



**Challenges of Pharmaceuticals Outbound Logistics in Ethiopia:
The Case of Ethiopian Pharmaceuticals Supply Agency**

A Thesis Submitted to Addis Ababa University, Faculty of Business and Economics, School of Commerce, Department of Logistics and Supply Chain Management for the Partial fulfillment of the Requirements for the Award of the Master of Arts Degree in Logistics and Supply Chain Management

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Declaration

I Temesgen Senbeta Muleta, would like to declare that this thesis entitled “Challenges of Pharmaceuticals Outbound Logistics in Ethiopia: The Case of Ethiopian Pharmaceuticals Supply Agency” is my independent work. It is submitted to Addis Ababa University, Faculty of Business and Economics, School of Commerce, Department of Logistics and Supply Chain Management for the Partial fulfillment of the Requirements for the Award of the Masters of Arts Degree in Logistics and Supply Chain Management. I signed below to declare that this work has not been submitted for a degree to any other university. All the references are duly acknowledged.

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Acronyms and Abbreviations Used in the Study

ART - Anti Retro-viral Therapy

DDG - Deputy Director General

DFM - Distribution & Fleet Management (Directorate)

EFDA - Ethiopian Food & Drug Administration

EPSA - Ethiopian Pharmaceuticals Supply Agency

FEFO - First Expire First Out

GPS - Global Positioning System

GTP - Growth and Transformation Plan

GRNF - Goods Receiving Notification Form

GRV - Goods Receiving Voucher

HCMIS - Health Care Management Information System

HIV/AIDS - Human Immune Virus / Acquired Immuno Deficiency Syndrome

HRM - Human Resource Management

PO - Purchasing Order

RDF - Revolving Drug Fund

SOP - Standard Operating Procedures

STV - Standard Transfer Voucher

TB - Tuberculosis

USAID - United States Agency for International Development

WHO- World Health Organization

WIM - Warehouse & Inventory Management (Directorate)

Table of Contents

Contents	Pages
Declaration	I
Certification	II
Board of the Examiners' Approval	III
Acknowledgement	IV
List of Acronyms and Abbreviations	V
Table of Contents	VII
List of Tables & Figures	IX
Abstract	X
CHAPTER ONE: INTRODUCTION	1
1.1 Background of the Study	1
1.2 Background of The Organization; EPSA	3
1.3 Statement of the problem.....	5
1.4 Objectives of the study.....	6
1.4.1 General Objective.....	6
1.4.2 Specific objectives	6
1.5 Research Questions.....	7
1.6 Significance of the Study	7
1.7 Scope of the Study.....	7
1.8 Limitation of the Study	8
1.9 Conceptual Definitions of Terms and Concepts.....	8
1.10 Organization of the Thesis	9
CHAPTER TWO: RELATED LITERATURE REVIEW	10
2.1 Theoretical Literature Review	10
2.1.1 Basic Concepts on Pharmaceuticals Handling During Logistics.....	10
2.1.2 Pharmaceuticals outbound Logistics practices & challenges	13
2.1.3 Pharmaceuticals logistics challenges in Developing Countries	16
2.2 Empirical Literature Review	20
2.2.1 The Global Evidence	20
2.2.2 Empirical Evidences from Ethiopian Context	23
2.3 Literature Gap.....	24
2.4 Conceptual Framework of the Study	24

CHAPTER THREE: RESERACH METHODOLOGY	26
3.1 Description of the Study Area	26
3.2 Research Approach	26
3.3 Research Design	26
3.4 Population of the Study	27
3.5 Sampling Design and Sample Size	28
3.6 Data Source and Collection Methods.....	29
3.7 Types of Data.....	29
3.8 Reliability and Validity.....	29
3.9 Data Analysis Method.....	30
3.10 Ethical Consideration	31
CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION	32
4.1 Response Rate of the Study.....	32
4.2 Socio - Demographic Characteristics of the Respondents	32
4.3 Results of the Study	34
4.4 Analysis and Discussion	36
4.4.1 Challenges of Warehousing Pharmaceuticals	36
4.4.2 Challenges of Pharmaceuticals Inventory Management	37
4.4.3 Challenges of Pharmaceuticals Distribution	38
4.4.4 Challenges of Pharmaceuticals Transportation	39
4.4.5 Features of Pharmaceutical Products Contributing to Difficulties in Outbound Logistics	41
CHAPTER FIVE: SUMMARY OF MAJOR FINDINGS, CONCLUSIONS AND RECOMMENDATIONS	45
5.1 Summary of Major Findings	45
5.2 Conclusions	47
5.3 Recommendations	49
5.4 Limitations and Future Research Directions	51

References...	53
Appendices	57
1. Organogram of EPSA	57
2. Interview Checklist	58
3. Questionnaire	61
4. Questionnaire for Drivers (Amharic Version)	65

List of Tables and Figures

List of Tables and Figures	
Tables	Page
Table 4.1: Socio-demographic Characteristics of the Respondents	33
Table 4.2: Results of the Study	34
Table 4.4.5: Features of Pharmaceuticals that Makes them Challenging	41
Figure 2.1: Conceptual Framework of the Study	24

Abstract

Pharmaceuticals outbound logistics is the process and activities of storing, distributing and transporting of health care commodities to end users. For the central EPSA the practice begins when the inventory management team receives order from the hubs and customers and ends when the pharmaceutical products are delivered. The goal of this study was to identify the challenges of outbound logistics using qualitative research approach. Primary data which were collected with open ended questionnaires, in-depth face-to-face interviews and direct observation were used as data collecting tools. The study identified major challenges of pharmaceuticals outbound logistics including insufficient warehouse spaces, poor integration links between operational units, the agency's structure itself, inadequacy of material handling equipments and their operatives, poor labeling and descriptions, product non conformance with documents, inability to segregate warehouses for different pharmaceuticals products during storage and integrate during transport. Based on the conclusions of summary of results, recommendations were forwarded to the agency including: constructing additional centralized warehouses, integration of functional units, restructuring of the civil service structure, working in collaboration with regional governments and close monitoring of activities. Inability of the study to extrapolate challenges of outbound logistics of the agency's hubs to health facilities were limitations of the study, and the period at which the study conducted, when the agency is implementing change initiatives were taken as good opportunity for future directions.

Keywords - outbound logistics, Pharmaceuticals, order fill rate

CHAPTER ONE

INTRODUCTION

In this first chapter of the thesis, mainly background of the study, background of the organization, statement of the problem, objectives of the study, the research questions, significance of the study, scope of the study, definition of terms and organization of the paper are included.

1.1 Background of the Study

Outbound logistics, by definition refers to the processes, activities and tasks involved with moving the products from manufacturer to end user. It applies relatively for players who operate a downstream in supply chain. The outbound logistics activities include: the storage of manufactured products, distribution of the products and transporting them to the point of the end user. It plays a critical role in a supplier's overall customer relationship management process. In business performance, strategically, it represents a major factor in a retailer's decision whether or not to stock a supplier's products, and therefore, also represents an important determinant of a supplier's supply chain and business success. (T. Miller et.al, 2015)

Garcia (2019), also defined outbound logistics as it is the processes and activities of storing, distributing and transporting goods to users. It starts with order receiving from customer, followed by warehousing, picking and packing and finally ends with transporting the products for delivery. Picking the right distribution channels, maintaining a visible inventory stocking system and optimization of delivery options are basic strategies to make outbound logistics effective.

Because of its landscape which is widely varied and very remote locations, lack of infrastructure such as roads, electric systems, communication facilities and internet, cargo facilities, poor data monitoring, transportation facilities, high temperature because of minimal rainfall are logistics challenges of health care commodities in Africa. These challenges become more complex when it comes to temperature controlled products and countries need to design and execute processes and innovations that mitigate associated risks. Logistics of pharmaceuticals need to be supported with research and developments. (Remo H. et.al, 2019)

Delivering inappropriate pharmaceutical product is harmful for the health of community. It is better to do nothing than delivering pharmaceuticals which are not appropriately manufactured, stored and transported in such a way that their safety, efficacy and potency are not ensured. Ethically, following the rules and regulation that the sector need is mandatory for business companies involved in pharmaceuticals. Quality of every operations of pharmaceutical should be maintained for the safe delivery of quality medicines that the community need. Work discipline matters than profitability in the industry. (Adriana petryna et.al, 2006)

Any good health care system necessitates supply chains that can guarantee consistent availability of affordable, high-quality medicines, vaccines and health products at all health service delivery points. (World Bank, 2006)

A supply chain arranged to function well ensures the delivery of product or service from manufacturer or supplier to end user. In health care system, pharmaceuticals logistics is the backbone of the service which ensures availability of products for health care, vaccines and medicines, from manufacturer to patient. But, in developing countries, health care product supply chains have many problems where, supply chains are ineffective and weaken the overall health system's ability to respond to the health care needs of the population and put treatment programs inefficient. In Public Sector Medicine Supply Chains the major challenges are : diffuse accountability, lack of supply chain planning data, long resupply intervals, lack of interest in funding operational costs, uncertainties in financing, unnecessary level of complexity, skill and system design mismatch and lack of incentives for supply chain staff. The systems are most often under-performing and their diagnosis is fail as there is no treatment of the underlying structural causes. (Prashant Yadav, 2015)

Any risk in pharmaceuticals supply results in disruption of the health system as pharmaceutical products are vital in health care system. Financial, economical and political factors affecting pharmaceutical logistics industry are threats to the health care sector. So the government should have to work on such factors for safe delivery of pharmaceuticals to the community. Medicine regulation need high intervention from the government. (Mona J. et.al, 2015)

1.2 Background of the Organization: EPSA

According to its official website, EPSA was first established in 1947 with the name “The Main Pharmacy” with capital of 80 million Ethiopian Birr to supply pharmaceutical products to the community with affordable price. 1976 later, the military regime restructured the organization by merging other similar private organizations with similar activities to create a new organization, the Ethiopian Pharmaceuticals & Medical Supplies Corporation (EPHARMECOR). The corporation were given responsibility of manufacturing, importing and distributing human, plants and animals pharmaceuticals.

In 1994, the Transitional Government restructured the corporation allocating huge budget due to the weakened supply, and its name changed to Pharmaceutical and Medical Supplies Importer and Distributor (PHARMID).

PHARMID had over 400 workers and two-hundred Eighty million Ethiopian Birr worth of Pharmaceuticals and medical supplies and distributed them primarily to health institutions led by government. Seeking to ensure the organization fulfills its mission optimally, eight years later, in 2002, it was restructured as a share company that distributes pharmaceuticals and medical supplies purchased locally and from overseas.

In 2007, under proclamation No. 553/2007, PHARMID was once again restructured with reformed vision, mission and goals as “Pharmaceutical Fund and Supply Agency (PFSA).” PFSA is structured to ensure sustainable supply of both regular and program pharmaceuticals used for treating the main health problems in the country along with medical equipment and to consider the purchasing capacity of the society in providing its services. In 2019, PFSA changed its name to Ethiopian Pharmaceuticals Supply Agency (EPSA) however its mission and goals remain similar. Currently, the agency has 19 branches throughout the country and 20 directorates at the central. It administering over 18 billion Ethiopian Birr worth of pharmaceuticals and has 2,990 employees of which 2149 are male and 841 female.

According to the SOP’S of newly implemented Centre of Excellence Practices (2019), the logistics activity of the agency has two phases; the inbound and outbound. The inbound logistics activity begin either when pharmaceuticals arrive on ports (seaport,

dry-ports or Bole International Airport) for pharmaceuticals procured overseas and donated program pharmaceuticals; or when the products arrive at warehouses for those procured from local manufacturers. The pharmaceuticals from overseas received at ports passes through EFDA inspection and Custom clearing activities and transported to the warehouses they allocated. Once the products arrive at warehouses, documents are received from the contract management unit, vehicles are inspected with checklists, products are unloaded, sorted, checked for discrepancy, wrapped and putted away on their appropriate location by the warehousing team. Then, they are registered on HCMIS with generation of GRNF by the warehousing team. Finally, the generated GRNF along with the documents of the products sent to finance for costing and get ready for distribution after GRV is generated, where the inbound logistics activities end.

The outbound logistics activities begin when the inventory management team receives order from the hubs and customers. They process orders according to FEFO, prepare and print pick lists and transfer to the warehouses to arrange issues. The warehousing team along with distribution team picks the products and arranges issues and request for vehicle based on the volume of the product to be loaded. Finally, the distribution team prints the STV; products are loaded and transported to hubs.

With regard to outbound logistics, the warehousing team is responsible for picking and packing, confirming the quantity, batch and expiry date of the products, loading and issuing by handover the products to drivers signing the STV. Order receiving, preparation and printing of pick list are the major responsibilities of inventory management team with regard to outbound logistics. The distribution team is mainly responsible for monitoring dispatches and printing the STV where as the fleet management team administer issues of vehicles and transporting the pharmaceuticals from central to the hubs.

