# FACTOR AFFECTING EFFECTIVENESS OF PHARMACUTICAL DISTRBUTIONTHE CASE OF ETHIOPIAN PHARMACEUTICALS SUPPLY AGENCY ADDIS ABABA BRANCH

By

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A THESIS SUBMITTED TO THE ADDISABABA UNIVERSITY SCHOOL OF COMMERCE, FOR THE PARTIAL FULFILLMENT OF REQUIREMENT OF THE DEGREE OF MASTER OF ARTS IN LOGISTICS AND SUPPLY CHAIN MANAGEMENT

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May, 2019

Addis Ababa, Ethiopia

# Addis Ababa University

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**FACTOR AFFECTING EFFECTIVENESS OF PHARMACUTICAL DISTRBUTIONTHE CASE OF ETHIOPIAN PHARMACEUTICALS SUPPLY AGENCY ADDIS ABABA BRANCH**

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Declaration

I hereby declare that this thesis entitled "Factor affecting effectiveness of pharmaceutical distribution": A Study on EPSA Addis Ababa branch has been carried out in my own work and that, to the best of my knowledge and belief, that this work has not been submitted for any other degree or processional qualification except as specified.

Demeke Alemu Signature Date

# Statement of Certification

This to certify that Demeke Alemu has carried out his thesis work on the topic entitled 'Factor affecting effectiveness of pharmaceutical distribution effectiveness: The Case of EPSA Addis Ababa' under my guidance and supervision. Accordingly, I here assure that his work is appropriate and standard enough to be submitted for the award of Master's of Arts in Logistics and Supply Chain Management.

Teklegiorgis Assefa (Asst.Prof) Signature Date

# Dedication

I would like to dedicate this work to my mother Mrs. Hawa Dawed who give me all her love, attention, motivation, and prayer throughout may life without ending.

# Acknowledgments

I would like to thank my family for the continuous support they have given me throughout my life

Besides, I would like to thank my advisor, Teklegiorgis Assefa (Asst.Prof), for his unfailing guidance,

Last but not least, I would also like to thank all of my lecturers who have given me important knowledge, suggestion, and worthy advice especially Dr. Shiferaw Mitiku (Asst.Prof) for his helpful advices, dedication of time while conducting my research.

Lastly, I would like to thank those who have provided me insightful comments, encouragement and support throughout the entire process of conducting the study and those participants for responding the questionnaires by giving me their precious times.

Thanks for everything

The Researcher

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ABBREVATIONS AND ACRONYMS

**EPSA:** Ethiopian pharmaceuticals Supply Agency

**FMOH:** Federal Ministry of Health

**RRF:** Request and Resupply Form

**LMIS:** Logistics Management Information System

**IPLS:** Integrated Pharmaceuticals Logistics System

**WHO:** World Health Organization

**USAID:** United States Aid for International Development

**SDP:** Service Delivery Point

# Abstract

*The main purpose of this study was to analysis the effectiveness of pharmaceutical distribution in EPSA AA hub. The research develops on three key dimensions of pharmaceutical distribution effectiveness (Storage and inventory control practice, Order fulfillment, communication and customer service management, Transport and distribution system) to test effectiveness of distribution in the organization. Both descriptive and exploratory research design was employed. The total population of the study is 286; the researcher used stratified simple random sampling and purposefully sampling technique. The data for the study was collected from 90 employs who work in EPSA AA hub and health facility with 95.7% of respondent rate. the effectiveness of pharmaceutical distribution data were in filled using the five point linkert-scale while the cronbach Alpha was used to check the data for reliability of measurement scale. Percentile and the relationships proposed in the hypothesis were tested using Spearman rho correlation by SPSS 20.0 software version. out of nine independent variable, five of them were statistical significant with p-value of less than 0.05.where as the remaining four statistical insignificant with p-value greater than 0.05.From the study findings, the result showed that productivity indicator for Storage and inventory control practice, quality, time and productivity indicator for Order fulfillment, communication and customer service management, productivity indicator for Transport and distribution system were positively related to effectiveness of pharmaceutical distribution in organizational in a strong level, while the other were in a weak level. The study found there were good practice in pharmaceuticals are secured from theft on the other hand the hub bad practice in reporting RRF on time. From the recommendation the transportation system in EPS AA hub needs to improve.*

*Finally t has been recommended to EPSA AA hub to take measure s to solve and improve Distribution Performance of the organization.*

# CHAPTER ONE

## INTRODUCTION

*This chapter mainly includes the background of the study, statement of the problem, research question, its objectives, significant and scope of the study, definition of terms and general framework of the study.*

### 1.1. Background of the study

Inability of distribution of pharmaceuticals effectively and efficiently is a major barrier to health facility in order to fulfill the right of every person to obtain and use health commodities when they are needed, there for the supply and distribution of medicines are a fundamental aspect of the success of any health system. Disruptions to this supply of medicines undermine health outcomes as supply chains have an impact on the availability, cost and quality of medicines available to patients. The use of technologies can further enhance the efficiency in daily operations for faster and more accurate delivery. Technologies like track and trace systems can also increase the visibility of logistics end users, allowing customers to track their shipment or package and to know when the delivery will be performed. Pharmaceutical products may require more security, speedier delivery (especially for those with quick expiration dates), and special handling for those products with temperature restrictions (Javalgi and Reisenwitz 2001).

Distribution is an important activity in the integrated supply-chain management of pharmaceutical products (USAID, 2008).

Distribution is an element of the marketing mix; others include product, pricing and promotion that are defined as making products or services available for use by consumers using direct or indirect means (Kotler, Keller & Burton 2009).

Distribution of pharmaceutical products has emerged as an important element for reconfiguration as it occupies a large percentage of total products costs (Smith, 2009).

The pharmaceutical supply chain is relatively complex compared to the supply chains for other products, particularly when considering the strict deadline and sufficiency requirements. Different information technologies such as product identification, bar coding, usage related

Information, and electronic identification have been applied to facilitate the rapid distribution of the pharmaceuticals in the supply chain (Belson, 2005).

The system for warehousing and distribution of medicines is often a major constraint on efforts to meet the health-care needs of large sectors of the population, particularly in rural areas. An ineffective or poorly designed distribution system is likely to cause stock-outs at health facilities despite the availability of stock at the central warehouse On the other hand; an inefficient distribution system can result in an increase in the system's financing requirements, making it unsustainable over time. A balanced approach that acknowledges the current state of technical capacity, administrative structures and resource availability should guide the proper design and operation of a distribution system. (PrashantYadav , 2011).

Two strategic planning have designed for effective distribution system comprises the careful consideration of pharmaceuticals:

- Where to place the facilities including warehouses inventories in support of rapid distribution of the medical supplies.
- What is the best strategy to distribute the medical supplies and what routes to be used?

### 1.2. Background of the organization

PFSA was established proclamation number 553/2007 with the mandate to procure, warehouse and distribute medical commodities to Ethiopian health facilities. PFSA work to support the national health strategic plan and the Ethiopian health package for health in providing public health facilities with the "right quantity and quality of drugs and medical supplies" at the best market value".

EPSA worked to establish an integrated health commodity supply chain that would include all health program commodities, and would connect all levels with accurate and timely data for decision making. IPLS is the term applied to the single pharmaceuticals reporting and distribution system based on the overall mandate and scope of the PFSA.

EPSA has now moved from vertical, fragmented, program based supply chains to a single integrated supply chain for program commodities (including HIV/AIDS, family planning, TB). Since August 2011, PFSA has started to directly deliver program commodities to many health

facilities (all hospitals and accessible health centers). PFSA HUB three distribution levels i.e. PFSA center are delivered directly to over 1,035 ART sites and more than 2,000 PMTCT sites (direct or pass through their respective Wordea Health Offices)(IPLS implementation report ).

### 1.3. Statement of the problem

Fast pharmaceutical distribution of supplies plays a significant role in ensuring an effective and efficient healthcare system. The medical supply distribution is about the movement of a large volume of different items that must be delivered rapidly (Peidro, Mula, Poler, &Lario, 2009).

Proper packaging regulatory and compliance issues relating to transportation, storage, packaging and technical compliance, influences the safety cold chain items to the user level are critical in this process to avoid degradation (Blake, 2008).

The supply and distribution of pharmaceutical products is often highly centralized and marked by poor storage facilities, inaccurate demand planning processes, insufficient human resource management capabilities, high stock pilferage and inadequate financing all these resulting in frequent stock outs Some of these challenges can be reduced by adoption of relevant technology at the distribution channel level., Several studies with regard to the impact of technology on channel distribution have been done. (Scott & Scott 2011).

The Federal Ministry of Health (FMOH) has been working to ensure an efficient and high performing healthcare supply chain that will ensure equitable access to affordable medicines for all Ethiopians. In past years, significant progress has been made, pharmaceutical fund and supply agency tries to improve distribution of pharmaceuticals the write quality, quantity and affordable price. significant progress has been made, although various challenges remain, including an— an inadequate supply of quality and affordable essential pharmaceuticals, poor storage conditions, and weak stock management—which resulted in high levels of waste and stock outs (IPLS, 2015).

Pharmaceutical distribution in Ethiopia has several challenges including Undefined stock quantity as available, Report interruption and delay, Some items reported as stock out during bi-weekly report but not requested/needed when the facilities bring their request, Use of quick win plan to fulfill routine task that was performed by DSM (EPSA 2018)

Drug shortages present an ongoing challenge for health care providers and health facility personnel. The management of drug shortages in hospitals and health systems is particularly complex because these facilities routinely treat patients with acute or emergent conditions, deliver a significant number of medically necessary or single-source products, and use high-cost new drug technologies. In response to drug shortages, health systems must act rapidly to identify and obtain the drug, or the alternative product, to avoid disruptions in patient care and to provide uninterrupted, therapeutically equivalent, safe drug therapy, preferably at comparable costs. A drug shortage can also affect established procedures regarding drug procurement, therapeutic decision-making, and other institutional practices.(lee ventola 2011)

Effective distribution of pharmaceuticals leads to customer satisfaction and decrease delivery time. However health facilities complains on pharmaceutical distributor on slow response to emergency cases, inadequate information flows, delays in medical supplies, shortage of medical equipment and laboratory re-agent, inability to coordinate each other (MOH and Social Welfare, Dar es salaam, Tanzania 2008).

The process of loading/unloading items takes too much time, flammable products are stored together with other products, scattered warehouses harsh condition to collect pharmaceuticals as PFSA Annual report 2016 Referenced, The main Challenges that affect EPSA adds Ababa hub performance are limited vehicle Capacity for distribution, lack of coordination between central EPSA to Addis Ababa hub regarding expiration, stock states and quantification, health facility are delayed in reporting RRF and problems in data quality, quantification, facilities do not know exactly their patient load and which patient on which regiment in (ART drug training in 2018).

Review meeting in April 2018 EPSA Mission have to provide avail affordable & quality pharmaceuticals sustainably to all public health facilities through revolving drug fund & capacity building to ensure Proper inventory Mgt & Rational drug use. However there are some Thesaurus which are Delay procurement of medical equipment, Data quality problem, Increasing demand by health facilities and Some facilities are not willing to receive short expiry program products. This has high negative impact for Smooth distribution system.

The failure of drug supply chains is the result of a complex set of circumstances. Limited funding (for both procurement and transport), weak public infrastructure, insufficient staff

numbers and capacity, poor training and remuneration, inadequate storage facilities, the absence of pharmacy standards, parallel procurement and distribution systems for some medicines, corruption and theft all probably contribute to some degree but it is unclear to what extent each plays a role (Michael James Nunan 218).

One of the problems which contributed to a lot forwards in delivering vaccine products to health facility could be lack of coordination in transporting system of vehicles and limited number of cold chin vehicles in the hub. Moreover, even though the agency works its effort as much as possible to deliver regarding delivering vaccine to health facility ,head office lack of understanding what problems are in the ground. (Vaccine training in 2018)

Therefore, this study aims at investigating the pharmaceutical distribution effectiveness of channels of distribution models in the performance of EPSA, in Addis Ababa hub. Where improve receiving, put away, storing, transporting, picking and packing is needed at PFSA.As different research paper describe there are big challenge of order picking (which involves the process of selecting and gathering a right amount of the right pharmaceuticals in accordance with customer's request) and delivering of pharmaceuticals in suitable condition.

### 1.4. Research questions

1 How effective is the pharmaceutical distribution process to achieve safe, quality and consistence pharmaceuticals supply distribution?
2 To what extent EPSA coordinate with health facility in order to solve problems regarding data reporting, collection and analyzing?
3 What are the major factors affecting effectiveness of pharmaceutical distribution?

## 1.5.Objectives of the Research

### 1.5.1. General Objectives

The general objective of this study is to assess pharmaceutical distribution effectiveness in Pharmaceuticals Fund and Supply Agency Addis Ababa branch.

1.5.2. Specific Objectives

- To assess the effectiveness of pharmaceutical distribution in terms of quality, safety and time by preventing security and temperature incidents in end-to-end supply chain.
- To determine the extent of EPSA coordinate with health facility in order to solve problems regarding data reporting, collection and analyzing.
- To identify factors affecting EPSA's pharmaceutical distribution effectiveness

## 1.6 The scope of the study

The study has two scopes the first one being the geographic scope. The study only focuses on health facilities in Addis Ababa it does not address health facilities outside of Addis Ababa. The second scope of the study is the conceptual scope. The study focuses on the pharmaceutical distribution effectiveness in pharmaceutical fund and supply agency in Addis Ababa hub. The population of study consists of EPSA Addis Ababa branch and select public-sector health facilities: hospitals, health centers, and health posts.

## 1.7Significance of the Study

The finding of this research will contribute primarily to EPSA in brief the strengths and weakness of distribution of pharmaceuticals, providing recent information on the major factors affecting the effectiveness of distribution, secondly this finding contribute to a health facility informing what is the cause of long lead time to reach pharmaceuticals to them and inform the consequence of not filling RRF accurately and on time on delivering of pharmaceuticals on time. Thirdly, these findings contribute to the government how to ensure proper pharmaceuticals to the public to achieve millennium health goal. Finally donors use this finding providing data and information for decision making.

## 1.8 Limitation of the study

The researcher will face the following major limitation in caring out the study;

- The large data variance during analysis because the respondents is not from a uniform educational background.

## 1.9 Definition of concepts and Terms

**Good Distribution Practices (GDP) GDP:** is that part of quality assurance which ensures that the quality of medicinal products is maintained throughout all stages of the supply chain from the site of the manufacturer to the pharmacy or person authorized or entitled to supply medicinal products to the public.

**Distribution** is the process of ensuring movement of products and ensuring they are in the right place at the right time in affordable price in appropriate condition.

**Lead time** is the length of time between placing an order and receiving the items

**Effectiveness** is the extent to which health facility requirements are met.

**Pharmaceutical manufacturing companies**: Are those companies that produce drugs for humans, medical supplies, laboratory reagents from raw materials.

**Health Facilities:** are hospitals and health centers who receive pharmaceuticals from EPSA.

**Performance:** is the accomplishment of a given task measured against preset known standards of accuracy, completeness, cost, and speed (business dictionary.com, 2018).

## 1.10Organization of the Study

The study is organized into five Chapters. The first chapter include: Background of the study, Statement of the problem, Research questions, Research objectives, Significance of the study, Scope of the study, Limitation of the study, and Definition of terms and Organization of the study. Chapter two include: a review of related literature (theoretical and empirical). chapter three includes research methodology(research design, population of the study, sampling techniques, sample size, data collection instruments, the data collection procedures and ends with data analysis approach).next chapter is chapter four results of the research and the discussion upon the findings. The last chapter is chapter five presents a summary of the major findings of the research and recommendations based on the findings. Also this chapter contains the conclusion and section of the study.

# CHAPTER TWO

## RELATED LITERATURE REVIEW

The purpose of this chapter is to review literature and theoretical framework of pharmaceutical distribution which contains reviews and opinions of the different researches related to pharmaceutical distribution that assist in generating the hypothesis statement.

### 2.1. Theoretical Literature review

#### 2.1 .1. Overview of Pharmaceuticals distribution

The distribution process has the end objective of delivering pharmaceuticals at the right time and in the right quantities to satisfy health facility demands; it entails various activities along the supply chain, from demand planning to the physical delivery of medicines to the health facility.

The World Health Organization (WHO) defines a drug or pharmaceutical preparation as: any substance or mixture of substances manufactured, sold, offered for sale or represented for use in the diagnosis, treatment, mitigation or prevention of disease, abnormal physical state or the symptoms thereof in man or animal; [and for use in] restoring, correcting or modifying organic functions in man or animal.

The distribution of pharmaceutical products is an important activity in the supply chain and involves several players. It consists of procuring, holding, supplying, importing and exporting of pharmaceutical products. Distribution activities are carried out by manufacturers, importers, wholesalers/distributors, retailers and other persons authorized to supply pharmaceutical products in the public and private sectors (NAFDAC, 2016).

According to WHO(2010),pharmaceutical distribution is procuring ,purchasing ,holding ,selling, supplying ,importing , exporting or movement of pharmaceutical products with the exception of the dispensing or providing pharmaceutical products directly to the patient or his or her agent.

The primary drug distribution management goal is to maintain a steady supply of pharmaceuticals and supplies to facilities where they are needed, while ensuring that resources are being utilized in the most effective manner. Adequate and dedicated transportation facilities laced with cold chain maintenance are an important factor in maintaining the timely distribution of quality medicines round the clock at health facilities.( Mir Javid Iqbal ,2017).

