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**CHALLENGES OF PHARMACEUTICAL SUPPLY CHAIN
MANAGEMENT IN PUBLIC HEALTH FACILITIES IN WEST
SHEWA ZONE, OROMIA REGION- ETHIOPIA**

BY GIRMA ESHETU (GSD/5660/10)

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ADDIS ABABA, ETHIOPIA

June, 2020

ADDIS ABABA UNIVERSITY
COLLEGE OF BUSINESS AND ECONOMICS
SCHOOL OF COMMERCE
LOGISTICS AND SUPPLY CHAIN MANAGEMENT UNIT

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June, 2020

Declaration

I, Girma Eshetu declared that a thesis entitled with “*Challenges of Pharmaceutical Supply Chain Management in Public Health Facilities in West Shewa Zone, Oromia Region-Ethiopia*” is my original research work and have never been submitted to any other university for any Degree. I also declare that all the resources used under this research has been acknowledged clearly.

Declared By Girma Eshetu

Date: _____

Signature _____

Letter of certification

This is to certify a research undertaken by Girma Eshetu under my advice entitled with ***“Challenges of Pharmaceutical Supply Chain Management in Public Health Facilities in West Shewa Zone, Oromia Region-Ethiopia”*** submitted to the AAU in partial fulfillment of the requirements for the Degree of Master of Arts in Logistics and Supply Chain Management complies with the regulations of the Addis Ababa University and meets the accepted standards with respect to originality and quality.

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CHALLENGES OF PHARMACEUTICAL SUPPLY CHAIN MANAGEMENT IN
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Abbreviations

CMS	Central Medical Store
DTC	Drug and therapeutics committee
EFDA	Ethiopian Food and Drug Administration
EPSA	Ethiopia Pharmaceuticals Supply Agency
FMoH	Federal Ministry of Health
HSC	Health supply chain
FIP	International Pharmaceutical Federation
IFRR	Internal Facility Request and Report
IPLS	Integrated Pharmaceuticals Logistics System
IT	Information Technology
LIAT	Logistics Indicator Assessment Tool
LMIS	Logistics Management Information System
LMICs	Low- and Middle-Income Countries
MSH	Management Sciences for Health
NPPL	National Pharmaceuticals Procurement List
PFSA	Pharmaceuticals Fund and Supply Agency
PLMP	Pharmaceuticals Logistics Master Plan
RMS	Regional Medical Store
RRF	Report and Requisition Form
RDF	Revolving Drug Fund
SCM	Supply Chain Management
SCMS	Supply Chain Management System
SPSS	Statistical Package for the Social Science
VMI	Vendor Managed Inventory

Abstract

The World Health Organization (WHO) defines access to medicine as a priority for citizens. It needs to be available at all times in adequate amounts, in appropriate dosage and quality and at an affordable price for individuals and communities. To ensure that people have access to essential and quality medicines, a functioning and sustainable supply chain is necessary. The study aimed at assessing the challenges of pharmaceuticals supply chain management in Public health facilities in west Shewa zone, Oromia region -Ethiopia. Descriptive type of research with mixed research approaches were employed to investigate the challenges of pharmaceutical supply chain management. The data was collected by using structured questionnaire from forty health facilities (three hospitals and 37 health centers). The questionnaires were provided to pharmacy section heads, laboratory section heads and store managers of the selected health facilities and five key informants were interviewed by using interview guide from zonal health desk, hospital and health center. The health facilities were classified by their type of facilities and each health facility was selected by using lottery method. The data collected from 40 health facilities and analyzed by using descriptive statistics. From the finding of the study the human resource, financial resource and infrastructure and information technology challenges were identified. It was concluded that human resources identified to be one of the important challenges in pharmaceutical supply chain management. Lack of adequate financial allocation was major challenges in financial resources which limit availability of essential pharmaceuticals to provide basic service at facility level. From the study it was also found that there were inadequacies of storage spaces with substandard shelves. It is better to solve human resource, financial resource and infrastructure and information technology challenges through training of manpower, using revolving drug funds and renovation of warehouses consecutively .

Key words: *Pharmaceutical, Pharmaceutical supply chain management, public health facilities*

CHAPTER ONE

Introduction

1.1 Background of the Study

Supply chain management (SCM) is becoming very crucial for the survival of a world-class organization. Currently, many organizations become part of at least one supply chain in order to perform equally well and to achieve better performance. This requires elimination of interface between many techniques across applications and individual departments (Premaratne, 2005). Although Pharmaceutical supply chain management follows same principle, it is very complex because it has impact on public health, pharmaceuticals are vital products, availability and accessibility of pharmaceuticals are important issues for both manufacturing companies and governments and large varieties of pharmaceuticals are required for diagnosis, prevention and treatment of certain disease conditions. And again, the needs of the pharmaceuticals for the health service differ from country to country, season to season, and program to program. The pharmaceutical supply chain management deals with a large number of pharmaceutical lists, specific shelf life (expiry date), storage condition requirements, and involvement of too many stakeholders in most key process areas such as forecasting and procurement. The situations where customers and service provider can choose, obtain, and use medicines and other health commodities when and where they need them for prevention, diagnosis, treatment, and care is the one that SCM can provide. It is crucial that drugs be delivered at the right time to the right person in standard conditions. Improper distribution of pharmaceuticals results in negative effects on public health and client's dissatisfaction, and affects manufacturing companies' goodwill and profit (Nazila and Ahmad,2015).

Most leading causes of death and disability in developing countries can be prevented, treated or at least alleviated with affordable essential drugs. Despite this fact hundreds of millions of people do not have access to essential drugs. Essential drugs have important role throughout the world even if the relative frequency of specific health problems differ from country to country. Health services throughout the world presented with a fairly common set of health problems.

Mortality figures across developing countries can be significantly reduced if affordable, effective and quality pharmaceuticals are available and appropriately used. Through provision of essential pharmaceuticals, the burden of illness can be significantly decreased. Emelia stated that even in industrialized countries escalating costs of healthcare have placed evidence-based and efficient pharmaceuticals management high on the agenda. Good pharmaceuticals management is an essential component of effective and affordable health care services globally (Emelia et al., 2014).

The World Health Organization (WHO) defines access to medicine as a priority for citizens. It needs to be available at all times in adequate amounts, in appropriate dosage and quality and at an affordable price for individuals and communities. It is estimated that two billion people do not have access to medicines in the world and four million lives per year could be saved in Africa and Southeast Asia with the appropriate treatment through provision of essential pharmaceuticals. With this estimate in mind, WHO and 192 states committed themselves to reaching eight Millennium Development Goals. The fourth millennium goal on the list is to reduce the child mortality rate; the fifth is to improve maternal health and the sixth, to combat HIV/AIDS, malaria and other diseases (WHO, 2012). To ensure essential pharmaceuticals availability, World Health Organization (WHO) focuses on policies, access, quality and rational use of pharmaceuticals. To ensure that people have access to essential and quality medicines, a functioning and sustainable supply chain is necessary, which includes proper pharmaceuticals selection, quantification, timely procurement and inventory management. In line with this the FMOH established semi-autonomous entities, Pharmaceuticals Supply and Fund Agency (PFSA), which is responsible for the forecasting, procurement, storage and distribution of pharmaceuticals to public health facilities across the country (House of Representatives, 2007). The Federal Ministry of Health (FMOH) has been working to ensure an efficient and high performing health care supply chain that ensures equitable access to affordable medicines and related supplies for all Ethiopians (EPSA, 2018).

Sporrong stated that Ethiopia is on the way to developing a sustainable nationwide health supply chain (HSC). There are Positive changes such as building infrastructure and attitudinal changes recognizing the need for trained personnel for HSC management. However, there are still short-

term and long-term challenges; short term challenges include the importance of highlighting strategies and programs for human resources in HSC management. In the long term, it is important to ensure a sustainable financial base and find ways to further develop and sustain human resources in HSC management for the increased availability of medicines to be a reality for all people in Ethiopia. It is vital for the Ethiopian Government to take a lead in coordinating the process for systematic improvements in the HSC by engaging all partners including international organizations, and leading the strategic development agenda (Sporrong et al., 2016).

1.2 Statement of the Problem

Availability of essential drugs is the building block of the pharmaceutical supply chain management. The components of pharmaceutical supply chain management are selection, quantification, procurement, and inventory management and a failure in one part of the component leads to the failure of the whole pharmaceutical management process. Lack of effective pharmaceutical supply chain not only affects the availability of essential drugs but also significantly affects efficiency. Ineffectiveness in selection, quantification, procurement, and inventory management, as well as high prices, poor quality, theft, expiration of drugs, irrational prescribing and incorrect use of medicines by patients increase the health expenditures (MSH, 2012). A supply chain disruption occurs when supply fall severely short of supply. Such disruptions take place when either the nominal supply capacity of a business process is greatly reduced for some period of time, or a sudden increase in demand, or both. Disruptions in pharmaceuticals/ healthcare contexts disturb the continuity of providing for patient needs, and can have particularly severe consequences (Gravesa, 2009). Disruption in supply of pharmaceutical products in public health facilities results in repeated stock outs, interruption of services in health institution, exacerbation of infection, and not position to deliver better health care to patients.

In Ethiopia, there were multiple parallel supply chain systems for different programs, lengthy processes and five layers in the supply chain systems (from federal ministry of health to region health bureaus, from regional health bureaus to zonal health desks, from zonal health desks to woreda health offices and from woreda health offices to health facilities), multiple players in the forecasting and procurement, storage and distributions, and management and decision making in the Ethiopian health supply chain systems. Moreover, there were multiple duplication of efforts

at national and regional levels of the health SCMS (FMoH, 2006). As a result, the FMoH with partners established PFSA in 2007 (now it is called EPSA) to deal with these challenges and improve the efficiency of the supply chain management system of the public health sector. In recent years, significant progress has been made by EPSA; however, various challenges remain including an inadequate supply of essential pharmaceuticals, poor storage conditions, and weak stock management which have resulted in high levels of waste and stock-outs (EPSA, 2018). Often there is fragmentation of responsibility and governance between the ministry of health, the EPSA, and health staff at the district and health facility. This creates a system of diffuse accountability where each actor can attribute the underperformance of the supply chain to other actors in the system.

The health supply chain (HSC) is an obstacle to achieve the health-related Millennium Development Goals and ideals of universal health coverage. Trained health professionals are needed to manage HSCs so that pharmaceuticals reach the patients who need them. The Global pharmacy workforce report of the International Pharmaceutical Federation (FIP) focuses attention on the lack of human resources in the healthcare sector, linking the lack of pharmacy personnel to inequalities in access to medicines. Of particular concern is sub-Saharan Africa, with an average of less than one pharmacist per 10,000 populations. A recent pharmacist workforce survey reports only 2.3 pharmacists per 100,000 populations in Ethiopia. According to WHO, the global health workforce crisis highlights the urgent need for competent, recognized and empowered HSC human resources, crucial for attaining the health-related Millennium Development Goals and realizing the goal of universal health coverage. Four of the eight Millennium Development Goals involve medicines or medical commodities and their availability at the primary care level or service delivery point. Understanding that the status of the HSC workforce in resource-constrained countries is in marked contrast to their status in high-income environments, a better grasp of the barriers and enablers to improving the human resources in HSCs is required. In addition to the human resources; infrastructure development, data management and finance need to be addressed in a systematic way in order for HSCs to continue to develop in Ethiopia in a sustainable way (Sporrong et al, 2016).