For the temperature controlled items, both the inbound and outbound logistics are different since they need quick operations to minimize their exposure time to external environment during unloading and loading. The products have their own vehicles and separate warehouses along with Standard Operating Procedures. While warehousing such products, monitoring the temperature is responsibility of warehouse managers.

Especially, during outbound logistics, STV is directly printed and products are loaded and transported accordingly to minimize time of delivery.

1.3 Statement of the problem

According to WHO (2009), access to medicine is a human right. Such access is deemed to be part of the right to health as supported by international law since 1946. The Organization states that essential medicines should be available, of good quality, accessible at affordable price to all. In developing world, this is however highly affected by numerous factors including economy, infrastructure and communication; and severe communicable conditions like HIV/AIDS, TB and malaria.

In Ethiopia, the Pharmaceuticals Supply Agency is trying to improve delivery of the right medicine at the right time with reduced cost. However still problems are observed due to an increase in the need of pharmaceutical products in the country, and less efficiency of distribution with the existing distribution network (Lissanework, 2013).

According to a study made on supply chain practices of the agency, the practices of the agency has many limitations including poor communication, poor storage facilities, poor fleet management practices, inadequate working machines and handling of pharmaceuticals by non professional drivers. (Admasu T. 2017)

According to data from interview made to to prepare this study, the order fill rate of the agency is very minimum, that is less than 30% for the last three years for RDF, and 40-50% for program items. Currency deficit and supplier's capacity are the external factors in addition to the challenges identified by this study and the nationally, the current availability of essential medicines ranges from 60-70% which is by far beyond WHO's recommendation.

So from the above mentioned evidences, there is gap in demand-supply balance of pharmaceuticals in the country. Supporting the organization with similar studies will improves its operations to deliver pharmaceuticals to the community.

Currently, the agency is working to improve its operations through implementing change initiatives like exercising centre of excellence, quick-win initiative, buying over 57 covered vehicles for pharmaceuticals transportation, warehouse floor maintenance as per WHO standard, implementing of security camera at warehouses and planting of disposal incinerators at eight different sites in different parts of the country. However efforts are being deployed to solve problems, still there are gaps to be filled to facilitate the outbound logistic of the agency be effective so that delivery of pharmaceuticals be timely with enhanced order fill rate.

This study contribute to the effectiveness of outbound logistics which improves outbound performance through the recommendations of the study. Once the central EPSA improve its order fill rate, pharmaceuticals availability at the hubs increases and stock out is reduced. Investigating and combating the outbound logistics challenges of pharmaceuticals no doubt, improves the order fill rate of the hubs and customers supplied by the central EPSA.

1.4 Objective of the Study

1.4.1 General Objective

The general objective of the research is to assess the challenges of outbound logistics of pharmaceuticals in Ethiopia based on the experiences of EPSA.

1.4.2 Specific Objectives

The specific objectives of the study are:

- ❖ To assess the challenges of pharmaceuticals warehousing in EPSA
- ❖ To reveal out the challenges of inventory management of pharmaceuticals in EPSA
- ❖ To assess challenges of pharmaceuticals distribution in EPSA
- ❖ To point out major challenges of pharmaceuticals transportation in Ethiopia with reference to the EPSA's perspectives

1.5 Research Questions

The study is conducted to answer the following research questions:

- What are the major challenges of pharmaceuticals warehousing in EPSA?
- What are the challenges of inventory management of pharmaceuticals in EPSA?
- What major challenges face pharmaceuticals distributions in EPSA?
- What are the major challenges of pharmaceuticals transportation in Ethiopia, based on EPSA perspectives?

1.6 Significance of the Study

This study is very significant since it targeted to find the challenges that are prominent in pharmaceuticals outbound logistics, the major operation area in EPSA. Once the challenges are identified, it is easy to manage and solve them. So, the study contribute for the improvement of outbound logistic operations of the agency to deliver pharmaceutical products to the society on time and in cost effective way. Contributing to Pharmaceutical supply chain improvement is not only a matter of business and grade achievement for graduation, but also improving the delivery system of products that saves lives. It will also be used as starting point for further investigation by extending to branches and health facilities to design good distribution practices by the supply managers.

1.7 Scope of the Study

This study has addressed challenges of pharmaceuticals outbound logistics at central EPSA. It covered the challenges of outbound activities of WIM and DFM at central EPSA. It also assessed challenges of pharmaceuticals transportation from central to the hubs throughout the country.

1.8 Limitation of the Study

However it captured challenges of pharmaceuticals transportation from central EPSA to hubs, the target and scope of the study is limited to outbound logistics of the agency's head office. But to capture all necessary data for challenges of pharmaceuticals outbound logistics in the country (which may worsen as we move from the capital city), including the challenges of hubs or branches is very crucial.

1.9 Conceptual Definitions of Terms and Concepts

Pharmaceuticals Outbound Logistics- Processes and activities of warehousing, managing inventory, distributing and transportation of health care products to health facilities. (Basis of Pharmaceuticals Logistics, 2019)

Order fill rate - Order fill rate, also known as demand satisfaction rate is a Percentage of consumption orders satisfied from stock available at a moment. It is a measure of an inventory's ability to meet demand. (Operations and Supply Chain Terms, 2016)

Pharmaceuticals - substances used for treatment, prevention, mitigation and diagnoses of diseases. It includes drugs, medical supplies and equipments, chemicals and laboratory reagents. (Ethiopian Food and Drug Administration, 2019)

Access to Medicines - refers to the reasonable ability for people to get needed medicines required to achieve health (WHO,2006)

Essential Medicines - are pharmaceuticals that satisfy the priority health care needs of the population. They are life saving and selected with due regard to public health relevance, evidence on efficacy and safety, and comparative cost-effectiveness. (WHO, 2013)

RDF Pharmaceuticals - are pharmaceuticals circulated through revolving drug fund, that is the agency add some percent on price to cover operational costs. (Dawit Teshome, 2015)

Program Pharmaceuticals - are pharmaceuticals obtained through donation. They include: HIV/AIDS pharmaceuticals, Family Planning contraceptives, TBL pharmaceuticals, pharmaceuticals used to treat malaria, vaccines and vaccines accessories and nutrition supplements. (EPSA official website)

Efficacy - maximum therapeutic effect expected from a drug. (Shalini S., 2019)

1.10 Organization of the Thesis

This study is organized into five chapters. The first chapter deals with background of the study and the organization, statement of the problem, research objectives and questions, scope of the study, significance of the study and conceptual definition and concepts of key terms used in the study. Chapter two is mainly concerned with review of related literatures. Both theoretical and empirical literatures are reviewed and conceptual framework is set for the study. The focus of chapter three is research methodology used for the study. It comprises rationale for the selection of the research setting, the study design and population and representative sample of the population, sampling techniques, data collection methods and analysis. Under chapter four data data are analyzed, results are presented and the results of the study are discussed. The last chapter specifically focuses on summary of major findings the study, conclusions drawn from the study and recommendations forwarded to the agency to improve their pharmaceuticals outbound logistics.

CHAPTER TWO

RELATED LITERATURE REVIEW

This chapter presents, relevant knowledge related to the study from recent literatures through extensive review. The chapter is composed of: the theoretical review, empirical review, literature gap and the conceptual framework of the study. The theoretical literature review discusses the research issue from the existing theories point of view, where as, empirical review presents empirical evidences in relation to other empirical data previously conducted in the area. The conceptual framework describes the effect of challenges on the outbound logistics and benefits the agency gain by improving those challenges.

2.1 Theoretical Literature Review

2.1.1 Basic Concepts on Pharmaceuticals Handling During Logistics

Pharmaceuticals handling require a high level of expertise to deliver the health care products safely from the manufacturing site to the patient. To handle pharmaceuticals, integrity and quality must be maintained. Monitoring temperature, government regulations and risks in pharmaceuticals shipment because of loss and damage make pharmaceuticals logistics difficult. Unlike other businesses, the impacts of delayed logistics in pharmaceuticals is not only profit loss, but also cause loss of lives. (ABCO Transportation Inc., 2018)

Because of regulatory requirements, pharmaceutical industries and aviation are very similar. They are the most regulated business industries today. In addition to control temperature and environmental conditions, the need for defined time conditions for the transportation of pharmaceutical products is a challenge deriving from product quality and regulatory aspects since the products are highly sensitive to time. Good distribution practice should be valid throughout the distribution chain but regulatory issues are still short of strength in practice. Standardized transportation mechanisms are among regulatory requirements and hence, pharmaceuticals transportation is considered as extended warehousing. But for business companies, compliances are business rather than regulatory driven. They need to invest more to care for regulatory issues which guarantee the business itself, or they may lose through damage and counterfeit (G. Badurina, 2018)

According to N. Kumar et.al, (2019), pharmaceuticals transportation and logistics as a general, requires special expertise to handle the medicinal products because of sensitivity of the products towards quality. Pharmaceuticals have weird features which makes them highly susceptible to quality non conformance. As a result, linkage of pharmaceutical quality system requirements with the Supply Chain Management principles should be maintained in every aspect of pharmaceuticals handling. Collaborative approach of technical, transport, logistics and supply chain teams within the pharmaceutical industry is very crucial for safe delivery and use of the products. The study highly recommended conceptualizing basic supply chain features such as segmentation, customization of requirement, market signals, differentiation, technology orientation and channel spanning performance.

Pharmaceuticals, starting as the products often leaves manufacturer to the end patient need direct control as it enters complex systems. Pharmaceuticals distribution systems require special handling based on the conditions clearly indicated in the labeling for the product. Licensing and regulation of business companies involved in pharmaceuticals should be in such a way it ensures the safety of the products. Companies are obligated to include quality systems and should be continuously monitored and updated to adhere to best practices while involved in pharmaceuticals businesses. There should be requirements for qualifications and training of personnel and sufficient facilities including material handling equipments, storage and inventory control, transportation, product disposition, non-conformance or exceptions and product protection. They should be aware of risk of introduction of adulterated and/or counterfeit products, product diversion, variances(equipment, facilities& skills), the significance of cumulative hazards to product quality (G. Hutchinson, 2015)

According to Shardul Pawar (2018), major issues in pharmaceutical logistics are discussed in detail. Lack of coordination is the main challenge for the inefficient and slow delivery of the products. Because of their ingredients, the products need to be kept at certain temperature range, so temperature monitoring is mandatory during pharmaceuticals logistics. The visibility of supply chain is also a critical issue in the pharmaceutical industry. They are totally different products which need updates despite of advancements in technologies. Their management need very secured conditions with secured warehouses.

According to Chris I. Enyinda et.al (2009), in global pharmaceuticals logistics, risk management becoming an important issue for the business. In pharmaceuticals business sector, risk management weigh the major concentration of the the leaders. Risks should be prioritized according to their impact on companies and need be mitigated accordingly. The decision makers in pharmaceuticals and food companies need to be smart enough to smell risks and prepare solutions for mitigation in advance. Risk management strategies should be accordingly that they should have to be risk reduction followed by risk avoidance. In food and drug industries risk avoidance has great impact and given priority for profitability of the companies as counterfeit products are dangerous for the health of users and their disposal cost additional payment for the companies.

Service quality in transportation, which is SERVQUAL scale (for the measurement of distributor perceived service quality at the distributor–manufacturer interface of the pharmaceutical supply chain) has huge impact on pharmaceuticals marketing industry. The findings of the study conducted on this issue indicated that distributor perceived service quality has impact on customer satisfaction and social implications. Service quality in pharmaceutical supply chain is very important, as it directly affects the health of the people, so the proposed scale can be used to control the quality of service. (Uma M. D. Parmata et.al, 2016)

According to Ludwig Höllein (2016), the problems of using substandard and counterfeit medicines is not only on developing countries. It is also prominent challenges of health care practices of industrialized nations. But in developed countries quality assurance of pharmaceuticals are given more emphasis using sophisticated analytical laboratories. In resource constraint countries, this situation is totally diverse. Implementation of quality standards in developing countries is overburdened and face many challenges including medicines supply. In African countries, like Tanzania, quality practices are only limited to site of manufacturing with non advanced technologies. But pharmaceuticals quality should be assured throughout their supply process to ensure their intended purpose.