Pharmaceutical distribution has never been just about delivering. It is about getting the right medicines to the right patients at the right time, safely and efficiently. Every day, pharmaceutical distributors sustain a complex supply chain, serving as an important link in the healthcare system and delivering medicines safely, securely and efficiently. Distributors work around the clock to help pharmacies, hospitals, long-term care facilities, clinics and other health care providers keep their shelves stocked with the medications and products that patients need. Different information technologies such as product identification, bar coding, usage related information, and electronic identification have been applied to facilitate the rapid distribution of the pharmaceuticals in the supply chain (Belson, 2005).

### 2.1.2 Pharmaceutical distribution management

#### 2.1.2.1. Pharmaceuticals storage system and inventory management

An important goal in storage of health products is the correct staging of health products to ensure that orders can be filled and distributed. Storage ensures the physical integrity and safety of products and their packaging, throughout the various storage facilities, until they are dispensed to clients. (USAID | DELIVER PROJECT, 2015).Medicinal products should normally be stored apart from other goods and under the conditions specified by the manufacturer in order to avoid any deterioration by light, moisture or temperature.

The layout of a warehouse is key to its efficient operation. In developing warehouse or distribution center layouts, pharmaceutical corporations face unique challenges due to the nature of their products. Pharmaceuticals are sensitive not only to external contamination from bacteria or chemicals but also to temperature changes. In some cases, even lighting can damage pharmaceuticals. Pharmaceuticals must also be stored in a way that makes it easy to use a first-in, first-out system and that keeps this critical and expensive products safe from theft and

deliberate contamination. These unique requirements mean that many factors need to be considered when setting up a warehouse for pharmaceutical storage.(IGPS 2019)

Proper storage facility for drugs ensures the effectiveness, safety, strength, and quality of drugs. Unless the drugs are segregated from other non-pharmaceutical items and stored properly, long shelf life of the drugs is not guaranteed. Medicines need to be stored to maintain the intended quality and prevent damage while handling until it reaches the consumer. (Harish Ganesh Joshi 2015)

Poor storage conditions, high temperature and high humidity conditions generally enhance chemical degradation and may alter the biopharmaceutical properties of the drugs, interactions may occur when products are exposed at high temperature and humidity, consequently reducing the dissolution rate.( Bonn 2012)

Medicine needs to be stored in warehouses under appropriate conditions regarding security, temperature, conditions and storage area. Furthermore, a correct inventory management is necessary to ensure adequate stock levels. Therefore, strategies such as regular stocktaking, inventory reconciliation, first-expired-first-out practices and traceability of batches are beneficial. Research outlines that more centralized ware-house management model with guidelines and standard operating procedures im-proved performance. ( anna schopperle2013)

Medicines should be stored under conditions which ensure that their quality is maintained. The temperature of storage is one of the most important factors that can affect the stability of a medicine. If medicines are not stored properly they may not work in the way they were intended, and so pose a potential risk to the health and wellbeing of the person receiving the medicine.(care inspector 2016)

Inventory Management is the core of pharmaceutical supply management, without which the entire supply chain structure is not viable. The concept of inventory management sounds easy when it is just described as the process to order, receive, storage, issue and then reordering of a limited list of product. In reality, implementation of a robust inventory system for a pharmaceutical supply is a difficult task (Management Sciences for Health, 2012).

A “sick” inventory arises due to individual decision making on frequency of reordering and quantity to be ordered, ad hoc structuring, inaccurate stock recording, lack of transparency, increase in complexity, and the absence of systematic monitoring. These problems, mainly arise due to lack of awareness or knowledge about of scientific stock keeping and warehouse practices. In developing countries like India, where budget is tight, overstocking of certain pharmaceutical items may block a substantial portion of the drug budget, resulting in insufficient funds for procuring drugs that are more important. For this reason, it is important to implement or upgrade an inventory control system in a public pharmaceutical supply to maintain a steady supply of drugs to the public. This ensures good health to all while minimizing the costs associated with inventory holding, lowering order processing, procurement or delivery costs, controlling stock levels and minimizing stock out conditions (Monica Balakrishnan Kokilam 2015).

Temperature should be monitored and recorded periodically. Records of temperature should be reviewed regularly. Records should be maintained of these conditions if they are critical for the maintenance of the characteristics of the pharmaceutical product stored.(WHO, 2010).

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 (IPLS, 2015).

Medicinal products should be handled and stored in such a manner as to prevent spillage, breakage, contamination and mix-ups. Medicinal products should not be stored directly on the floor unless the package is designed to allow such storage.(PIC/S GDP 2014).

An efficient inventory control system minimizes spoilage and expiry at all level maximum and minimum level are established at all levels for medicines and other health supplies. The commonly practiced periodic ordering or forced ordering, inventory control system at RMS and SDP ensures that at the end of each review period logistics personnel at those levels review all stock levels and order enough to bring stock levels up to the maximum.(Ghana MOH 2009)

Inventory management as the branch of business management concerned with planning and controlling inventory 2015 (APICS).The role of inventory management is to maintain the desired stock level of specific products or items. The systems that plan and control inventory must be based on the product, the customer, and the process that makes the product available. An effective and dedicated storage space provides the correct environment for the storage of medicines and commodities and assists the efficient flow of supplies Mir Javid Iqbal|(2017). IM systems or forms are necessary to gather information such as consumption data to identify successes and efficiency constraints (Transaid, 2013).

### 2.1.2.3. Transportation in pharmaceutical Distribution

Transportation refers to the movement of products from one location to another, as the products are rarely produced and consumed in the same location (Tsao & Lu, 2012). In order to understand the role of transportation in the distribution of pharmaceuticals, it is important to consider the perspectives of the parties involved, carriers and shippers. The carriers make investment decisions regarding transportation equipment in order to maximize the return on investment of the assets. They decide whether to use trucks, airplanes or other modes of transportation. On the other hand, shippers use transportation to minimize the total costs of operation (e.g., transportation, inventory, facility).

Transportation is an essential function in logistics for delivering the commodities to the health facility level. In many of the public sector logistics systems, not enough attention is given to the development of the transport system specifically for delivering products. However for HIV/AIDS program, more attention will need to pay to transport systems because of the nature of the supplies being high-volume, high-value and some with short shelf lives. As a result, transport systems need to be managed with better security and; efficiently in order to reduce lead-times, which can directly impact the amount of inventory the system needs to carry. In many countries, transportation is the weakest link which, if not addressed impacts the inventory, order management and customer service. Transportation systems can no longer be managed on an ad-hoc basis, but need to be managed as a scheduled delivery system. This means that programs need to either invest in transportation systems or seek for options to outsource this

function to private companies that can ensure timely, regular delivery. (SangeetaRaja, and Nadeem Mohammad 2004).

Pharmaceutical transportation should be secured and include the appropriate documentation to facilitate identification and verification of compliance with regulatory requirements. Policies and procedures should be followed by all persons involved in the transportation, to secure pharmaceutical products. (WHO, 2010).

When transporting pharmaceuticals, the truck must remain at a certain temperature to maintain their safety and efficacy. The exact temperature will depend on the pharmaceuticals you are transporting. Without proper temperature controls, these pharmaceuticals could become dangerous to use. Cold chain transport is integral to safe transportation of these medications (PFSA, 2015, pharmaceuticals distribution manual).Distributing medical supplies to the healthcare facilities also involves managing an effective transportation system and preventing misappropriation of fuel and vehicles for private or non-health related uses. The Responsibility of the supplying wholesale distributor to protect medicinal products against breakage, adulteration and theft, and to ensure that temperature conditions are maintained within acceptable limits during transport(EEA, 2013).

Road vehicles used to transport drug products should be suitable for their purpose. Monitoring devices should be placed in different areas of the trunk or cabin where the drug product will be positioned during seasonal extremes (e.g., summer and winter). The monitor should be secured so that it is immobile and there should be no ambiguity about its exact position within the payload so that the monitor is always placed in the same position. Monitoring devices used on or in packages or on containers may also be used (GSDP 2017).

Transportation of medicine to health center needs to balance high initial investments, capacity of health workers, reliability and stock-out situations. Therefore there are using different approaches for distribution, such as collection, delivery, outsourcing or public-private partnerships. Transportation cost can account for 10-20% of the stock value and thus, distribution systems need to be optimized (Anna Schöpperle, 2013)

Delivery schedules should be established and routes planned, taking local needs and conditions into account. Such schedules and plans should be realistic and systematic. Security risks should

also be taken into account when planning the schedules and routes of the delivery. Distributing pharmaceutical products to the healthcare facilities involves managing an effective transportation system and preventing misappropriation of fuel and vehicles for private or non-health related uses (EPSA , 2016, distribution manual).

### 2.1.2.4. Repackaging, Relabeling in pharmaceutical Distribution

A package would essentially protect and preserve a product. Along its development and extensive use in an industrialized society, other functions were attributed to packaging such as to store, to transport, and to promote product sales .To Ensures the product quality and to protect the contents from the rigors distribution, including environmental or physical damage the packaging of the pharmaceutical product should be selected and tested. (Lorenzini, Giana 2018)

As pharmaceutical products is likely to be distributed in a variety of ways, some going out through informal channels, the labeling of drugs and the package insert becomes important. (World Health Organization 2004)

All drug products have storage requirements that may contain specific controls. The container used for transporting the drug product should be qualified on the basis of labeled conditions of the product as well as anticipated environmental conditions. Consideration should be made with seasonal temperature differences, transportation hemispheres, and the routes and modes of transportation. The type, size, location, and amount of the temperature• stabilizers required to protect the product should be on documented studies of specific distribution environment, including domestic and international lanes, mode(s) of transport, duration, temperature, and other potential environmental exposures or sensitivities that may impact product quality PIC/S GDP( 2014).

Report on PFSA (2015) Medicinal products should be transported in containers that have no adverse effect on the quality of the products, and that offer adequate protection from external influences, including contamination. Pharmaceutical packaging has the vital role of keeping medicines safe.

Repackaging and relabeling of pharmaceutical products should be limited, as these practices may represent a risk to the safety and security of the supply chain(WHO 2010). during

transportation pharmaceuticals should be securely packaged, clearly labelled, and be accompanied by appropriate supporting documentation. Special care should be taken when using dry ice in shipment containers. In addition to safety issues it must be ensured that the pharmaceutical product does not come into contact with the dry ice, as it may have an adverse effect on the quality of the product.(WHO 2010).

### 2.1.3 Effective pharmaceutical distribution.

In the distribution of pharmaceuticals reducing the cycle time can add the efficiency of the supply chain. When a distributor reduces the time span for distribution cycle, making it short, the overall costs will be decreased. An effective supply chain is characterized by the timely, reliable movement of health commodities and data up and down the supply chain: from the service delivery point to hospital, health center, health posts, clinics.

Susarla and Karimi in (2012) describe A well-managed and well-designed distribution system will have Sustain a constant supply of medicines, Minimize loss due to expiration and damage,

Maintain correct inventory records, Utilize available transportation resources efficiently, provide information to determine forecasting medicine needs, and also Integrate a quality assurance program.

The distribution process begins when the manufacturer ships the medicine and ends when the medicine consumption report is back to the procurement entity (Susarla & Karimi, 2012).

A well-coordinated medicines supply system helps to ensure that funds available for the procurement of medicines are used effectively and efficiently. Failures in the supply system can lead to life threatening medicines shortages and waste of scarce resources. Problems frequently result when an inefficient public medicine supply system is intended to serve an entire country and/or more efficient private sector supply systems only serve urban populations (factbook on level 1 monitoring indicators 2007)

As mentioned WHO 2006, effective distribution management comes from selecting appropriate strategies for delivering, maintaining accountability procedures and secure storage at each level of the system, making reliable transport arrangement, keeping reliable records of medicine stocks

and consumption, designing an effective network for storage facility, allocating supplies based on actual workload and treatment needs.

Efficient distribution management includes the availability of an efficient network of storage facilities, keeping reliable records of drug stock balance and consumption, maintaining accountability procedures, ensuring adequate and secured storage, reliable transport systems and reinforcing, reporting and supervisory practices ( Matse, 2005).

An efficient drug distribution system ensures the availability of the right medicines in sufficient quantities procured at the lowest prices to secure the maximum therapeutic value to the largest number of beneficiaries with the availability and additional resources ( Mir Javid Iqbal, 2017).

### 2.1.4 Evaluation of pharmaceutical Distribution Effectiveness

Organizational effectiveness is defined as an external standard "of how well an organization is meeting the demands of the various groups and organizations that are concerned with its activities" ( Pfeffer and Salancik 1978).

Assessing for ways of improving performance of pharmaceutical distribution is very essential for distributor of pharmaceuticals. By evaluating and measuring distribution, performance manufacturers and businesses can see what they achieve, quantify ad qualify their effectiveness, identify opportunities for improvement and compare their performance against competitors. (Lezama 2015)

### 2.1.5 Distribution Challenges for pharmaceutical products

Inadequate availability of and access to essential health commodities are major barriers to the delivery of essential health care in developing countries.

Health is a basic human right and access to medicine is a basic tool to ensure health. This right and its tools are facing major issues in the world

The supply and distribution of medicines are a fundamental aspect of the success of any health system. Fundamentally, they ensure access to medicines to local populations. However, they also provide information on the supply and demand of products and transfer money to finance the

system. Disruptions to this supply of medicines undermine health outcomes as supply chains have an impact on the availability, cost and quality of medicines available to patients. Developing countries face a number of challenges that limit access to medicines. These include: Regulating the quality and flow of medicines into and within the country, Geographic access to medicines, financial access to medicines, Supply chain forecasting and planning, Limited warehousing.( Ariane McCabe 2014).

Improving access to affordable and high-quality essential medicines, and ensuring their rational use, are among the main objectives of national medicines policies. However, about 50% of the population in sub-Saharan Africa lacks regular access to essential medicines, while traditional medicine remains insufficiently integrated into conventional health services. Problems of insufficient access can be attributed to: inadequate human resources, insufficient financing, high medicine prices, inadequate management of public sector procurement and supply management systems and inadequately regulated pharmaceutical markets (who 2017).

The Federal Government of Ethiopia has made several efforts to improve the health of Ethiopian by setting up programs to deliver priority health interventions. Despite these efforts, shortage of foreign currency, displacement in most part of the country, unavailability of reliable transport system, lack infrastructure are a major contributing factor to shortage of pharmaceuticals (EPSA 2019 annual report)

Many low-income countries are still facing acute shortages of essential medicines because of the limited supply of affordable medicines and inadequate logistical systems to deliver them, and a continuing shortage of new products to meet developing country's health needs. As such, efficient medicine logistic and supply management is viewed as the key strategy in reducing costs of drugs and ensuring their availability in the healthcare facilities (WHO June, 2004).

Distribution of pharmaceuticals to a health facility is facing too many problems, which impact effectiveness of distribution performance. One of the major challenges of the pharmaceutical sector and health care delivery system in Ethiopia is the uncoordinated drug distribution system, which is not in line with good drug supply management, which the National Drug Policy stipulates(PFSA, 2015).

As report of EPSA by 2015 pharmaceutical distribution in Ethiopia face a lot of problems. The major ones among them include:

- ✓ Storage and Processing Problems: Storage and processing are critical in ensuring that the pharmaceutical products for a particular period are available for consumption whenever and wherever they are required. Medicines and some other medical supplies risk losing their efficacy due to poor storage conditions. Most facilities do not have conducive and adequate storage space. Medicines are stored in areas that may lead to faster deterioration
- ✓ Transportation and Infrastructural Inadequacies: Most facilities visited do not have transport facilities and some that are in place are old. lack of transport, high cost of it and poor conditions of vehicles are major setbacks at facility levels, when it comes to collecting medicines and medical supplies from PFSA. Inadequate infrastructure constitutes a major constraint to pharmaceutical distribution.
- ✓ Uncoordinated drug distribution system:

The level of HIV pharmaceuticals in health facility is several challenges for delivery such as, logistics support has remained at the same level, even if the number of ART sites increasing is rapidly. inadequate storage facility, the PFSA hubs are constrained by shortage of vehicles, portable cold chains, racks, palates in addition staff turnover is high, stock arrangement warehouse is poor(USAID 2009).

In health facility there are several challenges for delivery of pharmaceuticals such as poor road and vehicle infrastructure, long travel distances and shortage of funding. Last mile delivery deals with transportation, data collection and order fulfillment. There are used several approaches such as mobile warehouses, collection, scheduled delivery or manufacturer-managed transportation. The challenge is to deliver small quantities to several customers and balance incentives, ability of HWs, medicine availability at HCs and collection of consumption data. (Arlington MSH)

The level of stock availability at a regional store is influenced by various factors that take place in the central store. Some of which are inadequate stock to distribute to regional stores, lack of transport, long tendering procedures, supplier performance, uneconomical order quantities, computer system hang-ups and at times lack of due diligence on the part of central store staff

among other issues. The many factors mentioned invariably affect the availability of medicines and medical supplies at the health facilities as well (EPSA AA hub KPI training in 2018)

A WORKSHOP BY WHO (2006) outlines problems in distribution of medicines in Africa were poor communication, information and consumption data. And also inadequate storage facilities and temperature control systems and a lack of quality assurance procedures. Lack of transparent procurement procedures is the main challenge in Africa to distribute pharmaceuticals in Africa. In addition Lack of appropriate planning, monitoring and evaluation and inadequate budget allocation.