Generally, the following key areas are important:

- Human resource is an important factor in the practices of pharmaceutical supply chain management. The study identifies the human resource challenges have more impact on the practices of pharmaceutical supply chain management.
- There are challenges that should be identified and addressed in the areas of infrastructure, financial allocation and utilization as well as use of information technology to enhance pharmaceutical supply chain management activities.

1.3 Research Questions

The following were the basic research questions of the study:

- i. What are human resource challenges in pharmaceuticals supply chain management in public health facilities in west Shewa zone?
- ii. What are financial resource challenges in the pharmaceutical supply chain management in public health facilities in west Shewa zone?
- iii. What are technological and infrastructural related challenges in pharmaceutical supply chain management in public health facilities in west Shewa zone?

1.4 Objectives of the Study

1.4.1 General Objective

The general objective of the study is to assess the challenges of pharmaceuticals supply chain management in Public health facilities in west Shewa zone.

1.4.2 Specific Objectives

The specific objectives of the study are:

- i. To identify the human resource challenges in pharmaceutical supply chain management in public health facilities in west Shewa zone.
- ii. To assess the financial resource challenges in pharmaceutical supply chain management in public health facility in west Shewa zone.
- iii. To identify technological and infrastructure related challenges in pharmaceutical supply chain management in public health facilities in west Shewa zone.

1.5 Significance of the Study

Public health facilities use it to see the spectrum of the pharmaceuticals SCM including the strength, weaknesses and challenges. The root causes in pharmaceuticals supply chain

management challenges identified and show the government the areas of intervention. The government uses best practices obtaining from the researched health facilities. The public understands the root cause of unavailability of essential drugs at public health facilities.

1.6 Scope of the Study

The study covered only public health facilities in west Shewa zone to assess the challenges of pharmaceuticals supply chain.

1.7 Limitation of the Study

The study didn't cover the manufactures, importers and distributors of the pharmaceuticals. Some health centers do not have pharmacy and laboratory professionals who were potential personnel for the study.

1.8 Definition of Terms

Essential medicine: are the medicines that "satisfy the priority health care needs of the population". These are the medications to which people should have access at all times in sufficient amounts.

Public health facilities: these are health facilities owned by the government of Ethiopia and managed under Federal Ministry of Health (FMOH) or regional health bureaus.

Pharmaceuticals: means any substance or mixture of substances used in the diagnosis, treatment, mitigation or prevention of a disease, and include medical instruments and medical supplies.

Supply chain encompasses all activities associated with the flow and transformation of goods (products and services) from initial design stage through the early raw material stage, and on to the end user.

Supply chain management encompasses the planning and management of all activities involved in sourcing, procurement, conversion, and logistics management

Logistics is the operational component of supply chain management, including quantification, procurement, inventory management, transportation and fleet management, and data collection and reporting.

1.9 Organization of the Study

This thesis is organized into five chapters. The first chapter is an introduction which includes background of the study, problem statement, research questions, objective of the study, significance of the study, scope of the study and limitation of the study. The second chapter is review of related literature which consists review concepts and theories, empirical literature review and conceptual framework. The third Chapter includes description of the study area, research approach, research design, sample design, data sources, data collection procedures, data analysis and ethical consideration. The fourth chapter is analysis and discussion and the fifth chapter is summary, conclusions and recommendations.

CHAPTER TWO

2. Review of Related Literature

2.1 Review Concepts and Theories

2.1.1 The Concept and Nature of Pharmaceutical Supply Chain Management

The pharmaceutical supply chain provides the means through which medicines are delivered to patients. Pharmaceuticals are produced by local manufacturers or imported from foreign countries by pharmaceuticals importers; are transferred to wholesale distributors; stocked at health facility stores or retail outlets; dispensed by pharmacies; and ultimately delivered to clients with appropriate information and the patients are taken the pharmaceuticals accordingly. Pharmaceutical supply chain management spends hundreds of millions of dollar per year. The pharmaceutical supply chain is more complex and more unformed related to other sectors because it has impacts on human health and requires accuracy in conforming to the patients' need and also, they are vital products and availability and accessibility of them are important issues for both companies and governments. It is crucial that drugs be delivered at the right time to the right person in standard conditions. Improper distribution of pharmaceuticals results in negative effects on public health and client's dissatisfaction, and affects companies' goodwill and profits. Pharmaceutical stock outs expose clients to adverse events, and in some cases death (John et al. 2015; Nazilaand ,2015).

The key stakeholders in pharmaceutical supply chain include multiple government agencies, health facilities, drug manufacturers, drug distributors, pharmacies, research organizations, and authorities. Again, there are numerous other organizations, such as insurance companies and healthcare management organizations that further increase the complexity. They have different business objectives which result in managing pharmaceutical supply chain all the more difficult. And also, it is stated that the regulatory nature of the industry and numerous merger and acquisitions to acquire more Research and Development expertise, many pharmaceutical supply networks have grown in an uncontrolled fashion rather than being planned for optimal performance (Kapoor et al., 2018).

Jaberidoost stated that the Pharmaceutical supply chain should provide medicines in the right quantity, with the acceptable quality, to the right place and customers, at the right time and at affordable price to be consistent with health system's objectives and also it should make benefits for its stockholders. Unable to fulfill these criteria results in the deterioration of health service by threatening patients' life (Jaberidoost et al, 2013).

2.1.2 Responsive Supply Chain in Pharmaceuticals

The supply chain for pharmaceutical products is complex, and involves multiple organizations that play differing but sometimes overlapping roles in drug distribution and contracting. An incompetent supply chain is associated with pharmaceutical stock outs or shortages, poor performance, and lowered patient safety (WHO, 2008). Increasing the efficiency of Supply chain processes through building up of smarter and safer pharmacy operations results in reducing errors, optimizing the supply processes, and improving patient safety and satisfaction. The purpose of responsive supply chain is to react quickly to match the demand of the market. Producers are the source of drugs in the pharmaceutical supply chain, and wholesale distributors purchase pharmaceutical products from producers and distribute to retail outlet pharmacies or health facilities. Pharmacies are the final step on the pharmaceutical supply chain before drugs reach the consumer/patient. A two-way flow of information complements to physical flow of goods and flow of information, the flow of funds to some supply chains such as those found with point of sale or retail operations. It is more advantageous to abide by the rules and regulations connected with pharmaceutical distribution. With respect to responsive supply chain, the objective is to respond quickly to unpredictable demand in order to minimize stock out, forced markdowns and obsolete inventory. Again, companies must work aggressively to reduce their lead time as long as it doesn't increase their cost and generate high turns and minimize inventory throughout the chain (John, Jonathan and Devid, 2015).

Inefficient supply chain management practices will affect overall performance of the health facility. Pharmaceutical Supply Chain is more complex than that of other industries. If vital medicine is out of stock, it can result in the deterioration of patient health and finally to death. Thus pharmaceutical supply chains have to be more responsive than effective (Nawshad , Javed and Sitesh ,2016).

2.2 Pharmaceutical Supply Chain in Ethiopia Context

The provision of complete health care requires the availability of safe, effective and affordable pharmaceuticals of the required quality, in adequate quantity at all times. Despite this fact, in the past, the pharmaceutical supply chain management system of Ethiopia had several problems including non-availability, unaffordability, poor storage conditions and stock management and irrational use. To solve these problems in public health facilities, Pharmaceuticals Fund and Supply Agency (PFSA) was established in 2007 by Proclamation No. 553/2007 based on the Pharmaceuticals Logistics Master Plan (PLMP). The Agency is mandated to avail affordable and quality pharmaceuticals sustainably to all public health facilities and ensure their rational use. So as to execute its mandate in the area of pharmaceuticals supply in an efficient and effective manner, integrated pharmaceuticals logistics system (IPLS) has been developed and implemented since 2010 and it is under implementation currently. IPLS is the term applied to the single pharmaceuticals reporting and distribution system based on the overall mandate and scope of the PFSA. It aims to ensure that patients always get pharmaceuticals they need. To be successful, the system must fulfill the six rights of supply chain management by ensuring the right products, in the right quantity, of the right quality, at the right place, at the right time and for the right cost. The IPLS integrates the management of essential pharmaceuticals including the following pharmaceuticals that were used to be managed vertically: HIV/AIDS, Malaria, TB and Leprosy, EPI, MCH and purchased essential drugs. It is the primary mechanism through which all public health facilities obtain essential and vital pharmaceuticals. Products included on the National pharmaceuticals procurement List (NPPL) are supplied and managed through the IPLS (PFSA, 2015).

To help maintain adequate stock levels, the maximum months of stock, minimum months of stock and an emergency order point have been established for each health facility in the system. The inventory control system for the IPLS is a Forced Ordering Maximum/Minimum inventory control system. This means that all facilities are required to report on a fixed schedule (every other month) for all products. In addition, all products are re-supplied each time a report is completed. PFSA delivers pharmaceuticals to Hospitals and Health Centers which have submitted a completed and approved RRF on time. Hospitals and Health Centers receive pharmaceuticals every other month. In emergencies, an emergency order can be placed. A

maximum/minimum inventory control system is designed so that facilities always have enough stock to serve their clients and to prevent emergency orders. However, every system must have a procedure for placing emergency orders if they are ever needed. An emergency order would be needed to avoid reaching a stock out before the end of the review period. At the Health Centers and Hospitals an emergency order is needed if the stock level falls below 2 weeks of stock (0.5 months of stock) before the end of the review period (PFSA, 2015).