Although some envision a supply chain to be a set of warehouses, trucks and carton boxes, a supply chain is in fact the ecosystem of people, organizations, technology, information, activities and resources that have to come together to ensure the delivery

of the product from the point where it is manufactured to the end-patient in a cost-effective way. Pharmaceuticals logistics is not only delivering of medicines and health care products to the population, they also return critical information regarding demand and consumption to health system planners. (Management Sciences for Health, 2012)

European Union set minimum standards for business companies involved in pharmaceutical industry with compliance of Good Distribution Practices including: authorization of medicines in accordance with legislation of European Union (EU), storage of medicines at the right conditions including during transportation, avoidance of contamination by other products, mechanisms for an adequate turnover of stored medicines and mechanism which guarantee the delivery of the right products reach the right place within a satisfactory time period. (European Medicines Agency, 2016)

2.1.2 Pharmaceuticals outbound Logistics Practices and Challenges

WHO, in its report of Good Distribution Practices for Pharmaceutical Products (2010), outlined that pharmaceuticals distribution is an important activity in the integrated supply-chain management of the products. The various logistics elements of pharmaceuticals distribution are done by different people at different entities. Storing, picking and packing, labeling, documentation and record-keeping, and transportation practices are generally responsibility of different units, institutions or individuals in the chain. Effective integration of these various participants involved in particular role in distribution is highly recommended. If interruption occurs in in distribution chains, the nature of the risks encounter is likely to be similar to that for risks encountered in the manufacturing environment such as adulteration, mix-ups, contamination and cross- contamination. The resulted counterfeit pharmaceutical products are a real threat to public health and safety. In both developing and developed countries, weak chains of pharmaceutical products distribution processes provide an avenue for counterfeit as well as illegally imported, stolen and substandard medicines to enter the supply chain.

According to Johnson (2018), five major challenges of pharmaceuticals logistics which were big loss for pharmaceuticals industries are: human resource dependency, product damage, sanitation, temperature control and shortage avoidance. Most operations in pharmaceuticals industries need human intervention and are not

automated systems. Pharmaceuticals are vulnerable to damage and need more attention during storage and transportation. They also need sanitized environment from pests, bacteria, and other sources of biological contamination. As they are sensitive in nature, controlling the temperature is also another big issue in pharmaceuticals logistics. Satisfying the customer need is also among the challenges of pharmaceuticals supply chain. The industry fail to balance need and supply because of their price, theft, damage, contamination and difficulty to comply with regulations.

Pharmaceutical products worth billions of dollars are stored and transported at improper temperatures, or reach their destinations past their shelf lives across the world because of delay in shipments. In addition to making the products ineffective, such conditions make the products very harmful and possibly life-threatening to the people who use them. Sometimes, it seems as if pharmaceutical companies and other industry stakeholders don't know or care about this problem. But, it is beyond that, since stakeholders of the pharmaceuticals industry face more challenges when they implement good distribution practices, because of complexity of the business environments. So many operations such as sorting, packing, lifting, moving, loading and delivering products can leave room for human error. It is expensive to prevent and correct such conditions. In addition, the complicated government and other regulations in the pharmaceutical industry make hard to the business environment. Improper packaging, storing and transporting of pharmaceuticals can damage the products, resulting the companies to loss and suffering of the society to ill conditions. But therapeutics research and technologies such as advancements in packaging innovations, monitoring advancements, tracking advancements, upgrades in warehousing, shipping and transportation, developments in educational and training programs, and policy and regulatory are alleviating these problems if applied properly. (Claire Sykes, 2018)

Aiming to investigate the major challenges of pharmaceuticals supply chain, a study conducted by Christian L. Rossetti et.al (2011), discovered the need for radical shifts in pharmaceuticals supply chain structures. This is mainly because of the weak networks which makes the business ineffective. The delivery of the products to end customer is not effective and not going well as desired especially in developing world. The regulatory constraint has also big impact on the business since pharmaceuticals are highly regulated products. The operation strategies, inventory policies, visibility in supply chain and the desired service levels need to be updated along with time to

ensure the safe delivery of the products. Pharmaceuticals delivery from site of manufacture to end customer need high integrity and combined effects of all stakeholders.

Pharmaceutical companies should have to be aware of transporting, especially when it comes to the products sensitive to temperature, because the products are highly regulated. In the end, safer transports will benefit consumers, but this development puts higher investment demands on the pharmaceutical companies, as they will need to prove the quality and safety of their transport from start to finish. Quality management of cold chain logistics presents many challenges for the pharmaceutical industry. There are many actual challenges of transportation for cold chain items in pharmaceuticals including: lack of Good Distribution Practice for the pharmaceuticals cold chain, lack of guidelines which are more specific, internal audit plan with more focus on logistics, impacts of unforeseen consequences, requirements for product stability data, need for a more stringent validation of shipment solution and detailed data required for operational excellence. (Dan Arkwell, 2019)

Remarkable resistance to the implementation of global pharmaceutical norms for quality standards in developing states and in regulatory infrastructure are most challenging issues for pharmaceuticals transportation. Skilled human capacity for pharmaceuticals handling in many developing countries remains limited. Countries that have been leaders in establishing global norms do not appear to have influenced their neighbors in establishing regional patterns. In contrast to traditional theories of international norms diffusion, global standard-setters such as the United States or European Union appear to have surprisingly little influence on standard setting. (Anthony P, 2016)

Pharmaceuticals transportation challenges and constraints are internal and external politics, economic factors, climate, religion and infrastructure that will need concerted global effort and investment, and many years to address. Much of it is a matter of basic transport and supply chain management which challenging the provision of right pharmaceuticals to the right people at right time and right price. (A. Moosivand et.al, 2019)

On article (FlyPharma Conference Asia, 2018) variety of challenges that face the pharmaceutical outbound logistics including; collaboration concern, concern for

patients, market place awareness, temperature control, maintaining standards and chain strategies.

However spending billions of dollars, the pharmaceuticals logistics pose many new challenges especially for temperature controlled drugs. Such products can easily be damaged as they are sensitive to temperature. The regulatory systems of countries need to be strong for storage and transportation of such products. In addition to regulating temperature, the packaging of the products need concentration of regulatory bodies. The labeling and packaging of temperature controlled products have contribution during logistics for the safe delivery. (A. Mojzes et.al, 2013)

Transporting pharmaceuticals, one of the outbound logistic function, is more challenging than manufacturing them because of many reasons. First, manufacturing is done in set of arranged standards which keep the safety of pharmaceuticals and operators, but during transportation they pass through different environmental and weather conditions which can affect their efficacy. Second, manufacturing is done using advanced technologies which can detect any deviation and substandard and make corrective measures, but during transportation especially in developing countries there is no such activities which contribute to keep the pharmaceuticals safety. Finally, the transportation infrastructure is mostly substandard which contribute to the damage of the products. (Megan R. Nichols, 2018)

2.1.3 Pharmaceuticals logistics Challenges in Developing Countries

In many low and middle-income countries, high medicines prices, low affordability and poor availability are key challenges to access to treatment. Certainly, in those countries where the majority of the population still buys its medicines through out-of-pocket payments, the high cost of medicines is high risk to the family. Inequity in medicines access is widely perceived as symptomatic of weaknesses in the health-care system and represents a failure on the part of national governments to fulfill their obligations towards their citizens in terms of their right to health. Ensuring equitable access to quality pharmaceuticals is thus a key development challenge and an essential component of health system strengthening and primary health care reform programs throughout the world. To improve such access, many conditions need to be secured, of which one is the management of logistics, the means by which health care products reach the community (Alexandra Cameron, et.al, 2011)

In Africa, there is a constant shortage of skilled workers and supply chain infrastructure. Storage capacity and quality of storage facilities are scarce. Building a new pharmaceutical warehouse poses its own challenges, as engineering specs and limited oversight may result in defects like concrete that crumbles under the wheels of a forklift. With the exception of South Africa, most African countries also have poor road infrastructure, fragmented airline routes and insufficient flight connections for airfreight, which compromises pharmaceutical logistics. Security risks prevalent in Africa's pharmaceutical supply chain include not just theft, but also sub-standard counterfeit products that can jeopardize the reputation of established brands. One of the biggest obstacles hampering health care delivery in Africa is the lack of harmony in drug regulations across the continent. Since each country has different regulations, product registration becomes extremely complex and costly. As a result, many drug companies are not registering medicines in African countries. (Iain Barton, 2017)

Presence of diseases like malaria, Ebola, tuberculosis, cholera and AIDS, as well as widespread poverty, drought and violence have strained an already inadequate and overburdened health care delivery system to the breaking point. As a result, a significant number of disadvantaged poor Africans are not getting satisfactory medicine they need. While pharmaceutical availability and distribution is not the only sector affected by these challenges, the consequence of these late or missing pharmaceutical deliveries can impact lives. (WHO, World Health Statistics, 2014)

Developing countries, especially in sub-Saharan Africa, still there is the worst health conditions. Still deaths are being caused by infectious diseases unlike the rest part of the world. In many African nations 70% of premature deaths are still caused by infectious diseases and related conditions which can easily be treated, and the life expectancy for both men and women is still less than 55 years. Infrastructure and security are the major factors which make delivery of pharmaceuticals inefficient and contributing to such worst health care conditions. (B. Goshorn et.al, 2014)

To meet the WHO's access to medicine requirement for all citizens, well functioning pharmaceutical logistics is a priority. But in developing countries, the supply chain of pharmaceuticals, in general affected by many challenges. Lack of management procedures, poor information flow, inadequate facilities for storage, poor human resource capacity, unavailability of systems for well functioning transport

management, weak inventory management policies, weak political intervention, lack of clear roles and responsibilities, lack of good supervision and audit systems and inadequate budgeting. To solve such challenges from the root, countries need to build knowledge based innovations, implementation of easy information access, efficient communication, standardization of guidelines, implementation of regular monitoring, designing of correct key performance measures and measuring activities accordingly and building the capacity of employees is highly recommended. (Anna Schöpferle, 2013).

Care for pharmaceutical or proper pharmaceutical supply chain is a key component for health care systems as it ensures delivery of medicines needed to improve patient's quality of life. Pharmaceuticals distribution or supply chain at large, is not simply dispensing products, but it is a set of activities needed to be completed with right disciplines and ethics. In sub-Saharan African countries, trained health care workers in pharmaceutical care creates multiple disease conditions which has 25% the world's disease burden but where there is only 1.3% of the world's health workforce. In this region, disease conditions are worsen by the use of inappropriate pharmaceuticals caring conditions and drug resistance is the main issue. Governments need to establish efficient health care systems where professionalism is exercised and avoidance of political cadres in pharmaceutical practices including storing and distribution of the products. A paradigm shift is needed in curriculum where only professional health workers engaged in pharmaceuticals handling. (Rosalyn C. King et.al, (2009)

Voordijk (1999) studied obstacles and precondition of logistics and manufacturing as case study of the East African country of Eritrea. The result showed that each element of the supply chain network causes problems. The basic condition for logistics and manufacturing are well developed infrastructure: such as transport system and telecommunication network, enabling environment: such as sound industrial policy and educational system for skill development, and at firm level: such as purchasing materials, manufacturing capabilities and export and distribution. Such factors impede the efficient logistics and manufacturing of the country. To solve such obstacles, the government has to follow two types of policy. One, it has to reduce its own role by giving public firms more autonomy and by eliminating the remaining regulatory and

legal obstacles that constrain private (domestic and foreign) enterprises from investing. On the other hand, the government has to strengthen its role in the national economy by increasing investments in the transport and communication infrastructures.

According to a study conducted in Nigeria, despite of high interventions by international stakeholders, access to affordable quality essential medicines in developing countries likely continued to be health care challenges. Major contributing factor to this challenge is poor management of supply chain management of pharmaceuticals. The logistics systems of pharmaceuticals are not adequately equipped and standards to monitor logistics operations are not well set and implemented. In Nigeria, about 84% of logistics companies had no set of standard operating procedures for medicines logistics. About 37% are capable of providing cold chain logistics depending on the duration. There was no form of regulation enforcing standards for medicines logistics. In general, weak regulation, weak policy implementation and lack of support for medical logisticians are factors affecting pharmaceuticals logistics. So political intervention is highly recommended to help the pharmaceuticals logistics in developing countries. (Otuto A Chukwu et.al, 2018)

In 2006, WHO report outlined the main challenges and difficulties of the medicine supply of African countries are poor information communication, poor data consumption, inadequate storage facilities, temperature control systems and a lack of quality assurance procedures.

