines were expired as noted on table (4.13). In a study conducted in Tanzania, the amount of medicines and supplies that expired in 2006 at the central

store was 3.7% of supplied for the year. (MHSW Tanzania 2006). Another study conducted in South Sudan indicated that expired family planning commodities as well as other pharmaceuticals were observed as a result of poor storage conditions that were found in the majority (65%) of the facilities assessed (Dick M., Farai C. & Joseph N. ,2011). In relation to inventory management system, even though the current market is working in the modern era of computerization, still there are many healthcare centers and institutes which are not configured towards integrated system of supply chain management. They don't have a proper tracking mechanism to detect the consumption and expiry of products. Which is making the healthcare industry weak in its inventory management and inefficient in reaching customers on right time (Shetty A. 2015).

In relation to expiry of some of the Anti TB Medicines, the reason that was remarked during the interview was that those products were delivered close to the expiry dates. Other products were expired due to low level of consumption rate specifically for those drugs which are second line treatment drugs. In a study conducted in Malawi in 2010, Expired anti-TB medicines were found in some facilities; in one facility, an expired ethambutol 100 mg was found within usable stock. It was reported that the person who managed the treatment was aware that the medicine was expired, but the pharmacy technician said he was not aware; this is an indication of the passive role that pharmaceutical personnel play in the logistic management of anti-TB medicines in most facilities. It was reported that short-dated products were frequently supplied to the district and health centers. The other reasons reported for expired medicines included untrained staff and errors in forecasting. (Robert C. Chana ,2011). As indicated in this study, training of staff on pharmaceutical logistics is an important input for effective implementation of IPLS.

4.4.6 Storage Conditions

Storage condition is important to maintain purity, potency, safety and effectiveness of pharmaceuticals for a longer period of time (USAID /DELIVER 2013). Proper storage condition, therefore, is one of the strategies to help ensure that only high quality products reach the clients.

To assess the storage conditions 12 standard criteria were applied (Annex 2.3). It does not look that the stores at ALERT keep cartons and products in good conditions. Some store rooms need maintenance to be clean, remove all trashes. In all four store rooms there is narrow space for storing existing products. The problem of storage conditions in the stores has been reported in an assessment conducted in South Sudan, that only 35% of health facilities assessed were able to meet the acceptable standard conditions. (Dick M., Farai C. & Joseph N. ,2011).

A study conducted by USAID/DELIVER in January 2014 at facilities in Ethiopia which shows that, the storage condition for a significant percentage of health facilities did not meet the standard criteria. Observations by principal investigator and during the discussions with the staff, it was noted that protection from sunlight and keeping storage areas locked are important conditions met which is consistent with USAID/DELIVER survey of 2015. These two conditions are met most often by facilities of all levels however the least satisfied were products are stored in good conditions—clean, no trash, sturdy shelves, and boxes well-organized—and storage area is visually free from harmful insects and rodents (Shewarega Abiy, Paul Dowling *et. al*, 2015).

4.5 Other pharmaceutical Logistics Practices and Challenges

One of the critical challenge identified in this study is lack of a well –developed tool to check customer satisfaction at dispensaries and stores in ALERT hospital. The study indicated that 79.4% of the respondents disagreed or strongly disagreed that their facility has standard tool to assess customer satisfaction. During the interview with the senior staff it was noted that they did not have a separate customer satisfaction surveys done, but they seldom undertake hospital wide clients' satisfaction surveys as part of the requirements of Ethiopian Hospital Services Transformation Guideline (EHSTG). They believe that it is an important tool to have regular check up with the customer response about the way they provide services. According to (Adriana & Daniela 2010), customer service is the chain of activities and meeting customers' requirements which begins with receiving the orders. The hospital has also gaps in using up to date information for forecasting internal customer's needs and does not apply electronic communication. There is a delay also in order fulfilment from the stores at dispensing pharmacies.