## 2.6 Pharmaceuticals Supply Chain in Ethiopia

Despite major strides to improve the health of the population in the last one and half decades, Ethiopia's population still faces a high rate of morbidity and mortality and the health status remains relatively poor. The major health problems of the country are largely preventable communicable diseases and nutritional disorders. More than 90% of child deaths are due to pneumonia, diarrhea, malaria, neonatal problems, malnutrition and HIV/AIDS, and often as a combination of these conditions (HSDP 2014/15).

Road transport is the dominant transport system in Ethiopia; it connects urban to rural areas and the country to regional ports in neighboring countries. Since the early 1990s, there has been significant improvements in the restoration and expansion of Ethiopia's road network, the total road network in the country has increased on average by about 4.2% each year, by June 2010 the total classified road network had increased to 36,469 km (excluding community roads)(EPA, 2012)

The pharmaceutical distribution management system of the country had several problems including non-availability, weak transportation, un affordability, poor storage. There are frequent drug shortages in public health facilities. A national survey estimated that only 70% of key essential medicines were available in the public sector (FMoH 2003). Unavailability of medicines in the public sector compels patients to revert to the private sector. Consequently drugs can take up more than half of the actual cost of a visit, increasing the chance of incurring catastrophic health expenditures and the associated risks of falling into poverty (Russell & Abdella 2002; Bogale, *et al.* 2005; Mcintyre, *et al* 2005).

To overcome these challenges, the Ethiopian Pharmaceuticals Supply Agency (EPSA) was established in 2007 by Proclamation No. 553/2007. The Agency is mandated to avail affordable and quality pharmaceuticals sustainable to all public health facilities and to ensure their rational use. These funds aim to increase resources at facility-level through the sale of medicines with a mark-up, thereby generating additional funds for the procurement of new drugs and quality improvements. The strategy aims to enhance affordable and sustainable supply of medicines to the public, improve overall quality of services provided, and promote sustainability of health services (EPSA, 2014).

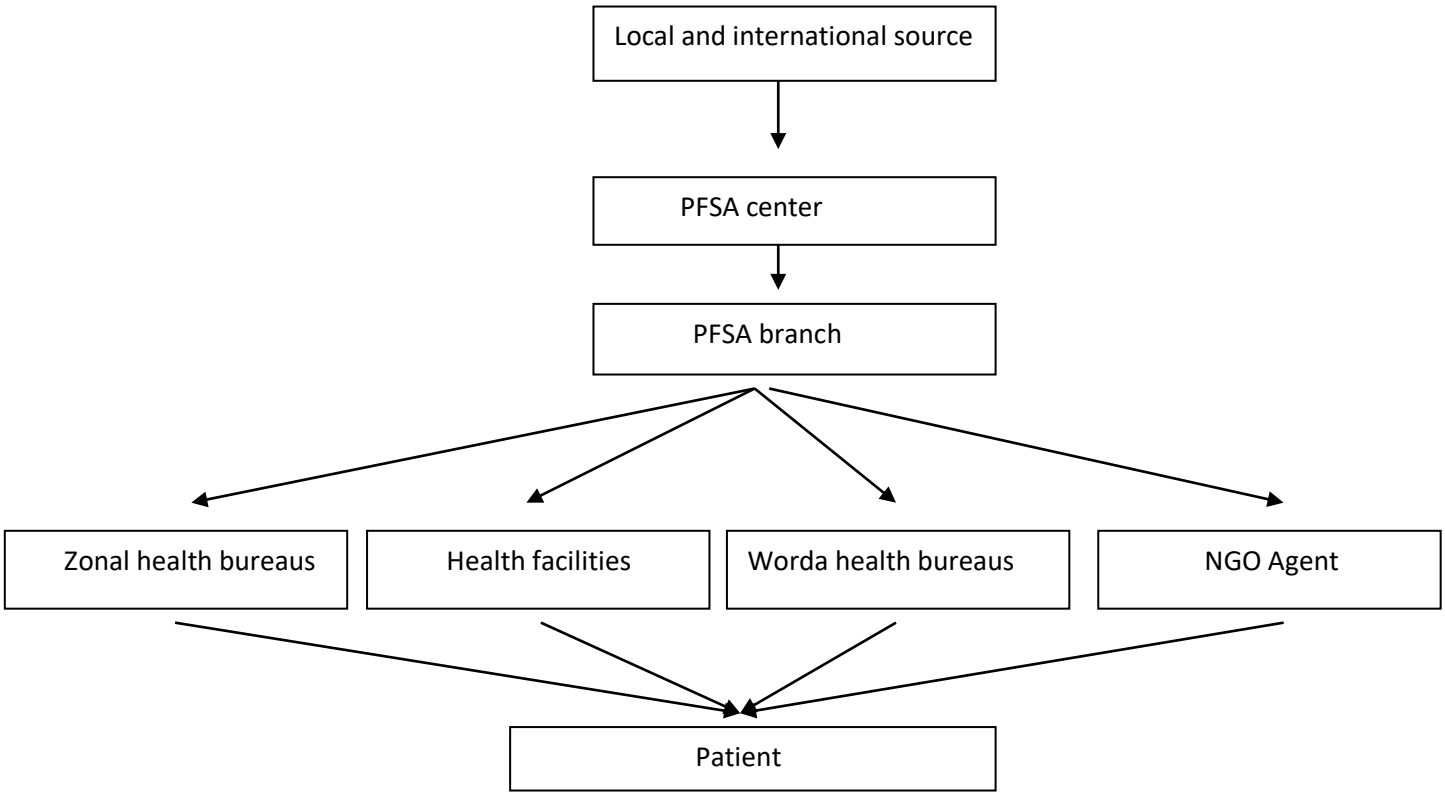
In the Ethiopian supply chain, commodities are delivered to facilities using a combination of mechanisms. Since March 2012, PFSA has directly delivered program commodities to many health facilities—all hospitals and accessible health centers. As an interim approach, the remaining health centers are receiving their products through woredas or zonal health offices (PFSA delivers to them). For RDF products, health facilities are expected to use their own vehicle, or other transportation, to collect their purchased products from higher levels or vendors. Health posts are expected to collect their products from their resupply health center every month. Ethiopia: National Survey of the Integrated Pharmaceutical Logistics System (2015).

In 2009, the USAID aided DELIVER project introduced an automated health commodity management information system (HCMIS) that can significantly improve health facilities' ability to manage supplies in their stores. The HCMIS is a locally-developed, user-friendly software package that helps health facilities manage all EDs, as well as medical and laboratory supplies. The HCMIS automatically receives and issues reports and orders, manages inventory, and produces a variety of commodity reports for store managers, pharmacists, and facility heads. Since the program began, the project has implemented the system in 205 selected health facilities throughout Ethiopia as of 2011 (John Snow/DELIVER, 2011).

The LMIS will be improved and integrated with the HMIS and stock management of health facilities to improve forecasting and quantification of pharmaceuticals. Regular operational research will be conducted to improve efficiency of the supply chain management on a continuous basis. Patients and health workers will be involved in improving the rational use of drugs. An Ethiopian national survey indicates poor order fill rate (the percentage of items that are

filled, based on the ordered quantities with the correct products) to health institutions, shortages of products at central level, and product overstocking , (Shewarega *et al*. ,2015).

Figure 2.1 Patterns distribution of pharmaceuticals in Ethiopia




Patterns distribution of pharmaceuticals in Ethiopia

**2.2 Empirical Literature Review**

USAID (2011) In developing country with poor roads It is expensive to transport products over rough terrain In India, for example, nearly 70 percent of the population lives in rural areas, where the health posts may be few and lacking in staff, electricity, and supplies. The costs of

drug distribution in India are two to three times greater than in the United States or the European Union, despite vastly lower labor costs Langer and Kelkar, 2008). Supply chain managers are always concerned with the last-mile problem: the disproportionately expensive and inefficient final leg on the distribution chain. In developing countries, the last mile is exceptionally long, extending to sparsely populated villages far from a paved road and farther from a supply center.

The research done by Adzimah (2014) A qualitative study on assessment of health commodities management practices in selected hospitals in Ghana revealed that, challenges in managing inventories in the hospitals was; inadequate availability of health commodities, poor procurement practices, undermined distribution, unavailability of storage facilities, unavailability of skilled labor, internal bureaucracy, lack of funding and logistical problems.

A study on inventory management practices at public and mission hospitals in Kenya by Shadrack (2015) explored that, the challenges experienced by the inventory management, team were; stock-outs, inadequate storage space, budget constraints, poor inventory record keeping, lack of teamwork, delayed supplies, delay in getting suppliers and inadequate staffing in the department. Ad-hoc decisions about order frequency and quantity, incomplete stock records, lack of Standardized Operating 10 Procedures (SOPs) to guide staff and lack of regular performance monitoring were other challenges faced in the studied hospitals.

In developed countries, the majority of medicinal products reach the patient through the traditional pharmaceutical full-line (pre-wholesaler) distribution pathway: manufacturer patient. In some cases, a pre-wholesaler is part of the retail pharmacy wholesaler supply chain, linking the manufacturer and the pharmaceutical full-line wholesaler.

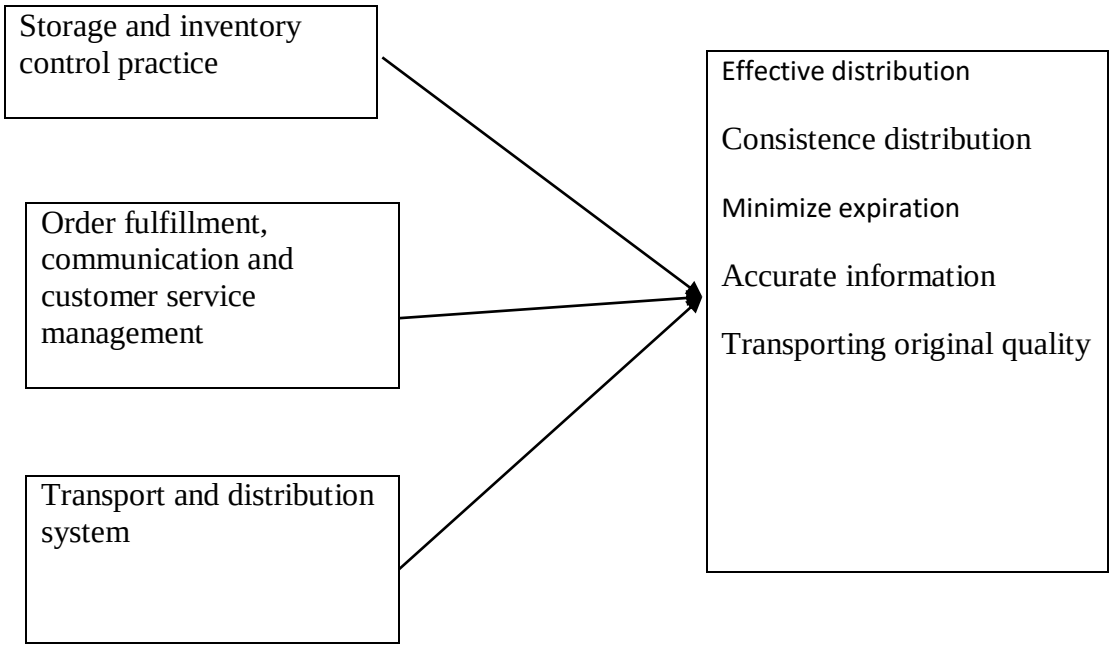
According to Admasu (2016) study result shows that in PFSA head office most of the location of warehouses is less comfortable to pick, load and unload pharmaceutical products. This is because the agency uses rental warehouses which were not planned and built for warehousing and storage purpose. In addition, study shows that problems during unloading of pharmaceuticals at branch and health facility level. The problem is higher when the move to health facilities. Some of the problems are; Warehouse managers may not available in the workstation, less human power to unload products especially at health facility level.

## 2.3 Conceptual Framework

The conceptual framework adopted for this study shows that pharmaceutical distribution effectiveness influences performance of effective distribution of pharmaceuticals to a health facility. This practice includes: Cost of pharmaceuticals, Delivery time, Distribution system, Customer satisfaction. The dependent variable is an Effective distribution of pharmaceuticals. Therefore, the conceptual framework shows that pharmaceutical distribution to health facilities.

Independent variables dependent variable

Figure 2.1 concept note of distribution effectiveness




Source: Own Survey Result, 2019

## 4 Identified literature gap

From the above literature review section, several studies have been carried out in relation to pharmaceutical distribution; however, there are little or no theories in relation to customer satisfaction and consistency of distribution of pharmaceutical products to health facility. Therefore, this research is intended to fill these gaps in the areas which are not researched by others.

# CHAPTER THREE

# RESEARCH METHODOLOGY

## Introduction

In this chapter, the researcher was describing the methodology. It describes the study area, research approach, research design, population, sampling and sampling technique, research, data collection procedure, data analysis and presentation.

## 3.1Description of the study area

The study was conducted in EPSA Addis Ababa hub one of among 19 branches found in Nifas silk Lafto Sub-city around Lebu. the distribution activity in the branch have program and RDF(revolving drug fund).In program the agency regularly delivered drugs to all ART and PMTCT every two months. In the branch integrated reporting system is operational for HV/AIDS, TB, FP, OI, Lab and related supplies. Under Addis Ababa hub there are governmental- 33 hospital 419 health center 18 kenema pharmacy and private facility -44 private hospitals and 363 clinics. The agency vision is to see the public access quality pharmaceuticals with honorable service and mission of the agency is avail affordable and quality pharmaceuticals sustainable to all health facilities through revolving drug fund and capacity building to ensure proper inventory management and rational drug use. The study focused on effectiveness of pharmaceutical distribution in PFSA. According to (Aronovich, 2010) There are sex performance indicators for distribution of supply chain. Stock out rate, order lead time, Plan in place for predictable change in demand, affordable price, Supplier Fill rate Product selection/Forecasting/Procurement. There for this research measure the performance of effectiveness of distribution of pharmaceuticals.

### 3.3 Research Approach

In this study both of Quantitative and qualitative approach were used for the research. Qualitative research identifies transportation challenges that are contributing to the health facility and pharmaceutical distribution. In addition, qualitative methodology supports open-ended questions of distribution pharmaceuticals and challenges in a bounded system also qualitative method used to understand phenomena of distribution of pharmaceutical in Addis Ababa branch. It aims to understand the individual's view without making any value judgment during data collection. Quantitative research is based on the measurement of quantity or amount. In addition, it is applicable to phenomena that can be expressed in terms of quantity (C.R. kothari 2004).

### 3.4Research Design

The design of this study was employee descriptive and explanatory research design. Descriptive research design is considered best for observing, describing recording, analyzing and reporting conditions that exist without alterations, Whereas explanatory study to examine the relationships between variables.

According to Donald and Pamela (2006), a descriptive study deals with what, how and who of a phenomenon; these are also the concerns of this study. This research design is appropriate for this study because the data required to meet the stated objectives can easily be obtained from questionnaire based sampling.

### 3.5 Study population

Target population refers to the aggregation of elements from which the sample is actually selected to (Barbie 2010). The total population of the study is 286. (i.e. EPSA staff directly related to pharmaceutical distribution program officer, RDF officer, Forecasting and capacity building officer, warehouse manager, dispatch office, deliverer, driver and management staff(80),pharmacy professionals who work in health facility which collect their pharmaceuticals

from EPSA include 12 governmental hospitals ,44 private hospital,99 public health centers,18 public pharmacies and 33 private medical center.)

### 3.6. Sample size

A sample size was taken from the target population of 286 employees working with EPSA AA HUB, hospitals, health center, and private diagnostic center.

The sample size for the study is calculated by using formulas of sample size determination cited by (Cochran 2010). Cochran's formula is considered especially appropriate in situations with large populations. A sample of any given size provides more information about a smaller population than a larger one. The Cochran formula is:

$$n_0 = \frac{Z^2 pq}{e^2}$$

Where:

$N_0$ is $n_0$ is Cochran's sample size recommendation

- e is the desired level of precision (i.e. the margin of error),
- p is the (estimated) proportion of the population which has the attribute in question,
- q Is 1 – p.

p=0.9, q=0.1, z= 1.96, e= 0.05

N = 286

There for

$N_0 = \underline{(1.96)^2(0.9*0.1}$

(0.05)2

$= \underline{0.3457}$

0.0025

$=138.3 = 138$

According to Cochran's, if the population of study is small in number. We can calculate the sample size by using this equation:

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}}$$

There for in the study N is the population size

n is sample size

$n_0$ is Cochran's sample size recommendation

There for we would calculate our sample size

138.30000 .

1+138.3-1

286

=138.3

1.48

=93.44

=94

### 3.7 Sampling techniques

The researcher use Stratified simple random sampling technique to select 82 representatives from total population. The information that was collected from health facility and internal staffs are different in terms of the knowledge of pharmaceutical distribution. Therefore, to achieve efficient results, stratified sampling was used to ensure larger sample in the study. Target population for the study is divided in five strata based on the level of health facilities that collect pharmaceuticals from EPSA Addis Ababa hub. After dividing the population into strata, the researcher were draw a random sample from each sub population. Government hospitals

selected purposefully due to the fact that they serve large amount of patients and considering all types of services have been provided in hospitals. In addition, they are small in number. Therefore the researcher took all governmental hospitals located in Addis Ababa, which are 12 in number.