Supply chains play a role in each of the categories identified for health system performance improvement: payment, organization, regulation, and also behavioral aspects of the health system, but has not been fully utilized in improving public health supply chains in developing countries. As a result, supply chains that serve patients in low-income countries remain weak and ineffective. (Roberts M. et.al, 2004)

Lack of information technology and poor information flow leads to disruption and delay in the supply chain of anti-malarial drugs of both private and public sectors in Ghana. It has also huge implication on drug insecurity and affordability. To achieve availability of drugs at the right time and place, the availability of information and infrastructure is mandatory for the supply chain. (D. Asamoah et al, 2011)

In late 2006, The Federal Ministry of Health (FMOH) implemented PLMP (Pharmaceutical Logistics Master Plan) and one year later EPSA reformed. The agency mandate is to avail affordable, sustainable and quality pharmaceuticals to the public health facilities and ensure their rational use. In 2009, to execute this mandate, EPSA, being with partners such as USAID | Deliver Project and Supply Chain Management Systems (SCMS) and other stakeholders in the sector, developed and began implementing the pharmaceuticals reporting and distribution system, IPLS (Integrated Pharmaceuticals Logistics System). (USAID | Deliver Project, February 2015)

Ethiopia Health Sector Transformational Plan (HSTP 2016-2020) lay emphasis on the need to have strong health commodity supply chain management and pharmacy services to fulfill customer satisfaction with regards to obtaining the right pharmaceutical with right quantity and right condition, at the required time, for the right client. It demonstrates the performance of the pharmacy service and logistics system, highlights successes, and informs the design of appropriate interventions for areas that need improvement. (Federal Ministry of Health, 2019)

According to EPSA mission as per the proclamation No. 553/2007, the agency shall be considered to ensure affordability, sustainable availability and accessibility of essential medicines and medical equipment with appropriate quality, safety and efficacy. But, as EPSA report (2015), various challenges were reported like poor storage conditions, lack of essential medicines, poor fleet management, poor logistics systems and significant progress were made such as warehouse floor maintenance, GPS implantation, centre of excellence and implementation of quick-win initiative since then.

2.2 Empirical Literature Review

2.2.1 The Global Evidence

According to WHO, Medicines and Health Report (2011), Medicine availability and prices in both public and private sectors are key indicators of access to treatment. Surveys of medicine affordability and availability, conducted using a standard methodology, have shown that poor medicine availability, particularly in the public sector, is a key barrier to access to medicines. Public sector availability of generic

medicines is less than 60% across regions; ranging from 32% in the Eastern Mediterranean Region to 58% in the European Region. Due to low availability of medicines in the public sector, patients are often forced to purchase medicines in the private sector.

A study conducted Targeting to present the latest innovations in the drug distribution processes of hospitals and other health institutions revealed high inventory and storage costs and fragmented organizational responsibilities. According to this study, by managing their storage and inventory caring costs, health institutions can reduce their total cost up to 7% which is very significant in hospital industry. The study also showed that the unit dose system that is, minimizing inventory holding, allows hospitals to improve the patient care quality in addition to costs reduction. (Roberta Pinna et.al, 2015)

Since the final customers of pharmaceutical logistics are responsible for caring of the lives of their patients, pharmaceutical logistics is unique and need optimization of effectiveness rather than efficiency. It is the second most expensive component of health care after staff cost. Its classification includes Non-cold Chain Logistics and Cold Chain Logistics with proportion of 93.5% and 6.5% respectively. The most common mode of transport for pharmaceutical logistics is ground transportation followed by shipping and air transport. Ground transportation market share of all transportation is about 45.1% in 2016. According to this study, of all classes of pharmaceuticals, the most expensive pharmaceutical logistics is Chemical Pharmaceuticals covering about 67.6 % in 2016. (Pranali Choudhari (2019).

In pharmaceuticals industry, effectiveness of the outbound logistics plays role for both delivery of the product and operation cost reduction. Extended operational activities of pharmaceuticals leads to damage and wastage. A study conducted on intravenous fluid delivery time improvement showed that cross-dock reduces 19% of the total cost of operation in its outbound logistics. The cost of pharmaceutical supply chain due to drug waste is one of the current major issues in health care. In addition to this huge monetary achievement, it also play role for on-time delivery and improved inpatient care. (Isasan T. et.al, 2018)

A study conducted by N. Pagliarulo et.al (2018) identified top challenges that pharmaceuticals supply chain industry face including lack of visibility which is the

root cause of many challenges resulting in drug shortages and counterfeits. Due to poor temperature controls in transit, there is a critical ingredients loss. Logistics coordination is also another big challenge which result in inefficient delivery of pharmaceuticals and up to 17% loss because of delay in delivery since drugs are time sensitive. Cold-chain shipping, especially when it is across border of countries having different climatic condition, is also another big challenge causing damage to pharmaceutical products. Non compliance of regulations between countries is also among identified challenges pharmaceuticals logistics.

Pharmaceuticals logistics is very expensive in its nature and most developing countries can't afford by themselves. Staff cost, medical equipments and supply costs, material costs and need of additional features like temperature monitoring during storage and transportation make the pharmaceuticals logistics very expensive. "Zion Market Research studied that the medical transportation services market is valued at USD 21.82 billion in 2017 and is expected to reach USD 31.51 billion globally by 2026." Supply chain security, new developments in medicine, climate control, customs and documentation are among factors make pharmaceuticals logistics very expensive and challenging. (AFP Global Logistics, 2019)

Globally, two billion people cannot access the medicine they need. Huge advances in global health are being made, and yet new challenges continue to emerge. Among the many stakeholders working to improve access, pharmaceutical companies have a critical role to play (Access to Medicine Index, Methodology Report, 2018).

A study conducted on real-time information sharing and integrated supply chain control of pharmaceuticals distribution revealed that, application of real-time information and integration can improve the supply chain efficiency with the potential of improving speed and reliability of the the delivery of products with reduced resource consumption. However, the study underlined challenges associated with financial, political and trust issues in the industry remain unresolved in most countries of the world. (H. C. Dreyer et.al, 2010)

Entirely, losses of pharmaceutical industries exceeded \$35 billion due to transportation problems, delays and the resulting temperature excursions. This significant figure even will increase with addition of security and theft problems of developing countries. Air transport has been deemed to be the most potentially risky

of all the modes of global pharmaceuticals transportation. The heat generated by turbines is the major factor for this. Stakeholders including manufacturers, third-party logistics companies, airlines, shippers, packaging companies and freight handlers have been working to reduce opportunities for temperature excursions. The best significant achievement is the establishment of the International Air Transport Association's (IATA's) Center of Excellence for Independent Validators (CEIV) Pharmaceuticals Logistics program in 2014. (Agnes Shanley, 2018)

2.2.2 Empirical Evidences from Ethiopian Context

In low income countries, the average availability of essential medicines is reported to be less than 57% in public health facilities and 65.1% in private ones. In Ethiopia, hospital pharmacies had higher availability of medicines compared to other private pharmacies. Stock out is more reported in private pharmacies compared to public pharmacies because of unavailability. However they are constructed at acceptable conditions, most private pharmacies accumulate large volume of damaged and expired products due to lack of good pharmaceuticals reverse logistics systems in the country. (Ali Seid, 2017)

In Ethiopia, availability of essential medicines is only 65% with high expiry rate (8.24%) and low patient knowledge on correct dosage (50.5%) and low satisfaction on pharmacy services (74.5%). (Mende Mensa, et.al, 2017)

According to Dawit Teshome (2015), Ethiopia spent 5.06% on health from the estimated \$55 billion gross domestic product (GDP). EPSA is responsible for the whole supply chain management of pharmaceuticals including: forecasting, procurement, custom clearing, storage and distribution of pharmaceuticals. It covers almost 70% of the country's need. The agency distributes both program items (like contraceptives, test kits, vaccines, TB kits, ART, Anti-malarial drugs) and RDF items through which the agency support the capacity of local local manufacturers providing them up to 25% of price protection when they compete in an international bid; and rewards 30% of advance payments for tender winners.

2.3 Literature Gap

As reviewed in literatures, challenges of pharmaceuticals are multidimensional. Economical, financial, political, environmental, human factors all affect the pharmaceuticals logistics. Because of their specific nature, unlike other products, pharmaceuticals logistics is also challenging. The available literatures related to the study are mostly generalized to logistics. Only few studies are available on outbound logistics and transportation. And, mostly they lack structured empirical evidence. So this study will contribute in bridging the gap by providing some evidences on outbound logistics of pharmaceuticals in Ethiopia, based on EPSA's experiences.

2.4 Conceptual Framework of the Study

A conceptual framework is an analytical tool with several variations and contexts. It can be applied in different categories of work where an overall picture is needed. It is used to make conceptual distinctions and organize ideas. Strong conceptual frameworks capture something real and do this in a way that is easy to remember and apply. (S. B. Mishra et.al, 2017)

The main target of outbound operation of the central EPSA is to deliver pharmaceuticals to its branches on time with possible minimum cost. This performance is mainly measured by a variable "order fill rate", the rate at which the requests of hubs are responded. This variable is affected by the challenges identified by this study.

The conceptual framework below is developed to show the relationship of variables of challenges of pharmaceuticals outbound logistics which are dependent variable, and the benefit (performance) the agency get from the study by working on the challenges so that improve its performance, the independent variables. Once the order fill rate enhanced through outbound performance, the community at large benefit by improved availability of pharmaceuticals and/or reduced stock outs.

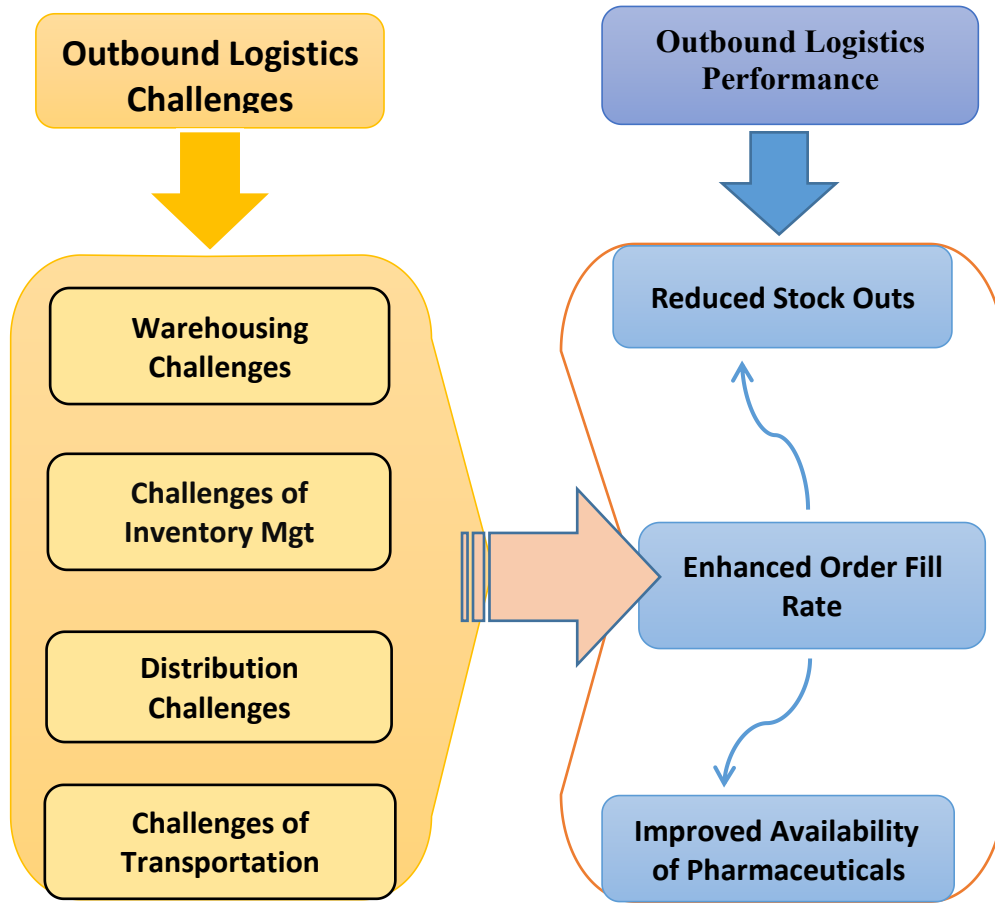


Fig 2.1: Conceptual Framework

CHAPTER THREE

RESERACH METHODOLOGY

The chapter mainly describes the research methodology used for the study. Specifically, the chapter presents description of the study setting, the research approach, population of the study and sampling design, research design, data source and collection methods, data collection instruments, method of data analysis and collection ethics.

3.1 Description of the Study Setting

The study setting of the thesis is the two directorates of EPSA head office which are being involved in outbound logistics operation of pharmaceuticals, WIM & DFM. Both are managed under one DDG, which is Outbound Deputy Director General. There are four teams under the two directorates for the outbound logistics operations and coordinated as a department or team. These includes: warehousing team, inventory management team, distribution team and fleet management team.