Careful selection of a limited range of essential medicines results in a higher quality of care, better management of medicines (including improved quality of prescribed medicines), and more cost-effective use of health resources (WHO 2002). It was indicated that 80% respondents agreed or strongly agreed that the medicines available at ALERT hospital are relevant to local diseases pattern. During the interview with the senior staff, it was noted that the medicines and supplies available at stores and dispensaries are relevant to the diseases pattern and received from EPSA based on the need that the facilities requested to EPSA. They also indicated that they will follow the national essential medicine lists which is approved by World Health organization. The challenge they have is in relation to lack of information communication technology and data base to facilitate product selection. A study in Malawi indicated that facilities should avail medicines based on a list of essential medicines have been selected and are in use in Malawi. This list is in accordance with the World Health Organization's Essential Medicines List (Robert C. Chana ,2011)

A prerequisite for conducting quantification for any health commodity is clear, well-defined, and disseminated Standard Treatment Guidelines (STGs), testing protocols, and laboratory testing menus for defining how specific products should be administered for treatment or used for testing. This is especially true when reliable consumption data are not available. A critical assumption when using demographic data, morbidity data, and services data is that service providers are following established standard guidelines. Therefore, standardization should precede quantification, as these guidelines are the basis for the assumptions in the forecasting step of the process. (USAID/DELIVER, 2011). In this study 85.3% of the respondents agreed or strongly agreed that their facility uses consumption methods to forecast need. During the interview with senior staff, it was noted that the facility follows STGs, but efforts are usually exerted to get consumption data. Morbidity method is also used to estimate pharmaceutical needs at ALERT. Morbidity method (i.e., the number of patients needing treatment for the quantification period). The total quantity of each medicine was then calculated as tablet/capsule units or as vials. A 10% additional quantity was included in the calculation to act as buffer stock. (Robert C. Chana ,2011). There is lack of

collaborative planning among those who quantify and procure medicines and supplies. More than 58% of the respondents strongly disagreed or disagreed that there is collaborative planning between quantification and procurement. More than 61% of the respondents disagreed that there is effective implementation of purchase order processing. During the interview it was indicated that staff shortage and lack of proper scheduling of purchases are critical challenges and efforts will be geared towards alleviating the challenges specifically increasing staff levels as of next Ethiopian fiscal year. The facility disposes damaged or expired stock based on the national medical waste management guidelines. Seventy-two percent of the respondents agreed or strongly agreed that this is a common practice at ALERT. During the visits at the store rooms and interview with senior staff it was clear that the facility has challenges to store products based on recommended guidelines. This is accompanied with inadequate storage spaces and lack of infrastructures like racks and shelves becomes one of the challenges they face in IPLS implementation. Sixty-four percent of the respondents agreed or strongly agreed that there is a practice that ensures the stock levels within the established maximum stock level and emergency order point. More than 73% of the respondents agreed or strongly agreed that distribution of pharmaceutical products is based on needs. As per the requirement of IPLS and under normal condition Hospitals are expected to request refill by sending their RRF report to EPSA every two months and it is only under rare condition when their stock fall below two weeks' consumption should they request emergency order so that they can avoid stock outs. Hence, as per the IPLS recommendation frequent emergency order is not encouraged. (PFSA, 2014).

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter presents the summary based on the objectives of the research. It also contains , conclusion , recommendations and limitation of the study .

1. Summary

Integrated Pharmaceutical Logistics System (IPLS) implementation needs better human, and financial, resources management. It also requires better infrastructural and ICT arrangements and availability with proper utilization of LMIS. IPLS is designed for the purpose it is intended to deliver, all the basic data as defined by Ethiopian Pharmaceutical Supply Agency (EPSA) are clearly identified and defined in the IPLS's Standard Operating Procedures (SOP). This does not mean that it will produce results. This research applied mixed method to assess challenges in the implementation of IPLS at hospital level in ALERT hospital. Five dimension of challenges including human resources, financial, infrastructure, technology and legislative related challenges as well as LMIS related challenges have been described. The summary of major findings is indicated below:

- The human resources should be adequate in terms of number and staff should also be trained well. In ALERT hospital it was found that management of human resources is one of the challenge affecting the implementation of IPLS as there is lack of staff and training of staff on IPLS should also be provided to implement IPLS. In addition to the training, IPLS should be accompanied with regular supportive supervision and feedback. In this study it was identified that staff are not receiving adequate supportive supervision to improve staff skills and performances in the area of recording and reporting using the standard formats. Staff turnover is identified as a critical challenge, and forced the facility to assign untrained staff for IPLS implementation. From the observation and interviews, it was noted that 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.
- IPLS implementation should be provided with adequate financial inputs. In this study it was found that financial challenges affect its implementation in terms of availing essential drugs when there is no stock available at EPSA's stores and even in the stores of the hospitals. Proper staffing, training and other inputs are also in need of more financial allocations.
- In relation to infrastructure challenges; there are four stores in ALERT hospital, almost all of them designed with inadequate storage spaces. It was also found that the storage rooms do not fulfill cold chain requirements and other conditions for some temperature sensitive pharmaceuticals and supplies. It was found that staff working at the stores and dispensaries need better training to improve services in their operations.
- In relation to ICT availability and utilization, it is found that all the activities in the dispensaries and stores are found to be manual, there is lack of computers to use in the storage and dispensary operations. IPLS is found to be well designed for the purpose it is intended to serve; all the basic logistics data items, as defined by EPSA, are clearly identified and defined in the IPLS SOP with their sources and accompanying instructions. The research has found that records are not updated on time, and staff need more support to improve data quality for evidence based decision in relation with pharmaceutical logistics. In

addition to the recording and reporting formats, the recording and reporting formats are comprehensive and they are designed to collect data on all types of products that are supplied by EPSA. It is also found that the formats are simple to use by the end users with 100% response from staffs. There is lack of collaborations between forecasting and quantification functions at ALERT. Moreover, there is an inherent challenge in IPLS of Ethiopia, that 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).

- Several SOPs are available at ALERT, and it was encouraging that the SOPs help implement IPLS with the required quality and scheduled plans. These SOPs, rules and regulations are not provided to staff in the form of orientation and training. Most of the SOPs needs to be accompanied with appropriate orientation, training, coaching and mentorship endeavors by the hospital.
- In relation to LMIS challenges and practices; it is found that availability and utilization of the recording and reporting formats is encouraging; however, the fact that the printing cost is still a challenge and should be addressed in terms of sustainability. During the discussions with staff it was found that printing costs are high and no budget is usually earmarked for printing purposes by the hospital, the hospital tends to relay on partners like JSI, Chemonics to print formats. Most importantly, even if all types of products were not covered in this assessment, for the Anti TB medicines, report submission and quality is so encouraging, but still it needs the attention of the senior managers for further improvement.
- Appropriate use of bin cards needs attention of the management to be improved, as 31% of the bin cards found to be not updated during the day of the visit. In addition to checking the use and updating of bin cards, quality of data was checked for accuracy for the anti TB drugs. This include checking the accuracy of the bin card balance with physical count of the TB drugs. It is good to note that having less than a 10 percent discrepancy between the bin card and the physical count is considered near to accurate. Out of the 13 drugs 11 (84.6%) have accurate balance.
- Most anti TB medicines were available at dispensaries as well as at their stores, however Levofloxacin Tablet, 250mg and Ethambutol Tablet, 100mg. were stocked out at the time of the visits. Levofloxacin Tablet, 250mg and Amikacin Injection, 1g Vial. were stock out within the last six months prior to the visit. In terms of expiry monitoring, this study found out that Kanamycin Injection, 1g Vial, Isoniazid (H) 300, Levofloxacin Tablet, 250mg, and Amikacin Injection, 1g Vial were expired.
- To assess the storage conditions 12 standard criteria were applied. The stores at ALERT does not keep cartons and products in good conditions. Some store rooms need maintenance to be clean, and remove all trashes
- As indicated in the tale 4.16, majority (79.4%) of the respondents disagreed or strongly disagreed that there is a well –developed tool to check customer satisfaction at ALERT hospital. This is found to be a critical challenge in terms of addressing customer issues in a more scientific and comprehensive manner. It was noted in the discussions with senior staff that the hospital should be able to developed standard tools to check customer satisfaction and identify factors related with delays in order fulfilment.