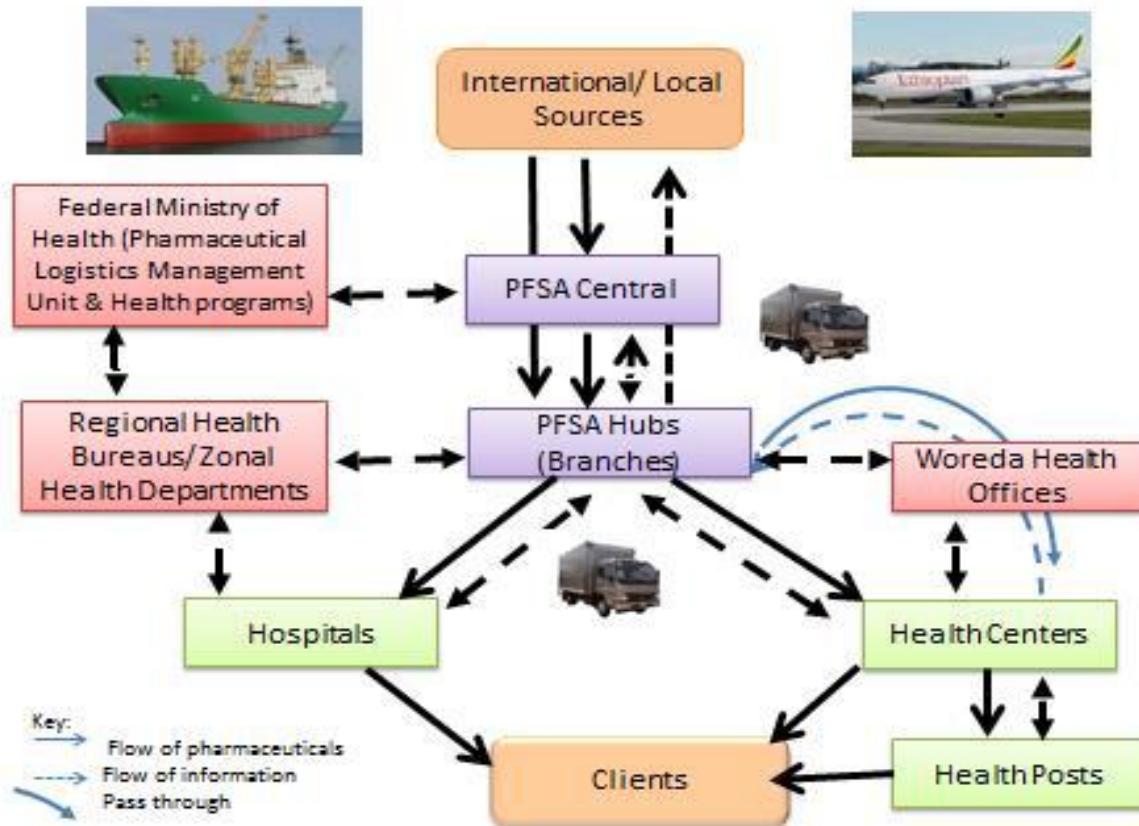


Figure 2.1: Flow of Pharmaceuticals and Information in the Integrated Pharmaceutical Logistics System (IPLS)

Source: PFSA, 2015

Within hospitals and health centers, products will be managed centrally in the Pharmacy Store. All products will be received into the pharmacy store and most of the products will be stored there, until they are needed in the various dispensing units within the facility. The pharmacy store manager and pharmacy head in collaboration with staffs in dispensing units will establish a

re-supply schedule for the dispensing units. Dispensing unit staff will complete an Internal Facility Report and Resupply Form (IFRR); the Pharmacy Store manager will use the information to determine the re-supply quantity needed to serve clients until the next scheduled re-supply day. Pharmaceuticals used by a facility should be stored in the pharmacy storeroom. When pharmaceuticals are issued from the storeroom to dispensing unit (DU), the dispensing unit (DU) staff will provide essential logistics data on the IFRR. After completing the report section of the form, the health worker will take the IFRR to the pharmacy to obtain the needed pharmaceuticals. The store manager will use the information in the report section to determine re-supply quantities and issue the pharmaceuticals (PFSA, 2015).

2.3 Empirical Literature Review

The challenges in pharmaceutical supply chain are insufficient trained man power, budget constraints, lack of information technology and poor infrastructure. These challenges affect the pharmaceutical supply chain management activities at health facilities level such as selection, quantification, procurement and inventory management.

2.3.1 Major Activities of the Pharmaceuticals Supply Chain management at Health Facility Level

In general, the Pharmaceuticals SCM involves different activities that must be carefully planned and coordinated to ensure the right commodities of acceptable quality get to the right place at the right time so that customers use for diagnosis, treatment, and care when needed. Therefore, the key activities are:

2.3.1.1 Selection of Pharmaceuticals

The foundation for a real time accessibility to drugs and other essential medicines involves selection of drugs based on the evidence or diagnosis, rational utilization, price affordability, optimal resources (monetary and personnel) and a reliable, robust and self-sustaining supply system (Kolikam, Joshi and Kamathi, 2015). Health facilities must select their pharmaceuticals by depending on the national list of pharmaceuticals. At national level, a national formulary and therapeutics committee, pharmaceutical board, board of physicians, or other government-appointed group may be responsible for pharmaceuticals selection of a particular country. 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). Essential medicines are selected depending on public health relevance, evidence on efficacy and safety, and comparative cost-effectiveness. Careful selection of a limited range of essential medicines results in a higher quality of care, better management of medicines, and more cost-effective use of health resources (WHO, 2002).

Selection starts at national level and cascaded to the specific place where the care is going to be provided. It involves establishing a list of pharmaceuticals at national and facility levels. Therefore, the list should be developed based on the prevailing health care needs and should address the essential health package of the country. Selection of pharmaceuticals should be an inclusive and participatory process as develop a consensus list. In Ethiopia, product selection is done at the national level by national advisory board and health programs in collaboration with Ethiopian Food and Drug Administration (EFDA). Drug and therapeutics committees (DTCs) develop facility-based formularies.

2.3.1.2 Quantification/Forecasting of Pharmaceuticals

The quantity of selected products 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 (USAID | DELIVER, 2011). Pharmaceuticals quantification refers to the process of calculating the quantities of specific Pharmaceuticals required for a health program for a given amount of resources available, e.g. for a given budget (Emelia al et., 2014).

Quantification could be based on minimum/maximum quantities, where health facilities order medicine up to maximum levels, when drugs reach minimum levels. There are other approaches for quantification such as the kit system, where products are packed in predetermined quantities and are distributed to Health facilities; the two-bin system consists of two bins with equal quantities, whereas a replacement bin is distributed when the first bin is empty; and there is the meet-up and resupply system, where stakeholders have a regular meeting for resupply, training and quantification. For quantification it is necessary to recruit dedicated personnel, who train, supervise and check health workers regarding quantification (Allan, 2013).

Quantification is a critical supply chain management activity that, once the outputs have been produced as a result of the exercise, should drive an interactive process of reviewing and updating the quantification data and assumptions, and recalculating the total commodity requirements and costs to reflect actual service delivery and consumption of commodities, as well as changes in program policies and plans over time. The results of a quantification should be reviewed and updated at least every six months, and more frequently for rapidly growing or changing programs. Quantification is important for informing supply chain decisions on product selection, financing, procurement, and delivery (EPSA, 2016). It is difficult to predict the exact demand for medicines. One of the issues is the availability of accurate data on consumption. However, the lack of standard nomenclature for healthcare products, plus the preferences of clinicians creates further uncertainties. In Ethiopia consumption type of quantification method involves minimum /maximum inventory management type is used.

2.3.1.3 Procurement of Pharmaceuticals

The quantified pharmaceuticals must be procured by coinciding with the available budgets. 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. Since services cannot be produced for storage like physical products, providers adopt customer waiting as a remedy. However, as a result of the differences between healthcare and other services, long waiting times are not affordable in healthcare systems because patient condition may worsen substantially during the waiting. This therefore calls to duty all functions including procurement which must ensure that pharmaceuticals are always available. Underscore the role of the procurement function in healthcare systems; they contend that simultaneity of production and consumption of services results in highly unpredictable and unique demand which is difficult to match with service capacity; hence the need for sufficient inventory. Some aspects of procurement performance such as inefficient processes and delayed delivery or stock outs of medical supplies may affect both efficiency and effectiveness of healthcare systems (Kizito and James, 2013).

Good purchasing practice is prerequisite for efficient accessibility to appropriate and good quality drugs. The main objectives of the procurement system are purchasing of right quantities

of drugs in a cost-effective way, selection of reliable suppliers of higher quality goods, assuring timely delivery and distribution of drugs and other requirements and achieving the lowest possible total cost associated with the transaction in the procurement system. Procurement of drugs is based on three aspects: -selection of drugs, type of dosage forms and the availability of monetary resources. Procedures followed during the process of procurement are Quantification of each drug product for a given period, listing of prices of the required drug in various dosage forms and allocation of funds depending on requirement priority of the drug and dosage form available (Kolikam, Joshi and Kamathi, 2015).

2.3.1.4 Inventory Management of Pharmaceuticals

The procured pharmaceuticals 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).

In Ethiopia Program pharmaceuticals are ordered every two months by hospitals and health centers and delivered by PFSA to these facilities directly or indirectly. Direct delivery sites are facilities that receive program pharmaceuticals directly from PFSA hubs whereas non-direct delivery sites are health centers that receive products from PFSA hubs through Woreda Health Offices. For revolving drug fund (RDF) pharmaceuticals, health centers and hospitals will complete report and requisition form (RRF) as per the facilities review period which can be every two months, every quarter or every six months and collect products from affiliated PFSA branch. Storing is the safe keeping of pharmaceuticals to avoid damage, expiry, and theft. Proper storage procedures help to ensure that storage facilities protect the shelf life of products, that only high-quality products are issued, and that there is little or no waste due to damaged or expired products. If proper storage procedures are followed, customers can be assured that they have received a high-quality product. Storage conditions will affect the quality of the pharmaceuticals being stored. Rooms that are too hot, stacks of cartons that are too high, and other poor storage conditions can cause damage or cause a reduction in shelf life. A well-organized storeroom will simplify a facility 's work; time will not be wasted trying to find needed supplies (PFSA, 2015).

2.3.2 Challenges in Pharmaceutical Supply Chain Management

A workshop by WHO (2006) outlines the difficulties of the medicine supply of African countries: the main challenges being poor information, lack of consumption data and inadequate storage facilities. The workshop designed a regional framework to improve procurement and supply management systems for essential medicine in African regions and outlines challenges, goals and tasks for quantification and forecasting and storage and distribution. This framework lists challenges for selection and quantification, lack of transparent procurement procedures, inadequate storage facilities and capacity, lack of inappropriate planning, inadequate budget allocation, and irrational use. Medical supply chains are different from Commercial supply chains due to access constraints, security constraints, traceability and the value of products and often it is run by governmental monopolies, which hinder small-scale business model innovations. The problem within the medicine sector is the unpredictability of demand and a lack of market research. It is so difficult to predict demands and forecast quantities considering actual demand data, population and seasons for epidemic diseases and to be able to learn from previous periods. There are the constraints for planning and organizational transparency. It is because of a lack of uncertain processes such as emergency order points, human resource capacity and expertise such as dedicated personnel or poor communication possibilities. It is possible to collect data during resupply, in practice there are more challenges than just the collection of consumption data. It is more about the use, adjustment and quality of data. There are several good practical examples for inventory management such as Vendor Managed Inventory (VMI), for communication possibilities such as mobile phones, for transportation possibilities such as delivery, outsourcing or public-private partnerships, for the use of guidelines and performance measurements and for innovative training approaches, but it is still a relatively underdeveloped area. Pharmaceutical availability due to a lack of defined processes and management approaches such as the use of individual lead times, quality and quantity of available transport or appropriate planning considering total quantity, weight and volume of supplies (Allan, 2013).

