ANALYSIS OF SUPPLY CHAIN MANAGEMENT PRACTICES & OPERATIONAL PERFORMANCE OF KEY TRACER DRUGS AND SUPPLIES IN PRIVATE AND NGO's MATERNAL AND CHILD HEALTH CENTERS IN ADDIS ABABA, ETHIOPIA: COMPARATIVE STUDY

BY

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This is to certify that the thesis is prepared by Biniyam Takele, entitled Analysis of Supply Chain management practices & Operational Performances of Key Tracer Drugs & Supplies in private & NGO's MCH centers in Addis Ababa, Ethiopia: Comparative study in partial fulfilment of the requirements for masters of Arts in Logistics and supply chain management with the regulation of the University.

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Declaration

I, Biniyam Takele, hereby declare that this research paper entitled "**Analysis of Supply Chain management practices & Operational Performances of Key Tracer Drugs & Supplies within private & NGO's MCH centers in Addis Ababa, Ethiopia: Comparative study"** is my original work and has not been used by others for any other requirements in any other university and all sources of information in the study have been appropriately acknowledged.

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Statement of certification

This is to certify that **Biniyam Takele** has carried out his thesis on the topic entitled *"Analysis of supply chain management practice & operational performances of KTDS within private and NGO MCH centers found in Addis Ababa Ethiopia: a comparative study".* He has conducted this thesis under my guidance and supervision. The study is his own original work and suitable for submission of the award of MA in Logistics and supply chain Management.

Advisor: _____

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Biniyam Takele

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Acronyms & List of Abbreviation

FMHACA:	Food, Medicine and Health Care Administration and Control Authority
FMOH:	Federal Ministry of Health
HAI:	Health Action International
HSDP	Health Sector Development Program
HSDP:	Health Sector Development Program
INGO:	International Non-Government Organization
IPLS:	Integrated Pharmaceutical Logistics System
JSI:	John Snow Inc.
KTDS:	Key Tracer Drugs & Supplies
LMIS	Logistics Management Information System
MCH:	Maternal and Child Health
MOH:	Ministry of Health
MSH:	Management Science for Health
NGO:	Non - Governmental Organization
PFSA:	Pharmaceuticals Fund and Supply Agency
SCM:	Supply Chain Management
SCMOP:	Supply Chain Management Operational Performance
SIAPS:	Systems for Improved Access to Pharmaceuticals and Services
SOP:	Standard Operating Procedure
USAID:	Agency for International Development
WHO:	World Health Organization
ROI:	Return on Investments

Abstract

This research was conducted in an attempt to investigate the status of supply chain management practice (measured in terms of four dimensions, namely procurement practice, Inventory management practice, warehouse storage practices and transportation practices) and its relationship with Supply Chain Management operational performance in Maternal Child Health centers both the private & Non-Governmental Organizations in Addis Ababa Ethiopia. Owning to the small number of the total population, the study had employed census survey to quantitatively & qualitatively assess the supposed relationship between the dependent and independent variables. Questionnaire was used as the formal instrument of data collection. A total of 50 questionnaires were distributed and 47 of them were filled and returned which made the response rate about 94 percent and of which all of them were found complete and hence qualified for being processed. The study findings show that the levels of supply chain management practices and supply chain management operational performance of Private Maternal Child Health centers are at improved level than that of Non-Governmental Organization's Maternal Child Health centers which is at moderate level as the perceived evaluation of the respondents reply. It has also revealed that, though all of the dimensions of Supply Chain Management practices have statistically significant positive relationship with Supply Chain Management operational performance. Transportation practices was found to have no statistically significant predictive power on Supply chain management operational performance of Maternal Child Health centers, while the remaining three dimensions have found to have a statistically significant predictive power on Supply Chain Management operational performance of Maternal Child Health centers. It is recommended that all Maternal Child Health centers especially in Non-Governmental Organizations are required to review their existing Supply Chain Management practices. In addition, they have to make the necessary modifications in order to benefit from the performance improvements in terms of improved quality, swift delivery time, reduced total cost of Supply Chain Management, and volume & mix flexibility of Key tracer drugs and supplies and satisfaction of customers.

Keywords: Supply, chain, Key, tracer, drugs

CHAPTER ONE

1. INTRODUCTION

This research is focused on Supply Chain Management practices & Supply chain management performances of key tracer drugs and supplies within private and NGO Maternal child health centers found in Addis Ababa, Ethiopia. It consists five Chapters. Chapter 1 Introduction contains Background of the study, statement of the problem, Objective, Research question, Scope of the study, Operational definitions, Significance of the study and organization of the study.

1.1 Back ground of the study

Supply chain management is an integrated approach beginning with planning and control of materials, logistics, services, and information stream from suppliers to manufacturers or service providers to the end client; it represents a most important change in business management practices (Fantazy KA. *etal*.,2010). Everyone agrees that effective supply chain management can provide a major source of competitive advantage. The goal of a supply chain manager must therefore be to link the end customers, the channels of distribution, the production processes and the procurement activity in such a way that customers' service expectations are exceeded and yet at a lower total cost than the competition It is one of the most effective ways for firms to improve their performance (*Ou CS. etal.,2010*).

SCM includes a set of approaches and practices to effectively integrate suppliers, manufacturers, distributors and customers for improving the long-term performance of the individual firms and the supply chain as a whole in a cohesive and high-performing business model (Chopra S, & Meindl P 2001). A successful SCM implementation is expected to enhance the relationship between upstream suppliers and downstream customers, and thereby increase customer satisfaction and firm performance. Prior research has indicated SCM as a key driver of firm performance (Wisner, J. D., *etal* 2010).

Each person who works in supply chain management systems (SCMS) must remember that s/he selects, procures, stores, or distributes products to meet customer needs. The logistics system ensures customer service by fulfilling the six rights. Each activity in the logistics cycle, therefore, contributes to providing excellent customer service. The situation where customers and service provider can choose, obtain, and use medicines and other health commodities when and where

they need them for prevention, diagnosis, treatment, and care is the one that SCM can provide. The whole supply chain activities in public health are for saving lives and/or improving the health status of the people. (John Snow Inc. /DELIVER, 2006)

The Pharmaceutical procurement system is a major determinant of drug availability and total health costs. Drug purchases represent the single largest health expenditure after personnel costs. An effective procurement process ensures the availability of the right drug in the right quantities at reasonable prices, and at recognized standards of quality. Storage and distribution costs are a significant component of a health budget and transportation costs can represent several times the value of the drugs distributed to remote locations. Designing a system for storing and distributing drugs, medical supplies and equipment is complex and important. (WHO, 2003b)

The increasing challenges in the judicious use of scarce resources make it imperative that the necessary mechanisms are put in place in time to ensure the desired efficiency and quality in health care delivery. It is essential that procurement and distribution activities be performed by trained staff using sound procedures, working in adequate offices with good communications and with access to reliable inventory and consumption information. (WHO, 2003a)

1.1.1 Over View of Maternal & Child Health system

MCH centers are special centers where maternal & child health care is practiced including obstetrics, gynecological, Neonates & child health. In Ethiopia only 18 private and NGO MCH centers which are active and registered by EFMHACA, from those 16 are in Addis Ababa, 13 Private & 3 NGO MCH centers, (FMHACA, 2018).

Where a woman gives birth should not decide her fate, especially when affordable, effective medicines to treat and prevent the leading causes of maternal deaths excessive bleeding after childbirth and seizures during pregnancy exist. Still, nearly 290,000 women, 99 percent of whom live in developing countries, die each year from causes related to pregnancy and childbirth. (Kristy K, Lindsay M, 2012)

At the heart of good maternal health care is a set of three basic, low-cost, but essential medicines: oxytocin, misoprostol, and magnesium sulfate. For less than US$1 each, these three medicines have the potential to save lives and help protect the well-being of mothers and their babies whose health is inextricably linked. (Kristy K, Lindsay M, 2012).