3.2 Research Approach

According to Priya Chetty (2016), a research approach is a plan and procedure that consists of the steps of broad assumptions to detailed method of data collection, analysis and interpretation

Accordingly, qualitative research approach were used for the study. Qualitative research is descriptive in nature, because it generally deals with non-numerical and things which are not quantifiable. Qualitatively, the study explored, identified and described challenges that have negative impact on pharmaceuticals outbound logistics. The data used for the study were primary which collected with open ended questionnaires, in-depth face-to-face interviews and direct observation. The data were analyzed using descriptive summary statistics such as frequency and percentage, summarized, presented and interpreted.

3.3 Research Design

Both descriptive and exploratory research design were used in the study. The purpose of employing descriptive design is to describe the nature of existing situation at the time of the study and to explore the cause/s of particular phenomena. (Creswell, 2013).

Descriptive design is a fact-finding procedure and used to describe the existing situation. It includes analysis and interpretation of data. On other hand, exploratory research is defined as a research design used to investigate a problem which is not clearly defined. Exploratory design is conducted to have better understanding of existing problem, but it will not provide conclusive results, rather, it is used to examine and explain the relationships between variables. That is why mixture of both descriptive and exploratory design is appropriate for this study.

Accordingly, based on their impact on outbound logistics operations, challenges of the outbound logistics of the central EPSA were described and analyzed using descriptive statistics majorly frequency & percentage and statistical analysis, the mean. Challenges were compared and explained based on their magnitude of impact and opinion of the respondents. The data required to meet the stated objectives was easily obtained from questionnaire and interview based sampling and strengthened with observations. The intention of the study was to assess the existing challenges of outbound logistics of pharmaceuticals and to describe opinions that are held on for decision making in the organization by prioritizing them.

3.4 Population of the Study

According to Rafeedale (2013), Population of a study is explained as a comprehensive group of individuals, institutions and objects which have a common characteristics that are the interest of a researcher. They have common characteristics of the groups distinguish them from other individuals, institutions or objects.

Accordingly, all the 142 employees of the two directorates of the agency including the two directorates and DDG being involved in outbound logistics were target population for study. Employees from other departments and those who are not involved in the outbound logistics were excluded from the study since their contribution for data is insignificant. The WIM directorate has two teams namely, warehousing and inventory management team with 57 employees including the director, coordinators, officers, warehouse managers and data encoders. Also, there are two teams under DFM Directorate, the distribution and fleet management teams which comprise total of 84 employees including the director, coordinators, officers, drivers, data encoders and office personnel.

Inclusion criterion

The employees who directly involved in the operation of outbound activities are included in the population of the study

Exclusion criteria

- Sixteen data encoders, data clerks and office personnel who were not being involved in operation were also excluded from the study.
- Since the investigator can not access them at a time, 27 drivers who were giving satellite operation service on malaria campaign at Adama project were excluded from the study.

Totally, 43 employees were excluded due to the above mentioned reasons and only 99 employees were legible for data source.

3.5 Sampling Design and Sample size

To select the respondents from each group, stratified random sampling method was used. Stratified random sampling intends to guarantee that the sample represents specific subgroups or strata. Accordingly, application of stratified sampling method involves dividing population into different subgroups (strata) and selecting subjects from each stratum in a proportionate manner.

The sample size drawn from 99 total population of the two directorates of the agency was 79 respondents. Sloven's formula (1960) was used to draw the sample size from total population

$$n = \frac{N}{1 + (N * e^2)}$$

Where;

N= population size

e = Tolerance at desired level of confidence, take 0.05 at 95% confidence level

n= sample size.

$$\text{Accordingly, } n = \frac{99}{(1 + (99 * 0.0025))}$$

$$n = 79$$

3.6 Data Source and Collection Methods

To assess challenges of pharmaceuticals outbound logistics, primary sources were used to collect data using questionnaires and interviews from the staffs directly being involved in the activities. Face-to-face interviews were made to capture data from the DDG and the two directorates, whereas questionnaires were disseminated to collect data from coordinators, officers and warehouse managers and collected one day later. Data were also captured and confirmed by observation of the investigator of the study. Data collection from drivers took two weeks to meet the desired sample size as they were not available at once because of the nature of their duty.

3.7 Types of Data

As already mentioned under research approach, qualitative data were used in the study. Structured & semi structured questionnaires, interviews and observation were instruments for data collection. Data from the 3 leaders including DDG and the two directors were captured with interviews and the rest data from other respondents including coordinators, officers, warehouse managers and drivers were captured with questionnaires. For clarity purpose the data from drivers were collected with Amharic version.

3.8 Reliability and Validity

Validity

The degree to which the instrument measures what it is supposed to measure indicates validity (Kothari, 2004). Accordingly, Prior to dissemination to respondents the tools used for data collection were tested for validity and clarity by experts, two coordinators (one from each directorate), four officers (one from each team) and two drivers. Their constructive suggestions and comments were considered and the questionnaire was improved accordingly. Finally pilot test was applied on selected 3 individuals from the population of study and issuing them with the questionnaire

Reliability

The consistency of the obtained scores from all the respondents and questionnaire items were measured by Cronbach's alpha. Cronbach's alpha is a measure of internal

consistency, that is, how closely related a set of items are as a group. It is considered to be a measure of scale reliability. The measurement scales for the variables in this study were 3 ranging from “Mild” to “Strange Mountainous”.

The formula for Cronbach’s alpha is:

$$\alpha = \frac{N \cdot \bar{c}}{\bar{v} + (N-1) \cdot \bar{c}}, \text{ Where:}$$

- N = the number of items.
- \bar{c} = average co-variance between item-pairs.
- \bar{v} = average variance.

In general, a score of more than 0.7 is usually accepted

Crosbach’s alpha	Internal consistency
$\alpha > 0.9$	Excellent
$0.9 > \alpha > 0.8$	Good
$0.8 > \alpha > 0.7$	Acceptable
$0.6 > \alpha > 0.5$	Questionable
$0.5 > \alpha$	Unacceptable

The value of coefficient alpha ranges from zero (no internal consistency) to one (complete internal consistency). Accordingly, the alpha coefficient for the 45 items which addressed with the major questionnaire (coordinators, officers and warehouse managers) were 0.862 suggesting that the items have relatively high internal consistency. Internal consistency reliability is a way to gauge how well a test or survey is actually measuring what you want it to measure

3.9 Data Analysis Method

For this study, both qualitative and quantitative data analysis techniques are used. Qualitative analysis involves coding and organizing of collected data into explanation, understanding or interpretation that addresses the research questions, (Mugenda, 2003). Quantitative data analysis consists of measuring values analyzed using

descriptive analysis such as central tendencies like mean, mode, median and measures of dispersion such range standard deviation and variance (Kathori, 2004)

Qualitatively, data collected by questionnaires and interviews were checked for completeness, errors, missed information and edited where necessary after the respondents were communicated. organized, discussed, interpreted systematically in such a way that the major issues were identified and described; and analyzed quantitatively with descriptive summary statistics, such as frequency, percentage and mean. For analysis, percentage is mainly used uniformly throughout the discussion.

3.10 Ethical Consideration

Research ethics is closely related to the ethical principles of social responsibility (Pranas Žukauskas, 2018).

Accordingly, the research was not subjected to harm anyone who involved in the research and respected the dignity and full consent of the participants. The privacy of respondents was ensured.

The study ensured adequate level of confidentiality of the research data and anonymity of individuals and organizations participating in the research. There was no any deception or exaggeration about the aims and objectives of the research.

The objective of the study was clearly stated on the questionnaire. Any type of communication in relation to the research was done with honesty and transparency. There was not misleading information, as well as representation of primary data findings in a bias.

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

This chapter presents the data gathered by questionnaire and interviews. Results from data captured by questionnaire and interview are presented, analyzed and discussed with tables, charts, frequency distribution and percentages.

All data sources were primary data which were collected from individuals who directly involved in outbound logistics operation of pharmaceuticals in the Agency. Two types of questionnaires (English and Amharic) were used to capture the data from warehouse managers, officers and coordinators. The Amharic questionnaire was used to collect data from drivers. Data from the directors and DDG were captured by interview. In addition, the investigator has moved to two hubs located at opposite poles (North and South-West) of the country along with drivers to observe transportation challenges and visited all central warehouses to see some warehousing, inventory management and distribution challenges

4.1 Response Rate of the Study

Total of Seventy Eight individuals (from sample size of 79) responded to the study. That is the response rate is 98.7% and it is acceptable according to Mugenda & Mugenda (1999), which says response rate of 70% and above is acceptable. Only one individual has not returned the disseminated questionnaire for data collection. The data from 3 management bodies were were collected by face-to-face in-depth interview and open ended questionnaire were used to gather data from the rest 75 respondents. From the 75 respondents who returned the questionnaire, seven of them were communicated for completeness during data collection and still 13 drivers were consulted with investigator for further clarification, but not on filling process and marks.

4.2. Socio - Demographic Characteristics of the Respondents

Under this section, Socio-demographic characteristic of the 78 respondents including sex, age and qualification is presented the table below.

Table 4.1: Socio - Demographic Characteristics of the Respondents

Sex of the Respondents		
	Frequency	Percentage
Male	67	85.9%
Female	11	14.1%
Age of the Respondents		
Age	Frequency	Percentage
21 - 30 years	28	35.9%
31- 40 years	33	42.3%
> 40 years	17	21.8%
Educational Background & Qualification of the Respondents		
Qualification	Frequency	Percentage
Less than College Diploma	37	47.4%
Diploma in Pharmacy	9	11.5%
BPharm	24	30.9%
MA in LSCM & MPharm	3	3.8%
Laboratory Technologist	3	3.8%
Biomedical Engineer	2	2.6%

Source: own survey, 2020

As observed from the table above, the male to female sex ratio is very high. It is 85.9% male to 14.1% female. This indicates that the involvement of female employees in pharmaceuticals outbound logistics compared to male is minimum. But

fortunately, all the existing female employees were included in data provision for the study.

42.3% of the respondents were between 31-40 years, 35.9% were between 21-30 years and only 21.8% were above 40 years.

47.4% of the respondents attained less than college diploma, however, why this strata elevated is most of respondents categorized here are drivers. 47.2% of the respondents studied pharmacy with 30.9% first degree, 11.5% diploma and 3.8% masters of art. And MPharm. 3.8% and 2.6% of the respondents were Laboratory Technologists and Biomedical Engineers consecutively.

4.3 Results of the Study

The table below shows the results gathered from the respondents using semi structured questionnaire where out of 46 disseminated questionnaire 45 respondents (97.8%) replied including coordinators, officers and warehouse managers. Only one individual refused to return the questionnaire. The respondents described the challenges' magnitude based on its impact on outbound logistics with three measurement scales for the variables ranging from "Mild" to "Strange Mountainous". The results of the responses are summarized and presented as follows, by Using descriptive statistics (such as mean, frequency and percentage)

Table 4.3: Results of the study

Challenges	Description of the Challenges						Mean
	Mild		Difficult & unpleasant		Strange Mountainous		
	Frq.	%age	Frq.	%age	Frq.	%age	
Insufficient warehouse spaces	7	15.6%	15	33.3%	23	51.1%	2.36
managing multi-batch pharmaceuticals	12	26.7%	14	31.1%	19	42.2%	2.16

Lack of timely information for the upcoming activity	6	13.3%	29	24.5%	10	22.2%	2.09
Weak integration links between operational units	8	17.8%	3	6.7%	34	75.5%	2.58
Holding & processing large volume expired & damaged products	13	28.9%	15	33.3%	17	37.8%	2.09
Issuing & distributing fraction products	8	17.8%	12	26.7%	25	55.5%	2.38
Inadequacy of material handling equipment skilled operatives	12	26.7%	9	20%	24	53.3%	2.27
Vehicle crowds at warehouse & poor cooperation from drivers	28	62.2%	10	22.2%	7	15.6%	1.53
Volume estimation error & unavailability of items visible on HCIMS	5	11.1%	9	20%	31	68.9%	3.22
Pressure from top management	8	17.8%	25	55.5%	12	26.7%	2.09

Source: own survey, 2020

From the table above, the average mean is 2.28, challenges above this value are considered as of high magnitude and less than this value as mild. But it does not mean they have minimum effect on outbound logistics. The reason some challenges got small value is that the respondent from different departments gave high score only for the challenges of their operations. That is why shared challenges between different departments got highest score. Best example is weak integration links between operational units with mean of 2.58. 34 of the 45 (75.5%) respondents described it strange mountainous. So, for analysis and discussion, value of percentage is used.

4.4 Data Analysis and Discussion

The results of the study obtained from both questionnaires and interview are discussed as follow according to their operational activities.