2.3.2.1 Human Resource Challenges in Pharmaceutical Supply Chain Management

Human resource management is the practice of integrating procedures, policies, and practices to recruit, develop, and maintain employees who are needed by an organization for it to meet its goals. Robust human resource management is defined by a strategy that enables an organization to systematically address the dynamics of the health workforce across the working lifespan from

entry, to development and performance, and then exit. By clearly defining each employee's responsibilities as they link to an organization's mission and building the policies and systems needed to enable those responsibilities, human resource capacity management can increase the capacity of an organization. Human resources are a key performance driver in supply chain management. Therefore, the effective management of a supply chain demands quality human resource managements. By proactively managing plans, polices, and procedures associated with human resource, an organization can expand operations that sustain supply chain performance. To run effectively, a public health supply chain requires a sufficient number of motivated staff with the competency required to fulfill essential supply chain functions; they must also be empowered to make decisions that positively impact health supply availability and supply chain operations. Insufficient amounts of adequately trained and/or motivated personnel are often the cause of supply chain system breakdowns and poor system performance as well, which is often demonstrated with product stock outs. This is compounded by a lack of recognition among many health institutions of the vital role supply chain personnel play in the performance of health systems. By strengthening the capacity of public health supply chain personnel, both supply chains and, ultimately, health systems, will operate more effectively; thus, ensuring clients have improved access to lifesaving health supplies (USAID/Deliver, 2013).

Vujicic stated that shortages, geographic imbalances, and poor performance of health workers pose major challenges for improving service delivery in developing countries. These health workforce challenges are major problems to improved health systems and health service delivery in developing countries. Many low- and middle-income countries are experiencing a crisis in human resources for health (HRH). The factors affecting this crisis are also key contributors to challenges countries face addressing human resources (HR) for the supply chain. In addition to shortage of workers, the workers that exist are overworked, undertrained, and often deployed in ways that do not best use their skills or meet the needs of the people they serve. In response to these challenges, development agencies have increasingly recognized the need to invest in human resources for health (HRH). The Global Fund for AIDS, Tuberculosis, and Malaria (the Global Fund), since its inception in 2002, has recognized the need to invest in HRH and has encouraged countries to use its grants for this purpose through all funding rounds. Through its health systems strengthening funding stream, the Global Alliance for Vaccines and

Immunization (GAVI) has also encouraged countries to include HRH-related activities in proposals (Vujicic et al., 2011).

2.3.2.2 Financial Resource Challenges in Pharmaceutical Supply Chain Management

Financing of pharmaceuticals is a critical issue to save lives and improve health service. Pharmaceutical financing must ensure access to medicines for all classes of the society. In most countries, medicines represent the largest expenditure for the ministry of health after staff salaries. Inadequate funding for medicines results in expenditures for staff salaries and other health care costs may be use inefficiently or simply wasted (MSH, 2012). In many low- and middle-income countries (LMICs), the high cost of medicines, together with economic instability, continued population growth, and a heavy burden of disease, makes it a challenge to ensure adequate financing for a stable and adequate supply of medicines. The emergence of diseases such as HIV/AIDS and drug-resistant strains of malaria and tuberculosis is further straining country health systems, resulting in reduced availability of medicines and rising pharmaceutical expenditures. Resource-poor countries face numerous challenges in ensuring access to affordable medicines, including sustainable financing and optimal allocation of resources, a lack of efficient and reliable supply and distribution channels, and inequity. A lack of or limited local production of medicines in these countries can add to these challenges. In many LMICs, spending on medicines is the largest driver of out-of-pocket payments less than one-third of pharmaceutical expenditures are publicly funded (Bhawalkar and Taddese, 2014).

2.3.2.3 Information Technology and Infrastructure Challenges in Pharmaceutical Supply Chain Management

Supply chain management is a very critical part of any business. A well-coordinated SCM can improve the efficiency of the business and help in cost reduction. As information technology (IT) is being used widely across all businesses, SCM can benefit to a large extent by the use of IT. It has made a significant impact in improving the efficiency of SCM (Saybal and Ajeya, 2018). Healthcare organizations often times 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 (LaPointe, 2017). The supply chain management of many healthcare centers and institutes are not configured towards integrated system. They don't have a proper tracking mechanism to detect the consumption and expiry of products. This makes the

healthcare industry weak in its supply chain management and inefficient in reaching customers on right time (Shetty, 2015). Health IT solutions facilitate data-sharing, which can help healthcare organizations reduce costs by decreasing process variations. The technologies can also help better track supplies from purchase to exportation to eliminate wasteful spending (Lapoint, 2017).

In developing countries poor planning and forecasting, insufficient information about consumption and current stock levels, funding and capacity constraints and a poor infrastructure result in inappropriate stock levels. Public warehouse infrastructures consist of Central Medical Store (CMS), Regional Medical Store (RMS) and Health Facilities, whereas challenges increase further down the supply chain with moisture, leaking ceilings, drains, inappropriate cold storage capacity and non-existent designated areas for reception, delivery and quarantined products. Stock management is done manually with stock holding cards and follows the first-expired-first-out (FEFO) strategy (Allan, 2013).

2.4 Conceptual framework of the study

Conceptual frame work provides a network of inter linking concepts that together provide a comprehensive understanding of phenomena. Conceptual frame work is a structure of concepts which are put together as a road map for the study.

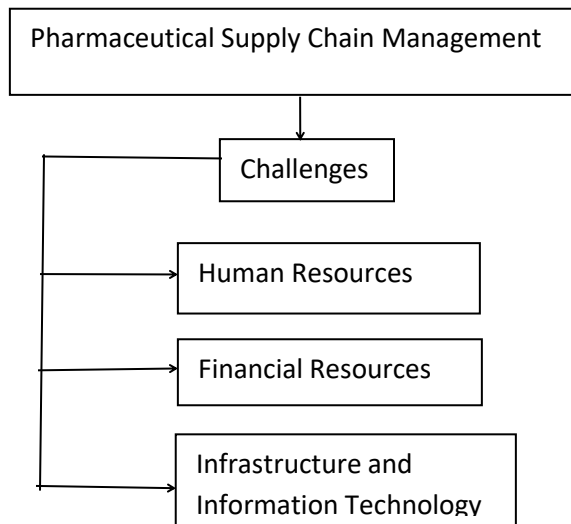


Fig. 2.2: Conceptual framework of pharmaceutical supply chain management challenges

Source: Developed by student researcher based on literature

CHAPTER THREE

3. Research Methodology

3.1 Description of the Study Area

Study will be conducted in west Shewa zone, Oromia regional state. West Shewa is one of the twenty Oromia zones. It is found west of Addis Ababa. The population of West Shewa zone is about 2.4 million with an area of 14,788.78 square kilometers. It has 100 health facilities, 8 hospitals and 92 health facilities. Health facilities are located in different woredas discretely. Pharmaceuticals are supplied to these zone health facilities partially from Addis Ababa and partially from Nekemte EPSA branches. Program pharmaceuticals are directly supplied by EPSA to health facilities or woreda health offices. The purchased drugs through RDFs are collected from EPSA by health facilities. There is road infrastructure problem to reach each health centers directly from EPSA and some health centers get their program pharmaceuticals through their respective woredas.

3.2 Research Approach

There are two methods that provide in the research method such as quantitative and qualitative, where one of them is not better than the others, all of this depends on how the researcher want to do a research of study (Ghauri and Kjell , 2005). To achieve the aforementioned objectives, the study adopts a mixed research approach; structured questionnaire for quantitative and interview guide for qualitative were used. A quantitative research enables the researcher to collect objective and numerical data to apply statistical tools. In mixed research approach quantitative results are expressed in numerical and quantifiable terms, while qualitative results are expressed verbally. In-depth interview is a qualitative technique designed to draw out a clear picture of the participant's view on the research topic.

3.3 Research Design

A research design is simply the framework or plan for a study that is used as a guide in collecting and analyzing the data. Research design is a blueprint that is followed in completing a study. Research design is the blue print for collection, measurement and analysis of data. Actually it is a map that is usually developed to guide the research (Prabhat , 2015). Descriptive research design

was used for this study. The Cross-sectional field survey method was used because data was collected at one point of time from March 10, 2020 to April 24, 2020.

3.4 Sampling Design

3.4.1 Population of the Study

The target population for the study consisted all public health facilities (hospitals and health centers) in west Shewa Zone. There were 100 public health facilities (hospitals and health facilities) in west Shewa Zone. In this research, source materials consist of all pharmacy section heads, pharmacy store managers and laboratory section heads of these public health facilities. Selection of the three respondents from each health facility for the study was guided by non-probability purposive sampling procedure wherein respondents were selected on the basis of their involvement in pharmaceutical supply chain management activities and being able to provide adequate information on the topics being analyzed. The respondents involved in the study by representing their respective health facilities.

3.4.2 Sample Size and Sampling techniques

Sample size was calculated according to the guide for conducting supply chain assessments using the LIAT (USAID | DELIVER, 2011). A confidence level of 90% with a margin of error of 10% was used. The sample size was then calculated using formula for calculating sample sizes in finite population bases. With this formula, sample size of 40 health facilities was obtained.

The general formula for calculating a sample size is:

$$n = \frac{Z^2 * p(1-p)}{m^2}$$

$$n = \frac{(1.64)^2 * 0.5(1-0.5)}{(0.1)^2}$$

$$n = 67$$

where: n = required sample size

Z = Z value (e.g. 1.64. for 90% confidence level)

p = estimated prevalence of the indicator (The product of p and [1-p] is maximized when p = 0.5).

Therefore, when prevalence is unknown, 0.5 should be used.

m = margin of error you wish to allow in estimating the prevalence at 10 percent, m = 0.1

However, there is a predetermined population (e.g., total number of public health facilities in

west Shewa Zone100), the sample size generated from the above equation needs to be multiplied by the Finite Population Correction (FPC) factor. For our purposes, the formula can be expressed as:

$$\text{New } n = \frac{n}{1 + [(n-1)/N]}$$

Where: New n = the adjusted new sample size N = the population size n = the sample size obtained from the general formula

$$\text{New } n = \frac{67}{1 + [(67-1)/100]}$$

New n= 40.36~40 health facilities

Sample size in number of respondents= 40 health facilities * 3 respondents from each HF=120

A total of 100 public health facilities that are providing health care service were used as a study population from which 40 selected health facilities were drawn. For selection of the sample population, first the health facilities were categorized into two different strata as per their type. The strata included 8 hospitals and 92 health centers. The number of health facilities to be included into the calculated sample of 40 facilities from each of the stratum was determined by using proportionate sampling respective sizes. Once the sample size per stratum was determined, a simple random sampling procedure was used to select three hospitals and 37 health centers. A total of 3 hospitals and 37 health centers were included in the study by using lottery method.

For the qualitative part, key five informants one from zonal health desk, two from one hospital (director and pharmacy section head) and two from one health center (director and pharmacy section head) were interviewed.

3.5 Source of Data

The source of this study was primary data source. As the research was intended to study the challenges of pharmaceutical supply chain management in public health facilities, the primary data collected from pharmacy section heads, pharmacy store managers and laboratory section heads via questionnaires distribution and collection. The data that were collected from sample survey through questionnaire that describes numerical figures was the quantitative data types that used in this study, the main sources of primary data were respondents who were public health facilities pharmacy section heads, pharmacy store managers and laboratory section heads. For the

qualitative part, key informants were interviewed by the student researcher by using interview guide.