Maternal health medicines are safe, effective, and essential to keeping women healthy throughout pregnancy and childbirth. But little is known about the supply, demand, and use of these products because very little relevant data exist, particularly in developing countries. Without this information, local health systems cannot accurately budget or predict demand, organizations that procure maternal health medicines from national and local governments to nongovernmental organizations do not know how many lifesaving doses to purchase, and manufacturers do not know how much medicine to produce. This cycle leads to frequent stockouts and endangers the health of women across the developing world. (John Snow Inc. /DELIVER, 2006)

1.1.2 Overview of Pharmaceutical Supply Chain System

Pharmaceuticals represent a large portion of the costs in the healthcare system. They account for 20–60 Percent of health spending in developing and transitional countries (Cameron *et al*., 2009). More than that, shortages of essential medicines, and spending on unnecessary or low-quality medicines also have a high cost wasted resources and preventable illness and death (Islam, 2007). Pharmaceutical SCM /logistics/ system typically includes a number of activities such as selection, forecasting, procurement, inventory management, and serving customers that supports the six rights, the right goods in the right quantities and in the right condition delivered to the right place at the right time at the right cost (John Snow Inc. /DELIVER, 2004)

Assuring the quality and availability of these pharmaceuticals at all levels of the health system requires effective pharmaceutical management for each of the following functions: product selection, procurement, distribution, and use. Each function must be supported by a policy and regulatory environment that promotes the equitable supply of high-quality products. (Charu & Swantra, 2004).

The rapidly growing private sector without adequate collaboration, regulation and control is a major challenge to the health sector. This has led to duplication of efforts in many instances and an inordinate urban/rural distribution of basic services. Indeed, although the private sector sees a significant proportion of patients, their involvement in the planning and decision-making process of the ministry is very limited. In the same context the utilization of primary services and the acceptance of the essential medicines concept have not been actively promoted. (Sheena P, Timothy A & Beth Y,2012)

The current Ethiopian health care system is guided by a National Health Policy which was issued in 1993 following changes of government in 1991 (MOH, 1993a). The policy was the first of its kind in the Ethiopia in a sense that it incorporates elements of democratization, decentralization, inter-sectorial collaboration, collaboration with neighboring countries, and promotion of the participation of the private sector in health care. The policy also calls for the promotion of occupational health and safety, environmental health and the extension of health services to pastoralists and other rural populations, the urban poor and victims of manmade and natural disasters (MOH, 1993b)

In response to high burden of ill health and high rate of mortality in the country because of poor access to health services and complex health system, the Ethiopian government has sought to reform the health service system into a cost-effective and efficient system for past several years. Accordingly, a twenty-year health development implementation strategy, known as Health Sector Development Program (HSDP) with a series of five-year investment programs was launched in 1998 which is aligned with the wider frame works of Plan for Accelerated Development to End Poverty and Millennium Development Goals. Currently the country is implementing the fourth year of HSDP IV (FMOH, 2011).

In Ethiopia, all public health facilities obtain essential and vital pharmaceuticals primarily through the integrated pharmaceuticals logistics system (IPLS), a single reporting and distribution system based on the overall mandate and scope of the national Pharmaceuticals Fund and Supply Agency. To be successful in ensuring that patients always receive pharmaceuticals, IPLS must fulfill the Six Rights (the right products, in the right quality, of the right quantity, at the right place, at the right time, and for the right cost). Among the pharmaceuticals managed by IPLS are MCH products, laboratory products, nutrition products, and environmental health and sanitation products (FMOH, 2011).

Through the USAID | DELIVER PROJECT, JSI has supported the implementation of the Integrated Pharmaceutical Logistics System (IPLS) with special focus on contraceptive security. It has also supported the development of Pharmaceutical Logistics Master Plan, the blueprint for an integrated healthcare supply chain for the public sector including the creation of the Pharmaceutical Fund and Supply Agency (PFSA), an autonomous government agency for supply chain management. The IPLS has led to a significant increase in the availability of essential medicines, including contraceptives in Ethiopia. JSI also developed and implemented a warehouse

management system for PFSA, and an inventory management system for health facilities implemented in nearly 500 facilities. (John Snow Inc. /DELIVER, 2014).

The logistics information is the motor that drives the pharmaceutical logistics. Information has to be gathered and analyzed about each activity in the cycle to coordinate subsequent actions. Thus, there is a need to manage the information system for other activities of the logistics to function properly. Logistics management information system (LMIS) is the collection, processing and utilization of logistics information for decision making (John Snow Inc. /DELIVER, 2004). The other very important issue regarding management of pharmaceuticals is management of medicine wastes. Pharmaceuticals designed for humans often become unfit to use for a variety of reasons, ranging from a physical damage of packaging to expiration. These unfit to use accumulated pharmaceuticals represent sub optimal delivery of health care and the potential for environmentally unsound disposal, which can pose exposure risks for humans and animals. (Ruhoy & Dauhgton, 2007).

In Ethiopia, a country wide assessment of the pharmaceuticals supply management system was undertaken by PFSA in 2015 to document the challenges faced in the procurement, storage and distribution of pharmaceuticals and health commodities. (Shewarega A.*etal* 2015).The assessment revealed that long procurement lead times, inadequate storage infrastructure, and unsystematic distribution practices were major constraints to pharmaceuticals supply management system in the country. The main causes of these problems are poor procurement planning, due to the lack of a logistics management information system (LMIS), inadequate staff capacity in the Federal Ministry of Health (FMOH) Pharmaceutical Administration and Supply Service and non-optimal administrative procedures at federal and regional government levels (FMOH, 2005).

The study collects information on SCM practice (procurement, inventory, warehouse(storage) & Transportation) and SCM operational performances (Quality, SCM cost, delivery time to meet customers demand & flexibility on volume & mix of KTDS), in addition on Challenges of SCM practices of Key tracer Drugs & Supplies within those MCH centers.

So, this study will try to fill the paucity of data on the status, barriers of the pharmaceutical Supply Chain management system particularly that of Key tracer Medicines and Medical supplies in those private and NGO MCH centers found in Addis Ababa, Ethiopia.

1.2 Statement of the problem

Assessment done on inventory management of pharmaceuticals of Black Lion Hospital in 2013, states that the overall expenditure of the Hospital's medicines budget deviated from the recommended values for medicines procurement. Because, less than 5 percent of medicines consumed greater than 75 percent of the overall medicines budget. Although reasonable proportion of budget is spent on the vital and essential medicines, there is still quite a large amount of budget being spent on medicines that are not within the Hospitals medicines list. But no research is done on Private & NGOs' MCH centers procurement procedures and budget spending by categorizing by VEN drugs. So, this assessment will try to identify the procurement procedures, the trends of proper allocated budget utilization to purchase those KTDS within the MCH centers.

According to the Addis Ababa Regional Health Bureau financial report 2013/14, more than 30 percent of the budget allocated to pharmaceutical sector to procure pharmaceuticals that are needed by the hospitals, and on the other hand the sector is claimed for its inappropriate management of the purchased pharmaceuticals. Some indicators for this could be the birr value of the expired dugs. And according to the Ethiopian pharmaceutical assessment 2003, the national average for presence of expired medicines in health facilities was found to be 8 percent. Both under stocking or overstocking and expiry of medicines highlight problems within the entire supply chain activities which include selection, quantification, procurement, Inventory management, storage, distribution and use (Godeliver A.B and Kagashe ,2012).