2. Conclusion

This study aims at assessing the challenges and other factors affecting practices of IPLS implementation at ALERT hospital in Addis Ababa. The study applied mixed research methods by using questionnaires and interviews with senior managers including the CEO of the hospital and other senior experts.

Percentage and descriptive statistics were used to analyse the data. Data analysis was done using SPSS version 20. In conclusion; the following major findings are listed herewith:

- Human resources found to be one of the critical challenge in the IPLS implementation that include shortage of staff, lack of training on pharmaceutical logistics, and there is no mechanism in place to address attrition and enhance motivation. Lack of supportive supervision with feedback identified in this study as a challenge. It is noted that the majority of respondents agreed that Human resources related factors affect IPLS implementation with aggregate mean of 4.10.
- Lack of adequate financial allocation has been found a challenge that affect IPLS implementation at ALERT. During the interview with senior staff it was noted that lack of collaborative planning among different units of the hospital as well as with EPSA affected IPLS implementation in terms of availing medicines and supplies. Generally, majority of the respondents agreed with the opinion that IPLS implementation are affected by lack of adequate financial inputs with aggregate mean of 4.11
- Infrastructure and technological factors affect IPLS implementation at ALERT. It was found that staff working at the stores and dispensaries need better training to improve services in their operations. It is also found that all the activities in the dispensaries and stores are found to be manual, there is lack of computers to use in the storage and dispensary operations. Regarding the operation at the stores 97% of the respondents agreed or strongly agreed that the system is not designed to improve services and eliminate errors in its operations. It is also indicated that 79.4% of the respondents agreed or strongly agreed that staff are not well trained to use computers and other technologies. The findings disclosed that 88.2% of the respondents agreed or strongly agreed that the storage activities are not automated to facilitate performances. Generally, most of the respondents agree that poor infrastructure and lack of technologies at the warehouse and storage spaces affected IPLS implementation at ALERT hospital with aggregate mean of 4.41.
- Unlike other hospitals in Addis Ababa, ALERT hospital still using paper based LMIS. From the interviews held with staff and senior management team it was noted that having the paper based LMIS affected informed logistics decision making at ALERT. It was also reported that the paper based LIMS has not been linked with health information management system that capture and reports services data.
- Availability and use of bin cards needs attention of the management to be improved, as 31% of the bin cards found to be not updated during the day of the visit. There are also challenges

associated with stock outs and tracking of expiry information as presented in the result part of this paper.

- Storage conditions needs more attention in terms of addressing inadequate spaces, fulfilling cold chain requirements for some temperature sensitive medical products and use of information technology.
- The hospital does not have standard tools to assess customer satisfactions in relation with pharmaceutical services. the management indicated that in addition to the EHSTG requirements to conduct periodic client satisfactions survey using the generic format, there is a need to develop standard tools to check customer satisfaction with regard to pharmaceutical logistic services in the hospital

3. Recommendations

This study identifies some issues and gaps to be addressed to improve IPLS implementation at ALERT hospital. Based on the findings of this assessment following recommendations are forwarded

- the management of the hospital should address most of the HR challenges including hiring additional staff as it is approved in the structure
- provide training on pharmaceutical logistics and conduct mentorship support on IPLS' SOP developed by EPSA.
- Conduct staff satisfaction survey and exit interview of leaving staff to identify areas to address attrition
- Incorporate IPLS practices based on the SOP in staff performance plan and evaluation schemes
- Assess and build better strategies to provide supportive supervision to enhance better implementation of IPLS
- Coordinate joint planning with EPSA and mobilize resources from internal revenues and donors to address financial constraints
- This study indicated that due to poor storage practices usable products are being wasted and hence the management of the hospital should address infrastructural issues around the store rooms including renovations and expansion
- The pharmacy team should work closely with the management to closely follow up expiry information and assess the possibility of developing systems to monitor expiry information
- It was noted that electronic LMIS or Health Commodities Information Management system (HCIMS) is rolled out in other hospitals like Black Lion in Addis, and ALERT hospital should be able to move to application of Electronic LMIS as soon as possible.
- Assess the possibility of linking the LMIS with HMIS and other data collection systems
- Develop standard tools to check internal and external customer satisfaction to address customer issues raised on pharmaceutical services at ALERT hospital