3.6 Data Collection Instrument

To get the information, the student researcher designed and distributed a set of structured questionnaires. The questionnaire has three parts, the first part is comprised of profile of respondent's demography, the second part is comprised of the pharmaceutical supply chain management activities and the third part is comprised of pharmaceutical supply chain management challenges. A survey by a questionnaire is considered the most appropriate method for measuring the perceptions of the respondents, while minimizing the possibility of researcher bias and providing a greater degree of subjectivity because of the direct response and feedback from the respondents that can be collected in short period of time and in an easier manner. The questionnaires were distributed to sampling amount of pharmacy section heads, pharmacy store managers and laboratory section heads of those selected health facilities in west Shewa zone.

3.7 Method of Data Analysis

An array of descriptive analysis was conducted to address the three research questions presented in the first chapter. Once data was collected, it was necessary to employ statistical techniques to analyze the information. Data was analyzed by using SPSS 20 software and excel spreadsheet.

3.8 Validity and Reliability Test

3.8.1 Validity Test

Validity is the degree to which a test measures what it is expected to measure (Creswell, 2009). It is the degree to which results are obtained from the analysis of the data actually represents the phenomena under study. A pilot study is conducted to refine the methodology and test instrument such as a questionnaire before administering the final phase. Questionnaires are tested on potential respondents to make the data collecting instruments objective, relevant, suitable to the problem and reliable as recommended by (Adams et al., 2007). The survey was tested by an adviser and pretest study was pilot tested on two health facilities i.e. one hospital and one health center, in order to check the validity of the data collection form and the health facilities participated on pilot study didn't participate in the main study. Issues raised by respondents were

gathered and questionnaires were refined accordingly. Finally, the improved version of the questionnaires were used.

3.8.2 Reliability Test

Statistical investigations (Cronbach’s alpha) in order to check the reliability of an instrument to capture intended objective of the study. Cronbach’s alpha was calculated by application of SPSS 20 for reliability analysis. The Cronbach’s alpha value for all constructs SCM activities and challenges was greater than 0.7 that was considered to be acceptable. Summary of the reliability test of SCM activities and Pharmaceutical SCM Challenges is on the table below.

Table 3.1 Reliability Cronbach’s alpha

Variable	Reliability Cronbach’s alpha
Selection	0.712
Forecasting and Procurement	0.780
Inventory Management	0.829
Human Resource	0.709
Financial Resource	0.738
Infrastructure and Information Technology	0.885

Source: Own Survey, 2020

3.9 Ethical Consideration

Before commencing data collection, the selected public health facilities were communicated with formal letters from the School of commerce, Addis Ababa University. The study was conducted after permission from the higher officials of respective public health facilities had been obtained. Participants of the study were asked for consent before participating in the study. During the consent process, they were provided with information regarding the purpose of the study, why and how they are selected to be involved in the study, and what were expected of them and that they can withdraw from the study at any time. Participants were also assured about confidentiality of the information obtained in the course of the study by not using personal

identifiers and analyzing the data in aggregates. The name for whom a questionnaire was administered and the health facility in which they work did not appear in data analysis.

CHAPTER FOUR

4. Results and Discussion

4.1 Introduction

The data gathered from primary sources using structured questionnaires. From forty (40) selected health facilities, two of them have no pharmacy professional and as well as five health facilities do not have laboratory health professionals. Some health centers have only one pharmacy professional and their Pharmaceutical stores are managed by Nurses. And again, in those health facilities do not have pharmacy professionals, the pharmaceutical stores are managed by nurses. At two health centers there were no pharmacy section head and at five health center there were no laboratory section heads. The questionnaires have distributed to 113 health professionals (72 pharmacy professionals, 34 laboratory professionals and 7 nurses). Seventy-one pharmacy professionals, 32 laboratory professionals and 5 nurses participated on the study. The return rate from the distributed questionnaires is $108/113 \times 100 = 95.58\%$.

4.2 Demographic Characteristics of Respondents

The study captured different demographic characteristics of the respondents as shown in the table below (Table 4.1). In terms of gender of respondents, the study included 60.2 % of males and 39.8 % of females. So, the research has contribution of both sexes involving in the pharmaceutical supply chain managements. Majority of the respondents (63.9%) are between 20-30 years old and 36.1% of the respondents between 30-40 years old. This shows us different age groups included in the study. Regarding the respondents' profession 20.45% pharmacists, 45.4% druggists, 13% laboratory technologists, 16.7 % Laboratory technicians and 4.6% Others participated on the study. Concerning their positions in the facilities, 35.2% pharmacy section heads, 29.6% laboratory section heads and 35.2% store managers participated on the study. The above stated health professionals with their respective positions have direct involvement on the management of pharmaceutical supply chain and the stated positions purposely selected for the study. The respondent work experience were different, the work experience of the professionals 33.3% 0-2 years, 41.7 % 2-5 years, and 25% 5-10 years. The work experience has impacts on the skills of managing pharmaceutical supply chains. Concerning the departments, they were working 70.4% pharmacy and 29.6% laboratory. The exposure to pharmaceutical supply chain

management is different for different departments. The pharmacy department has direct exposure when compare to laboratory department. Finally, the type of health facility involved in the study 91.7 % health centers and 8.3% hospitals.

Table 4.1: Demographic Characteristics of Respondents

Demography	Characteristics	Frequency	Percent (%)
Gender	male	65	60.2
	female	43	39.8
	Total	108	100.0
Age	20-30	69	63.9
	30-40	39	36.1
	Total	108	100.0
Profession	Pharmacist	22	20.4
	Druggist	49	45.4
	Laboratory Technologist	14	13.0
	Laboratory Technician	18	16.7
	Others	5	4.6
	Total	108	100.0
Position	Pharmacy section head	38	35.2
	Laboratory section head	32	29.6
	Pharmacy store manager	38	35.2
	Total	108	100.0
Work Experience	0-2 year	36	33.3
	2-5 year	45	41.7
	5-10 year	27	25.0
	Total	108	100.0
Type of Department	Pharmacy	76	70.4
	Laboratory	32	29.6
	Total	108	100.0
Type of health facility	Hospital	9	8.3
	Health center	99	91.7
	Total	108	100.0

Source: Own Survey, 2020

4.3 Pharmaceutical supply chain management activities at facility level

Pharmaceutical supply chain management activities include selection, forecasting, procurement and inventory management of pharmaceuticals. Respondents were asked to rate their opinion from 1(strongly disagree) to 5 (strongly agree). The mean of their responses score for each variable illustrates the level of achievements in pharmaceutical supply chain management activities where as standard deviation (SD) illustrates the deviation from the central value.

4.3.1 Selection of Pharmaceuticals at Facility Level

Drug and Therapeutics committee (DTC), drug list, list of common health problems and availability of essential medicines are discussed under this category.

Table 4.2: Selection of pharmaceuticals at facility level

Selection of pharmaceuticals		Response						Total	mean	Standard Deviation
		Strongly Disagree(1)	Disagree(2)	Neutral(3)	Agree(4)	Strongly Agree(5)				
S1	Your health facility has Drug and Therapeutics Committee (DTC)	69	27	4	6	2	108	1.56	0.94	
S2	Your health facility has list of common health problems	2	3	27	51	25	108	3.87	0.87	
S3	Your health Facility has its own drug list prepared by DTC	51	43	6	5	3	108	1.76	0.96	
S4	Essential medicines are available all times at adequate quantities and in the appropriate dosage forms	58	42	3	4	1	108	1.59	0.80	
Mean								2.20		
Standard Deviation									0.89	

Source: Own Survey, 2020

From the table 4.2, 88.89% of the health facilities disagreed or strongly disagreed that health facilities have DTC. 70.37% agreed or strongly agreed the health facilities have list of common health problems. 94% of respondents disagreed or strongly disagreed on availability of drug lists prepared by health facilities. 92.60% of the respondents disagreed or strongly disagreed on the availability of essential medicines all times at adequate quantities.

It was noted most of respondents disagreed with the achievement of pharmaceutical selection activities at facility level with aggregated mean of 2.20 and standard deviation of 0.89.

From the interview with the informants the following qualitative data obtained; there are no functional DTCs at facility level, no facility specific drug lists, and the requests presented to the supplier by estimation. The pharmaceuticals expired due to lack of proper selection.

4.3.2 Forecasting and Procurement of Pharmaceuticals at Facility Level

Annual forecasting, coinciding of forecasts with budgets, challenges of forecasting, timely arrangement of requests and procurement processes are discussed under this category.

Table 4.3: Forecasting and procurement of pharmaceuticals at facility level

Forecasting and procurement of pharmaceuticals		Response						Total	Mean	Standard Deviation
		Strongly Disagree(1)	Disagree(2)	Neutral(3)	Agree(4)	Strongly Agree(5)				
FP1	Forecasts are updated at least annually	2	10	11	77	8	108	3.73	0.80	
FP2	Forecasts are prepared on a schedule coinciding with local budgeting and procurement cycles	8	36	22	38	4	108	2.94	1.07	
FP3	There are no challenges during forecasting process	11	59	14	21	3	108	2.50	1.01	
FP4	Essential pharmaceuticals are available all times at adequate quantities and in the appropriate dosage forms	58	42	3	4	1	108	1.59	0.80	
FP5	Arrange timely request to your suppliers to avoid shortage and stock outs	20	30	15	39	4	108	2.79	1.22	
FP6	The correct amounts of all products are procured and obtained in an appropriate time frame	43	57	2	6	0	108	1.73	0.76	
Aggregate mean								2.55		
Aggregate Standard Deviation									0.94	

Source: Own survey, 2020

From the table 4.3, 78.7% of respondents agreed or strongly agreed with that forecasts were updated at least annually. 40.74 % of respondents disagreed or strongly disagreed forecasts were prepared on schedules coinciding with local budgeting and procurement cycles whereas 38.89 %

of respondents agreed or strongly agree with forecasts were prepared on schedules coinciding with local budgeting and procurement cycles. 64.81 % of respondents disagreed or strongly disagreed that there were no challenges during forecasting process. 92.3 of respondents disagreed or strongly disagreed on the availability of essential pharmaceuticals at all times at adequate quantities. 46.3 % of respondents disagreed or strongly disagreed with arrangement of timely request to the suppliers to avoid shortage and stock outs where as 39.81 % of the respondents agreed or strongly agreed with arrangement of timely request to the suppliers to avoid shortage and stock outs. Finally, 92.6% of respondents disagreed or strongly disagreed the correct amounts of all products are procured and obtained in appropriate time.

It was noted most of respondents disagreed with the achievement of pharmaceutical forecasting and procurement activities at facility level with aggregated mean of 2.55 and standard deviation of 0.94.

From the interviews the following qualitative data on forecasting and procurement was obtained. The health facilities conduct their forecasts annually and submitted to EPSA. The forecasting process conducted manually and there were no automation. Even if there is no automation, there was an improvement on the availability of summarized data from year to year. One of the informants at the health facilities said the EPSA did not provide the necessary pharmaceuticals as per the health facilities' requests.