Despite the problem is so huge, but to researcher knowledge no research is made for the Bureaus' Private & NGO MCH centers, on the rate of drug expiry and the rate of damaged pharmaceuticals especially those areas are working with the life of mothers and Childs, so this research will find out the actual rate of expiry of procured key tracer drugs & supplies within those private & NGO MCH centers in relation to its cost.

The MCH centers pharmacy store has to be according the standard that is set by the regulatory body Food, Medicine and Health Care Administration and Control Authority (FMHACA,2018). Even though there is a standard criterion to establish pharmaceutical storage, no research has been done related to the physical setup of the pharmacy stores, and good storage practices in the MCH centers, so this research will evaluate all the MCH centers pharmacy stores according to a standard that is developed by Management science for health check list.

Refrigerators found in the hospital pharmacy stores are containers for some expensive and sensitive, pharmaceuticals, for this reason they require a closer follow up by the store keeper and there is a standard operating procedure to follow it (WHO,2009). But no research has been found weather the Private & NGO MCH centers pharmacy store keepers comply with good cold chain storage practices properly or not, so this study will find out the current performance on cold chain management and storage in the MCH centers.

According to Susan and Michael, (2000) accuracy of inventory records is necessary to provide satisfactory customer service, determine replenishment of individual items, ensure that material availability and meets projected demand. And a research done by Adino *etal.,* (2012) in Addis Ababa's health facility, 50percent of the assessed hospitals and 54percent of health centers were using stock/bin cards for all HIV/AIDS and TB laboratory commodities in main pharmacy store.

The above study was restricted on HIV/AIDS and TB laboratory commodities only, but this study will investigate the private & NGO MCH centers under Addis Ababa City administration health Bureaus current availability of proper data recording for all types of pharmaceuticals found in the store (accuracy of inventory).

Ensuring availability of modern contraceptives and essential life-saving maternal/RH medicines is a major challenge in Ethiopia, where unmet need is very high and funding for supplies is almost completely donor dependent. (Morrison and Brundage, 2012). Only when the supply chain delivers a reliable and continuous supply of affordable, high-quality medicines, contraceptives, and other essential commodities, can health and family planning programs succeed. (John Snow Inc. /DELIVER, 2014). So, this study will show the availability of those essential drugs within MCH centers in Addis Ababa.

To the researcher's knowledge there exist literature gap on assessment of Supply chain management practice of Key tracer drugs & supplies within MCH centers, specially no studies on pharmaceutical Logistics system on private as well as NGO MCH centers in Ethiopia were found, but a few of studies are done on Government Hospitals and health centers Like Assessment of pharmaceuticals in selected Hospitals, Health centers & Health Posts in Ethiopia by MSH in 2011 & assessment on availability of maternal supplies in primary health care system in Amhara Region, by Raifman ,S.*etal*, in 2013.

Bearing the aforementioned facts in mind, this study, therefore, aimed to assess the Practices of Supply chain management of key tracer drugs & supplies and SCM operational performances in Private Maternal child health (MCH) specialty centers and NGO MCH centers based in Addis Ababa City administration, Ethiopia.

This study envisages to provide an empirical snapshot of the current Pharmaceuticals supply chain situation in those MCH centers and to provide baseline information to track changes and improvements in pharmaceutical Supply chain management over time.

1.3 Objectives

1.3.1 General Objectives

The general objective of the assessment is to provide information on Supply chain management practice of key MCH tracer drugs and supplies, and to measure supply chain system performance of KTDS on private & NGO MCH centers in Addis Ababa, Ethiopia.

1.3.2 The specific objectives of the survey are

- To examine the procurement practices of KTDS in Private & NGO MCH centers in Addis Ababa.
- To examine Inventory Management of KTDS in Private & NGO MCH Centers in Addis Ababa.
- To examine Transportation Systems of KTDS in Private & NGO MCH Centers in Addis Ababa.
- To examine Warehouse & storage conditions of KTDS in Private & NGO MCH Centers in Addis Ababa.
- To Identify Challenges of SCM KTDS in Private & NGO MCH Centers in Addis Ababa.
- To examine the effect of the dimensions of SCM practices namely Procurement, inventory management, warehouse storage and transportation practices have on SCM operational performance.
- And to Come up with purposive measures to be taken.

1.4 Research Question/Hypothesis

Based on specific objective the following research question are developed

- How KTDS procurement is being practiced at MCH centers?
- How inventory management of KTDS is being practiced at MCH centers?

- How KTDS are being transported to & within the MCH centers?
- How KTDS are being managed using storage management standards?
- What are the challenges on improving the SCM systems of key tracer medicines and supplies within those MCH centers?
- To What extent the dimension of supply chain Management practices has effect on Supply chain management operational performance

1.5 Scope of the study

SCM has a wide scope and includes a lot of theories about how to set up the chain yet this study did not go through details regarding everything included in the term SCM. The aim for this study was only to analyze the supply chain management practices and SCM operational performance in private and NGO MCH center found in Addis Ababa, Ethiopia. The study mainly focuses on SCM practice of key tracer drugs and supplies /essential medicines/ that include both Donated and procured, with four dimensions namely procurement, inventory, storage & transportation practices and their relationship with SCM operational performances. The study was conducted on all 16 private MCH centers and 3 NGO MCH centers based in Addis Ababa, Ethiopia using cross sectional data (one-time data) collected during the period of July through September 2018.

1.6 Delimitation of the study

The three NGO MCH Specialty Centers (Marie stopes International Ethiopia with 2 MCH branches & One Local NGO which is Abebech Gobena MCH Center) found in Addis Ababa are included. The reason to choose those organization is, NGO are charitable organizations working not for profit, they are here to serve people and donor dependent (charities & societies Agency, 2010). Their supply chain management should be controlled well to decrease wastage of those donated supplies. In general, good supply chain management of Key tracer maternity drugs is so much more important for the well-being of the MCH centers.

Due to limitation of budget and time the study scope is focused on those SCM practices (procurement, inventory, warehouse & transportation), SCM challenges (Political, Economic, Technological & management support) and operational performances on those MCH centers only, not reaching out into the other actors in the supply chain network. In other words, the interaction among the other actors in the network in terms of SCM practiced is not deeply assessed.

There are around 18 private & NGO MCH centers in Ethiopia from those 16 are found in Addis Ababa (FMHACA a, 2018). For my assessment all private MCH specialized Centers found in Addis Ababa have

been included. The reason why these private MCH centers are chosen, private MCH centers are areas where higher income people are served and higher financial flows are there so the supply chain should be controlled well.

The focus of this study was to assess the Supply chain management practices & performances of Key tracer Pharmaceuticals and the availability of such Essential medicine at MCH centers only.