4.4.1 Challenges of Warehousing Pharmaceuticals

Availability of insufficient warehouses space is major challenge of pharmaceuticals warehousing at EPSA. 51.1% of the respondents described it as strange mountainous or challenge of high magnitude, 33.3% difficult and unpleasant and 15.6% as mild. According qualitative data from interview and observation of investigator, in addition to insufficiency, there are other factors exacerbating this challenge including: availability of large volume of expired and damaged products occupying spaces and different pharmaceutical products being managed in similar warehouses, the available warehouses are scattered in different parts of the city which make them difficult to manage and take time to collect pharmaceutical products during distribution. This challenge is more sound for cold chain items, chemicals & laboratory reagents and medical supplies & equipment which need isolated warehousing and the related management conditions.

Processing & managing mutli-batch pharmaceutical products is the second challenge described as strange mountainous by 42.2%, as difficult and unpleasant by 31.1% and mild by 26.7%. The respondents in interview gave emphasis on managing multi-batch pharmaceutical products, especially for program pharmaceuticals which the agency can't refuse to accept since they are donated for free and have high importance both in price and health care value. They said, most of the time, the products arrive with batches up 100s and take weeks to sort them. Such products consumes resources, time and space during sorting, storing, dispatching and loading for transportation. And, one of the respondents said, such products even have extended impact on products recall in case they have defects since there may be batch mix-up during sorting.

Lack of timely information for the upcoming activities with 22.2% as strange mountainous, 24.5% as difficult and unpleasant, and 13.3% as mild is the other challenge of pharmaceuticals warehousing at the agency. As we observe from the result of the respondents, in general, the information sharing and integration link of inter departments and among the teams of the agency is weak. 75.5% of the respondent rank this challenge as high from different directorates and teams. But

according to literatures reviewed, supply chain requires integration and wholestic approach with understanding of impact of one activity on the other.

Inadequacy of material handling equipment such as hand pallet track, forklifts and their skilled operatives is also among challenges of warehousing of pharmaceuticals at EPSA. 24 Of the 45 respondents (that is 53.3%) described it under challenge of high magnitude. Doing such operational activities with inadequate materials and unprofessional operatives consumes time, result in damage of the equipments and delay of the activities which in-turn slow down the delivery of pharmaceuticals, then the intended purpose may not be achieved. As observed by investigator, bases of some racks in one warehouse of the agency are damaged crushed by forklifts. This results in economical cost, delay in distribution which may cost life of patients and/or force them to stay in pain and sufferings.

Fear of risk of theft is also an outlined challenge of pharmaceuticals warehousing in the agency. All warehouse managers described it as strange mountainous and data from the interviews also acknowledged it. As one of the respondent, the agency has lost huge capital related to security and theft in the last four years because of theft and problems related to security. Four warehouses were subjected to theft, one vehicle totally burned down with products, and three vehicles were stacked and stayed for more than six months and products were stolen related to violence's in the country.

4.4.2 Challenges of Pharmaceuticals Inventory Management

Holding and processing large volume of expired & damaged products, which consume time and space is described as major challenge of inventory management. 37.8% of the respondents described this challenge as strange mountainous, 33.3% as difficult & unpleasant and 28.9% as mild. According to data from interviews, however the agency planted incinerators in different parts of the country, they are not fully functional and giving the intended purpose. Expired and damaged pharmaceutical products are still available in large quantity occupying spaces in the warehouses as observed in all warehouses. Management of such products is more important and need close attention as they are toxic and cause harm if distributed mistakenly.

Failure of conversion of pick list to STV's because of many reasons, is underlined challenge of the inventory management of pharmaceuticals at EPSA. As one of the

respondents replied in written form and observed while pickers are searching products in warehouses, due to unavailability of product in warehouse which are visible on HCIMS already selected on pick list, with specific batch number and quantity is big challenge of the inventory management department. This challenge is also confirmed from the interview as they said the officers prefer to manage the products only on system being at offices. But to make visible corrections and adjustments, physical monitoring of the products is crucial.

Another big challenge of pharmaceuticals inventory management at EPSA is managing & issuing of fraction and mismatching volume-metric products, according data from interview. Because of distributing products in fraction, the agency is inefficient in time management. It cause delayance for pharmaceuticals delivery since the operators are forced to open cartoons, pick and repack them. This challenge is also shared by warehousing as they spend time for opening cartoons, count the products and repack them.

The impact of theft (which was acknowledged from interview) had also extended negative impact on pharmaceuticals inventory management of the agency. This is because, when the products lost from the warehouses, the agency were forced to stop regular operations to undertake unplanned inventory counting. During the period of inventory counting, the agency fail to distribute products stored in the specific warehouse under investigation. One the warehouse of the agency were observed being under such investigation while the study is conducted.

4.4.3 Challenges of Pharmaceuticals Distribution

Volume estimation error and unavailability of items visible on HCIMS, which leads to multiple voiding of STV were also major challenge of pharmaceutical distribution. 68.9% the respondents described the the challenge under strange mountainous 20% as unpleasant and only 11.1% as mild. After the pick lists are printed by inventory management team, some times the products are not available with specific batch and quantity in warehouses due to either location error, batch error or discrepancy. So, the distribution team fail to convert the pick list to STV and deliver the products. Large volume of issued products were observed unloaded in warehouses which in turn

complicate challenges of warehouse and inventory management since they are not located on their appropriate locations.

Inadequacy of material handling equipment such as hand pallet track, forklifts, and their skilled operatives is also major challenge of pharmaceuticals distribution identified. It is a shared challenge for both warehousing and distribution teams. 53.3% the respondents strongly complained the challenge and described it as strange mountainous, as they consume much time to wait the fork lifters to collect the products and make ready the dispatches. As it is confirmed from interview, the operatives are not professionals and assigned to the position, they act only by experience without role and responsibility due to the rigid civil service structure which do not invite competent personnels to the position.

According to data from interview, difficulty of integrating different pharmaceuticals especially cold chain items, chemical and reagents because of their nature and medical equipments because of their size and weight is also threat for pharmaceuticals distribution in the agency. To distribute them separately there is scarcity of resources including suitable vehicles and mostly they are distributed in small quantity, especially cold chain items, chemicals and reagents which leads to under utilization of resources.

They also acknowledge availability of insufficient premises to distribute different pharmaceutical products separately. The agency is distributing drugs (both RDF and program), chemicals & reagents and medical supplies & equipments in combination. Cold vans which are used to transport cold chain items are not available in sufficient quantity and the agency sometimes forced to use inappropriate vehicles especially during campaign which may reduce the potency of the products and decrease the expected results.

4.4.4 Challenges of Pharmaceuticals Transportation

Data gathered for the challenges of pharmaceuticals transportation were in two forms: those collected from the whole respondents including interview from the leaders and those collected from the drivers with Amharic questionnaire. Accordingly, the challenges of transportation of pharmaceuticals starting from loading from central, travelling to hubs and handover to hubs are discussed as follows.

During travelling fear of insecurity and theft is described as major challenge by all drivers responded to the questionnaire and the management bodies. Including the leaders responded to the specific challenge, 97.7% described it as big challenge and 4 of the respondents from the drivers remarked it special challenge which need special attention. This challenge is mainly resulted from security problems in the country because of political transition since four years. One of the respondent by interview said that the agency's vehicles are even considered in some regions as strange which used to transport political materials or weapons and the agency did not work on its image building activities. The investigator of the study observed this challenge while the drivers and assistants sleep in vehicles for fear of theft. There is also delay as the vehicles stop on every gates of towns for security check-ups.

Other challenges identified for transportation of pharmaceuticals are poor vehicle volume versus load size estimation which causes product leftover or under size which leads to increased waiting time to leave for delivery disturbing the schedule. 68.9% of the respondents described this challenge as strange mountainous, 20% as difficult and unpleasant and 11.1% as mild. This challenge leads to extended waiting time to load from central warehouses and unload at hubs due to increased vehicle crowds.

From the resource utilization perspective, data from interviews revealed that vehicle down time at garage and warehouses waiting extended time is the big challenge for pharmaceuticals transportation in the agency. On other hand, scarcity of vehicles for transporting pharmaceuticals is another challenge. They said the agency uses rental vehicles especially when there is bulk transportation of products like during campaign and cross-docks when the product arrive in bulk quantity, to push them to hubs and regions.

In addition, managing large volume of documents as they transport both program and RDF pharmaceuticals at a time, were also other challenge of pharmaceuticals transportation according to one of the respondent in interview. It was observed that handover of pharmaceuticals take extended time between warehouse managers and drivers as they handle large volume of documents. There was also disagreement on discrepancy between them on one hub.

All the drivers replied that they did not trained on pharmaceuticals handling and special care for the product. But from the literature review, we understood that

pharmaceuticals need special caring conditions during transportation. One of the writer of the literatures reviewed in this study said that pharmaceuticals transportation is the extended activity of warehousing. Pharmaceuticals are highly susceptible to time and environmental conditions such as temperature, humidity and moisture so that they need special caring conditions and their delivery should be on time of need as there may be lose of lives because of delay.

Other challenges acknowledged from interview are :

- Inconsistent data visibility and consumption. This resulted from disparities of description of physical items, the documents and PO on description, strength, composition, batch and expiry of the products.
- Poor cooperation from supportive staffs like human resource management, general service to substitute employees leaving the agency, arranging training and providing materials needed to accomplish activities.

4.4.5 Features of Pharmaceutical Products Contributing to Difficulties in Outbound Logistics

According to many of the literatures reviewed under chapter two, pharmaceuticals have different characteristics which makes them difficult to handle. Accordingly, targeting to identify such specific features of different pharmaceutical products which makes challenging during outbound logistics, the study has identified the following features of different pharmaceutical products included in the agency’s outbound logistics operation.

Table 4.4.5: Features of pharmaceuticals Products that Makes Them Challenging

Item	Feature of the product that makes challenging the specific item
Non Cold Chain Drugs	multiple batches which takes time to sort during receiving & issuing
	Poor labeling and poor packaging materials
	mismatch of Product vs document for quantity and batch
	Description and composition non conformance

Cold chain items	Electric power interruptions in warehouses
	Inadequacy of cold-vans
	Warehouse space shortage
	Damage and high expiry rate
Lab. reagents and chemicals	Poor packaging and labeling materials
	Lack of separated warehouse, professional and vehicles for storage, handling and transportation
	Receiving and managing of products with short life span and near expiry dates
	Difficulty to integrate with other pharmaceuticals products during transportation
Medical supplies and Equipment	Improper labeling and specifications
	Incomplete arrival of equipments (especially parts) which leads to stay in warehouses for extended period of time
	Lack of separated warehouses and professionals who handle them in warehouses
	Having large volumes and heavy weights which makes them difficult to unload, store, load and transport
	Delayed inspection and distribution accordingly

Source: own survey, 2020

The challenges presented in table 4.3 are discussed as follows:

i. Non Cold Chain Drugs

- Most of the time they arrive in multiple batches which takes time to sort during receiving and issuing- especially program pharmaceuticals arrive in bulk quantity and multiple batches (up to hundreds). This problem has extended negative impact starting from sorting during arrival to loading during dispatching and

handover at hubs. They also complicate the logistics operation as there are chances of mixing of batches.

- Non conformance between documents and the products. Pharmaceuticals logistics or supply chain is highly dependent on its documents and equal attention is given as its products. But sometimes, there is non conformance between the physical products and the documents. There is non conformance of formulations, strength and unit of the product as per PO and to correct such non conformance it takes time and the product stay in warehouse for prolonged time occupying the warehouse spaces.

ii. Cold chain Items

- Electric power interruptions in warehouses is a big challenge for cold chain items especially when the generators fail to start when there is no electric power. There is no technician assigned for specific purpose, and some times the warehouses may await power for more than 2 days. This decreases the effectiveness of the products and cause damage to the products so that they are discarded.
- The agency has only three cold warehouse at central, but is the only agent to supply all cold chain items in the country. All donated vaccines, hormonal drugs and other cold chain program items are distributed by the agency. So, there is big challenge in space shortage and some times these items are stored and transported in sub standard conditions.
- During transportation, such products can't be integrated with other products because of their nature and in conditions like need for small quantity, the agency is forced to transport them with in economical conditions. On other hand, the available cold vans are not sufficient to deliver products to hubs especially during campaigns.

iii. Laboratory Reagents and Chemicals

- Packaging and labeling materials of laboratory reagents & chemicals are so poor and some times damaged by the chemical themselves. This cause difficulty to distribute them and mostly damaged in warehouses.
- The warehouses for storage of such products, professionals who manage them and vehicles used to transport them are not separated and they are managed with

other products. Due to their fluidity nature, some times they leak and damage the other products.