4.3.3 Inventory Management of Pharmaceuticals at Facility Level

Availability of guidelines and established policies for maximum and minimum stock level, safety stock, recording of consumption data, written provision for redistribution of over stock supplies, First expiry first out (FEFO) policy, separation of expired drugs from active ones, stock outs problems of pharmaceuticals, physical inventory and disposal of expired drugs are discussed under this category.

Table 4.4: Inventory management of pharmaceuticals at facility level

Inventory management of pharmaceuticals		Response						Total	Mean	Standard Deviation
		Strongly Disagree(1)	Disagree(2)	Neutral(3)	Agree(4)	Strongly Agree(5)				
IM1	There are guidelines and established policies for maximum and minimum stock levels at which full supply Products should be maintained	30	51	17	7	3	108	2.09	0.97	
IM2	Safety stock level is set according to the frequency of delivery and average consumption	5	24	16	53	10	108	3.36	1.07	
IM3	Pharmaceuticals are reordered according to their consumption	6	18	19	51	14	108	3.45	1.09	
IM4	There are written provisions for the redistribution of over-stocked supplies	36	41	15	13	3	108	2.13	1.09	
IM5	The program has a policy of storing and issuing stock according to first expiry first out (FEFO) inventory control procedures	6	8	8	67	19	108	3.79	1.01	
IM6	Damaged/expired products are physically separated from inventory and removed from stock records at all levels	2	0	3	69	34	108	4.23	0.68	
IM7	Stock outs have not occurred for any product in the last 12 months at your facility	80	24	2	1	1	108	1.32	0.65	
IM8	There is a policy that requires at least one physical inventory of all products per year at each storage facility	1	2	2	55	48	108	4.36	0.70	
IM9	Expired products are destroyed according to the program's disposal guidelines	71	30	0	5	2	108	1.49	0.87	
Aggregate mean								2.91		
Aggregate Standard Deviation									0.90	

Source: Own Survey,2020

From table 4.4, 75% of respondents disagreed or strongly disagreed with there were guidelines and established polices for minimum and maximum stock levels. 58.33% of respondents agreed or strongly agreed with safety stock level were set according to consumption. 60.19% of the respondents agreed or strongly agreed on pharmaceuticals were reordered according to their consumption. 71.30% of respondents disagreed or strongly disagreed that there were written

provisions for the redistribution of over-stocked supplies. 79.63% of the respondents agreed or strongly agreed of storing and issuing stock according to first expiry first out (FEFO) inventory control procedures. 95.37% of the respondents agreed or strongly agreed on expired products were physically separated from inventory. 96.30% of respondents disagreed and strongly disagreed that Stock outs had not occurred for any product in the last 12 months. 95.37 % of respondents agreed or strongly agreed that there was a policy that requires at least one physical inventory of all products per year. 93.52% of respondents disagreed or strongly disagreed with expired products were destroyed according to the program's disposal guidelines.

It was noted most of respondents disagreed with the achievement of pharmaceutical inventory management activities at facility level with aggregated mean of 2.91 and standard deviation of 0.90.

The following qualitative data obtained from the interviews:

There were disposal problems to dispose the expired drugs according to the guidelines. The expired drugs occupied the space of storage areas and there are frequent stock outs of essential pharmaceuticals.

4.4 Challenges in pharmaceutical Supply Chain Management of Public Health Facilities in West Shewa Zone

4.4.1 Human Resource Challenges

The first objective of this study was to identify the human resource challenges in pharmaceutical supply chain management in public health facilities of west Shewa zone. Experience and skills of professionals, salary, adequacy of staffs, attrition rate, motivation of the professionals, awareness and understanding of the managements, supportive supervision with feedback, work overload, leadership commitments, compensations, performance appraisals, education opportunities and training status of the professionals were discussed under this category.

Table 4.5: Human resource challenges in pharmaceutical supply chain management of public health facilities of west Shewa zone

Human resource challenges on pharmaceutical supply chain managements		Response						Mean	Deviation
		Disagree(1)	Disagree(2)	Neutral(3)	Agree(4)	Agree(5)	Total		
HR1	The professionals working on pharmaceutical supply chain management have adequate skills and	8	28	19	41	12	108	3.19	1.16
HR2	The salary paid for professionals working on pharmaceutical supply chain management is sufficient	51	29	5	21	2	108	2.02	1.22
HR3	There is sufficient number of staff working on pharmaceutical supply chain management	33	64	1	1	4	108	1.93	0.93
HR4	There is low turnover (attrition rate) of staff working on pharmaceutical supply chain	48	42	13	5	0	108	1.77	0.84
HR5	There is high motivation among staff to accomplish pharmaceutical supply chain management activities	9	22	41	23	13	108	3.08	1.11
HR6	The health facility management is more aware and understand the pharmaceutical supply chain management advantages	5	41	15	41	6	108	3.02	1.08
HR7	There is adequate supportive supervision with feedback	31	57	12	6	2	108	1.99	0.89
HR8	There is low work overload on the available staff	43	47	11	6	1	108	1.84	0.96
HR9	There is leadership commitment to motivate professionals who perform best	28	37	31	11	1	108	2.26	0.99
HR10	There is compensation for professionals	53	30	11	8	6	108	1.93	1.18
HR11	There is performance appraisal for professionals depending on their performance	22	52	25	6	3	108	2.22	0.93
HR12	There is education opportunity for professionals working on pharmaceutical supply chain management	27	45	21	11	4	108	2.26	1.06
HR13	There are sufficient amounts of adequately trained personnel on pharmaceutical supply chain management activities	53	40	11	1	3	108	1.71	0.9
Aggregate mean							2.42		
Aggregate standard deviation								1.02	

Source: Own survey, 2020

Table 4.5 shows respondents' responses on human resources challenges in pharmaceutical supply chain management. It is indicated 49 % of the respondents agreed or strongly agreed that the professionals working on pharmaceutical supply chain management have adequate experiences and skills whereas only 33.3% of the respondents disagreed or strongly disagreed on this issue. 74.1% of the respondents disagreed or strongly disagreed on the sufficiency of the salary paid for the health professionals working on pharmaceutical supply chain managements. 97% of the respondents disagreed or strongly disagreed on the sufficiency in number of professionals working on pharmaceutical supply chain management. 90% of the respondents disagreed or strongly disagreed on the low attrition rate. 33.3 % of the respondents agreed or strongly agreed on the high motivation of the professionals whereas 28.7% of the respondents disagreed or strongly disagreed with the high motivation of the professionals. 43.5 % of the respondents agreed or strongly agreed on the management awareness and understanding whereas 42.6% disagreed or strongly disagreed on the management awareness and understanding. 81.5% of the professionals disagreed or strongly disagreed of adequacy of supportive supervision with feedback. 83.33% of the respondents agreed or disagreed on the low work load. 60.2 % of the respondents disagreed or strongly disagreed on leadership ship commitments. 76.9% respondents disagreed or strongly disagreed on the availability of compensation for work overload. 68.5% respondents agreed or disagreed with the performance appraisals. 66.67% of the respondents disagreed or strongly disagreed with the availability of education opportunities. Finally, 86.1% of the respondents disagreed or strongly disagreed on the sufficiency of adequately trained personnel on pharmaceutical supply chain management.

It was noted most of respondents disagreed with the achievement of human resources related activities regarding pharmaceutical supply chain management with aggregated mean of 2.42 and standard deviation of 1.02.

The following qualitative data was obtained from the interviews with the key informants:

There were shortage of professionals working on pharmaceuticals supply chain management and high workload on the available professionals. There were high attrition rates and the salaries paid were in insufficient. The staffs need more training on pharmaceutical supply chain management. There was weak supervision with feedback in pharmaceutical supply chain management areas. Currently ,the trainings were not organized for professionals working on pharmaceutical supply

chain management. There were better education opportunities during this time. There were no performance appraisals and compensations for work overload.

4.4.2 Financial Resource Challenges

The second objective of the study was to assess the financial resource challenges in pharmaceutical supply chain management in public health facilities of west Shewa zone. Budget allocation and utilization were discussed under this category.

Table 4.6 Financial challenges in pharmaceutical supply chain management of public health facilities of west Shewa zone

Financial resource challenges		Response						Total	Mean	Standard Deviation
		Strongly Disagree(1)	Disagree(2)	Neutral(3)	Agree(4)	Strongly Agree(5)				
FR1	Sufficient budget is allocated by the government to avail all essential pharmaceuticals	58	37	9	3	1	108	1.63	0.83	
FR2	Inadequate budget allocation is not one of the key Constraints in pharmaceutical supply chain performance in your facility	28	61	18	1	0	108	1.93	0.68	
FR3	There is proper understanding of pharmaceutical Supply chain management costs during budget planning	24	58	23	3	0	108	2.04	0.74	
FR4	There is efficient utilization of the allocated budget for essential pharmaceuticals availability	4	28	21	44	11	108	3.28	1.08	
Aggregate Mean								2.22		
Aggregate Standard deviation									0.83	

Source: Own Survey, 2020

Table 4.6 shows the respondents' response on financial resources challenges on pharmaceutical supply chain management in public health facilities of west Shewa zone. As stated in the table 4.3, 88% of the respondents disagreed or strongly disagreed with sufficiency of allocated budgets. 82.4% of respondents disagreed or strongly disagreed inadequate budget allocation is not one of the key constraints in pharmaceutical supply chain management. Regarding the understanding of pharmaceutical supply chain management costs, 75.2% of the respondents disagreed or strongly

disagreed. Finally, 50.9% of the respondents agreed or strongly agreed on the efficient utilization of allocated budgets and 29.6% of the respondents disagreed or strongly disagreed on efficient utilization.

It was noted most of respondents disagreed with the achievement of financial resources related activities regarding pharmaceutical supply chain management with aggregated mean of 2.22 and standard deviation of 0.83.

From interviews the following qualitative data was obtained:

There were inadequate allocations of budgets to avail essential pharmaceuticals. Due to limited resources the health facilities provided services under their capacities. The allocated budgets used properly to procure pharmaceuticals from EPSA. In case the pharmaceuticals were not available EPSA resulted in inappropriate use of the allocated budgets.

4.4.3 Infrastructure and Information Technology Challenges

The third objective of study was to identify technological and infrastructure challenges in pharmaceutical supply chain in public health facilities of west Shewa zone . Storage capacity, storage equipment, availability of computers, training on computers, automation of warehouse, use of technology and decision making were discussed under this category.