1.7 Operational Definitions

- **Supply chain management:** encompasses the planning and management of all activities involved in sourcing, procurement, conversion, and logistics management, (Council of Supply Chain Management Professionals).
- **Public health facilities:** these are health facilities owned by the government of Ethiopia and managed under FMOH or regional health bureaus
- **Private MCH specialty Centers**: Maternal child health centers which are non-governmental owned by private stake holders, Companies & Share companies.
- **NGO MCH Centers**: Centers owned by non-governmental organization which are donor dependent and working not for profit and Charitable.
- **Pharmaceuticals**: any drugs, medical supplies, medical equipment's and laboratory reagents used for health care services within the center, in this study for Maternal & child Health purpose.
- **Key tracer Drugs**: Those medicines, medical supplies & equipment's identified as Essential, Vital and used for life saving purpose within the MCH centers, they needs to be available within the center 24 hours a day and 365 days in a year
- **Medicine wastes**: unfit to use drugs generated in the pharmacy premises of the health facilities, but not to medical equipment's, and other health care wastes generated by the health facilities
- **Stock out**: unavailability of usable stocks in the store or a balance of zero on the bin cards at store.
- **SCM performance (operational) measures:** Performance measurement is generally defined as the process of quantifying the efficiency and effectiveness of action, where effectiveness is meant to gauge the extent to which customer's requirements are met, while efficiency measures how economically firm's resources are utilized to achieve a predetermined level of customer satisfaction (Neely et al., 1995., and Agami, Saleh and

Rasmy, 2012). However, it has been also asserted that performance concept includes both financial and non-financial (operational) aspects

- **Lead Time:** The time between when new stock is ordered and when it is received and available for use.

1.8 Significance of the study

According to the APTS implementation guideline (2012) the lion share of the hospitals annual budget is occupied by the pharmaceutical items that are to be used for medical purpose, so managing pharmaceuticals of the hospital does mean managing the hospital for a better patient and staff satisfaction, this also applies for MCH centers since they are one part of hospitals and specialty centers

The findings from the study will be used as an input to benefit the people who are being served by the MCH Specialty Centers and the policy makers shall consider the gaps and the study will be used as a standing point to show where the MCH centers overall practices of Supply chain management of key tracer drugs & supplies is. Finally, the study will be use as base line information for future studies related to the specific topic for there is no prior study has been done on this area, few researches are done on the government Hospitals which include MCH as departments but no researches were done on private and NGO maternal and child health centers.

The problems that are related to inappropriate management pharmaceuticals shall be addressed by investigating the root causes of each and every component of the current pharmaceutical Procurement, storage & inventory management in the MCH centers. So, this study will investigate the current status of the MCH centers pharmaceuticals Supply chain management. Addressing these problems mean ultimately result in good patient / client satisfaction, saving a large amount of money that could be lost by the Misuse & expiry of the excess medicines and saving the lives of patients by availing vital and essential drugs at the MCH centers whenever they are need. This will play important role to the development of health care system in Ethiopia through decreasing the rate of maternal mortality, which is according to the health development goal set on the GTP

1.9 Organizations of the study

This study with the title of Assessment on Supply chain management practice of key tracer drugs and supplies within selected Private and NGO Maternal and child health centers in Addis Ababa, Ethiopia, is organized into five chapters. The first chapter presents background followed by

statement of the problem, research questions, and objective so the study, significance of the study, scope of the study and organization of the paper. The second chapter deals with literature review which shows a review of related topics for the research and conceptual framework of the study with operational definition. The third chapter is a research methodology which includes research design, source population, study population, sample design, data collection instrument and administration, data management, data processing procedures and ethical consideration. The fourth chapter handles data analysis, result and discussion. The fifth chapter wind ups the paper by summarizing the major findings giving conclusion, recommendation, by listing limitation of the study and by giving suggestions for further study.

CHAPTER TWO

2. RELATED LITERATURE REVIEW

This chapter briefly introduced and provided a synopsis of literature specific to concepts and ideas of SCM, Supply Chain Management Practice and organizations' performance, the concepts and functions of supply chains, importance of supply chain, Challenges of Supply Chain Practices, the peculiarities of supply chain in health industry and reviews of related literatures from scholars and study findings.

2.1 Theoretical Literature Review

2.1.1 Supply Chain Management: Concepts, key Issues, and Functions

Supply chain management is a philosophy of an integrated approach to manage the total flow of a distribution channel from the supplier to the ultimate customer. (Ellram and Cooper, 1990).

The management of upstream and downstream companies connecting inside and outside the company's operations with suppliers and customers to deliver value to key customers with a low-cost supply chain as a whole (Martin, 1998). SCM creates value for Organizations and permits the development of important competitive advantages by means of the relationships between suppliers and clients (Bordonaba-Juste and Cambra-Fierro, 2009). From this perspective, several studies have verified that integration and collaboration in the supply chain can provide important benefits to the companies involved. Among these benefits are added value, the creation of efficiencies and client satisfaction (Stock *et al*, 2010; Chow *et al*, 2008), which are represented by the reduction in inventories, improvements in service delivery and quality and shorter product development cycles (Corbett *et al*., 1999)

Supply chain is a system of suppliers, manufactures, distributors, retailers and customers where material typically flows downstream from suppliers to customers (except for reverse logistics) and information flow in both directions. SCM involves managing a connected series of activities including planning, coordinating and controlling movement of goods from supplier to customer. Therefore, there are decisions to be made strategic, tactical and operational. The decision-making levels in supply chain are strategic the duration will be from 5 to 10 years, Tactical from 3 months to 2 years and operational day to day (Charu & Swatantra, 2004).

key issues that face SCM activities are distribution network configuration, inventory control, supply contracts, distribution strategies, supply chain integration and strategic partnering, outsourcing and procurement strategies, information technology and decision support systems, and customer value. The level & Type of decisions are made to address these key issues. (Charu & Swatantra, 2004)

Supply chain strategies require total systems view of the links in the chain that work together efficiently to create customer satisfaction at the end point of delivery to the consumer. As a consequence, costs must be lowered throughout the chain by driving out unnecessary expenses, movements, and handling. The main focus is turned to efficiency and added value, or the end user's perception of value. Efficiency must be increased, and bottlenecks removed. The measurement of performance focuses on total system efficiency and the equitable monetary reward distribution to those within the supply chain. The supply chain system must be responsive to customer requirements (Hines, 2004).

The purpose of a logistics system is simple: to obtain and move goods, supplies and equipment in a timely fashion to the places where they are needed, at a reasonable cost. Matters are complicated by the fact that equipment and supplies usually cannot go directly from their source to the end user; they frequently must be held as inventory at one or more intermediate points along the way. There are only four reasons for holding inventory: transportation efficiency, safety stocks, storage capacity and anticipation of a program that is growing or changing (USAID | DELIVER PROJECT, 2009). Hence, reducing cost of operations, improving inventory, lead times and customer satisfaction, increasing flexibility and cross-functional communication, and remaining competitive appear to be the most important objectives to implement SCM strategies (Tummala, Cheryl, & Melanie, 2006).

Therefore, the whole purposes of SCM are to reduce cost, speed market, and to provide better customer services so that the organization will be visible, effective and efficient both internally and with its customers (supplier and consumer). In health care industry, the main reasons are cost and risk (Charu & Swatantra, 2004).

2.1.2 Integrated Supply Chain Process: Key Issues and Opportunities.

There is now a greater awareness in the Health Care industry that there are significant payoffs through efficient management of the health care supply chain, whose processes incur avoidable costs in following areas :Transportation from a production plant to a regional distribution center;

Distribution center operations; Outbound freight; Wholesale distributor's receiving and warehousing operations; Wholesaler distributor's mark-up for information processing and customer service; Transportation to the care provider; and Inventory (Council of Supply chain, 2010).

According to Council of Supply Chain Management Professionals (2010), in order to successfully integrate the supply chain processes, five supply chain management areas need to be met or exceeded such as: Demand Management, order management, supplier management, logistics management, Inventory management.

2.1.3 Major Activities of the Public Health Supply Chain Practices

Most reference books such as hand book of supply chain management of pharmaceuticals by MSH in (2012) & The Logistics Handbook by JSI (2004, 2006): explain the different SCM Practice (functions) of public health supply chain in almost similar manners. In general, the public health SCM practices involves different activities that must be carefully planned and coordinated to ensure the right commodities of acceptable quality get to the right place at the right time so that customers use for diagnosis, treatment, and care when needed.