Purposive sampling is used to identify and select the individuals that have more information than the regular group members (Welman et al 2005:204).

Table bellows show the total sample used in the study. To accomplish the research effectively the researcher selects the following respondents as a sample size.

Table 3.1: Number of target population

| no | Strata group | Sampling technique | Number of population(health professionals) | Sample size |
|---|---|---|---|---|
| 1 | Internal staff | Stratified S.T | 80 | 23 |
| 2 | Government Hospital | Purposive | 12 | 12 |
| 3 | Government H/C | Stratified S.T | 99 | 33 |
| 4 | Public pharmacies | Stratified S.T | 18 | 5 |
| 5 | Private Hospital | Stratified S.T | 44 | 12 |
| 6 | Private diagnostic center | Stratified S.T | 33 | 9 |
| | | | 286 | 94 |

Source: Own computation using survey data

### 3.8 Data source and types

In this study, the researcher can gather data from primary data .Primary data is original research data in its raw form, without any interpretation or analysis, and thus original in character (Kothari, 2004, p. 95).Primary data ware collected from EPSA internal staff and from health facility who are pharmacy professionals who come to EPSA to collect pharmaceuticals.

### 3.9 Data collection procedure

The researcher collected data from primary sources. The primary data was collected through questionnaires with open and closed ended questions. Open-ended questions can be employed both to gather information and to motivate respondents (ports, 2011).In the study; the researcher used open-ended questions to avoid steering respondents in a particular direction, to motivate respondents giving them an opportunity.

In addition the researcher was using closed-ended questionnaires, developing five points Likert scale, which range from strongly disagree to strongly agree and additional quantitative questions. The respondents select their choice of the scale based on their knowledge of pharmaceutical distribution. Questionnaires have the advantage that the respondent has adequate time to respond to questions and free from bias because the respondents are guided and the interviewer did not influence answers.

The questionnaire adapted from Amasu (2017) and gullelat (2018) documents the researcher modifies it in order to suitable to the study.

The questions are distributed to the respondents by appreciating their willingness and giving time for the research. Then the questionnaires were collected after checking the completeness of the data.

### 3.10 Ethical consideration

Ethics are the norms or standards of conducts that distinguish between right and wrong. Approval to conduct this study was sought from Addis Ababa university school of commerce. In the study Permission asked EPSA Addis Ababa branch and each heath facility during study. the person participating in the evaluation is fully informed about the evaluation being conducted, aware of the purpose of the research and also participants are free to withdraw their participation at any time without negatively impacting on their involvement in future services or the current the study. In order to keep confidentiality name of personal and health facility that give the response for complete-ting the questionnaire will not list on the questionnaire. Only the researcher had access to the transcripts of the interviews.

### 3.11 Method of data analysis and presentation

In the study effort has been employed to maintain quality of data through the different steps like data entry, analysis, interpretation and representation. The researcher used descriptive statistics and explanatory research design to analyze data to allow for meaningful description of data collected using statistics. The data collected through questionnaires was coded and entered into the statistical package for social science (SPSSV-20) for analysis of quantitative data in computer to give all analysis. After the data had been analyzed and transmitted into figures and tables, a conclusion for each question is made to relate the findings and the survey topic together.

### 3.12 validity and reliability test

#### 3.12.1 Validity

Validity implies the degree to which a question measures what it was intended to measure. The questionnaires were developed on the bases of previous studies and review of related literature. Pharmaceutical distribution effectiveness has evaluated in questionnaires. A pilot study conducted in a new branch of EPSA found around bola. 15 sample questioners distributed to make the validity of the data collection questionnaire (instrument) a certainty before the actual data collection tool was dispatched to the responders. The feedbacks obtained from pre-testing the questionnaire was amended to avoid errors during data collection Data entry should be done the same day.

#### 3.12.2 Reliability test

Reliability refers to the consistency of a measure, the ability of the instrument used in research to consistently measure the characteristics of interest over time (Ahmed *et al*, 1994).The data reliability test is measured by using Cronbach‟s Alpha. Cronbach's Alpha was also calculated as part of the reliability test to assess how valid the results were and should produce similar generalized results if the sample size were increased (Field, 2006). The Alpha value is ranges from a maximum of 1.0 for a perfect score to a minimum of zero, good measure of the alpha should be 0.70 or higher (Neuman, 2007).for this research the variables for effectiveness of pharmaceutical distribution in which measure delivery time, customer satisfaction, in EPSA

Addis Ababa hub in perception of customer and staff. Which measure each indicator, delivery time, percentage of RRF quality, stock out percentage?

Table 3.2 Reliability Test

| Construct | Cronbach's alpha | Number of Item |
|---|---|---|
| Quality indicator for Storage and inventory control practice | 0.766 | 6 |
| Time indicator for SICP | 0.754 | 2 |
| Productivity indicator for SICP | 0.752 | 3 |
| Quality indicator for Order fulfillment, communication and customer service management | 0.765 | 3 |
| Time indicator for OCCSM | 0.777 | 4 |
| Productivity indicator for OCCSM | 0.749 | 3 |
| Quality indicator for Transport and distribution system | 0.748 | 3 |
| Time indicator for TDS | 0.783 | 2 |
| Productivity indicator for TDS | 0.804 | 7 |
| Effectiveness distribution | 0.76 | 4 |
| Total Cronbach's alpha of all | 0.7658 | 37 |

Source: Own Survey, 2019

# CHAPTER FOUR

## RESEARCH FINDINGS AND DISCUSSION

### 4.1. INTRODUCTION

This chapter presents the reports of data analysis; interpretation and summary of findings. Discusses about results for effectiveness of pharmaceutical practices and their effect of operation performance in EPSA AA branch. The data analysis was made with the help of Statistical Package for Social Science. Both descriptive and inferential analyses are presented. In order to conduct this study a total of 94 questionnaires were distributed to EPSA staff, governmental hospital and health center, Kenema pharmacy, Private hospital and diagnostic which are located only in A.A, among these questionnaires 90 are collected which are 95% and the remaining 4 questionnaires are not returned.

Table 1 shows that the rate of questionnaire answering and returning was relatively high and therefore the conclusion drawn here is that the data has a high validity in terms of the target population reviewed.

Table 4.1: Response Rate

| Details | Number | Percentage |
|---|---|---|
| Returned Questionnaires | 90 | 95 |
| Non-Responses | 4 | 5 |
| Total | 94 | 100 |

Source: Own Survey Result, 2019

### 4.2demographic information of the respondents

In the following table, the demographic information of respondents is presented. These include Gender of respondents, age, Work department of respondent's, Job position of respondents, Field of specialization of respondents, educational level and experience of respondents. To get information on these issues the respondents were asked and their responses are analyzed as follows.

Table 4.2 profile of information of respondents

Source: Own Survey Result, 2019

| **Variable** | item | frequency | percent |
|---|---|---|---|
| **Gender** | Male | 68 | 75.6 |
| | Female | 22 | 24.4 |
| | Total | 90 | 100 |
| **Age of respondents** | 19-25 | 3 | 3.3 |
| | 26-30 | 30 | 33.3 |
| | 31-35 | 33 | 36.7 |
| | 36-40 | 16 | 17.8 |
| | 41-45 | 1 | 1.1 |
| | ABOVE 45 | 6 | 7.8 |
| | Total | 90 | 100 |
| **Work department of respondents** | store manger | 7 | 7.8 |
| | deliverer | 5 | 5.6 |
| | storage and distribution | 11 | 12.2 |
| | health center customer | 27 | 30 |
| | hospital customer | 12 | 13.3 |
| | private medical center | 9 | 10 |
| | private hospital customer | 13 | 14.4 |
| | other | 6 | 6.7 |
| | Total | 90 | 100 |
| **Job position** | deliverer | 3 | 3.3 |
| | DSM | 22 | 24.4 |
| | head pharmacy | 40 | 44.4 |
| | officer | 14 | 15.6 |
| | store manager | 11 | 12.2 |
| | Total | 90 | 100 |
| **Field of specialization** | druggist | 10 | 11.1 |
| | pharmacist | 80 | 88.9 |
| | Total | 90 | 100 |
| **Education Level** | Diploma | 12 | 33.3 |
| | Degree | 66 | 73.3 |
| | Master | 11 | 12.2 |
| | other | 1 | 1.1 |
| | Total | 90 | 100 |
| **Work experience** | 0-5 year | 19 | 21.1 |
| | 6-10 year | 41 | 45.6 |
| | Greater than 10 years | 30 | 33.3 |
| | Total | 90 | 100 |

### 4.2.1 Distribution of respondents according to gender

Teble4. 2 indicate that the majority respondents (75.6%) were Male while 24.4% were female. It was observed that in every department, although the male were many compared to females, this tells as the majority respondents are males.

### 4.2.2 Age of respondents

Results in Table 4.2 indicate that of the employees 36.7%were on the age category of 31-35 years, followed by 33.3% with 26-30 years and 17.8% were in the age category of 36-40. The others 7.8%were above 45, 3.3% were 19-25 and 1.1% was 41-45 were respectively. From this the researcher concludes that 33(36.7%) of respondents are experienced and that can be able to perform missions of the minster of health.

### 4.2.3 Work department of respondents

Results in table 4.3 show that 30 % respondent being from health center, 25.5% were in internal staff. 13.3 % were governmental hospital, 14.4 % were private hospital, and 10% were private medical center. 6.7% was other including Kenema pharmacy.

### 4.2.4 Job position

Regarding their position The respondents were asked to indicate their job position, 44.4% of the respondents were head of pharmacy, 22 (24.4%) were DSM, 14(15.6 %) were officers, 11(12.2%) were store manager and 3(3.3%) were deliverer. head of pharmacy formed the largest group of 40 respondents. since most of the time head of pharmacy have a general knowledge over distribution of pharmaceutical this research are good representative.

### 4.2.5.5 Field of specialization

On the table 4.2 above indicates that the contribution different health professionals for managing pharmaceutical activities and health service in health facility.88.9% and 10% of respondents were pharmacist and druggist respectively those have more contact with pharmaceutical distribution management.

### 4.2.6: Education Level

The study requested the respondent to indicate their highest level of education. From the findings, 73% of the respondent indicated their highest education level as degree, 13.3% of the respondent indicated their highest education level as diploma, and 12.2% of the respondents indicated their highest education level as masters, whereas 1.1% of the respondents indicated their highest education level as others. This is an indication that the majority of the respondents were middle level professionals which are BSC/BA holders. There for the respondents provide relevant and reliable information on distribution of pharmaceuticals needed for the study and they are fitted in line with the response to the questionnaire.

### 4.2.7 Work Experience

From the findings the study established that, 41% % had worked for a period of 6-10 year, 33.3% of the respondents had worked for a period of Greater than 10 years, 21.1% of the respondents had worked for a period 0-5 year this implies that majority of the respondents engaged in this study had worked for a considerable time and thus they had vast knowledge which could be relied upon in the study. The more experienced one is, is attributed to performance, hence directly having an impact on the consistency at which pharmaceutical distribution were availed.

Therefore, the demographic analyses indicate that there is a higher male ratio, force, high work experience and very good educational level.

## 4.3 Descriptive analysis

Effectiveness of pharmaceuticals distribution in EPSA AA branch is presented and discussed for each indicator of effectiveness of distribution with respective tables through strongly disagree, disagree, neutral, agree and strongly agree mean and standard deviation. A scale of 1-5 was used. The scores “strongly disagree” and “Disagree” were represented by mean score, equivalent to 1 to 2.5 on the continuous Likert scale. The scores of ‘Not sure’ were represented by a score equivalent to 2.6 to 3.5 on the Likert. The score of “Agree” and “Strongly agree” were represented by a mean score equivalent to 3.6 to 5.0 on the Likert Scale Durham Unversty,2013).

### 4.3.1 Descriptive Statistics of Storage and inventory control practice

Table 4.9 Descriptive Statistics of Storage and inventory control practice

| Items storage and inventory control practice | **SD** | d | n | a | SA | mean | S.D |
|---|---|---|---|---|---|---|---|
| Current storage space is sufficient for existing products & planned program expansion | 14 | 21 | 20 | 28 | 7 | 2.92 | 1.22 |
| In EPSA Addis Ababa hub pharmaceuticals are Put-Away Accuracy in the correct location so they can be quickly and easily located | 12 | 25 | 23 | 26 | 4 | 2.83 | 1.124 |
| stored at appropriate temperature according to product temperature specifications (8°–30°C) and including cold chain storage (2°–8°C), as required for certain products | 6 | 7 | 17 | 35 | 24 | 3.72 | 1.148 |
| In the agency there are tools(camera, security guard) to control all activity to monitor security of pharmaceutical products | 11 | 8 | 10 | 39 | 22 | 3.59 | 1.289 |
| Pharmaceuticals are stored and organized to FEFO procedures and are accessible for counting and general stock management | 8 | 8 | 17 | 39 | 18 | 3.57 | 1.17 |
| Health facility have enough safety stock to prevent stock out of pharmaceuticals of HIV pharmaceuticals | 9 | 20 | 25 | 28 | 8 | 3.07 | 1.17 |
| Grand mean of QIDI | | | | | | 3.2833 | 1.181 |
| In EPSA AA hub the time taken to receive pharmaceuticals from warehouse are appropriate | 7 | 23 | 31 | 26 | 3 | 2.94 | 0.998 |
| The time taken pharmaceuticals to unload from truck after arriving at warehouse and preparing to picking are appropriate | 3 | 21 | 45 | 18 | 3 | 2.97 | 0.841 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Grand mean of TISI | | | | | | 2.955 | 0.919 |
| Proper dispatching procedures have been undertaken by EPSA | 4 | 19 | 22 | 30 | 15 | 3.37 | 1.126 |
| In dispatching area repacking of one drug in a container of another drug have discouraged, the name, dosage and batch number and expiry date is clearly indicated | 7 | 13 | 33 | 22 | 15 | 3.28 | 1.14 |
| Stocks renewed on EPSA AA HUB are done on scheduled dates | 8 | 20 | 32 | 21 | 9 | 3.03 | 1.16 |
| Grand mean of PISI | | | | | | 3.226 | 1.142 |

Source: Own Survey Result, 2019

On storage and inventory control practice, respondents were asked current storage space is sufficient for existing products and planned program expansion 28(31.1%) of the respondents agree,21(23.3%)disagree, 20(22.2%) neutral,14(15.6%) strongly disagreeing and only 7(7.8%)strongly agreed. and this results supported by mean value of 2.92 and 1.22 standard deviation. However the result of responding is agreeing the mean value indicates storage spaces are in the moderate range. From the results majority responds that storage space is sufficient, but because of sometime pharmaceuticals delivered to hub in push system, poor forecasting quantification system and damage and expired pharmaceuticals did not dispose on time leads the store space limited. This result contradict to the study done in Kenya (Ministry of Medical Services and Ministry of Public Health & Sanitation 2009) storage facilities for medicines have deteriorated or remained inadequate both centrally and in health facilities in the public sector.

Concerning whether the organization has put-away accurately pharmaceuticals or not, most of the respondents are answered 28.9% agree and 27.8% disagree, this is also supported by mean value of 2.83 and standard division of 1.124. The results demonstrated the agency practice to put-away accurately pharmaceuticals. However respondents suggest pharmaceuticals were not arranged and are not put in rack system. However this result contradicts the report of (USAID publication in 2009) store management in PFSA

warehouse is generally poor. Stocks are stored wherever space is available. Inaccurate put away might lead to Inventory not being available at the desired location during the picking process that might lead to unfulfilled/ delayed health facility orders.

In response to pharmaceuticals are stored at appropriate temperature with specification 38.9% of respondents said agree and 26.7%of respondents have strongly agree with mean score value 3.72 Therefore, the result showed that products are stored at appropriate label of temperature. To balance the result open ended questioner conducted during the study. In open ended questioner respondents explain interruption of electrical system have a big problem for pharmaceuticals which needs special temperature. This finding was align with the finding of (Gulilat 2018) which states products at PFSA are stored at the appropriate temperature according to product temperature specifications (8°–30°C) and including cold chain storage (2°–8°C).

Concerning to controlling mechanize to monitor the activity of the agency, whether there was a tool or not 43.3% of the respondents have agreed 24.4% strongly disagree,11.1%, neutral,8.9% disagree and 12.2%strongly disagree, with a mean value of 3.59.this result implies that there are proper safety and security controlled mechanism in the agency to prevent theft. Which contradicts with the finding of (gulilat 2018) revealed that PFSA head office has not any mechanism to track those who are attempting to theft and fraud.

On stock management of pharmaceuticals, respondents asked whether pharmaceuticals organized in FEFO methods. 18.9% respondents respond have neutral and 43.3% have agree the organization follow procedure. This result supported by mean value of 3.57. Proper procedure of using FEFO has minimized expiration of pharmaceuticals. This result shows in FEFO the hub practice good job. This results alien with (USAID publication in 2009) stock control is based on first expiry, first out (FEFO) principles.

As can seen in the table above 31.1%of respondents agree on HIV pharmaceuticals are enough stock to prevent stock out in their facility and 27.8% have neutral.10%strongly disagree, 22.2%disagree, 8.9%strongly agree, and this result supported by mean value of 3.07 and S.D=1.14.this implies that health facility was stock enough amount of HIV drugs. From the result in open ended and the above HIV drugs were most of the time available.