- Laboratory reagents and chemicals mostly have short life span, and they arrive with near expiry dates. Especially, for program items, the agency can't refuse to accept them, and as a result, forced to manage products which are going to be disposed without giving purpose.
- Some of them are radioactive substances which are hazardous to environment and difficult to dispose in the country with available technologies. So, they stay in warehouses for extended period of time waiting the reverse logistics occupying spaces and being risks for the health conditions of warehouse managers and operatives.

iv. Medical Supplies and Equipments

- Improper labeling and specifications- medical equipments are complex and have detailed specification which are very difficult to understand. And unfortunately, they are not primarily managed by biomedical engineers at the agency.
- Most of the time, medical equipments arrive with incomplete parts. As a result, the agency can't distribute them to health facilities to give the intended purpose. They stay in warehouses for extended period of time occupying the warehouses' space.
- The warehouses they stored in and professionals who handle them are not segregated. They are being handled by pharmacy professionals along with drugs which make them very challenging pharmaceutical products at the agency.
- Because of their large volumes and heavy weights medical equipments are difficult to unload, store, load and transport
- Delayed inspection and distribution accordingly - as the warehouses are managed by druggists, they have no detailed knowledge and skills to inspect and manage medical equipments. Biomedical engineers from other department inspect the product after they already received at warehouses, and mostly this is not done on time and cause delayed distribution.

CHAPTER FIVE

SUMMARY OF MAJOR FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

This chapter mainly describes summary of the findings, conclusions drawn from the findings of the study and the way forward for improvement of pharmaceuticals outbound logistics of EPSA. From the beginning, the target of the study is to investigate challenges of pharmaceuticals outbound logistics, which have negative impact on delivery of the product and hence decrease the order fill rate as set under conceptual framework of the study. The community at large benefit from the study once the agency working on the challenges identified and improve its performance.

5.1 Summary of Major Findings

The results of pharmaceuticals outbound logistics challenges presented in chapter four are summarized as follows:

From the comparison of challenges of different activities of outbound logistics, transportation challenges got high magnitude with uniform score from the respondents. 100% of the respondents gave max score for the challenges related to risks of security. It was also highly acknowledged by the leaders responded on interview.

Availability of insufficient warehouse spaces and scattered presence of the available warehouses also major challenge of pharmaceuticals outbound logistics at EPSA. This challenge is acknowledged from leaders as more sound for cold chain items, chemicals & laboratory reagents and medical supplies & equipment which need isolated warehousing and the related management conditions.

From the result of the study, processing & managing multi-batch pharmaceutical products is a big challenge for the agency. It is a mainly challenge of warehousing and distribution but has also extended impact on the other two operational departments.

Inadequacy of material handling equipment such as hand pallet track, forklifts and their skilled operatives is shared challenge for both warehousing and distribution of pharmaceuticals at EPSA, again with extended impact on the others, that is delayance.

Failure of full conversion of pick list to STV due to poor volume estimation which cause left over during loading of pharmaceuticals is also among identified challenges

of pharmaceuticals distribution in the agency with impact on warehousing and inventory management.

As data obtained from interview, the major challenges of inventory management of pharmaceuticals are more related to system and physical product non conformance. This happens because of many factors including inappropriate product location, movement of products to bulk locations, errors during receiving, poor perpetual inventory, and results in delay of the delivery of the products. Discrepancy (shortage) is also another major cause for such challenges.

Similarly, difficulty in finding the products listed on pick lists in warehouses with appropriate batches and quantity is also identified challenge of pharmaceuticals distribution. This is mainly because of poor inventory management. Sometimes products with similar description are issued regardless of considering their batches which leads to availability of product in warehouses with wrong batch.

Difficulty of integrating different pharmaceutical products during distribution because of their nature and inability to segregate such products during storing and inventory management were also the major challenges of distribution and warehousing respectively according to data from the interviews.

From the resource utilization perspective, vehicle down time at garage and warehouses which results in extended waiting time is the big challenge for pharmaceuticals transportation in the organization.

Handling of pharmaceuticals by nonprofessional drivers even who do not trained basic pharmaceuticals handling and importance of delivering the products on time is another challenge observed at the agency. Pharmaceutical products are susceptible to environmental conditions such temperature, humidity and moisture so that they need special caring conditions. Their delivery should be on time of need as there may be lose of lives because of delay.

Time taken during handover with multiple documents from site of loading, that is from central warehouse managers to drivers and unloading, back to hubs' warehouse managers is also another challenge of pharmaceuticals transportation.

As obtained from many respondents the information sharing and integration link of inter departments and among the teams of the agency is weak. Furthermore, poor packaging and labeling, description/product non conformance, electric power interruptions, incompleteness, inspection expertise problems, human factors such as lack of commitment, skill gap, attitude, accountability and poor strategy are among challenges of pharmaceuticals outbound logistics in the agency.

5.2 Conclusions

Based on the results of the study, the conclusions drawn are discussed below:

- There is weak integration links and poor network between the two directorates and the teams with in the directorates involved in the pharmaceuticals outbound logistics.

From the questionnaire itself every individuals in the team focused on their department's operations and not much concerned for the other departments' activities. Every one gave high score for challenges of their department and less for the other departments'. But supply chain, and hence logistics's efficiency and effectiveness is interlinked by nature. Weakness of one unit contribute for failure of the other in the chain and every one need to understand the impact of its unit's activity on the next operation.

Due to weak and ineffective link with inbound departments, some non conformance between documents and products, PO and physical products, incorrect descriptions of items have extended negative impact on outbound logistics operations.

- Another point to conclude from the study is that the agency has limitations in warehousing spaces and even the available one's are mostly rental and scattered.

Currently the agency has only six centralized warehouses and use rental warehouses in the city, but managing huge products as it is the only government agent to supply pharmaceuticals in the country. Despite of limitation, the available rental warehouses are scattered and difficult to manage.

- Managing different pharmaceutical products in similar warehouses is also big challenge to smooth operations of outbound logistics.

In addition to limitation, the warehousing and inventory management of the agency is also poor. Different pharmaceutical products like drugs, laboratory reagents and chemicals, medical supplies and equipment are being managed in similar warehouses with only pharmacists and druggists who do not have deep knowledge on chemicals, laboratory reagents, supplies and medical equipments.

- There is also limitation in material handling equipment and their skilled operatives. Labour flow and lack of commitment from such areas is also high since it is not attractive in terms of payment.

However it is public institution, most EPSA's operations are technical which need qualified operators to run activities both in skill and labor. But the current positions are not attractive payment wise and there is high labor flow from the agency and the department, especially warehousing. Once excel and capable to run the activities, the employees are not interested to stay there and the agency is forced to replace them with non capable and non experienced ones.

- Another possible point to conclude is the commitment of the employees being involved in working area is low because of preferential treatment among the employees of the agency.

From the result of the study, it is possible to conclude that the employees of outbound department have complain on fair treatment among employees of the agency. Training programs are not arranged for officers being involved in outbound logistics and are given less attention compared to other departments.

- With the existing situations in the country, fear of security and theft is is growing as major risk for the outbound operations of the agency.

The insecurity situations and violence in the country related to political transition in the country, fear of security is the major challenge of pharmaceuticals transportation and warehousing.

- The agency has shortage of premises like vehicles for cold chain items and these challenge has big impact on its operations as cold chain products (like vaccines and hormonal drugs) need special attention with regard to their importance and interests of the donors.
- Despite planting incinerators in many parts of the country, the agency didn't dispose most of its damaged and expired products.

As discussed in results of the study, there are still high accumulation of damaged and expired products in warehouses of the agency being obstacles to the outbound operations. To solve this challenge, the agency has planted incinerators in different parts of the country. But as they are not giving service as intended, the products are still available in warehouses.

- The transportation of pharmaceuticals in Ethiopia is being carried by non professional drivers who even not trained basic pharmaceuticals handling and their importance in health caring service.
- However the agency is implementing new initiatives to improve its operations, the agency has still some bottlenecks which slow down improvements. And, human factors share high from these bottlenecks

5.3 Recommendations

Based on the results obtained from the study and conclusions drawn, the following recommendations are forwarded for the improvement of pharmaceuticals outbound logistics of Ethiopian Pharmaceuticals Supply Agency

- ✓ To improve and strengthen the network links between directorates and teams, restructuring is very important.

The current team structure is separate and not suitable environment for cooperation. Teams being involved in similar activities like warehousing, managing the inventory & distributing pharmaceuticals work only their own operations being at separate rooms. To avoid such problem, the agency better rearrange or redesign the team structure. For example, they can make new team selecting employees from different

department like warehousing, inventory management and distribution to manage only selected categories of activities like RDF pharmaceuticals and the other to manage program items.

- ✓ To improve its warehousing capacity, the agency better construct new centralized, but segregated warehouses especially for chemicals, laboratory reagents, medical supplies and equipments in certain location near or in Addis Ababa and use the currently available warehouses only for drugs.. Currently the agency has only six warehouses at central and mostly use rental warehouses which are scattered.
- ✓ The inventory management of the agency need some improvements related to physical monitoring of the products to undertake appropriate error corrections and adjustments.
- ✓ Most of the agency's activities are operational which need technical skills and consume labor, but the agency still led by civil service code of conducts and fail to attract employees and run its operational activities especially which need technical and labor costs. So, to solve such challenges and be able competent, the agency better search for other options like changing its structure to corporate company so that it improves its negotiating power with employees.
- ✓ One of the identified challenge of the outbound logistics is lack of commitment, even the employees themselves underlined this challenge and pointed out the reason for this as preferential treatment and lack of attention for outbound logistics. So the agency better give attention for all working areas and fair treatment for all employees to build trust and commitment.
- ✓ Another challenge of the agency especially while transporting pharmaceuticals is security risks.

As data obtained from drivers clarify, in some regions of the country the agency's vehicles are considered as strange and they are mostly not aware of their purpose. So the agency should work on its image building and create awareness to let the community knows it supplying pharmaceuticals to save their lives. Further, the agency better work in collaboration with regions to secure such challenges

- ✓ The agency should give attention on distribution of cold chain items and enough availability of cold vans as they distribute program pharmaceuticals including vaccines donated from international donors. These products need special care to reach the community safely and timely.
- ✓ As it is already discussed in conclusion, the incinerators planted by the agency in different parts of the country are not functioning and disposing damaged and expired products which occupy much of the warehouse spaces. The agency need to assess the bottlenecks and strengthen its reverse logistics and green its operations which contribute to have spaces in warehouses and reduce risks and damages that can be resulted by such products.
- ✓ To combat handling and transporting of pharmaceuticals by non nonprofessional drivers the agency better use the following recommendations step-by-step
 - A. Training and certifying the existing drivers so that they will have know how on basic handling of pharmaceuticals and they are aiding delivery of products which saving lives
 - B. Recruiting delivery pharmacy professionals or druggists who facilitate the operation being with drivers
- ✓ Strengthening the integration link with inbound especially with contract administration unit to have timely information on upcoming activities and procurement to solve specification issues and non conformance of products with their documents and descriptions of items as per PO.
- ✓ The agency better give emphasis on capacity development and reshaping of the employees attitude to gain more potential from them.

5.4 Limitations and Future Research Directions

- ❖ The study has not addressed challenges of pharmaceuticals outbound logistics at regional hubs. But to find more challenges and draw complete conclusion at country level, deep investigation of all EPSA branches and the outbound logistics of pharmaceuticals from hubs to health facilities will be required.

- ❖ Corona virus pandemic caused difficulty to get data from leaders as they were busy because the agency is the logistic centre for the infection.
- ❖ Lack of volunteerism to give data through interview from some respondents, but fortunately there was shift of positions for such individuals during data collection.
- ❖ As the agency is under reform and implementing new initiatives for change and the study area is given special attention. So it will be fertile ground for further study in the future.