Procurement

After the products are selected, quantity needs and supply plan are known through appropriate forecasting and supply planning, the products need to be procured. This process is to ensure supply plans are met and the available budget is aligned with the commodity overall cost. The procurement shall base on the supply plan. There should also be appropriate procurement methods in place to ensure continuous availability and improve cost efficiency. In procurement adherence to the procurement regulations and directives is key likewise clients' management and relationship (John Snow Inc. /DELIVER, 2004).

In Ethiopia, PSFA is accountable for procurement of contraceptives and other essential drugs. Thus, besides building its capacity on procurement the agency is working closely with the donors to ensure that the requested quantities are procured and delivered in a timely manner and that the procurement complements the government's and other funding agencies' procurements (John Snow Inc. /DELIVER, 2014/).

All public health facilities obtain essential and vital pharmaceuticals primarily through the Integrated Pharmaceuticals Logistics System (IPLS), a single reporting and distribution system based on the overall mandate and scope of the national Pharmaceuticals Fund and Supply Agency. To be successful in ensuring that patients always receive pharmaceuticals, IPLS must fulfill the Six Rights (the right products, in the right quality, of the right quantity, at the right place, at the right time, and for the right cost). Among the pharmaceuticals managed by IPLS are MCH products, laboratory products, nutrition products, and environmental health and sanitation products (FMOH, 2011).

Inventory management:

Inventory management system provides information to efficiently manage the flow of materials, effectively utilize people and equipment, coordinate internal activities and communicate with customers. Inventory Management does not make decisions or manage operations but provides the information to managers who make more accurate and timely decisions to manage their operations (Aarti and Dhawa , 2010).

When we come to pharmaceutical inventory, it is a major component of any health system and just like other inventory it requires proper planning, managing and controlling in order to achieve the basic aims of minimizing costs at acceptable levels of investment and providing the desired levels of customer service. According to the World Health Organization (WHO) Managing inventory manual (2008), the main purposes include the decoupling of supply and demand through the creation of buffer stocks and the buildup of anticipation stocks to meet planned or expected demand.

According to the Deliver logistics handbook (2006), proper inventory management avoids overstocking, under stocking and stock out, minimizes wastage of product from damage and expiry of the pharmaceuticals, simplifies inventory control decision making and it aids forecasting when there is a consistency of stock levels.

Ware house & storage area

The Guideline for storage of essential medicines and health commodities by Deliver project in collaboration with WHO (2003), states maintaining proper storage conditions for health commodities is vital to ensure their quality and product expiration dates are also based on ideal

storage conditions and protecting product quality until their expiration date is important for serving customers and conserving resources.

Every health facility, large or small, needs to store and manage its medicine stocks, for a better outcome of the patient satisfaction. Health facilities should have a good pharmaceutical inventory management in which a system must be in place to insure secure storage, storage in correct environmental conditions, accurate record keeping, effective recording, effective stock rotation and expiry monitoring and effective fire and theft prevention. Good pharmaceutical inventory control makes ordering and pharmaceuticals management easier. (Management Science for Health, 2012).

The Hospital & MCH Pharmacy store has to be according the standard that is set by the regulatory body Food, Medicine and Health Care Administration and Control Authority (FMHACA). There is standard set by FMHACA for every health facilities including specialty centers to obey and work with the guidelines. (FMHACA b, 2018).

According to the WHO good storage practice guide (2009), refrigerators found in the hospital pharmacy stores are containers for some expensive and sensitive, pharmaceuticals, for this reason they require a closer follow up by the store keeper and there is a standard operating procedure to follow it. This study will find out the current performance on cold chain management and storage in the MCH centers

Transport Management

This is the process of transferring products from the source of supply to the place of consumption. It is the art of getting the right amounts of commodities to the right places at the right time. It involves transportation, delivery, and receiving of commodities, proper storage, and inventory control for receipt and disbursement and information systems. Moreover, there are need to have quality monitoring activity for each activity to perform properly and ensure continuous availability of products to the customers. Also, other crosscutting issues are important in SCM including but not limited to finance and budgeting management, human resources management and management information systems (John Snow Inc. /DELIVER, 2006).

2.1.4 Challenges of KTDS SCM within MCH centers

Most of the African countries are in the margin of the underdeveloped and developing stages. Expert feedback from Africa shows that it undergoes a series of SCM challenges, like inferior logistics infrastructure, shortage of professionals, technological challenges and the present economy of the countries (Msimangira, 2003), whereas state-of-the-art technology, excellent infrastructure, availability of professionals and a developed economy are the strengths of countries like the USA, the UK, Sweden, Singapore, Argentina and Germany (Quayle, 2003). Hence, the SCM practices of these countries are relatively improved. whereas, Li (2002), and Quesada and Meneses (2010) identified three generic supply Chain management factors and sub-factors that might affect supply chain management activities. Those are environmental factors (Environment, Government supports regarding policies, uncertainty aspects), Information Technology (telecommunication and both software and hardware computer technologies) and Supplier relationship factors (supplier and Customer)

According to Khizer Hayat *etal*, (2012), the major factors that are considered to be as Challenges that may affects organization SCM practices are categorized into four: Top level management commitment, lack of Information technology, Organizational factors, Mutual understanding and relationship decision making.

The major categories of SCM Challenges covered in this research dealt with external challenges such as Political, Economic, Technological Challenges and Internal Challenges which is Lack of top-level Management support and economic factors such as availability of enough funds. Those areas are selected because the above literatures have in common and expected to be the major challenges within MCH centers.

2.1.5 The Variables of SCM operational Performance

It would be very difficult to attribute total supply chain or firm performance to particular supply chain factors especially when performance is measured in overall terms such as market share, ROI and profitability since with these general measures, there are many other (both economic and managerial) variables that impact on performance items (Rodriguez, 2009; Van der Vaart and van Donk, 2008). Van der Vaart and van Donk (2008) suggested that it seems potentially more fruitful to relate the level of collaboration in a single buyer-supplier relationship to the performance of that particular relationship, which in fact is supposed to involve mostly operational aspect purchasing performance measures. Similarly, Huoet al. (2014) stressed that though financial performance has

been widely used as a key output measure of firm performance; numerous studies have pinpointed the limitations in relying on financial performance measures in supply chain studies.

On the basis of such arguments, this study would adopt SCM operational performance of focal organizations to assess their SCM practice. In this regard, it has been stressed that while many performance frameworks have been advanced in the literature on operations and supply chain management advocating the use of various operational performance measures, cost, quality, flexibility, and delivery are widely regarded as constituting the major operational performance variables (Vereecke and Muylle, 2006). In a similar fashion, (Sanchez-Rodriguez, 2009) has defined Purchasing /operational performance as the effectiveness in procuring materials at the lower total cost of acquisition, on time, of the right quality and in the right quantities. Similarly, it has been argued that internal customer satisfaction has been identified as the most important element of purchasing performance outcome in several studies since the measures of the operational successes of purchasing such as quality of purchase, on time delivery and both volume and mix flexibility have a direct implication on the satisfaction of the user organ, hence, determining the level of internal customers' satisfaction (Sanchez-Rodriguez, 2009).

The four dimensions of operational performance are quality, delivery, flexibility and cost (Prajogo, 2012). Quality with respect to conformance product specification and product quality performance. Delivery is operationalized to on time delivery/speed of delivery. Flexibility is seen in terms of mix and volume while cost in terms of operation cost.