4. Limitation of the Study

This assessment conducted at a facility and focuses on anti TB medicines as tracer and consequently, it will be difficult to make generalization based on its findings. As a result of differences in design and scope of researches though most of the findings of this assessment are similar with other relevant studies conducted in the field, some findings found to be different. These differences may trigger additional studies.

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7. Appendices.

Annex 1

Structured Questionnaire to Collect Data on Integrated Pharmaceutical Logistics Implementation

Part One- Profile of Respondents

Years of Experience: _____

Level of education: 2 years diploma _____

First degree _____

Advanced degree _____

Other: specify _____

Current position _____

Age : A. under 25 , B. 25-30, C. 30-35 D. 35 to 40 E . Above 40

Sex _____

Part Two: Challenges in Integrated Pharmaceutical Logistics Systems (IPLS)

- Please indicate the extent to which you agree with the following as challenges of IPLS implementation in your facility

		Strongly disagree 1	Disagree 2	Indifferent 3	Agree 4	Strongly agree 5
I.	Human Resources					
1.1	Staff need more adequate training on pharmaceutical logistics					
1.2	High turnover of staff affected IPLS implementation in your facility					
1.3	There is lack of supportive supervision with feedback					
1.4	There is low motivation among staff to accomplish logistics tasks such as reporting					

		Strongly disagree 1	Disagree 2	Indifferent 3	Agree 4	Strongly agree 5
II.	Finance					
2.1	<i>Do you agree that inadequate budget allocation is one of the key constraints in pharmaceutical logistics implementation in your facility?</i>					
2.2	<i>There is poor or incomplete understanding of pharmaceutical logistic costs with a tendency to affect budget planning & utilization</i>					
III	Infrastructure and technology					
	Warehouse					
3.1	<i>The warehouse is designed with inadequate storage spaces</i>					
3.2	<i>The warehouse does not fulfil cold chain requirements and other conditions for some temperature sensitive commodities</i>					
3.3	<i>The warehouse system is not designed properly to improve services and eliminate errors in warehouse operations</i>					
3.4	<i>Staff are not trained well to use computers and other technologies to perform their activities</i>					
3.5	<i>Most warehouse activities are not automated</i>					
	<i>Planning , and tracking and utilization of technology</i>					
3.6	<i>The facility does not apply technology to use up-to date data for</i>					

		Strongly disagree 1	Disagree 2	Indifferent 3	Agree 4	Strongly agree 5
	<i>forecasting internal pharmaceutical needs and consumptions for its different units</i>					
3.7	<i>The facility does not apply electronic communications for joint planning among its different units</i>					
3.8	<i>The facility does not apply standard system to track expiry information at the health facility level</i>					
3.9	<i>Stock outs of medicines in your facility are common</i>					
	<i>Logistics Management Information system (LMIS)</i>					
3.10	<i>LMIS not automated in your facility</i>					
3.11	<i>LMIS forms (like bin card, report and resupply formats) are not designed easy to use</i>					
3.12	<i>LMIS forms sometimes are not available in your facility</i>					
4	<i>Legislative</i>					
4.1	<i>Your facility does not have clear guideline for procurement of pharmaceuticals</i>					
4.2	<i>Your facility does not have an internal policy for disposing damaged or expired stock</i>					
4.3	<i>Standard operating procedures and job aids are not available in your facility</i>					