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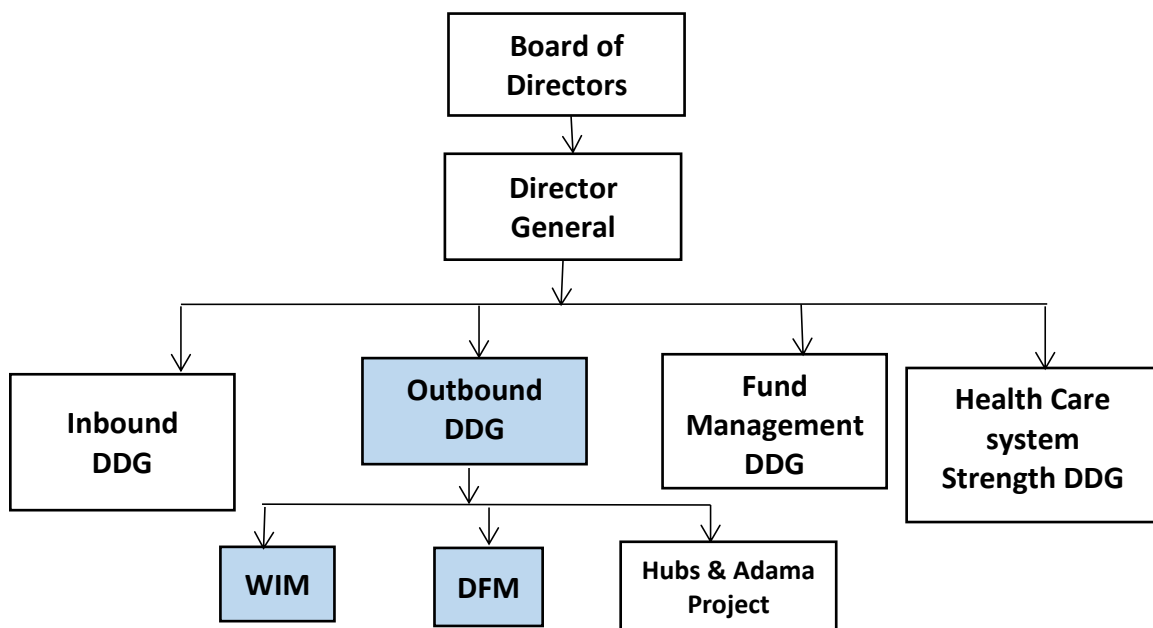
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APPENDICES

1. Organogram of the Organization

The management structure of EPSA central was re arranged in 2019 in to four Deputy Director Generals led by Director General. They include: Inbound DDG, Outbound DDG, Fund Management DDG and Health Care System Strength DDG. There are two directorates under the Outbound DDG which are being involved in outbound logistics operation of pharmaceuticals, WIM & DFM. There are four teams under the two directorates for the outbound logistics operations and coordinated as a department or team. These includes: warehousing team, inventory management team (both under WIM), distribution team and fleet management team (both under DFM).

The following Diagram shows the hierarchical structure of the study focus



2. Interview Checklist

1. How long have you been working in the position? (optional)

2. How do you express leading pharmaceuticals outbound logistics, is it a bit challenging?

3. If your answer to question number 2 is yes, please would you tell me some general points which makes the outbound logistics challenging?

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4. Please would you mention some major challenges you encounter on the pharmaceuticals outbound logistics at the following specific operation areas?

A, warehousing

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B, Inventory Management

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C, Distribution

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D, Transportation

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5. With regard to current Ethiopian political environment (instability and insecurity), how do you discuss its challenging effect on pharmaceuticals outbound logistics?

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6. Effective communication is a vital component to successful supply chain management (River Logic, 2018). How do you define the team spirit and information sharing among the directorate/s and teams you lead? Please discuss positive and negative impacts they had in your experience (if any) ?

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7. The end goal of supply chain and/or logistics is to satisfy a customer (Umair,2019). And fortunately, you are leading a public pharmaceuticals outbound logistics which intended to save lives. How you discuss your customer satisfaction, do you think your agency striking its target?

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8. In addition to measuring customer satisfaction there are also other variables which can measure the effectiveness of outbound logistics including order fill rate, percentage of availability of products, product expiration rate and stock out

percentage. Please would you discuss the order fill rate, percentage of stock out and availability especially for essential medicine in Ethiopia with some improvements over the last few years?

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9. How do you observe the staffs effort against pharmaceuticals logistics outbound challenges? Do they report on time when they encounter difficulties? And how do you discuss the role of individuals and teams with regard to challenges of their own operation areas?

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10, If there is any point you think un addressed with regard to pharmaceuticals outbound challenges, please you can add on

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Thank You !

3. Questionnaire

**Addis Ababa University, College of Business and Economics, School of
Commerce, Department of Logistics and Supply Chain Management**

Dear/Sr, I am Temesgen Senbeta conducting a study entitled “Challenges of Pharmaceuticals Outbound Logistics in Ethiopia: The Case of EPSA” for the Partial fulfillment of Requirements of Masters Degree of Art in Logistics and Supply Chain Management. Accordingly, the following questionnaire is developed to gather information on challenges you and your directorate face on pharmaceuticals outbound logistics. Please you are kindly requested to provide information required to assess challenges in your working area. Ethically, all information provided shall be treated as confidential and used only for academic purpose.

I. Profile of the respondent - Please tick (✓) or Provide your own answers where applicable.

1. Gender: - Male - Female

2. Age in years: < 20 21-30
31-40 >40

3. Educational Background:

A. Field of study:- MA in LSCM B.Pharm Pharmacy Diploma

Laboratory Technologist Biomedical Engineer

B. Year of Experience:- less than one year 1-5 years

5-10 years >10 years

C. Position Status:- Coordinator Officer W/H Manager

II. Information on Challenges Assessment

1. How do you describe the challenges in your specific working area? Please indicate with (✓) your view

S. No	Description of Challenges	Mild	Difficult & possibly unpleasant	Strange Mountainous
1	Insufficient warehouses space			
2	Processing & managing multi-batch pharmaceutical products			
3	Lack of timely information for the upcoming and next activity			
4	Weak integration links between teams & directorates			
5	Fear of security and theft			
6	Pressure from top management			
7	Holding and processing large volume expired & damaged products			
8	Managing and processing fraction and mismatching volume-metric products			
9	Inadequacy of material handling equipment such as hand pallet track, forklift and their skilled operatives			
10	Vehicle crowds at warehouse & poor cooperation from drivers			
11	Volume estimation error and unavailability of items visible on HCIMS			

2. What other challenges do you face on your daily outbound operations other than those mentioned on the previous page? Please list them, if there are some, according to their impact on your routine activities, and block the lines if you don't think no more challenges left from the previous table under question 2

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3. What special feature makes the following pharmaceutical items more challenging during warehousing, inventory management and distribution? Please list some points

Item description	Feature that makes challenging the specific item during your operation
Drugs	
Cold chain items	
Laboratory reagents and chemicals	
Medical supplies and Equipment	

4. How do you describe responses of leaders, team members and other responsive bodies to your complaint for solving challenges in your agency? Please indicate with (✓) your view in the boxes provided.

-Responsive Not timely Poor Unresponsive

5. Effective distribution management is the integral result of 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 (WHO 2006). If you think your logistics is not effective, which factor affects most? Indicate with numbers from 1-6 based on their magnitude.

Poor strategy	Lack of accountability	Insufficient transport arrangement	Poor stock record management	Inadequate warehousing facilities	weak network

6. EPSA is implementing some initiatives such as centre of excellence, floor maintenance, quick-win initiative, implementing GPS & security camera etc to improve its operations. To what extent these initiatives improving challenges of the outbound logistics? Indicate your view with (✓)

- Extremely improving To some extent Not as much

7. If your answer to question number 6 is “not as much”, what factors you think hindering the initiatives not going as planned? Indicate your view with (✓). You can tick more than one and specify your adds on the space provided.

Lack of awareness	
Lack of commitment	
Skill gap	

Thanks for Your Cooperation!

4. Questionnaire for Drivers (Amharic Version)

የአሽከርካሪዎች መጠይቅ

በመድሃኒት ክምችትና ስርጭት ላይ የሚያጋጥሙ ተግዳሮቶችን ለመጥናት የተዘጋጀ መጠይቅ

የአሽከርካሪው የግል መረጃ

ዕድሜ በኤጄንሲው የአገልግሎት ዘመን

የመንጃ ፈቃድ አይነትና ደረጃ

1. ኤጄንሲው እርስዎን በሚያሰራበት ወቅት በሚከፍሉት ደሞዝ፣ አበልና ጥቅማጥቅም ምን ያህል ደስተኛ ነዎት? እርካታዎን በቀረበልዎ ሳጥን ወስጥ በምልክት (✓) ያሳዩ

በጣም ደስተኛ

መካከለኛ

መጠነኛ

2. መድሃኒቶችንና የህክምና ግብዓቶችን ለማጓጓዝ በቂ የግንዛቤ ስልጠና አግኝተዋል ያወቃሉ ?

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አላወቅም

3. በመድሃኒት ስርጭት ወቅት ከሚያጋጥሙ ችግሮች ለየትኛው ትልቅ ክብደት ይሰጣሉ?

(እባክዎ እንደችግሩ ክብደት ከ 1-4 ይስጡ ፤ ከተጠቀሱት ችግሮች ለርስዎ ብዙም አሳሳቢ ያልሆነ ካለ ዜሮ ይስጡ ፤ ሌላ መጨመር ከፈለጉ በመጻፍ ተመጣጣኝ ክብደት ይስጡ)

ተ.ቁ	ተግዳሮቶች	ክብደት
1	በመጫን ጊዜ ያለ የተንዛዛ አሰራር	
2	በመንገድ ላይ ያለ የደህንነት ስጋት	
3	በማራገፍ ወቅት የሚያጋጥም የተንዛዛ አሰራር	
4	ከአበል ክፍያና ወስጣዊ አሰራር ጋር የተያያዘ አለመመቻቸት	

4. መድሃኒቶችን በሚጭኑበት ወቅት ያሉትን ተግዳሮቶች በደረጃ ያስቀምጡ (እባክዎ እንደችግሩ ክብደት ከ 1-4 ይስጡ ፤ ከተጠቀሱት ችግሮች ለርስዎ ብዙም አሳሳቢ ያልሆነ ካለ ዜሮ ይስጡ ፤ ሌላ መጨመር ከፈለጉ በመጻፍ ተመጣጣኝ ክብደት ይስጡ)

ተ.ቁ	ተግዳሮቶች	ክብደት
1	የማስጫኛ ሰነድ ሲበዛ ለረጅም ጊዜ ወረፋ መጠበቅ	
2	ከመጋዘን ኃላፊዎች ጋር በርክክብ ወቅት ያለ አለመግባባት	
3	የመኪናና የጭነት መጠን ባለመጣጣም የሚከሰት እንግልት	
4	የአበል ክፍያ መዘግየት	

5. መድሃኒቶችን በሚያንገቡበት ወቅት ያሉትን ተግዳሮቶች በደረጃ ያስቀምጡ (እባክዎ እንደችግሩ ክብደት ከ 1-4 ይስጡ ፤ ከተጠቀሱት ችግሮች ለርስዎ ብዙም አሳሳቢ ያልሆነ ካለ ዜሮ ይስጡ ፤ ሌላ መጨመር ከፈለጉ በመጻፍ ተመጣጣኝ ክብደት ይስጡ)

ተ.ቁ	ተግዳሮቶች	ክብደት
1	የመንገዶች አለመመቸት (ፒስታ : ጠመዝማዛ ወዘተ)	
2	የሌብነትና ዝርፊያ ስጋት	
3	የፀጥታ ስጋት	
4	መንገዶች ላይ ባሉ ፊተሻ ኬላዎች የሚደርስ መጉላላት	

6. መድሃኒቶችን በሚያስረክቡበት ወቅት ያሉትን ተግዳሮቶች በደረጃ ያስቀምጡ (እባክዎ እንደችግሩ ክብደት ከ 1- 4 ይስጡ ፤ ከተጠቀሱት ችግሮች ለርስዎ ብዙም አሳሳቢ ያልሆነ ካለ ዜሮ ይስጡ ፤ ሌላ መጨመር ከፈለጉ በመጻፍ ተመጣጣኝ ክብደት ይስጡ)

ተ.ቁ	ተግዳሮቶች	ክብደት
1	ለማራገፍ ቀናትን የሚወስድ ወረፋ መጠበቅ	
2	በርክክብ ወቅት ከመጋዘን ኃላፊዎች ጋር በጉድለትና ባች አለመመሳሰል ጋር በሚያያዙ አለመግባባቶች	
3	በሰነድ ርክክብ ወቅት ያለ መዘግየት	
4	የሰዎች አመለካከት	

7. መድሃኒቶችን አስረክበው በሚመለሱበት ወቅት ያሉትን ተግዳሮቶች በደረጃ ያስቀምጡ (እባክዎ እንደችግሩ ክብደት ከ 1-3 ይስጡ ፤ ከተጠቀሱት ችግሮች ለርስዎ ብዙም አሳሳቢ ያልሆነ ካለ ዜሮ ይስጡ ፤ ሌላ መጨመር ከፈለጉ በመጻፍ ተመጣጣኝ ክብደት ይስጡ)

ተ.ቁ	ተግዳሮቶች	ክብደት
1	በተለያዩ ምክንያት ተመላሽ በሚሆኑ መድሃኒቶች በፊተሽ ኬላ ላይ መጉላላት	
2	የተመላሽ ዕቃ ሰነዶችን 'STV' ለማሰራት ከመጋዘን አያያዝ ባለሙያዎች ቶሎ ምላሽ አለማግኘት	
3	ተመላሽና ግድፈት ያለባቸውን መድሃኒቶች ለመጋዘን ሃላፊዎች መልሰው መተማመኛ ማግኘት	

አመሰግናለሁ !