2.2 Empirical Literature Review

Public health supply chain in most developing countries are designed and implemented to meet demands of specific program logistics. Some of the examples of vertical or standalone public health supply chains are supply chain systems for tuberculosis, HIV/AIDS, family planning, malaria, vaccines and so on. As a result, the public health supply chain systems are very fragmented and undeveloped. The different health programs have multiple parallel SCM but all basically perform similar functional activities i.e. primarily meeting the supply needs of their clients or customers. However, as the health programs mature and funding from donor's decline, there are interests and efforts for integration to takeover. The main anticipation for integrations is SCM knowhow improves and capacity developed. Because of these and recent worldwide notion

to improve and integrate public health supply chain, Ethiopia government started moving to make the public health SCM more efficient and integrated (FMOH & WHO, 2003).

However, unlike other sectors such as discrete parts in manufacturing and fast-moving consumer goods where there has been a long history and experience with management of inventory, the healthcare sector is behind other industry sectors in implementing effective supply chain management (SCM) practices (McKone *et al.,* 2005; Baltacioglu *et al*., 2007). The main reason for the sector's difficulties in implementing effective SCM practices is that the healthcare supply chains are much more complex compared to supply chains in other industries (Vikram, Prakash, & Amrik, 2012).

The overall expenditure of the Black Lion Hospitals medicines budget deviated from the recommended values for medicines procurement. Because, less than 5percent of medicines consumed greater than 75Percent of the overall medicines budget. Although reasonable proportion of budget is spent on the vital and essential medicines, there is still quite a large amount of budget being spent on medicines that are not within the hospital's medicines list (Abate SM ,2013).

According to Ethiopian Health Sector Development Program IV 2010-2015 (2010). The Ethiopian pharmaceutical supply & services Targets are majorly to decrease procurement lead time from 240 days to 120 days, to decrease proportion of health facilities with stock-out for essential drugs from 35 percent to 0 percent. And to reduce percentage of stock wasted due to expiry from 8.24 percent to 2 percent.

The USAID deliver project success report .2011, Hawassa Teaching Hospital, there are no expired drugs in the store, and a high percentage of the hundreds of inventory items are available. Using the Integrated Pharmaceutical Logistics System, the pharmacists calculate orders for hundreds of products from a hub warehouse, according to the changing needs of all the hospital wards. The pharmacists include a percentage to cover increased demand, but they avoid surpluses and overstocks.

In their patient-based research, Ana *et al.,* (2012). described, drug shortages have increased over the past decade, tripling since 2006 and pharmacy material managers are challenged with developing inventory policies given changing demand, limited suppliers, and regulations affecting supply. Forecasting pharmaceuticals is difficult to predict the exact demand for medicines. One of

the issues is the availability of accurate data on consumption. However, the lack of standard nomenclature for healthcare products, plus the preferences of clinicians creates further uncertainties and lack of supply chain education. Awareness of the concept of supply chain management, particularly within hospitals, is low. Therefore, managers are not properly equipped to control the supply of medication (Noorfa and Andrew, 2009).

According to assessment conducted by USAID/Deliver project. (2015), on national survey of IPLS Availability of blank bin cards, IFRRs, and RRFs are high at hospitals (above 90 percent) and health centers (close to 80 percent). However, the availability of the recording and reporting formats decline when moving down the supply chain. The availability of bin cards the fundamental logistics records that captures essential inventory data was 40 percent at the health post level. Similarly, the HPMRR health posts monthly reporting and resupply form was available in 55 percent of health posts and 49 percent of health centers

When EDs are stored appropriately, clients can be assured that they will receive a high-quality product. The stability of a drug product depends on the active ingredient, which can be affected by its formulation and packaging. Inadequate storage and distribution can lead to physical deterioration and chemical decomposition, and reduced potency (MSH, 2011). Assessment conducted by USAID/Deliver project,2015 on national survey of IPLS, on average, slightly more than half (55 percent) the facilities met acceptable storage conditions (80 percent of the criteria or more). Health center stores (63 percent) did better than hospitals (43 percent). Only 29 percent of health posts had acceptable storage conditions. But in Kenya assessment done on Supply management & availability of essential maternity drugs in 2012, only 69 percent of the hospitals surveyed had operational refrigerators met acceptable storage conditions and only 50 percent and 26 percent of dispensaries and health centers monitored and recorded temperatures regularly. (Sheena P, Timothy A & Beth Y,2012)

The findings from the survey of USAID/Deliver project (2015), on national survey of IPLS reflect, in most health facilities 78 percent of the hospitals and 71 percent of health centers program commodities are usually delivered to their stores via delivery from a higher level; while most health posts (76 percent) collect their products from the supplying health center. The survey also assessed the type of transportation facilities used to collect their products. For hospitals (73 percent) and health centers (35 percent), facility vehicles are reported to be the primary means of

transport. A significant percentage of health centers also reported using public transport (27 percent) or private vehicles (17 percent) to collect products. Two-thirds of health post staff travel on foot to collect their products from health centers or woredas.

The Strengthening Pharmaceutical Systems (2011) stated that health systems rely on the continuous availability of safe, affordable pharmaceuticals of assured quality. However, surveys conducted between 2001 and 2007 in 27 developing countries found that the availability of essential medicines averaged only 35 percent in the public sector and 63 percent in the private sector (WHO/HAI, 2008).