Any additional challenge can be indicated here

Part Three : IPLS Practices

3.1 LMIS related questions

1. Do you have stock keeping records?
 - a. Bin card: Yes _____ No _____
 - b. Stock card: Yes _____ No _____
 - c. Other : specify _____
2. Which transaction records do you use on a regular basis?
 - i. Receiving voucher: Yes _____ No _____
 - ii. Issue voucher: Yes _____ No _____
 - iii. Internal Facility Report and Resupply (IFRR) form: Yes _____ No _____
 - iv. Other : specify _____
3. What LMIS forms do you use for reporting/ordering Multiple response are possible Must be verified with completed reports a. IFRR: 1. Yes _____ No _____ b. RRF: 1. Yes _____ No _____ c. HPMRR: 1. Yes _____ No _____ d. Other. 1. Yes _____ (Specify) _____ 2. No _____
4. The Hospital compiles and sends RRF reports to higher level? 1. Yes _____ 2. No _____ If No, go to question number 10 .
5. If yes, to whom? Multiple responses are possible. (DO NOT READ THE RESPONSES) a. PFSA _____ b. RHB _____ c. Zone Health Office _____ d. WoHO _____ e. Resupply Health Center _____ f. Don't Know _____ g. Other(Specify) _____
6. When was the last time the Hospital sent RRF report? Must be verified with completed reports
 - a) Never _____ b) Within the last month _____ c) months ago _____ d) 3 months ago _____
 - e) More than 3 months ago _____
7. Do all columns in RRF are completed for all medicines? Must be verified with last completed reports
 - a. Yes _____ b. No _____ c. Completed reports not available _____
8. Does the facility received feedback on RRF reports from the higher level? Yes. _____ No. _____
9. Did your last feedback received include drug management/ logistics(e.g. Stock transfer facilitated, stock status of priority products(vital pharmaceuticals), number of stock outs, reporting rate, consumptions trend, errors of reporting, performance measurement compared to other facilities in their area)? Yes. _____ No. _____ Don't Know _____

10. Does the TB pharmacy use IFRR for regular reporting? Must be verified with completed report

Yes _____ No _____ N/A _____

11. Does the Hospital has a resupply schedule for dispensing units?

Yes _____ No _____

If Yes, Check posted Schedule _____

If No, specify the reason _____

12. If yes, do the dispensing units follow their regular schedule?

Yes _____ No _____

If yes, Observe filled IFRR with their schedule _____ If no reason _____

13. In how many days did you usually receive your refill for the last reporting period after you submitted the Report and Requisition Form (RRF) ?

i. One week: Yes _____ No _____

ii. Two weeks: Yes _____ No _____

iii. Three weeks: Yes _____ No _____

iv. One month: Yes _____ No _____

v. Other: specify _____

14. Are all the recording and reporting forms well designed and easy to fill out? Yes _____,

No _____

15. Are the recording forms easy to aggregate in to the RRF? Yes _____ No _____

16. When did you receive your most recent supervision visit?

a. Never received _____, b. Within the last month _____, c. 1 - 3 months ago _____

d. 3 - 6 months ago _____, e. More than 6 months ago _____, f. Other (specify) _____

17. Did your last supervision visit include drug management/logistics (e.g., bin cards checked, logistics reports checked, storage conditions checked, etc.)?

a. Yes _____ b. No _____, c. I do not know _____

18. The last supervision visit that included drug management/LMIS was by

a. FMOH, _____, b. PFSA c. partner (specify) _____, d. other _____

- *Please indicate the extent to which you agree with the following as practices of IPLS implementation in your facility*

3.2 Customer services

		<i>Strongly disagree</i> <i>1</i>	<i>Disagree</i> <i>2</i>	<i>Indifferent</i> <i>3</i>	<i>Agree</i> <i>4</i>	<i>Strongly agree</i> <i>5</i>
<i>3.2.1</i>	there is a well –developed tool to check customer satisfaction					
<i>3.2.2</i>	Staff share technical information with clinicians/other customers when required					
<i>3.2.3</i>	Orders from different units and clients are filled on time					

3.3 Product Selection

		<i>Strongly disagree</i> <i>1</i>	<i>Disagree</i> <i>2</i>	<i>Indifferent</i> <i>3</i>	<i>Agree</i> <i>4</i>	<i>Strongly agree</i> <i>5</i>
<i>3.3.1</i>	The medicines available at you facility are relevant to the local disease patterns					
<i>3.3.2</i>	The facility has an information communication technology and data base to facilitate product selection					