Other studies obtained similar results Ethiopia: National Survey (2015) In PFSA most health facilities—78 percent of the hospitals and 71 percent of health centers—program commodities are usually delivered to their stores via delivery from a higher level.

As it summarized in the table respondents assures that quality indicators of 3.2833 grand mean and 1.181 grand standard deviations can determine the effectiveness of pharmaceutical distribution. From this result, it can be understand from this result that EPSA AA hub has done in moderately regarding quality of storage and inventory practice in the agency.

As majority of the respondents 34.4% indicated that time taken to receive pharmaceuticals from the warehouse have neutral,25.6% of respondents disagree,7.8% strongly disagree while 3.3% have strongly agree with the mean value of 2.94.even if the result show neutral when respondents asked in open ended questioners, there are delays in receiving pharmaceuticals from warehouse because of items on storage and on system does not much which causes voiding, most of the time store manager was receive and dispatching pharmaceuticals at the same time it makes the overall process to take time. this result contradict from the research done by manaye (2018) which states that the time taken by receiving pharmaceuticals from warehouse is not appropriate and it was not in the best interest of customers who were served in the warehouses of PFSA, AA Branch.

According to the respondent results, 50% of them say time take pharmaceuticals to preparing to picking after unloading from the truck is moderate or neutral,23.3% respondents disagree, 20% are agreeing while 3.3% of them are both strongly disagree and strongly agree. The mean value of the questioner is 2.97. From the result, there are some challenges in loading and unloading in the organization. In addition to that above presented facts from open questioners respondent suggest that it takes to unload from the trucks for the reason of warehouse manager was most of the time buzz because of work burden and some medical equipment need forklift which are not available.

From these time indicators for measuring effectiveness of storage and inventory with grand mean of 2.955 and grand standard division of 0.919.which indicates that time receive from warehouse and time taken to unload from truck was in moderate practice. From the response

it can be understood that the time indicator measurement in storage and inventory practice EPSA AA hub are not performing in the best interest of their customer.

Regarding dispatching procedures 33.3% of respondent have agree that there is a proper dispatching process, 24.4% were neutral, 21.1% of them disagree, and 16.5% strongly agree. Where us 4.4% of them strongly disagree. in addition, this result supported by the mean value of 3.37, respondents in open ended questioners describe in dispatching process order of customer does not follow its steps and suggest the agency need to work effectively to solve problems related to dispatching process.

According to respondent 36.4% are neutral ,24.4% are agree on dosage ,batch number and expiry date included during repacking of container,16.7% were strongly agree, 14.4% of them are disagree, while 7.8% are strongly disagree. The result shows that neutral for the statement which can be interpreted. They may not have enough information to say other ways secondly limited knowledge about questioners. This result supported by mean value of 3.28. From the result in the agency repacking process is in a moderate way.

Final respondents were asked about renewed of stock on EPSA AA hub are done on scheduled or not, majority of respondents 35.3% neutrals, 23.3% agree, 22.2%of respondents disagree, 10% strongly agree and 8.9% respondents strongly disagree and mean value of 3.03. In addition even if the document sent in head office sometimes sent in delivery which makes the item late for preparing delivered, renewed of pharmaceuticals are not in good practice the consequence of not renewed pharmaceuticals causes long time stock out of pharmaceuticals.

The grand mean values of productivity measurement of storage and inventory are 3.226 and average standard division of 1.142. So the result indicates that the proper dispatching practice has not done in a good way. In addition, in repacking and renewed of pharmaceuticals hubs need improvement.

In general the overall storage and inventory practice in the agency was in moderate way, even if there is a fluctuation between linker scale questioner and open ended questioner.

### 4.3.2 Order fulfillment, communication, customer service management.

Table 4.10 Order fulfillment, communication, customer service management.

| | s.d | d | n | a | s.a | Mean | S.dev |
|---|---|---|---|---|---|---|---|
| EPSA Addis Ababa hub, Health facility and other branch is communicate to distribute over-stock and near expiry pharmaceuticals | 4 | 19 | 28 | 30 | 9 | 3.23 | 1.03 |
| There is strong Information exchange among distribution officers, store managers and customers | 3 | 20 | 24 | 31 | 12 | 3.32 | 1.06 |
| EPSA Addis Ababa hub has information exchange mechanisms other than letter and telephone cells | 6 | 13 | 26 | 34 | 11 | 3.34 | 1.08 |
| Grand mean of QIOCC | | | | | | 3.296 | 1.56 |
| The demand and request of customers' orders are filled on time and up on their request and expectation | 14 | 26 | 24 | 21 | 5 | 2.74 | 1.14 |
| Health facility report RRF in accuracy and on time | 4 | 19 | 28 | 33 | 6 | 3.2 | 0.997 |
| IN EPSA The response time to receive an order is short | 6 | 20 | 27 | 32 | 5 | 3.11 | 1.03 |
| Products which are slow and fast moving are reported timely | 5 | 18 | 37 | 20 | 10 | 3.13 | 1.04 |
| Grand mean of TIOCC | | | | | | 3.045 | 1.051 |
| The quantity ordered by health facility sites for pharmaceutical product is based on real consumption analysis | 9 | 18 | 32 | 25 | 6 | 3.01 | 1.07 |
| In EPSA AA hub the price of pharmaceuticals are affordable with comparing other supplier | 7 | 4 | 8 | 35 | 36 | 3.99 | 1.17 |
| In EPSA AA hub There is well developed tool to check customer satisfaction in Distribution activities of the Agency | 15 | 27 | 27 | 18 | 3 | 2.63 | 1.08 |
| Grand mean of PIOCC | | | | | | 3.21 | 1.10 |

Source: Own Survey Result, 2019

The Majority of respondents 33.3% and 31.1% were agreed and neutral concerning the communication to distribute over-stock and near expiry pharmaceuticals with in branch to branch, branch to health facilities. Whereas 21.1% 10%, 4.4% were disagreeing, strongly agreeing and strongly disagreed respectively. This result indicates EPSA AA hub is strong communication practice with other branch and health facility to minimize over stock and to decrease to expiration of pharmaceuticals. Which is consistence with the finding of the open ended which concluded that the branch has done its effort to distribute over –stock and near expiry pharmaceuticals.

With regarding to the question raise to respondents for information exchange among distribution officer ,store manager and customer respondents agreed in34.4%,26.7% neutral, 22.2% disagree,12% strongly agree and 3.3% strongly disagreeing with mean value of 3.32 from this result EPSA AA branch has good information exchange practice to improve distribution effectiveness. Respondent explains in open questioner there is good coordination with each other to decrease overstock, to use alternative medication and to minimize expiry of pharmaceuticals.

In the next question, respondents asked whether the distribution of pharmaceutical information exchange have additional mechanism other than letter and telephone,37.8% respondents agree,28.9% are neutral, 14.4% disagree,12.2% were strongly agree,6.7% were strongly disagreeing, this results supported with a mean value of 3.34. From the result the agency was used other mechanism in addition to telephone and later to strength communication like viber, telegram and whatsapp. In order to inform that whether there are new pharmaceutical are arrived or not.

From quality indicator in ordering, communication and customer service management the result shows with grand mean value of 3.296 and average standard division 1.56 this result implies the agency has done well in communicating to other branch and health facility and use different mechanisms of communication to improve overall distribution system. From this anyone can understand information communication technology play a significant role in the distribution of pharmaceuticals effectively.

From the table respondents asked whether health facility RRF report was accurate and on time 36.6% agree, 31.1%neutral, 21.1disagree, 6.7 strongly agree 4.4% were strongly disagree while mean value of this is 3.22.from this majority answer agree, but the result contradicts almost all of open ended respondents mention that there is a major problem on time report and accuracy of RRF due to lack of training, and negligence. The result align with National Survey of the Integrated Pharmaceutical Logistics System(2015) that The utilization of RRF was high (97 percent) Overall, regardless of the type of facility, completeness of the RRF was found to be good (at PFSA) However, data quality of the RRF is an issue in most health facilities.

According to table respondents responses on time to receive an order.35%agree,30%were neuteral,22.2%of respondents disagree,5.6% strongly agree and 6.7% were strongly disagree. Mean value of 3.13. From the result of the respondent in the agency the response time to receive an order in performed in good performance. However because of their problems in quantification either in EPSA and health facility, quality problem in refilling RRF, and long time stock out of chemical reagents which needs more effort.

Concerning whether the organization has reported timely which are slow and fast moving pharmaceuticals.41.1% respondent responds neutral, 22.2%agree, 20%dsagree, 11.1% strongly agree while 5.6%strongle disagree whether slow and fast moving are reported timely. With a mean value of 3.13.this result indicates the organization has in moderate performance in reporting slow and fast moving pharmaceuticals. Which is contradicted with the finding of the interview which concluded that the agency has not only report fast and slow pharmaceuticals in the branch but also report pharmaceuticals which are on the way of forecasting and arriving in the border. Reporting slow and fast moving pharmaceutical decreases expiration and over stock of products in the agency.

The other indicators in ordering, communication and customer service management is time indicators which are grand mean of 3.0454 and average standard division of 1.051.this result show in the time indicator of ordering, communication and customer service management EPSA AA hub and health facility has worked on awareness regarding response time, reporting fast and slow moving items on time, accurate RRF reporting and timely reporting. The general time indicator for this practice has in moderate in the agency.

Regarding the quantity ordered by health facility sites for pharmaceutical product is based on real consumption analysis 35.6%were response neuteral,27.8%agree,20%disagree 10%strongly disagree and 6.7%strongly agree .also mean value of 3.01. From the result, respondent nether agreed nor disagree order are based on real consumption. However the majority of respondent suggest in open ended questioners that health facility has big problems on ordering there need based on their real consumption. This problem results product wastage and repeated stock out in health facility and filled orders on time and there expectation in the agency.

Majority of respondent were responded, 40% strongly agree that price of pharmaceuticals is affordable comparing of other suppliers, 38.9% agree, 8.9% neutral 7.8% strongly disagree, 4.4% disagree. The mean value of this questionnaires is 3.99 which indicate the respondent are strongly agree the agency price are affordable with comparing to other distributor even some drugs like cancer, cardiac are delivered in decreasing the original amount up to 30%.this results alien the results study in Kenya (Ministry of Medical Services and Ministry of Public Health & Sanitation 2009)the government and FBHS procurement agencies are almost exclusively procuring generic products and are obtaining price-efficiency in medicines procurement, with the government sector obtaining comparatively lower prices. Where medicine prices are high, people (especially the poor) may have to forego treatment or incur debts in order to afford the out of pocket expenses for the life saving medicines they need.

Finally respondents were asked if there is developed tool to check customer satisfaction in the distribution of pharmaceuticals in EPSA AA branch 30% of respondents were both disagree and neutral 20% of them were agreed,16.7% strongly disagree and 3.3% were strongly agree. 2.63 mean value. This indicates that the majority of the respondents disagreement that there is no as such a well-developed tool to check the customer satisfaction level in distribution of pharmaceuticals. This is consistence with the finding of the open questioners which results that the agency does not any tool to check customer satisfaction. This implies that EPSA AA hub did not any way to measure the level of customer satisfaction.

Generally, the average mean and standard deviation of the respondents were 3.21 and 1.1 respectively; this shows most of the respondent's shows nether agree nor disagree on effectiveness in productivity indicators in order fulfillment, communication, and customer service management.

Generally, the results emphasized that regarding Order fulfillment, communication, customer service management indicators for effectiveness of pharmaceuticals most of indicator result are in moderate. Which shows the agency need to consider deeply in order to Improve effectiveness of distribution performance in the organization.

### 4.3.3 Transportation and distribution system

Table 4.11 Transportation and distribution system

| Variable Item (N=90) | SD | D | N | A | SA | Mean | S.d |
|---|---|---|---|---|---|---|---|
| Pharmaceuticals which are heat sensitive (chemicals, vaccines) are transported by refrigerated truck | 3 | 12 | 14 | 36 | 25 | 3.76 | 1.1 |
| In EPSA AA hub stock outs of essential medicine is a regular situation | 5 | 11 | 29 | 32 | 13 | 3.14 | 1.05 |
| In distribution of pharmaceuticals bad road network affect delivery | 6 | 10 | 25 | 30 | 19 | 3.51 | 1.14 |
| Grand mean of QITD | | | | | | 3.47 | 1.09 |
| Pharmaceuticals which are ordered by health facility are delivered on time | 6 | 20 | 30 | 29 | 5 | 3.08 | 1.01 |
| Pharmaceuticals which are delivered to health facility in the vehicle is received are correct items and quantities much with during receiving period | 3 | 15 | 19 | 39 | 14 | 3.51 | 1.05 |
| Grand mean of TITD | | | | | | 3.29 | 1.03 |
| There are a sufficient number of functioning vehicles with available drivers to meet the desired distribution schedule | 5 | 21 | 29 | 29 | 6 | 3.11 | 1.02 |
| The quality of pharmaceuticals are ensured during transport with the use of data loggers from EPSA to HF warehouse | 5 | 21 | 26 | 28 | 10 | 3.19 | 1.09 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| EPSA AA hub have the capacity to fulfill health facility demand accurately and to deliver all the requested pharmaceuticals | 13 | 34 | 25 | 15 | 3 | 2.57 | 1.03 |
| There are established procedures for placing emergency orders? | 6 | 14 | 25 | 36 | 9 | 3.31 | 1.06 |
| EPSA are willing to prompt corrective action for defectives pharmaceuticals | 8 | 12 | 29 | 35 | 5 | 3.16 | 1.09 |
| Vehicles are comfortable to load pharmaceuticals according to the distance of delivery sites(for short distance site pharmaceuticals will be load last) | 5 | 6 | 32 | 32 | 15 | 3.51 | 1.03 |
| The average amount of time from the moment an order is received at the storage facility until the time the order is actually transported to health facility is appropriate | 7 | 9 | 43 | 26 | 5 | 3.14 | 0.96 |
| Grand mean of PITD | | | | | | 3.14 | 1.04 |

Source: Own Survey Result, 2019

Concerning to heat sensitive pharmaceuticals respondents asked whether or not transported with refrigerated truck 40% respondents agree,27.8%strongly agreeing ,15.6% neutral 12% disagree,3.3%strongly disagree with a mean value of 3.76.this result implies transportation of heat sensitive pharmaceuticals in the agency are transported in good condition. Which implies the organization practice action plan to provide heat sensitive pharmaceuticals transported in appropriate way which aligns with the findings in Thailand (2011) PATH, World Health Organization, The highest rates of freezing occurred during transport from provincial to district warehouses. Vaccine freezing occurred at all levels of the cold chain transportation in Ethiopia, especially from EPSA AA hub the district health centers. However, from open ended results because of shortage of cold chin vehicles (2) and unscheduled cold chin delivered heat sensitive pharmaceuticals delivered on unrefrigerated truck this cause quality defect.

When respondent asked about stock out are regular situation in essential medicine they respond as follow 35.6% replied that they are agreed that in the agency stock out were regular situation,32.2% neutral,14.4% strongly agree,12.2%disagree,5.6% strongly disagreed, and the mean value of 3.14. This results aliens with the study done in Kenya (Ministry of Medical Services and Ministry of Public Health & Sanitation 2009). These

findings indicate that there is interruptions in distribution of pharmaceuticals in health facility. The public sector supply chain and comparatively less in the FBHS supply chain. Also the result in the study in EPSA AA hub by JOHN SNOW, incorporated shows that high rate of stock out which is 19.3% which aliens this study. From the result in EPSA AA hub stock out o pharmaceutical was regular situation and a big gap in the agency which needs a strategy to overcome it.

With regard to the impact of the bad road network affect delivery of pharmaceuticals 33% agree, 25% strongly disagree that the bad road network has an impact delivery of pharmaceuticals ,27.8%neuteral,11.1% disagree,6.6% strongly disagree with a mean value of 3.51 this result indicates the bad road network has a big impact and cause Late delivery to health facilities.

To sum up, From the result quality indicator in the transportation and distribution system shows with grand mean of 3.47 which implies even if there are some problems in the agency pharmaceuticals which are heat sensitive are transported in well manner where us in stock out there was a high rate of stock out in the agency. And also bad network affects delivery of pharmaceuticals.

Concerning delivery of pharmaceuticals on time, which are ordered by health facility or not 22.2% disagree, 6.7% strongly disagree on time delivery that there were delays in delivery,32.2% agree,5.6% strongly agree that there are the delivery was on time delivery whereas 33.3% of respondents responds neutral. This result supported by mean value of 3.08. study done by John show, Incorporated(2019) shows in EPSA AA hub 58.8% which indicates pharmaceuticals are not reach to health facility on time. This results aliens with this study. Also from Respondents describe their opinion during open ended questioner because of different reasons such as shortage of cold chin vehicles, off-road, there is no accurate schedule time for distribution of pharmaceuticals to health facility, the agency has not delivered up on time.

When respondents asked pharmaceuticals which are delivered in the vehicle much during receiving period incorrect items and quantities 16.6% disagree, 3.3%strongly disagree,21.1%neutral,43.3%agree,while 15.5% strongly agree. With a mean value of

3.51.quationers distribute to respondents in open ended result shows that most of respondent clarifies there is a big problem that some of pharmaceuticals loss in pack, expire were not mach with the invoice, and also gram of pharmaceuticals may be changed.