2.3 Conceptual Frame work

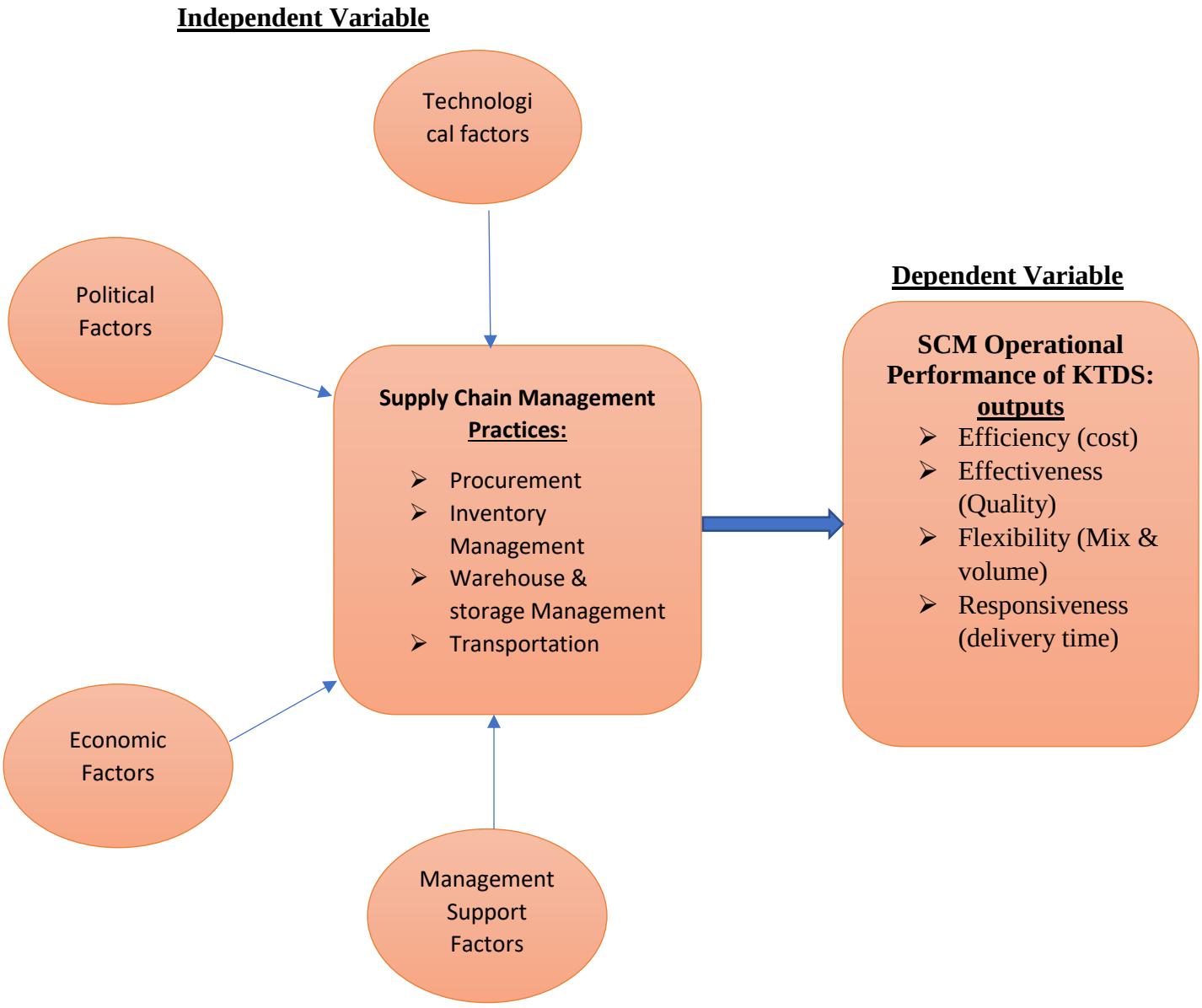


Figure 2.1: Conceptual model (adapted from Sanchez-Rodriguez, 2009); (Prajogo, 2012); (Chen et al. 2004)

2.4 Identified Literature Gap

In Ethiopia, a country wide assessment of the pharmaceuticals supply management system was undertaken to document the challenges faced in the procurement, storage and distribution of pharmaceuticals and health commodities. The assessment revealed that long procurement lead times, inadequate storage infrastructure, and unsystematic distribution practices were major constraints to pharmaceuticals supply management system in the country. The main causes of these problems are poor procurement planning, due to the lack of a logistics management information system (LMIS), inadequate staff capacity in the Federal Ministry of Health (FMOH) Pharmaceutical Administration and Supply Service and non-optimal administrative procedures at federal and regional government levels (FMOH, 2005). But to decide on SCM performances all elements including Inventory management and Transportation should be studied. So, this assessment will show the overall performances of SCM of KTDS within private and NGO MCH centers.

Studies done by USAID delivery, 2015 shows that only 43percent Hospitals maintain good storage conditions of essential drugs while research in Kenya shows 69 percent of hospitals have functional refrigerator and maintain good storage conditions of essential maternity drugs & supplies. This shows there is great difference among our country MCH centers and Hospitals Pharmaceuticals good storage management and Kenya's, so this study will assess the MCH Key tracer drugs and supplies storage conditions.

Overall, studies dedicated to assess Supply chain management of Key tracer drugs & supplies of MCH centers in Ethiopia are limited. To Researcher's knowledge no studies were found on Tracer Drugs and Supplies Supply Chain Management practices on private as well as NGOs' MCH centers in Ethiopia but a few of studies are done on Government Hospitals and health centers. This study will try to fill the empirical gap found from literatures on the status, performances and barriers of the pharmaceutical SCM system particularly that of key tracer drugs and medical supplies in those MCH centers.

CHAPTER THREE

3. METHODS OF THE STUDY

According to Saunders et al. (2003) a study that establishes causal relationships between variables may be termed explanatory study; the key issue here is to study a situation or a problem in order to explain the relationships between variables. Sekaran (2003) further divides explanatory studies into causal study and correlational study, Therefore, the study has adopted both descriptive and explanatory approaches. Since descriptive research helps to examine supply chain practices of KTDS, explanatory method was used to illustrate the correlation between variable.

So, this is both explanatory & descriptive study aimed at determining the Supply chain management practice & SCM operational performances of the key tracer MCH pharmaceuticals in private & NGO MCH centers located in Addis Ababa, Ethiopia. The study was conducted to the selected MCH centers Health care providers such as Midwives, nurses, Pharmacists, Druggist (store keepers) & pharmaceutical managers. Methods used included structured Questionnaires and open-ended interview questionnaires

3.1 Study/Research design

Regarding time dimension this research design used a cross sectional survey of private and NGO's MCH centers in Addis Ababa, Ethiopia. The study adopted both explanatory and descriptive research design to quantitatively and qualitatively assess the supply chain management practices and SCM operational performances through the MCH specialty centers.

3.2 Description of Study area

The study was conducted in all private & NGO MCH specialty Centers categorized as title of MCH specialized center by FMHACA list of active Registered & Licensing Facility, (2018) which are found in Addis Ababa. There are 13 Private MCH centers all included in the study. Two INGO MCH specialty Centers under MSIE, with two branches in Addis Ababa, all MSIE MCH center is included for the assessment & the other Local NGO included in the study is Abebech Gobena MCH Center found at Addis Ababa.

3.3 Population & Sample design

3.3.1 Sample size determination

By Using Census method all MCH centers, private and NGO MCH centers found in Addis Ababa Regional Health Burau were included to study the supply chain management of Key Tracer Drugs & Supplies. There are 16 MCH centers,13 Private MCH centers & 3 NGO MCH centers in Addis Ababa Regional Health Bureau.

3.3.2 Sampling procedure

A total of 16 MCH centers are found in Addis Ababa City Administration Health bureaus and all are included in the study. 13 of them are private owned MCH centers, 2 International NGO MCH centers & 1 Local NGO MCH centers were included in the study, as follows

1.Semah MCH Specialty center	9. Bethel MCH center
2.Woubserk Trading P.L.C Nain Maternal and Child Health Specialty Center	10. Ethio-Tebibe MCH center
3. Anania MCH Center	11. Addis MCH center
4. BGM MCH Center	12. Maria stopes International Ethiopia Gotera MCH specialty center
5. Grace MCH Center	13. Maria stopes International Ethiopia Arada MCH specialty center
6. Hemen MCH Specialized Center	14. Abebech Gobena MCH center
7. Dinberuwa MCH center	15. Betsega MCH center
8. Abrak MCH center	16. Brass MCH center

From all MCH centers a total of 50 samples by census have been taken. Because every one has an opportunity to participate, and it uses to obtain reliable and accurate information. Conducting a census can be very time-consuming and costly however, the advantage is that it allows the researcher to gain accurate information John W. Cresswell, (2009). The questionnaires were distributed to Store Managers, Head Pharmacists, Inpatient heads and Pharmaceutical administrators found on those MCH centers. Since they are in charge of the pharmaceutical

logistics management directly and indirectly, they are expected to provide the accurate information needed about the Supply Chain management of Pharmaceuticals inside their organizations.

The MCHs' store keepers/store managers/ have been included in the study and currently all the MCH centers have 1 medical store but MSIE have an additional Central warehouse from which the branches will get medicines & supplies managed by different store keepers, so included in the study so total number of store keepers were 17.

All the Head pharmacists working in the MCH Centers were included in the study for the assessment of SCM of key tracer Drugs & supplies. And according to the Addis Ababa Regional Health bureau Human Resource Manual of 2017 the total number of pharmacists within those MCH centers are 1 head pharmacist from each MCH and the total of 16 head pharmacists.

All Pharmaceutical administrators for those which have the position have been included, unfortunately MSIE is the only MCH center which have Pharmaceutical administrator other than Head pharmacist on the head office level as senior asset management officer level and have been included in the study. All Inpatient heads (head of Midwives) were included since there is 1 In Patient Head (IPH) total of 16 IPH were included in the assessment.