Table 4.7: Infrastructure and information technology challenges in pharmaceutical supply chain management in public health facilities of west Shewa Zona

Infrastructure and information technology challenges		Response						Total	Mean	Standard Deviation
		Strongly Disagree(1)	Disagree(2)	Neutral(3)	Agree(4)	Strongly Agree(5)				
IIT1	The existing storage capacity is adequate to handle the current quantities of products	48	50	4	4	2	108	1.72	0.85	
IIT2	The store is equipped with standardized shelves for pharmaceuticals	48	47	1	8	4	108	1.82	1.03	
IIT3	Computers available for warehouse management	55	37	4	8	4	108	1.79	1.07	
IIT4	Staff are trained well to use computers to perform their activities	33	47	23	4	1	108	2.01	0.87	
IIT5	Warehouse activities are automated	88	12	3	3	2	108	1.32	0.82	
IIT6	The facility applies technology to use up-to date for forecasting	26	63	10	3	6	108	2.07	0.97	
IIT7	The facility applies standard system to track expiry information at facility level	32	60	10	5	1	108	1.92	0.81	
IIT8	Summaries of consumption data are available	6	54	18	2	3	108	2.69	1.00	
IIT9	Decisions are based on available information	7	48	14	3	6	108	2.84	1.10	
Aggregate mean								2.02		
Aggregate standard deviation									0.95	

Source: Own Survey, 2020

As indicated in the table 4.7, 98% of the respondents disagreed or strongly disagreed the existing storage capacity is adequate to handle the products whereas 95% of the respondents disagreed or strongly disagreed that the store is equipped with standardized shelves. 85.2% of the respondents disagreed or strongly disagreed with availability of computers for warehouse management whereas 74.1% of the respondents disagreed or strongly disagreed on the staff were well trained to use computers. 92.6% disagreed or strongly disagreed on the warehouse activities are automated. 82.4% of the respondents disagreed or disagreed on the application of technology for forecasting. 85.25 of the respondents disagreed or strongly disagreed on the application of standard system to track expiry information. 55.6% of the respondents disagreed or strongly

disagreed on the availability of summarized consumption data. Finally, 50.9% disagreed or strongly disagreed that the decision based on available information.

It is noted most of respondents disagreed with the achievement of infrastructure and information technology related activities regarding pharmaceutical supply chain management with aggregated mean of 2.02 and standard deviation of 0.95.

From the interviews following qualitative data was obtained:

There were inadequate storage spaces and substandard shelves at facility level to stock effectively the available pharmaceuticals. The pharmaceutical stores were not automated and managed manually. There was lack of information technology to apply electronics services for forecasting, updating stock status, consumption summaries and tracking expiry dates. Due to lack of information technology, it was difficult to track accurate stock levels.

4.5 Discussions of the Results

4.5.1 Pharmaceutical Supply Chain Management Activities in Public Health Facilities in West Shewa Zone

4.5.1.1 Selection of Pharmaceuticals

Most of the respondents agreed the unavailability of DTCs and Facility specific drug lists. Most of them agreed on the availability of list of common health problems which is necessary for the preparation of facility specific drug lists. The unavailability of facility specific drug lists resulted in the stock outs of essential pharmaceuticals because the selection of pharmaceuticals was carried out by one person or one section.

During the interviews, the key informants stated that the facilities did not have functional DTCs and facility specific drug lists and the requests presented to the supplier through estimation which results in personal judgments. Without having functional DTC and facility specific drug list, it is impossible to provide essential pharmaceuticals properly. The informants at health facility stated that they had plans to establish DTCs and prepare their facility specific drug lists. One of the key informants at health facility said that there was high expiry rate due to lack of DTC and facility specific drug list which results in high wastage. WHO stated careful selection

of a limited range of essential medicines results in a higher quality of care, better management of medicines, and more cost-effective use of health resources (WHO, 2002).

4.5.1.2 Forecasting and Procurement of Pharmaceuticals

The most health facilities conducted forecasting at least annually even though there were challenges during the forecasts. There were challenges on the coincidence of forecasts with the available budgets to avail essential drugs in adequate quantities on time. During the interviews, the informants stated that the health facilities conducted their forecasts annually and submitted to EPSA. The forecasting process conducted manually and there were limited data to prepare the forecast accurately but there was an improvement on the availability of summarized data from year to year. One of the key informants at the health facilities said the EPSA did not provided the necessary pharmaceuticals as per the health facilities' requests. Sometimes most essential pharmaceuticals were stock outs at EPSA and the facilities obligated to purchase from the private companies which was costly when compared to EPSA. This resulted in the improper utilization of the available resources which leads to shortage of essential pharmaceuticals. Some aspects of procurement performance such as inefficient processes and delayed delivery or stock outs of medical supplies may affect both efficiency and effectiveness of healthcare systems (Kizito and James, 2013).

4.5.1.3 Inventory management of pharmaceuticals

Most of the respondents agreed that safety stocks were set depending on consumption, separation of expired pharmaceuticals from the active stocks, reordering of pharmaceuticals according to their consumption, storing and issuing pharmaceuticals according to first expiry first out (FEFO), conducting inventory at least once a year, and the occurrence of the stock outs in the last twelve months. Most of the respondents disagreed on the availability of guidelines and established police for maximum and minimum stock levels, redistribution of over-stocked supplies and disposal of expired drugs.

From the interviews, the key informants stated that there were disposal problems to dispose the expired drugs according to the guidelines. So, the expired drugs occupied the space of storage areas. Again, the informants emphasized the frequent stock out essential drugs which results in providing services under the capacity of the health facility.

4.5.2 Challenges of Pharmaceutical Supply Chain Management in Public Health Facilities in West Shewa Zone

4.5.2.1 Human Resource Challenges

Some professionals had lack experiences and skills to perform pharmaceutical supply chain management effectively and some professionals had adequate experiences and skills to conduct their jobs properly. Most of the respondents did not satisfy with the salary they got. This resulted in low motivation of the professionals working on pharmaceutical supply chain management. Again, most of the respondents agreed on the available staffs were insufficient to conduct the service effectively and complained the work overload. This shows the work overload related with the number of available staffs. Vujicic also stated that the workers that exist are overworked, undertrained, and often deployed in ways that do not best use their skills or meet the needs of the people they serve (Vujicic et al. 2011). Again, there was high attrition rate that is related with work overload. There was better awareness and understanding of the management on pharmaceutical supply chain management whereas there were low leadership commitments to motivate professionals who perform best. The supportive supervision with feedback provided to the health facility by the higher officials to improve their service was insufficient. Most of the respondents agreed that there were no performance appraisals and education opportunities. Again, there was no adequate training provided for professionals working on pharmaceutical supply chain management. USAID/Deliver stated that insufficient amounts of adequately trained and/or motivated personnel are often the cause of supply chain system breakdowns and poor system performance as well, which is often demonstrated with product stock outs (USAID/Deliver, 2013).

During the interviews with the key informants, they emphasized on the shortage of professionals working on pharmaceuticals supply chain management which resulted in high workload on the available professionals. And again, they emphasize that there were high attrition rates due to insufficient salaries, work overload and infrastructure problems to retain the professionals. Health centers in the rural areas do not have infrastructures such as roads, electric service and clean water. This resulted in the low motivation of professionals working in those areas. They served for few years and left the health facilities for better life to be employed in those areas had better infrastructure services. The informants remarked that staffs need more training on pharmaceutical supply chain management. Again, the informants stated the integrated supervisions were provided by integrated with other programs but there were no program-based

supervisions. There was weak supervision with feedback in pharmaceutical supply chain management areas. Currently the training was not organized for professionals working on pharmaceutical supply chain management. Training is one of the motivational strategies to decrease the attrition rate of professionals working on pharmaceutical supply chain management. One of the informants emphasized that the government and partners working on areas of training should give priority on training in pharmaceutical supply chain management. During the discussion with the key informants stated that there were better education opportunities during this time but professionals working on pharmaceutical supply chain management were not satisfied with the available opportunities. The key informants said that there were no performance appraisals and compensations for work overload. The informants stated there were better management awareness and leadership commitment even though the respondents partially agreed on these issues.

4.5.2.2 Financial Resource Challenges

Most of the respondents agreed on the insufficiency of the budgets allocated by the government to the health facilities. Again, they agreed the inadequate allocation of the budgets is the key constraints in pharmaceutical supply chain management performance. Most respondents agreed on there was improper understanding of the pharmaceutical supply chain management costs. Most of the respondents agreed on the efficient utilization of budgets for essential pharmaceuticals availability. key Informants stated that there were inadequate allocations of budgets which limit availability of essential pharmaceuticals to provide basic service at facility level. The key informants emphasized due to limited resources the health facilities provided services under their capacities. The financial constraints limit the availability of essential pharmaceutical services at facility levels. Bhawalkar and Taddese stated that Resource-poor countries face numerous challenges in ensuring access to affordable medicines, including sustainable financing and optimal allocation of resources, a lack of efficient and reliable supply and distribution channels, and inequity (Bhawalkar and A. Taddese). During interviews the informants stated the allocated budgets were utilized efficiently but some essential pharmaceuticals not available at the Ethiopian Pharmaceutical Supply Agency (EPSA) at the time of requests. This restricted the proper utilization of the budgets. All the essential pharmaceuticals were not provided by EPSA on time. Because of this sometimes the allocated budgets were not utilized efficiently and resulted in the shortage of essential pharmaceuticals.

4.5.2.3 Infrastructure and Information Technology Challenges

The respondents agreed on the infrastructure and information technology problems regarding pharmaceutical supply chain managements. Most of the respondents agreed that there were inadequate storage spaces, insufficient furniture/ equipment such as shelves and computers, the store was not automated and limited application of information technology.

From the interviews, the key informants stated that problems in infrastructures such as inadequate storage spaces and substandard shelves. The informants emphasized that the available storage spaces were not adequate with the available pharmaceuticals and the health facilities did not have standardized shelves to monitor the pharmaceuticals effectively. The pharmaceutical stores managed manually because they were not automated. The health facilities did not apply electronic services for forecasting, updating stock status, consumption summaries and tracking expiry dates. During the discussion it was noted that due to lack of information technology, it is difficult to track accurate stock levels. Allan stated that in developing countries poor planning and forecasting, insufficient information about consumption and current stock levels, funding and capacity constraints and a poor infrastructure are reasons for inappropriate stock levels (Allan w., 2013).

CHAPTER FIVE

5. Summary, Conclusions and Recommendations

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

5.1 Summary of the Major Findings

Proper management of Pharmaceutical supply chain needs commitment of trained professionals, sustainable financial resources and adequate infrastructures and information technologies. This research applied mixed research approach to assess challenges in pharmaceutical supply chain managements in public health facilities of west Shewa zone. Three dimensions of challenges including human resources, financial resources, and infrastructure and information technology related challenges have been illustrated. The summary of basic findings stated below:

- Skilled, experienced, trained and motivated human resources are mandatory for proper management of pharmaceuticals supply chain. Human resource is one of the challenges in public health facilities of west Shewa zone. Professionals working on pharmaceutical supply chain management were not satisfied with the salary they get which resulted in the low motivation and high attrition rate of professionals. There was high work overload on the available staff without any compensation because there are insufficient numbers of professionals working on pharmaceutical supply chain managements. Training and supportive supervision with feedback are mandatory for properly managing pharmaceutical supply chain. In this zone, there were lack of trained professionals and there was no program based supportive supervisions were provided. The performance appraisal and education opportunity are used to retain the available staff but in this zone the staff working on pharmaceutical supply chain were not satisfied with performance appraisal and education opportunity. The education opportunity was not as the expectation of the professionals. From the interviews, it was noted high work overload, high attrition rate, lack of training, lack of performance appraisal, and lack of supportive supervision with feedback were the major human resource challenges.