From the result Time indicator in transportation and distribution grand mean of 3.29 shows there are a moderate practice in timely delivery and transportation of pharmaceuticals to HFs much with during receiving from the agency.

32.2% of respondents respond neutral and agree when they have asked whether the amount of vehicles and derivers are sufficient, 22.2% disagree, 6.7%strongly agree, 5.6% were strongly disagree. and mean value of 3.11.from the result majority of respondents were on neutral and agree, but respondents of disagree are not significant also in open ended questioner Majority of the deliverer and store manager did not believe the vehicles available to transportation of pharmaceuticals are enough because of vehicles stay longer time during maintenance and weak controlling mechanism (GPS) vehicles.

Regarding to transporting of the quality of pharmaceuticals were transported or not respondents respond 31%agree, neutral in28.9%, disagree in23.3 strongly agree in 11% while 5.6% were strongly disagree. The result shows that in the agency pharmaceuticals are transported in quality way. However in open ended questioners suggest some pharmaceuticals were damaged during transportation.

From the result of the above table about whether the hub were the capacity to fulfill HF demand accurately 37.8% disagree that the agency does not the capacity to fulfill the demand of HF unless absolute reform,27.8% neutral,16.7% agree and Strongly agree while 14.4% strongly disagree. From description part most of respondent because of quantification, forecasting, coordination, increasing of HF and high burden work it is difficult to fulfill HF demand.

Regarding to whether there is a procedure for placing an emergency order in EPSA AA hub majority of respondent respond agree, with 40%, 27.8% were neutral, 15.6% disagree, 10%strongly agree while 6.7% strongly disagree. This result shows similar result with the survey National Survey of the Integrated Pharmaceutical Logistics System (2015) that There are a procedure for emergency order in PFSA approximately half the facilities placed at least one emergency order in the three months preceding the survey; with a higher percentage of hospitals (68 percent) than health centers (43 percent) and health posts (38

percent).Most of the time emergency orders are requested for vital and HIV pharmaceuticals there should be procedure for it. According toUSAID (June 2013), Poor stock managements of facilities,) Out of stock from hospital. This indicates that there is problem during quantification.

As can be seen in table above respondents were asked whether EPSA AA branch willing to prompt corrective action for defective pharmaceuticals 38.9% were agree that the agency willing to prompt correction action, 32.2% neutral, 13.9%disagree, 8.9% strongly disagree, 5.6% strongly agree. And mean value of 3.16.in open ended questioner respondent describe that the agency not only willing to prompt corrective action but also support technically.

Arranging loading according to the distance of delivery sites, respondents responds 35.6% both neutral and agrees 16.6% strongly agree 6.7% disagree while 5.6% strongly disagree. Mean value of 3.51. Respondent gave in open ended question that Loading pharmaceuticals, according to distance where they are located decrease cost, time and prevent, damage of pharmaceuticals. Form the results the agency done a good job in arranging loading during delivery. This finding was contradicted with the finding of (Adimasu 2017) there is no system to load pharmaceuticals separately for separate health facilities.

Finally, respondents asked the time an order is received at storage until transported to health facility were appropriate majority of respondents responds neutral 47.9% 28.9%agree, 10%disagree, 7.8%strongle disagree,5.6%strongly agree with a mean value of 3.14 but Respondents also mentioned there are problems in wait a longer time to pick pharmaceuticals in storage, Technical problems in the cars.

Generally, the average mean and standard deviation of the respondents of the total item in inventory management activity represents 3.143 and 1.04 respectively thus it shows that most of the respondents neither agree nor disagree in productivity indicators of transportation and distribution system. This implies the agency needs to commit in order to improve this area.

### 4.3.4 Effective pharmaceutical distribution

Table 4.12 effective pharmaceutical distribution

| Indicators of effective pharmaceutical distribution | sd | d | n | a | sa | mean | S.d |
|---|---|---|---|---|---|---|---|
| Consistence pharmaceutical distribution are delivered to health facility. | 13 | 34 | 25 | 15 | 3 | 2.57 | 1.039 |
| EPSA AA hub minimize expiration of drug | 13 | 32 | 27 | 14 | 4 | 2.6 | 1.058 |
| EPSA AA is used accurate information for decision making | 4 | 21 | 22 | 31 | 12 | 3.29 | 1.104 |
| EPSA AA is supplying medicine with its original quality throughout the distribution process | 5 | 21 | 26 | 28 | 10 | 3.19 | 1.09 |
| Grand mean of EPD | | | | | | 2.91 | 1.072 |

Source: Own Survey Result, 2019

On the table above respondents asked whether EPSA AA hub delivered consistence of pharmaceuticals or not 37.8% disagree that EPSA AA hub does not deliver pharmaceuticals to health facility, 27.8% neutral, 16.7% agree that the agency deliver pharmaceuticals in consistency, 14.4% respondent strongly disagree that pharmaceuticals are not delivered the demand of pharmaceuticals to health facility in consistency. With mean value of 2.57 and standard division of 1.039 from this result the agency does not delivered pharmaceuticals in an uninterrupted way. in addition, this result aligns to open ended question respondent suggest that because of different reasons like increasing demand from health facility, high work burden does not deliver pharmaceuticals consistently.

Concerning to whether the agency minimizing expiration of pharmaceuticals or not 35.6% of respondent disagree that minimizing expiration of pharmaceuticals are done in EPSA, 30%neutral, 15.6% agree in minimization of expiry drugs were done in the agency, 14.4% disagree that there is no any minimization of expiry drug practice in the agency, while 4.4%

strongly agree there is good work in EPSA AA hub to minimize expiry. This result also supported by mean value of 2.6which implies that the branch did not work well to minimize expiration of pharmaceuticals.

Regarding to use accurate information for decision making 34.4% agree EPSA AA hub uses accurate information to make a decision, 24.4% neutral on it, while 23.3 disagree that the agency does not use accurate information, 13.3%srongly agree and 4.4% strongly disagree use of accurate information. Mean value of 3.29.This result implies that the agency has great job in using of accurate information for decision making. This result contradicted study done by (gulilat 2018) that the information management practices of PFSA is very poor.

Finally the respondent asked about whether the agency supply pharmaceuticals with its quality 23.3% disagree that the agency has problems distributing pharmaceuticals with originally, 28% of them were neutral, 31.1% agree the agency distributing pharmaceuticals in the quality of the original, while 11.1 strongly agree, 5.6% strongly disagree. With mean value of 3.19 and standard division of 0.1095.this result indicates that pharmaceutical products are reach to health facility with in good condition.

Generally the grand mean of effectiveness of organizational performance is 2.9111.from this every one can understand that EPSA AA hub needs to improvement in overall performance of effective distribution.

### 4.4. Inferential Analysis

In this study, a multiple regression analysis was conducted to establish relationship between the variables and the dependent variable. Coefficient of determination explains the extent to which changes in the dependent variable can be explained by the change in the independent variables or the percentage of variation in the dependent variable.

#### 4.4.1 Correlation Analyses

Correlations are the measure of the linear relationship between two variables. A correlation coefficient has a value ranging from -1 to 1. Values that are closer to the absolute value of 1 indicate that there is a strong relationship between the variables being correlated whereas values closer to 0 indicates that there is little or no linear relationship. As described by

(Pallant 2005), the correlation is a commonly used measure of the size of an effect: values of ± 0.1represent a small effect, ± 0.3 is a medium effect and ± 0.5 is a large effect. In this section, correlation analysis conducted in the light of each research objective developed.

Table 4.13 Correlation Analyses

Table 4' Correlation Matrix

| | | CSCP | QDS | TDS | PDS | QDO | TDO | PDO | TDT | PDT | QDT | ED |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QDS | Pearson Correlation | .666** | 1 | | | | | | | | | |
| | Sig. (2-tailed) | 0 | | | | | | | | | | |
| TDS | Pearson Correlation | .314** | 0.143 | 1 | | | | | | | | |
| | Sig. (2-tailed) | 0.003 | 0.179 | | | | | | | | | |
| | N | | | | | | | | | | | |
| PDS | Pearson Correlation | .406** | .479** | .255* | 1 | | | | | | | |
| | Sig. (2-tailed) | 0 | 0 | 0.015 | | | | | | | | |
| QDO | Pearson Correlation | .218* | .236* | .274** | .212* | 1 | | | | | | |
| | Sig. (2-tailed) | 0.039 | 0.025 | 0.009 | 0.045 | | | | | | | |
| TDO | Pearson Correlation | .356** | .384** | .250* | .485** | .492** | 1 | | | | | |
| | Sig. (2-tailed) | 0.001 | 0 | 0.017 | 0 | 0 | | | | | | |
| PDO | Pearson Correlation | .350** | .333** | .382** | 0.145 | .274** | .343** | 1 | | | | |
| | Sig. (2-tailed) | 0.001 | 0.001 | 0 | 0.171 | 0.009 | 0.001 | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TDT | Pearson Correlation | 0.202 | 0.199 | .288** | .360** | .312** | .384** | .253* | 1 | | | |
| | Sig. (2-tailed) | 0.057 | 0.061 | 0.006 | 0 | 0.003 | 0 | 0.016 | | | | |
| PDT | Pearson Correlation | .569** | .417** | .342** | .522** | .436** | .561** | .481** | .540** | 1 | | |
| | Sig. (2-tailed) | 0 | 0 | 0.001 | 0 | 0 | 0 | 0 | 0 | | | |
| QDT | Pearson Correlation | 0.033 | 0.079 | 0.014 | 0.147 | 0.078 | 0.078 | 0.132 | .238* | 0.187 | 1 | |
| | Sig. (2-tailed) | 0.756 | 0.46 | 0.898 | 0.166 | 0.466 | 0.463 | 0.215 | 0.02 | 0.078 | | |
| ED | Pearson Correlation | .425** | .399** | .335** | .530** | .577** | .674** | .550** | .431** | .757** | 0.1 | 1 |
| | Sig. (2-tailed) | 0 | 0 | 0.001 | 0 | 0 | 0 | 0 | 0 | 0 | 0.33 | |
| **. Correlation is significant at the 0.01 level (2-tailed). | | | | | | | | | | | | |
| *. Correlation is significant at the 0.05 level (2-tailed). | | | | | | | | | | | | |

Source: Own Survey Result, 2019

As it can be shown in the above correlation matrix, there is a positive and significant correlation between quality indicator of Storage and inventory control practice with effective distribution of pharmaceuticals. In other words quality indicator of Storage and inventory control practice with effective distribution of pharmaceuticals have relationship(r=0.399). The relationship indicates that as EPSA AA hub improvement in quality of Storage and inventory control practice the effectiveness of pharmaceutical distribution increases. That is increasing storage space, put-away pharmaceuticals in accuracy, store pharmaceuticals in appropriate temperature, monitor security, use FEFO procedure and fulfill the need of health facility to prevent stock out.

The correlation matrix in the above table indicates that Time indicator of Storage and inventory control practice is a moderate and positive correlation with effective distribution

of pharmaceuticals. (0.335).and also increasing performance in time Storage and inventory control practice that is decreasing receiving of pharmaceuticals from warehouse and increasing loading process can increase overall distribution process.

The coefficient of the above correlation analysis (0.530) shows that there is a strong and positive relation between productivity indicators of Storage and inventory control practice is strong and positive correlation relation to effective distribution of pharmaceuticals.

Also coefficient of the above correlation analysis (0.577) shows that there is strong positive correlation between quality indicator of Order fulfillment, communication and customer service management with effective distribution performance.

The Pearson correlation value of time indicator of The Pearson correlation value for is 0.674.The result shows that there is strong and positive relation between time indicator of Order fulfillment, communication and customer service management with effective distribution performance.

The Pearson correlation value for productivity of Order fulfillment, communication and customer service management with effective distribution performance is 0.550. The result shows that there is a strong and positive relation between Pearson correlation value for productivity of Order fulfillment, communication and customer service management with effective distribution performance.

The Pearson correlation value for quality indicator for Transport and distribution system with effective distribution performance is 0.431. The result shows that there is a moderate and positive relation between quality indicator or transportation and effective distribution performance.

The Pearson correlation value for time indicator for Transport and distribution system with effective distribution performance is 0.431. The result shows that there is a moderate and positive relation between time indicator for transportation and effective distribution performance.

Time indicator for Transport and distribution system shows weak positive relation with effective distribution performance with a correlation coefficient of 0.104.

Finally The Pearson correlation value for the productivity indicator for Transport and distribution system with effective distribution performance is 0.751.this results shows that there is strong and positive relation between productivity indicator for Transport and distribution system with effective distribution performance.

Therefore, the finding of the correlation analysis shows that the independent variables(productivity indicator of storage and inventory, quality indicator of order fulfillment, time indicator of order fulfillment, productivity indicator of order fulfillment and productivity indicator of transportation) are strong and positive related with the dependent variables of effectiveness of distribution, where us other dependent variable(quality indicator for storage and inventory, time indicator for storage and inventory, time indicator for transportation) are moderate and positive related with dependent variable of effectiveness of distribution.

### 4.4.2 Regression Analysis

Regression is a statistical measurement used in finance, investing and other disciplines that attempts to determine the strength of the relationship between one dependent variable (usually denoted by Y) and a series of other changing variables (known as independent variables) brian beers 2019.Regression analysis Used to understand which among the independent variables are related to the dependent variables and to explore the forms these relationship.

**Regression assumption**

The following Different assumption test will be used to run regression analysis

1 **Normality Test**

Normality refers to the distribution of the data for a particular variable. The normality test also indicates that all the variables are normally distributed meaning that of the variables is neither positively nor negatively skewed.

Skewness and kurtosis are statistical tools which can enable to check if the data is normally distributed or not. The skewness and kurtosis test results of the data is within the acceptable range (- 1.0 to +1.0) and it can be concluded that the data is normally distributed. So the result of kurtosis skewness exist between -1.0 to +1.0 which acceptable and error term for each variable constant. Since the p-value for this is >0.05, we can safely conclude that our data is normally distributed.

skewness tells you the amount and direction of skew (departure from horizontal symmetry), and kurtosis tells you how tall and sharp the central peak is, relative to a standard bell curve(2008–2011 by Stan Brown).

Table 4.14 Normality Test

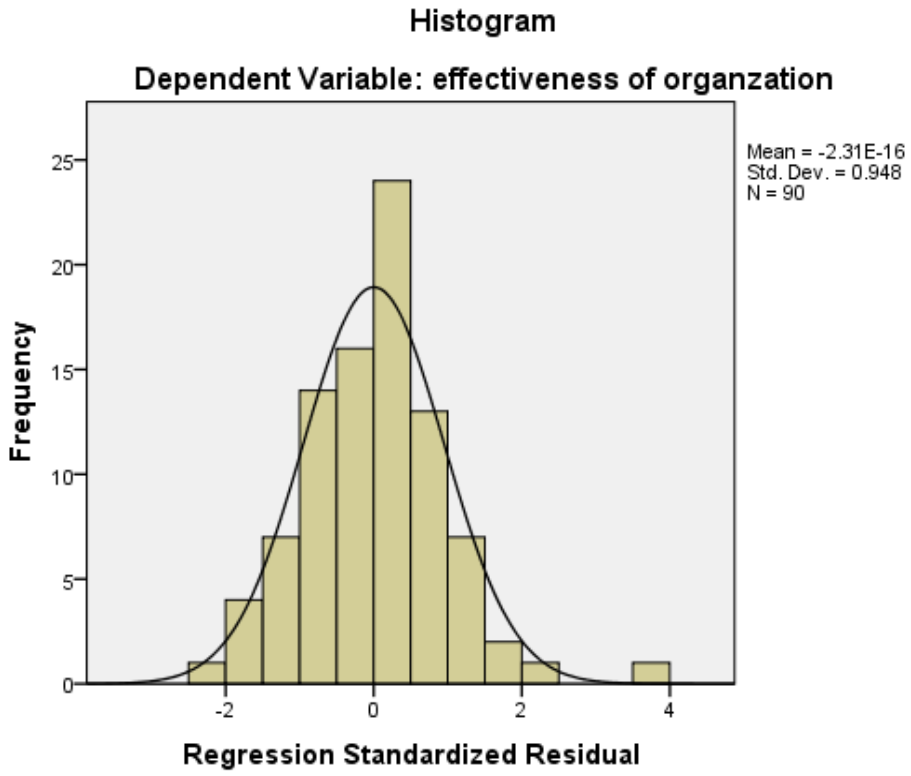
| **Descriptive Statistics** N =90 | | | | |
|---|---|---|---|---|
| | Skewness | | Kurtosis | |
| | Statistic | Std. Error | Statistic | Std. Error |
| **Quality indicator for storage** | -0.592 | 0.254 | 0.748 | 0.503 |
| **time indicator for storage** | 0.007 | 0.254 | 0.148 | 0.503 |
| **productivity indicator for storage** | 0.003 | 0.254 | -0.192 | 0.503 |
| **quality indicator for order** | -0.419 | 0.254 | 0.334 | 0.503 |
| **time indicator for order** | -0.103 | 0.254 | -0.671 | 0.503 |
| **productivity indicator for order** | -0.775 | 0.254 | 0.502 | 0.503 |
| **time indicator for transportation** | -0.465 | 0.254 | -0.296 | 0.503 |
| **productivity indicator for transportation** | -0.295 | 0.254 | 0.184 | 0.503 |
| **quality indicator for transportation** | -1.082 | 0.254 | 1.005 | 0.503 |
| **effectiveness of organization** | -0.031 | 0.254 | -0.582 | 0.503 |

Source: Own Survey Result, 2019

From the above table skewness and kurtosis are between -1 and +1. There for the distribution is normal.