3.4 Quantification and procurement

		<i>Strongly disagree</i> <i>1</i>	<i>Disagree</i> <i>2</i>	<i>Indifferent</i> <i>3</i>	<i>Agree</i> <i>4</i>	<i>Strongly agree</i> <i>5</i>
3.4.1	Consumption method is used to estimate pharmaceutical needs in your facility					
3.4.2	Morbidity method is used to estimate pharmaceutical needs in your facility					
3.4.3	There is collaborative planning between quantification and procurement					
3.4.4	There is effective implementation of purchase order processing in your facility					

3.5 Inventory management, storage & distribution

		<i>Strongly disagree</i> <i>1</i>	<i>Disagree</i> <i>2</i>	<i>Indifferent</i> <i>3</i>	<i>Agree</i> <i>4</i>	<i>Strongly agree</i> <i>5</i>
3.5.1	Your facility disposes damaged /expired stock as per national medicine waste management and disposal directive					
3.5.2	Your facility stores products according to recommended storage guidelines					
3.5.3	Ensuring the stock levels within the established maximum stock levels and emergency order point/ optimal inventory positioning					
3.5.4	In your facility distribution of pharmaceutical products is based on needs received from different units of the hospital					

Thanks for your participation

Qualitative Questions for senior staff

1. What is your opinion about IPLS implementation and key challenges at ALERT hospital?
2. Tell me about pharmaceutical logistics flows and any challenge about it? What about availability and use of bin card, standard operating procedures, job aids for IPLS implementation?
3. Can you discuss the regulatory policy and procedures in IPLS implementation in your hospital?
4. What are your experiences in tracking and reporting logistic information within ALERT and to FMOH?
5. Discuss the management ownership of IPLS within ALERT? How do you demonstrate it?
6. Can you comment on the human resources challenges in the implementation of IPLS?
7. Can you comment on availability of adequate financial resources and infrastructures to support IPLS implementation? Can you indicate some gaps in relation to financial resources and bottlenecks on infrastructures?
8. Discuss the importance and key practical challenges of supervision of staff for improving IPLS implementation?

Thanks for your cooperation!!

2.3 STORAGE CONDITION OBSERVATION CHECK LIST

SerNo	Descriptions	Score ¹	Remarks
1	Products ready to distribution/dispensing are arranged so that identification labels and expiry dates and/or manufacturing dates are visible.		
2	Products are stored and organized in a manner that facilitate first-to-expire, first-out (FEFO), counting and general management.		
3	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/gloves) and cartons are put right-side u		
4	The facility separate damaged and/or expired products from usable products and removes them from inventory.		
5	Products are protected from direct sunlight at all times of the day and during all seasons.		
6	Cartons and products are protected from water and humidity during all seasons.		
7	Storage area is visually free from insects and rodents. (Check the storage area for traces of rodents [droppings or insects].)		
8	Products are stored at the appropriate temperature during all seasons according to product temperature specifications.		
9	Roof is always maintained in good condition to avoid sunlight and water penetration at all times.		
10	Storeroom is maintained in good condition (clean, all trash removed, shelves are sturdy, boxes are organized)		
11	The current space and organization is sufficient for existing products and reasonable expansion (i.e., receipt of expected product deliveries for foreseeable future).		
12	Fire safety equipment is available and accessible (any item identified as been used to promote fire safety should be considered).		

¹ Note here that -To qualify 'Yes' all criteria should be met

Annex 3

Consent form with participants of this research

I _____ here by giving my consent to provide accurate Information about the challenges in the implementation of the Integrated Pharmaceutical Logistics System (IPLS) in at hospital level at ALERT hospital.

I understand there is no problem within my position in the health facility by participating in this research at the beginning as well as at the end of the study. I believe that the result of the study will help FMOH's PFSA and other health facilities to improve integrated pharmaceutical logistics services.

Participants Name _____ Signature _____ Date _____

Researcher's Name _____ Signature _____ Date _____