- Proper management of pharmaceutical supply chain needs adequate allocation of budgets and proper utilization of the allocated budgets. In this study the amount of allocated budget was insufficient to conduct the activities of pharmaceutical supply chain management. This resulted in stock outs of essential pharmaceuticals. Even if there was inadequate budgets allocation, there was proper utilization of the allocated budgets effectively for the availability of essential pharmaceuticals.
- The storage spaces and the equipment/ furniture are necessary for the proper storage and utilization of pharmaceuticals. Most of the health facilities had inadequate storage spaces with substandard shelves. In relation to information technology, most of the health facilities conducted their activity manually. Most health facilities did not have computers and professionals working in these areas were not trained on computers. The health facilities did not apply electronic services for forecasting, updating stock status, consumption summaries and tracking of expiry dates. The key informants stated that the available storage areas were inadequate to handle all the available pharmaceuticals properly. Again they emphasized the unavailability of information technology to apply electronic services.

5.2 Conclusions

This study aims assessing the challenges of pharmaceuticals supply chain management in Public health facilities of west Shewa zone. The study utilized mixed research approach by using structured questionnaire and interview guide. Descriptive statistics was used to analyze the data with SPSS version 20 and excel spreadsheets. Based on the results of the study obtained and summary of findings the following conclusions are given.

- ◆ Human resources identified to be one of the important challenges in pharmaceutical supply chain management that include insufficient amount of salary, shortage of staff, high attrition rate, high work overload, lack of compensation for work overload, lack of supportive supervision, lack of training, lack of performance appraisal and lack of education opportunity. The achievement of human resources related to pharmaceutical supply chain management was low with a aggregated mean of 2.42 and its standard deviation is 1.02.
- ◆ Lack of adequate financial allocation is major challenges in financial resources. The study found inadequate allocations of budgets which limit availability of essential pharmaceuticals to provide basic service at facility level. There was better utilization of the allocated budgets

but there are problems on availability of essential pharmaceuticals at EPSA. The achievement of financial resources related to pharmaceutical supply chain management was low with an aggregated mean of 2.22 and its standard deviation is 0.83.

- ◆ Infrastructure and information technology related factors also affect the proper management of pharmaceutical supply chain. From the study it was found that there were inadequacies of storage spaces with substandard shelves, the stores do not have computers with trained man power on computers and the health facilities did not apply electronic services. So, Pharmaceutical supply chain management activities conducted manually. The achievement of infrastructure and information technology related to pharmaceutical supply chain management was low with an aggregated mean of 2.02 and its standard deviation is 0.95.

5.3 Recommendations

Considering the findings of this study, the following recommendations are made in order to improve the pharmaceutical supply chain managements in public health facilities of west Shewa Zone.

- Human resources challenges such as insufficient amount of salary, shortage of staff, high attrition rate, high work overload, lack of compensation for work overload, lack of supportive supervision, lack of training, lack of performance appraisal and lack of education opportunity should be solved accordingly by health facilities, FMoH, Oromia Regional health bureau and EPSA.
- Financial resource challenges should be solved by mobilizing resources from internal revenues such revolving drug funds (RDFs) to solve financial constraints. EPSA should avail essential pharmaceuticals at all times in adequate quantities to make the facilities use their budgets effectively.
- Infrastructure and information technology challenges should be improved by renovated the warehouses and equipped with standard shelves and computers to handle the available pharmaceuticals and address the important information.

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Annexes

Annex I: Questionnaire

Addis Ababa University
Faculty of Business & Economics
School of Commerce Graduate Studies
Logistics and Supply Chain Management Unit

Dear respondents:

I am a graduate student at Addis Ababa University, College of Business and Economics, School of Commerce in the Unit of Logistics and Supply Chain Management. Currently, I'm conducting a research entitled '*Analysis of challenges of pharmaceutical supply chain management in public health facilities in west Shewa zone*' as a partial requirement for the award of Masters of Art Degree in Logistics and Supply Chain Management. The purpose of this questionnaire is to gather data for the proposed study, and hence you are kindly requested to assist the successful completion of the study by providing the necessary information. Your participation is entirely voluntary and the questionnaire is completely anonymous. I confirm you that the information you share will stay confidential and only used for the aforementioned academic purpose, thus not affects you in any way rather it may help you in improving pharmaceutical supply chain activities of your health facility. So, your genuine, frank and timely response is vital for the success of the study.

I want to thank you in advance for your kind cooperation and dedication of your precious time to fill this questionnaire.

Best Regards,

Girma Eshetu

Note:

1. No need of writing your name.
2. Indicate your answer with a check mark (X) on the appropriate cell for part I, part II and part III.

Do you agree? Yes _____ No _____

Name of health facility -----

I. Personal Information

No.	Questionnaire	Respondent Answer
1	Sex	1.Male <input type="checkbox"/> 2.Female <input type="checkbox"/>
2	Age	1. 20-30 <input type="checkbox"/> 2. 30-40 <input type="checkbox"/> 3.40-50 <input type="checkbox"/> 4.above 50 <input type="checkbox"/>
3	Profession	1.Pharmacist <input type="checkbox"/> 2.Druggist <input type="checkbox"/> 3.Laboratory Technologist <input type="checkbox"/> 4.Laboratory Technician <input type="checkbox"/> 5.Others <input type="checkbox"/> Specify
4	Position	1. Pharmacy section head <input type="checkbox"/> 2. Laboratory section head <input type="checkbox"/> 3. Store manager <input type="checkbox"/>
5	Your Work experience	1. 0-2year <input type="checkbox"/> 2. 2-5 year <input type="checkbox"/> 3. 5-10 year <input type="checkbox"/> 4. Above 10 <input type="checkbox"/>
6	Types of department that you work	1.Pharmacy <input type="checkbox"/> 2.Laboratory <input type="checkbox"/>
7	Types of health facility	1.Hospital <input type="checkbox"/> 2.Health center <input type="checkbox"/>

Please indicate your choice by putting the check mark X on the appropriate cell where: 1 Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5, Strongly Agree

Please indicate the degree to which you agree with the following statements regarding the activities and challenges of pharmaceutical supply chain in your facility/institution.

II. Pharmaceutical supply chain management activities

1. Selection

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1.1	Your health facility has Drug and Therapeutics Committee (DTC)	1	2	3	4	5
1.2	Your health facility has list of common health problems	1	2	3	4	5
1.3	Your health Facility has its own drug list prepared by DTC	1	2	3	4	5
1.4	Essential medicines are available all times at adequate quantities and in the appropriate dosage forms	1	2	3	4	5

2. Forecasting and procurement

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
2..1	Forecasts are updated at least annually	1	2	3	4	5
2.2	Forecasts are prepared on a schedule coinciding with local budgeting and procurement cycles	1	2	3	4	5
2.3	There are no challenges during forecasting process	1	2	3	4	5
2.4	Essential pharmaceuticals are available all times at adequate quantities and in the appropriate dosage forms	1	2	3	4	5
2.5	Arrange timely request to your suppliers to avoid shortage and stock outs	1	2	3	4	5
2.6	The correct amounts of all products are procured and obtained in an appropriate time frame	1	2	3	4	5

3. Inventory management

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
3.1	There are guidelines and established policies for maximum and minimum stock levels at which full supply Products should be maintained	1	2	3	4	5
3.2	Safety stock level is set according to the frequency of delivery and average consumption	1	2	3	4	5
3.3	Pharmaceuticals are reordered according to their consumption	1	2	3	4	5
3.4	There are written provisions for the redistribution of over-stocked supplies	1	2	3	4	5
3.5	The program has a policy of storing and issuing stock according to first expiry first out (FEFO) inventory control procedures	1	2	3	4	5
3.6	Damaged/expired products are physically separated from inventory and removed from stock records at all levels	1	2	3	4	5
3.7	Stock outs have not occurred for any product in the last 12 months at your facility	1	2	3	4	5
3.8	There is a policy that requires at least one physical inventory of all products per year at each storage facility	1	2	3	4	5
3.9	Damaged and expired products are destroyed according to the program's disposal guidelines	1	2	3	4	5

III. Challenges in pharmaceutical supply chain management

4. Human Resources Challenges

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
4.1	The professionals working on pharmaceutical supply chain management have adequate skills and experiences	1	2	3	4	5
4.2	The salary paid for professionals working on pharmaceutical supply chain management is sufficient	1	2	3	4	5
4.3	There is sufficient number of staff working on pharmaceutical supply chain management	1	2	3	4	5
4.4	There is low turnover (attrition rate) of staff working on pharmaceutical supply chain management	1	2	3	4	5
4.5	There is high motivation among staff to accomplish pharmaceutical supply chain management activities	1	2	3	4	5
4.6	The health facility management is more aware and understand the pharmaceutical supply chain management advantages	1	2	3	4	5
4.7	There is adequate supportive supervision with feedback	1	2	3	4	5
4.8	There is low work overload on the available staff	1	2	3	4	5
4.9	There is leadership commitment to motivate professionals who perform best	1	2	3	4	5
4.10	There is compensation for professionals overworked	1	2	3	4	5
4.11	There is performance appraisal for professionals depending on their performance	1	2	3	4	5
4.12	There is education opportunity for professionals working on pharmaceutical supply chain management	1	2	3	4	5
4.13	There are sufficient amounts of adequately trained personnel on pharmaceutical supply chain management activities	1	2	3	4	5

5. Financial resource

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
5.1	Sufficient budget is allocated by the government to avail all essential pharmaceuticals	1	2	3	4	5
5.2	Inadequate budget allocation is not one of the key Constraints in pharmaceutical supply chain performance in your facility	1	2	3	4	5
5.3	There is proper understanding of pharmaceutical Supply chain management costs during budget planning	1	2	3	4	5
5.4	There is efficient utilization of the allocated budget for essential pharmaceuticals availability	1	2	3		5

6. Infrastructure and Information technology

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
6.1	The existing storage capacity is adequate to handle the current quantities of products	1	2	3	4	5
6.2	The store is equipped with standardized shelves for pharmaceuticals	1	2	3	4	5
6.3	Computers available for warehouse management	1	2	3	4	5
6.4	Staff are trained well to use computers to perform their activities	1	2	3	4	5
6.5	Warehouse activities are automated	1	2	3	4	5
6.6	The facility applies technology to use up-to date for forecasting	1	2	3	4	5
6.7	The facility applies standard system to track expiry information at facility level	1	2	3	4	5
6.8	Summaries of consumption data are available	1	2	3	4	5
6.9	Decisions are based on available information	1	2	3	4	5

Annex II: Interview Guide

1. What is your opinion about pharmaceutical supply chain management activities and key challenges?
2. Could you mention the human resource challenges which affect pharmaceutical supply chain activities? How?
3. Could you comment on the financial resources and infrastructure to support pharmaceutical supply chain activities?
4. How your health facilities utilize technology for monitoring stock status, expiry tracking and forecasting?