### 4.3.1.4 Normality

Figure 4.1: Normality Distribution Histogram

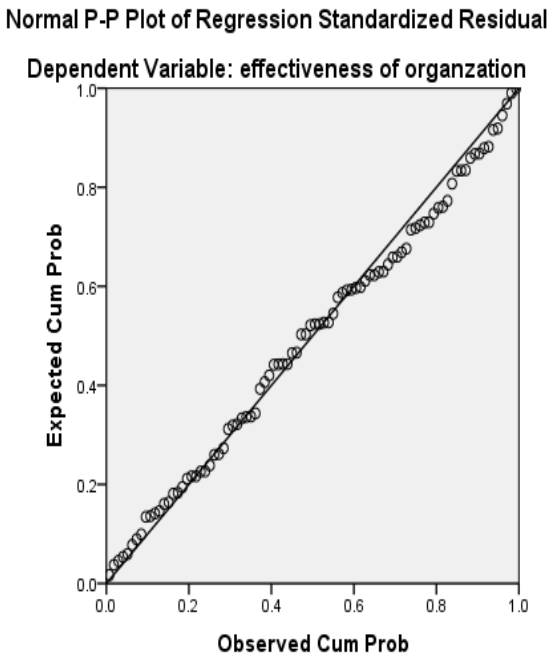



In order to run OLS the residuals must be normally distributed; therefore in order to test the normality assumption histogram and normal distribution curve was used; and as shown below the residuals are normally distributed.

## 2 Linearity Assumptions

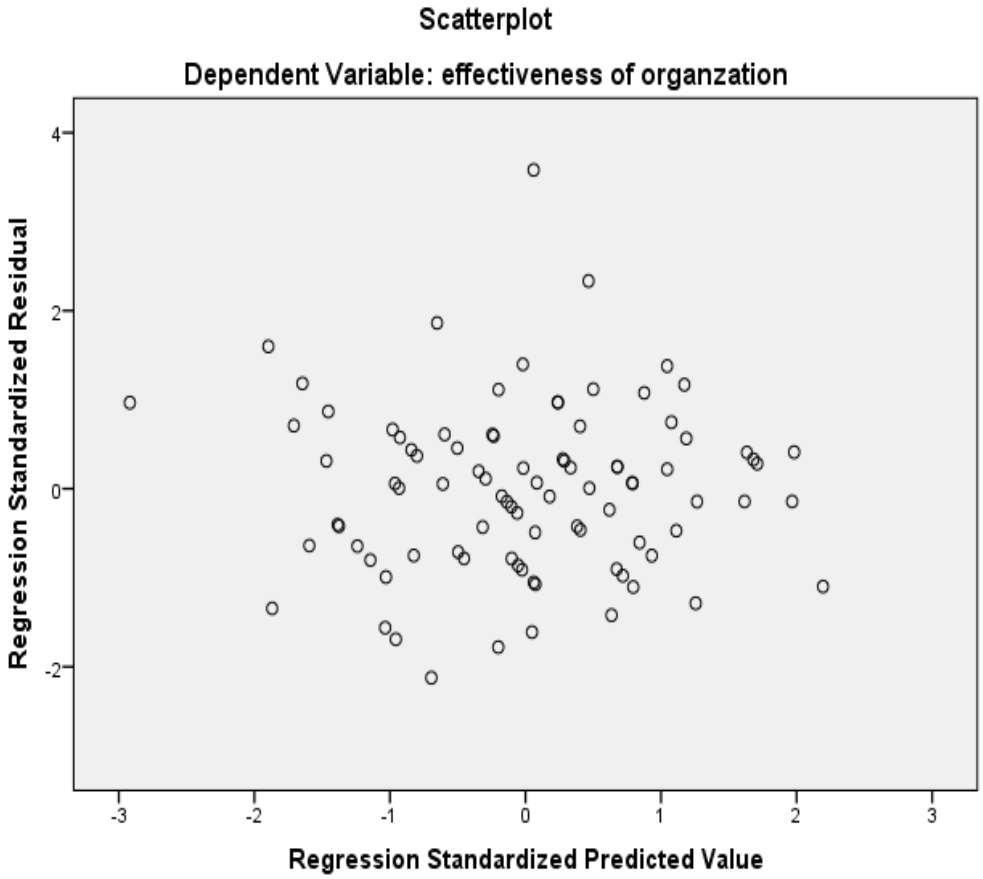
Linearity Assumption states that the residuals should be linear relationship with the predicted dependent variables scores. Linear relationships between independent variables and dependent variables.

Figure 4.2: Normality Distribution P-P Plot




The assumption of linearity says the dependent and each independent variable should have a linear relationship. Therefore, scatter plot technique was employed to test the linearity assumption.

Figure 4.3 Homoscedasticity Multiple Regression Assumption




### 3 Multicollinearity

Collinearity, or multicollinearity, is the existence of near-linear relationships among the set of independent variables.

The table 4.8correlation coefficient below describes that both the tolerance and variance inflation factor (VIF) are greater than 10%, and below 10 respectively. Tolerance measures the influence of one independent variable on all other independent variables. With T < 0.1 there might be multicollinearity in the data and with T < 0.0

The VIFs of the linear regression indicate the degree that the variances in the regression estimates are increased due to multicollinearity. VIF values higher than 10 indicate that

multicollinearity is a problem. So that VIF must be between1-10. The Variance inflation factor (VIF) and tolerance statistic can tell you whether or not a given explanatory variable has a strong relationship with the other explanatory variables.

Table 4.14multicollinearity test

| Model | | Collinearity Statistics | |
|---|---|---|---|
| | | Tolerance | VIF |
| **1** | Quality indicator for storage | 0.675 | 1.482 |
| | Time indicator for storage | 0.763 | 1.311 |
| | Productivity indicator for storage | 0.545 | 1.836 |
| | Quality indicator for order | 0.691 | 1.448 |
| | Time indicator for order | 0.539 | 1.856 |
| | Productivity indicator for order | 0.636 | 1.573 |
| | Time indicator for transportation | 0.656 | 1.525 |
| | Productivity indicator for transportation | 0.423 | 2.365 |
| | Quality indicator for transportation | 0.918 | 1.089 |
| **a. Dependent Variable: effectiveness of organization** | | | |

Source: Own survey result, 2019

From the table above the final result indicates that tolerance is more than 0.10 in all indicators of QIS, TIS, PIS, QIO, TIO, PIO, QIT, TIT, and PIT are 0.65,0.763,0.545,0.691,0.539,0.636,0.656,0.423 and 0.918 Respectively. Also the VIP results shows 1.482,1.311,1.836,1.448,1.856,1.573,1.525,2.365,and 1.089 respectively. Therefore the requirement for the model is achieved. There for multicollinearity is not a problem. The result shows that VIF is less than 3 and the tolerance also more than 0.10 in all cases.

**Model summary**

Significance and percentage of variation in effectiveness of distribution of pharmaceuticals are generally summarized in model summary

**Table 4.17 Model Summaryb**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | | Durbin-Watson |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change | |
| 1 | .867[a] | 0.752 | 0.724 | 0.432 | 0.752 | 26.914 | 9 | 80 | 0 | 1.609 |

a. Predictors: (Constant), quality indicator for transportation, time indicator for storage, Quality indicator for storage, quality indicator for order , time indicator for transportation, productivity indicator for order, productivity indicator for storage, time indicator for order, productivity indicator for transportation
b. Dependent Variable: effectiveness of organization
Source: Own survey result, 2019

The "**R**" column represents the value of *R*, the ***multiple correlation coefficients***. *R* can be considered to be one measure of the quality of the prediction of the dependent variable. R is the square root of R-Squared and is the correlation between the observed and predicted values of the dependent variable.

R-squared ($R^2$) is a statistical measure that represents the proportion of the variance for a dependent variable that's explained by an independent variable or variables in a regression model. A value of R2 near zero indicates a complete lack of fit between Y and the Xs, while a value near one indicates a perfect fit.

The Durbin Watson (DW) statistic is a test for autocorrelation in the residuals from a statistical regression analysis. The Value of 2.0 implies that there is no autocorrelation detected in the sample. Values from 0 to less than 2 indicate positive autocorrelation and values from 2 to 4 indicate negative autocorrelation(will Kenton 2019).

As indicated in the table the value of dourbin-watson is 1.609 which is approaching to 2 there for the results are no autocorrelation problem with residuals.

R of 0.867 in multiple correlations shows the combined correlation of all the independent variables. Therefore; from this result, it can be interpreted as there is a strong correlation between the observed effectiveness of distribution organizational performance and predicted performance of the organization. In addition, 72% adjusted R2 implies the variation in effectiveness of pharmaceuticals can be explained in all (9) independent variables. The finding shows that, the independent variables (quality indicator in transportation, time indicator in storage, Quality indicator in storage, quality indicator in order, time indicator for transportation, productivity indicator in order, productivity indicator for storage, time indicator for order, productivity indicator in transportation) that were studied, explain 75.2% the effectiveness of organization distribution. Therefore, this indicator has a big role for effectiveness of distribution.

Table4.18

ANOVAa

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 45.133 | 9 | 5.015 | 26.914 | .000[b] |
| | Residual | 14.906 | 80 | 0.186 | | |
| | Total | 60.039 | 89 | | | |

a. Dependent Variable: effectiveness of organization

b. Predictors: (Constant), quality indicator for transportation, time indicator for storage, Quality indicator for storage, quality indicator for order, time indicator for transportation, productivity

Indicator for order, productivity indicator for storage, time indicator for order, productivity indicator for transportation.

Source: own survey, 2019

It is a statistical method used to test the differences between two or more means. It is used to test general differences rather than specific differences among means. It assesses the significance of one or more factors, by comparing the response variable means at different factor levels. The F value is used in the analysis of variance (ANOVA). It is calculated by dividing two mean squares. This calculation determines the ratio of explained variance to unexplained variance.

In the above table F value are 26.914 which are greater than 5 this result indicates that the independent variable are significantly much with dependent variables.

**Regression coefficients**

The regression coefficients are the least squares estimates of the parameters. The value indicates how much change in Y occurs in a one-unit change in that particular X when the remaining X's are held constant.

Table 4.19 regression coefficients

| Coefficients[a] | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model** | | Unstandardized Coefficients | | Standardized Coefficients | T | Sig. | 95.0% Confidence Interval for B | | Correlations | | | Collinearity Statistics | |
| | | B | Std. Error | Beta | | | Lower Bound | Upper Bound | Zero-order | Partial | Part | Tolerance | VIF |
| **1** | (Constant) | -.576 | .308 | | -1.870 | .065 | -1.190 | .037 | | | | | |
| | Quality indicator for storage | -.060 | .069 | -.058 | -.862 | .391 | -.197 | .078 | .399 | -.096 | -.048 | .675 | 1.482 |
| | time indicator for storage | -.041 | .063 | -.041 | -.641 | .523 | -.167 | .085 | .335 | -.072 | -.036 | .763 | 1.311 |
| | productivity indicator for storage | .181 | .067 | .203 | 2.692 | .009 | .047 | .316 | .530 | .288 | .150 | .545 | 1.836 |
| | quality indicator for order | .222 | .063 | .237 | 3.530 | .001 | .097 | .346 | .577 | .367 | .197 | .691 | 1.448 |
| | time indicator for order | .212 | .076 | .211 | 2.784 | .007 | .061 | .364 | .674 | .297 | .155 | .539 | 1.856 |
| | productivity indicato | .230 | .063 | .254 | 3.639 | .000 | .104 | .356 | .550 | .377 | .203 | .636 | 1.573 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | r for order | | | | | | | | | | | |
| | time indicator for transportation | -.021 | .060 | -.024 | -.348 | .728 | -.141 | .099 | .431 | -.039 | -.019 | .656 | 1.525 |
| | productivity indicator for transportation | .427 | .100 | .368 | 4.292 | .000 | .229 | .625 | .757 | .433 | .239 | .423 | 2.365 |
| | quality indicator for transportation | -.048 | .053 | -.053 | -.905 | .368 | -.154 | .058 | .104 | -.101 | -.050 | .918 | 1.089 |

a. Dependent Variable: effectiveness of organization

Source: Own survey result, 2019

Regression measures the effect of changes in the independent variable on the dependent variable.

The standardize beta value shows the number of standard deviations that the outcome will change as a result of one standard deviation change in the predictor.

The dependent variable has been determined more as the value of beta coefficient larger in an independent variable

From the results of the above equation, the regression equation is:

Y=-576+-0.058.x1+(-)0.041x2+0.203x3+0.237x4+0.211x5+0.254x6+(-)0.24x7+0.368x8+(-)0.253x9

Where y=effectiveness of pharmaceuticals distribution

X1=productivity indicators of storage

X2=quality indicator of order fulfillment

X3=time indicator of order fulfillment

X4=productivity indicator of order fulfillment

X5=productivity indicator of transportation

From regression model, above table indicates that beta coefficient for the independent variables and the significance of the explanatory variables in relation to the explained variable. The results indicate that the standardize beta value of productivity indicator of transportation practice 0.368 this implies that, this variable has a relatively strong degree of importance for analyzing the effect of effectiveness of the organization distribution. With p value of 0.000.the standardized beta value for productivity indicator of storage and inventory control practice, quality indicator of order fulfillment, time indicator of order fulfillment, productivity indicator of order fulfillment are 0.2.3,0.237,0.211and 0.254 respectively. The p value of them are 0.09 0.001, 0.07, 0.000 respectively. In contrast, in quality indicator for storage, time indicator for storage, time indicator for transportation, quality indicator for transportation the standard beta value of -0.058,-0.041,-0.024and -0.053 which couldn't make statistically significant that is 0.391,0.523,0.728,0.368 respectively. From the regression equation established, taking all factors (quality, time, productivity of storage, order fulfillment and transportation) constant at zero, the framework agreement factors at EPSA AA would be -0.576.

Even though the result of Regression indicate the above indicators was weak impact on effectiveness of pharmaceutical distribution in descriptive analysis they are a big impact in effectiveness of distribution with grand mean value of quality indicator for storage and inventory is 3.28 and average standard division 1.181,time indicator for storage and inventory 2.955 and average standard division0.919, in addition quality indicator for transportation and distribution management 3.47 grand mean , and grand standard division 1.09. And also time indicator for transportation and distribution management 3.29 grand mean and 1.03 average standard division. When come to correlation Analyses the result shows that there is a positive relationship with the effectiveness of the organization with .399**, .000 for quality indicator for storage with effectiveness, .335**, 001 with time indicator for storage and inventory. And also .431**,.000, for time indicator for

transportation and distribution management with effectiveness of distribution and 0.104,0.331 for quality indicator for transportation and distribution management with effectiveness of distribution. There for from this indicator which has not impacted in regression does not indicate there is not an impact rather they are a big impact in distribution effectiveness.

If all the other variables are kept constant, a unit increase in PDS there is an increase of 0.203 in effectiveness of organization at EPSA AA hub. A unit increase in QDO will lead to a 0.237 increases in effectiveness of organization distribution at EPSA AA hub; a unit increase in TDO will lead to a 0.211 effectiveness organization distribution at EPSA AA hub, A unit increase in PDO will lead to a 0. 254 increase in effectiveness of organization distribution at EPSA AA hub; while a unit increase in PDT will lead to a 0.368 increase in effectiveness organization distribution at EPSA AA hub.

## 4.9 Summary of the findings

| | | Grand mean | Standard division |
|---|---|---|---|
| | Grand mean of QIDI | 3.2833 | 1.181 |
| | Grand mean of TISI | 2.955 | 0.919 |
| | Grand mean of PISI | 3.226 | 1.142 |
| | Grand mean of QIOCC | 3.296 | 1.56 |
| | Grand mean of TIOCC | 3.045 | 1.051 |
| | Grand mean of PIOCC | 3.21 | 1.10 |
| | Grand mean of QITD | 3.47 | 1.09 |
| | Grand mean of TITD | 3.29 | 1.03 |
| | Grand mean of PITD | 3.14 | 1.04 |
| | Grand mean of EPD | 2.91 | 1.072 |

Generally from the result of the study of descriptive statistics of Storage and inventory control practice as we see in the table above majority of indicators practiced in EPSA Addis Ababa hub distribution practice where in moderate way. Therefore from the result the agency needs to improvement in overall performance of effective distribution.

From the result of a regression model productivity indicator for storage and inventory control practice, quality indicator for order fulfillment, time indicator for order fulfillment,

productivity indicator for order fulfillment, productivity indicator for transportation practice were there are a positive relationship with effectiveness of pharmaceutical distribution, therefore there are a big impact in distribution effectiveness. Whereas Quality indicator for storage, time indicator for storage, time indicator for transportation, quality indicator for transportation weak impact in effectiveness of pharmaceutical distribution.

# CHAPTER FIVE

# 5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This final chapter contains the study summary and conclusion with regards to the effectiveness of pharmaceutical distribution in EPSA AA branch. The chapter looks at the study summary and presented the conclusion of the study based on the results of the analysis. The study's evident limitations of the study and its recommendations are also presented.

## 5.1 Summary of the study

Based on the analysis and interpretation of data in chapter 4 of this research work, the following findings were made:

### 5.1.1 Storage and inventory control practice

The first objective was to establish the factors related to storage and inventory control practice on effectiveness of the distribution in organization. The grand mean value of 3.15 and standard deviation of 1.07. The majority of the respondents believe from the moderate in indicators of questioners. Quality indicators in storage space implies the respondent agreed that current storage space is sufficient, put-away accuracy in the warehouse were agree in the respondent, in addition, respondent agree pharmaceuticals are stored in appropriate temperature, regarding to controlling mechanism the respondents result implies there are tools to control all activities.

When we come to time indicators the result of the respondent Indicates neutral in both receiving pharmaceuticals from the store and time taken to unload from truck this result shows the respondent are whether they are not enough knowledge or information on receiving pharmaceutical from store and time taken to unload from truck.

In regarding to productivity indicators of proper dispatching have done the result shows us 33.3% agree that good dispatching practice were done. However, respondent's responds

36.6% neutral when asked about the name, batch and expiry date are clearly indicated. And most of respondent responded neither agree nor disagree about stock renewal was done in the agency.

From Spearman‟s correlation coefficient, quality and time indicators of storage and inventory are moderate and positive correlation with effective distribution of pharmaceuticals with r =(r=0.399)and (0.335) respectively, where as productivity indicators of Storage and inventory control practice is strong and positive correlation relation with effective distribution of pharmaceuticals.(0.530).

From the regression model, a unit increase in productivity of storage and inventory practice, there is an increase of 0.181 in effectiveness of pharmaceutical distribution in EPSA AA hub. The results as shown productivity of storage and inventory practice that is one of the determinant of EPSA AA hub performance.

### 5.1.2 Order fulfillment, communication, customer service management

This result shows that the grand mean value of 3.18 and standard deviation of 1.23 in all indicators that is quality, time and productivity of Order fulfillment, communication, customer service management in effectiveness of pharmaceutical distribution. Regarding to communication the agency with health facility and other hub respondent agree there are good communication practice. Similarly, the result show there are communication between an officer, store manager and customer. Majority of results shows agree in orders are filled on time, health facility report RRF on time. However the result on the agency report slow and fast products on time and quantity ordered were in real consumption analysis was neither agree nor disagree.

From Spearman‟s correlation coefficient, there is strong a positive correlation and significantly related between quality, time and productivity indicator of Order fulfillment, communication and customer service management with effective distribution performance correlation coefficient of r =(0.577), 0.674 and 0.550 respectively.

From the regression model, a unit increase in quality, time, productivity of Order fulfillment, communication, customer service management there is an increase of 0.222,

0.212, and 0.230 respectively in effectiveness of pharmaceutical distribution in EPSA AA hub. The results as shown quality, time, and productivity of Order fulfillment, communication, and customer service management that is one of determinant of EPSA AA hub performance.

### 5.1.3 Transportation and distribution system

Concerning transportation and distribution system the results shows pharmaceutical which are heat sensitive are transported by a refrigerator truck majority of results were agreed. From the result obtained stock out of essential pharmaceuticals is regular situation 35.6% agree that stock out were regular situation. Regarding to whether the vehicle use to transport pharmaceuticals sufficient the result shows neutral and agree. The result show that respondent agreed in that the agency were willing to prompt corrective action for defective pharmaceuticals. The average amounts of time from an order to receiving at storage were appropriate responds neutral.

From Spearman"s correlation coefficient, there is moderate and positive correlation and significantly related between quality, time and productivity indicator of for Transport and distribution system with effective distribution performance correlation coefficient of rs0.431, 0.431, and 0.431 respectively.

From the regression model, a unit increase in quality, time, productivity of Transportation and distribution system there is an increase of 0.368 in effectiveness of pharmaceutical distribution in EPSA AA hub. The results as shown quality, time, productivity of Transportation and distribution system.

### 5.1.4 Effectiveness of pharmaceutical distribution

In effectiveness of pharmaceuticals 37.8 were disagreed in consistency of pharmaceuticals were delivered, concerning to minimization of expiry pharmaceuticals the result shows35.% disagree that there is poor practice to minimize expiry of pharmaceuticals.34.4% agree that the agency uses accurate information for decision making. Finality 28.8% of respondent's response neither agree nor disagree in pharmaceuticals is transported in its original quality.

## 5.2 Conclusions

This study aimed to provide up to date information on the distribution of pharmaceutical to health facility in EPSA AA hub and the achievement of expected outcomes. From the findings of this study, it can be concluded that: the effectiveness of pharmaceutical distribution in terms of quality, safety and time by Storage and inventory control practice, Order fulfillment, communication, customer service management, Transportation and distribution system with both the mean and correlation test indicating a great impact in a positive and negative relationship.

The study found A very positive finding is that EPSA AA hub that there were good practice enough storage space, pharmaceuticals store in appropriate temperature, pharmaceuticals are secured from theft , HIV drugs are enough stock in HC, short time to prepare picking, good dispatching process, expiry and batch number are labeled in repacking, renewal of pharmaceuticals are done on time, good communication, on time receiving, affordable price pharmaceuticals, cold chin pharmaceuticals are transported with in appropriate truck, the agency are willing to correct for defective pharmaceuticals, pharmaceuticals are loading according to delivery sites, the overall time starting to movement of un order until transported are appropriate.

On the other hand, based on the result, it can be concluded that, pharmaceuticals are not put-away accuracy, FEFO practice most of the time are not applied, time to receive pharmaceuticals in warehouse are not appropriate, poor quality and late arrival of RRF from health facility, fast moving and slow moving items are not identified and reported periodically, In the agency there is not developed tool to check customer satisfaction, in the agency stock out are regular, there are shortage of cold chin trucks, the rate of consumption was not closely monitored which lead to stock outs due to delays in placing an order, due to high burden of work and increasing need of pharmaceuticals from health facility unless the agency develop a strategy does not the capacity to fulfill need of health facility. Inconsistency in supply of pharmaceuticals was widely experienced culminating from bureaucratic procurement procedures. s. Lack of well trained quantification and forecasting professional pharmaceuticals are stock out at health facility. Pharmaceutical stock outs in health facilities point to weaknesses in the distribution system, and low overall performance

of the supply chain. Any stock out of key medicines is a serious occurrence, since patients would fail to obtain the medicine when needed. the more severe stock outs in public health facilities represent inadequacies in the current system for medicines distribution and replenishment. And also LMIS is weak at all.

The study concludes that effectiveness of pharmaceutical distribution in EPSA AA branch positively affected by storage and inventory control practice, order fulfillment, communication, customer service management, transport and distribution system.

And in the agency there are low level of maintenance vehicles, when vehicles enter to maintenance they took more than one month minimum, the longer time require for maintenance, costs the organization more in terms of effectiveness of pharmaceuticals distribution providing insufficient service for health facility which leads stock out.

### 5.3 Recommendation

The finding of distribution of pharmaceutical effectiveness that need to be implemented to improve access to pharmaceuticals and their appropriate use. The following are the key recommendations addressed to EPSA AA hub health facility.

To Increase the distribution of pharmaceuticals in consistency and customer satisfaction regarding quality, time and safety in branch Stock should be checked and balanced from HMIS regularly to prevent unnecessary voiding of invoice which leads most of time customer dissatisfaction and also Expiry and damaged pharmaceuticals should dispose on time with appropriate procedure the hub should have any standard tool to check level of customer satisfaction to take corrective action based on the results from the tool. In addition, EPSA Staff and customers should train standard operation procedure which helps handling of pharmaceuticals, reception of pharmaceuticals, how to load pharmaceuticals to vehicles ,cold chin management, how to deliver and transport pharmaceuticals, west disposal and expiry drug and so on.

Utilization of an efficient, customized electronic drug inventory management system instead of cumbersome annual paper-based system. Computerization of all processes with guaranteed services will ensure inventory control and tracking and tracing of drug

movements from the EPSA head office to the EPSA AA hub and to health facility warehouses until it reaches the health facilities and ultimately to the patients. And also revising the store management practices with a scientific stringent standardized approach and set schedule when pharmaceuticals should received from head office in order to decrease work burden.

Stock inventory should be checked regularly, at least for quantity, overall condition and retesting or expiration dates. Any discrepancies should be investigated. In order to avoid stock out and depletion of drugs enforces heath center to establish drug committee to initiate quantification and selection of drug requirement based on real time necessities and continuous monitoring on the drug usage.

Coordination is one type of distribution of pharmaceuticals that affects the performance of EPSA AA hub. Therefore, EPSA AA hub should Coordinating the actions of various departments involved in the drug selection, quantification, procurement and distribution of pharmaceutical products and the health facilities. This will provide better visibility and control in the system which will help in tracking the products and tracing the real evidence based requirements of the of the public.

The transport systems for EPSA AA hub needs to be improved in order to reduce risks of damage and to minimize over all time. Therefore, EPSA AA hub should consider adding technology, such as global positioning system (GPS) electronic tracking devices, which would enhance monitoring of driver and the security of pharmaceutical products while in the vehicle. And Schedule vehicles during delivery of pharmaceuticals to health facility and apply clear transportation system, preparing right truck, with enough quantity. To address efficiency and on time delivery of transportation the EPSA AA hub needs to plan all its functions and sub-functions into the system of goods movement in order to minimize cost as a result maximize service delivery. And also In order to minimize cost and time monthly vaccine delivery vs bimonthly health program commodities delivered to health facility should rearranged.

Even if EPSA AA hub relatively practiced to distribute pharmaceuticals there are factors affecting distribution of pharmaceuticals effectively. Thus, EPSA AA hub need to improve on IT and HCMIS advancement in new technology in order to distribute pharmaceuticals effectively, to be effective, LIMS should be equipped with adequate trained staff, forms, equipments, and facilities. In addition long and bureaucratic EPSA AA distribution pharmaceuticals procedures which cause delay in receiving pharmaceuticals should be abolished. Moreover, In EPSA The transition from a push system to a pull system for pharmaceutical products in full supply operation of both systems simultaneously, and transition from rationed supply to full supply is still one of the problems. These are enormous technical and operational challenges, which will require continued training and reinforcement.

## 5.4 Suggestion for Further Study

The study geographical scope particularly focused on health facility found in aids Ababa therefore further research should be carried out participation of other health facility which are served in EPSA AA hub.

There is also need to do further studies on other factors that determine the effectiveness of pharmaceutical distribution other than the study used indicator.

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# Annex I Questionnaires

**ADDIS ABABA UNIVERSITY SCHOOL OF COMMERCE**

**DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMEN**

Dear Sir/Madam,

I am a postgraduate student on Addis Ababa University, School of commerce conducting on logistics and supply chain management research work on Effectiveness of pharmaceutical distribution in PFSA Addis Ababa hub.

The objective of this study is to improve the body of knowledge in the field of logistics with emphasis on distribution effectiveness. It is purely an academic exercise for the partial fulfillment of master's degree in logistics and supply chain management.

I would like to extend my deep appreciation to your organization and you for the willingness and cooperation in undertaking this valuable research. Taking part in this study you will contribute towards alleviating the problem of distribution system. I request your cooperation to fill and respond truthfully for the asked Questions. If you have any question, you can contact me through 0910080523.

Thanks.

Yours faithfully,

Demeke Alemu

Section1. Personal Data

For this section, I kindly request you to indicate your response by putting a (√) mark in the corresponding boxes or in writing on the lines that follow the items.

1. Sex: Male □ Female □

2. Age Group:

19-25□ 26 – 30 □ 31-35 □

36-40□ 41-45 □ above 45 □

3. In which department you are working currently?

Store manager ☐ dispatch officer ☐ deliverer ☐ Storage and distributio☐

Forecasting and capacity building ☐ health center customer hospital customer ☐

Private medical center ☐ private hospital customer ☐

Other □, Specify_____

4. What is your current position in your organization? _____

5. What is your field of study /Specialization? _____

6. Please indicate your highest level of qualification.

Diploma □ BSC/BA □ MSC/MA □

□ others, namely: _____

7. Your work experience in years including your experience in other company.

Less than 1 year □ 1-5 Years □

6-10 years □ Greater than 10 years □

**Section 2. Rating Scale Questions**

Please rate to what extent you agree on the following Distribution practices of the Agency.

The scale below will be applicable: 1 = Strongly Disagree,2 = Disagree, 3 = Neutral, 4 = Agree

5 = Strongly Agree

**1 Storage and inventory control practice**

| S.N | Measurement tools | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | **Quality Indicators** | | | | | |
| 1 | Current storage space is sufficient for existing products & planned program expansion | | | | | |
| 2 | In EPSA Addis Ababa hub pharmaceuticals are Put-Away Accuracy in the correct location so they can be quickly and easily located. | | | | | |
| 3 | In storage area pharmaceuticals are stored at appropriate temperature according to product temperature specifications (8°–30°C) and including cold chain storage (2°–8°C), as required for certain products. | | | | | |
| 4 | In the agency there are tools(camera, security guard) to control all activity to monitor security of pharmaceutical products | | | | | |
| 5 | Pharmaceuticals are stored and organized to FEFO procedures and are accessible for counting and general stock management | | | | | |
| 6 | Health facility have enough safety stock to prevent stock out of pharmaceuticals of HIV pharmaceuticals | | | | | |
| | **Time Indicators** | | | | | |
| 7 | In EPSA AA hub the time taken to receive pharmaceuticals from warehouse are appropriate | | | | | |
| 8 | The time taken pharmaceuticals to unload from truck after arriving at warehouse and preparing to picking are appropriate | | | | | |

| | **Productivity Indicators** | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 9 | Proper dispatching procedures have been undertaken by EPSA | | | | | |
| 10 | In dispatching area repacking of one drug in a container of another drug have discouraged, the name, dosage and batch number and expiry date is clearly indicated | | | | | |
| 11 | Stocks renewed on EPSA AA HUB are done on scheduled dates | | | | | |

**2 Order fulfillment, communication and customer service management**

| | **Quality Indicators** | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 12 | EPSA Addis Ababa hub, Health facility and other branch is communicate to distribute over- stocked and near expiry pharmaceuticals | | | | | |
| 13 | There is strong Information exchange among distribution officers, store managers and customers | | | | | |
| 14 | EPSA Addis Ababa hub has information exchange mechanisms other than letter and telephone cells | | | | | |
| | **Time Indicators** | | | | | |
| 15 | The demand and request of customers' orders are filled on time and up on their request and expectation | | | | | |
| 16 | Health facility report RRF in accuracy and on time | | | | | |
| 17 | IN EPSA The response time to receive an order is short. | | | | | |
| 18 | Products which are slow and fast moving are reported timely | | | | | |
| | **Productivity Indicators** | | | | | |
| 19 | The quantity ordered by health facility sites for pharmaceutical product is based on real consumption analysis | | | | | |
| 20 | In EPSA AA hub the price of pharmaceuticals are affordable with comparing other supplier | | | | | |
| 21 | In EPSA AA hub There is well developed tool to check customer satisfaction in Distribution activities of the Agency. | | | | | |

**3 Transport and distribution system**

| | **Quality Indicators** | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 22 | Pharmaceuticals which are heat sensitive (chemicals, vaccines) are transported by refrigerated truck | | | | | |
| 23 | In EPSA AA hub stock outs of essential medicine is a regular situation | | | | | |
| 24 | In distribution of pharmaceuticals bad road network affect delivery | | | | | |
| | **Time Indicators** | | | | | |
| 25 | Pharmaceuticals which are ordered by health facility are delivered on time | | | | | |
| 26 | Pharmaceuticals which are delivered to health facility in the vehicle is received are correct items and quantities much with during receiving period. | | | | | |
| | **productivity Indicators** | | | | | |
| 27 | There are a sufficient number of functioning vehicles with available drivers to meet the desired distribution schedule | | | | | |
| 28 | The quality of pharmaceuticals are ensured during transport with the use of data loggers from EPSA to HF warehouse | | | | | |
| 29 | EPSA AA hub have the capacity to fulfill health facility demand accurately and to deliver all the requested pharmaceuticals | | | | | |
| 30 | There are established procedures for placing emergency orders? | | | | | |
| 31 | EPSA are willing to prompt corrective action for defectives pharmaceuticals | | | | | |
| 32 | Vehicles are comfortable to load pharmaceuticals according to the distance of delivery sites(for short distance site pharmaceuticals will be load last) | | | | | |
| 33 | The average amount of time from the moment an order is received at the storage facility until the time the order is actually transported to health facility is appropriate | | | | | |

**4 performance of distribution of pharmaceuticals**

| | | | | | | |
|---|---|---|---|---|---|---|
| **1** | Consistence pharmaceutical distribution are delivered to health facility | **1** | **2** | **3** | **4** | **5** |
| **2** | EPSA AA hub minimize expiration of drug | | | | | |
| **3** | EPSA AA is used accurate information for decision making | | | | | |
| **4** | EPSA AA is supplying medicine with its original quality throughout the distribution process | | | | | |

**Section 3. open-ended Questions.**

1 What challenges does the EPSA AA hub experience in distributing pharmaceuticals with regard to the following areas:

Distribution methods

Inventory management

Transportation

2 Do you think that the challenges of supply chain management activity of the company are avoidable?

If yes, please suggest the possible solutions to the challenges you listed above?

3. On average by how many days have HF took to receive pharmaceuticals from EPSA?

What are the major problems?

Please indicate your suggestion for the above problem