All vital (key tracer) drugs & supplies for maternal and child heath including neonates based on National Essential Drug List & WHO standard were included in the study for the assessment of the availability & SCM of those items. The reasons why vital drugs are chosen are; Since they are vital to the organization the researcher can be sure for their presence, more attention and closer follow-up is needed for all vital drugs, doing research for other essential and non-essential drugs could be meaningless while leaving the vital drugs not studied

3.3.3 Survey Instrument

3.3.3.1 Designing of the Instrument

The instrument used to collect data for this study is structured questionnaire and interview. The questionnaire items were measured on five-point Likert scale that range from strongly disagree to strongly agree and Interview with open-ended questioners are adapted to capture both the dimensions of independent (Procurement practice, inventory management practice, warehouse storage practice and Transportation practice) and dependent variables namely SCM operational performance on the basis of an extensive review of the existing literature. Structured questionnaires were administered for all of participants namely Store managers, Head pharmacists, Inpatient Heads and pharmaceutical administrator. Whereas, Open ended interview questioners were administered to Head Pharmacists & pharmaceutical administrator in addition to structured questionnaires to cover areas that may not be mentioned on questionnaires. The head pharmacists & pharmaceutical administrator were selected for the in-depth interview because they are expected to be in charge of the overall activities of pharmaceutical logistics and hence able to provide the needed information.

3.3.3.2 Instrument Validity test

As recommended by (Sanchez-Rodriguez, 2009), the questionnaire was developed on the basis of a thorough review of the existing literature on the area under study. Content validity is the requirement for a good instrument that ensures whether the measurement items in an instrument cover the major content of the construct (Li *et al*, 2006). Furthermore, apart from the initial attempt to strongly ground the development of the questionnaire on the extant literature, it was subjected to pre-test to one of NGO MCH center (MSIE Gotera MCH center) in order to further ensure its content validity as suggested by (Chen *et al*., 2004) and (Li *et al* 2006). Accordingly, five experienced Supply chain specialists working at four separate organizations have critically reviewed the items in the questionnaire for possible ambiguity, lack of clarity and appropriateness of the items. Following feedbacks, some amendments were made to make the items clearer, unambiguous and more representative/comprehensive.

3.3.3.3 Reliability test

The statistical packages such as SPSS can be utilized to determine the reliability through evaluating the reliability coefficients using Cronbach's Alpha (Abdel Fattah, 2008). Hence, it is the researchers' responsibility to assure high consistency and accuracy of the tests and scores (Kothari, 2005). To measure the reliability of the gathered data, Cronbach's alpha was applied. Cronbach's alpha is a coefficient of internal consistency. The Cronbach's Alpha value varies between 0-1. A high value of the Cronbach alpha coefficient suggests that the items that make up the scale are internally consistent and measure the same underlying construct. A value of Cronbach alpha above 0.70 can be used as a reasonable test of scale reliability (Cronbach, 1951). The Cronbach's Alpha has been evaluated for the entire scales employed in the questionnaire, and found to be 0.931 which means the questioners were highly reliable. The resulting Cronbach's alpha values of the dimensions are presented in the table 3.1 as follows:

Table 3.1: Cronbach's alpha

Dimension	**No. of Items**	**Cronbach's Alpha**
Procurement Practices	8	0.707
Inventory Management Practices	7	0.716
Warehouse & Storage Practices	6	0.710
Transportation Practices	5	0.829
SCM operational Performance	4	0.840
Over all reliability	30	0.931

Source: Survey Finding, 2018

As clearly depicted on table 3.1, all the dimensions involved in this particular study were found to be high in their internal consistency implying the reliability of the instrument that measures the study constructs. This is clearly implied by the calculated alpha values that range from the lowest value of 0.707 to the highest value of 0.840 and the overall reliability test as calculated alpha was 0.931.

3.3.3.4 Variables and Measurement

The four independent variables used to measure the construct of supply chain practices are procurement practice, Inventory management practice, Warehouse storage practice and Transportation practices while the dependent variable was organization's SCM performance which is operational performance.

Numbers of Items allocated to measure the independent variables were: eight for procurement practice, seven for Inventory management practices, six for warehouse storage management practice and five for transportation practice. one for each part. For dependent variable four separate items were allotted for the measurement of the dependent variable, i.e. SCM operational performance of private 7& NGO MCH centers. In addition, one open ended question for each independent and dependent variable were used

Table 3.2: Variables and measurement items

Variable/Factor	Measurement Items	Adopted From
Procurement practice	Items are Procured and delivered timely, purchase is based on procurement plan, follow up system for forecasted quantity, good ethical Purchasing practice which contributes for the availabilities of items, VEN/ABC analysis methods are used, rely on small number of high-quality suppliers, maintaining good relationship with suppliers for the timely delivery of items, supplier performance level	(Chen et al., 2004); (Krause et al., 2007); (Li et al., 2006) (Kizito K., James K., 2012) (Jossineter S., 2015)
Inventory management practice	Medicines are listed and appropriately documented in the Essential drug list; Usage of Stock keeping logistics forms like BIN Cards, stock cards, Models, IFRR & RRRF; Availability of Physical inventory is done at least ones per year; availability of tracer drugs; minimized wastage & expiry; Electronic inventory management system is well implemented for proper management of stock; Overall inventory management level of the organization.	(Monicah *etal*.,2013) (Simon M., 2013) (Chen *et al.*, 2004);
Warehouse storage practice	Special storage area for cold chain items; Enough Storage space is Enough to store items; functionalities of Storage equipment; Storage equipment are regularly checked for compliance; Measures in place to ensure pharmaceuticals don't wasted and expired; Existing SOPs that are followed to ensure proper storage	(Prajogo *etal,* 2012); (Monicah *etal*.,2013) (Simon M., 2013) (Chen *et al*., 2004)
Transportation practice	Availability of Special Vehicles for transportation of cold chain items: Transport vehicles are fitted with functional temperature and humidity monitoring devices; availability of enough vehicles to meet demand for delivery of procured goods; delivery is done within recommended timelines; level of transport and distribution practices.	(Monicah *etal.*,2013) (Simon M., 2013)
SCM Operational Performance	Minimum cost of purchased materials; assuring quality of purchased materials; on-time delivery of ordered materials; to meet customer satisfaction; Volume and mix flexibility	(Huo *et al*. 2014); (Sanchez-Rodriguez 2009); (Vereecke and Muylle,2006); (Prajogo *et. Al*, 2012)

3.4 Method of Data Analysis and Presentation

Miller (1991) notes that in order to analyze collected data, a researcher needs to have the following information about the statistical data analysis tools namely: descriptive, inferential and test statistics. The completed questionnaires were checked for completeness to ensure consistency. Data collected was both qualitative and quantitative, Qualitative data was analyzed using a

qualitative analysis technique (relistening tapes recorded several times, transcribing data, categorizing and reducing redundancy). Then, the verbatim phrases that represent each position have been pulled out. Finally, the findings were presented by narration with quotations., while quantitative data was analyzed using Statistical Package for Social Statistics (SPSS, V. 20.0).

Respondents' demographic information was summarized by percentages, tables and graphs. In order to determine the status of Supply Chain management practices and SCM operational performance, descriptive statistics such as mean and standard deviations of the respondents' scores on all the dimensions were employed.

In addition, the study used inferential statistics that involved Correlation and multiple regression analysis to study the relationship between independent and dependent variables. Pearson Product Moment Correlation Coefficient was applied to assess the association between SCM practice and SCM operational performance of MCH centers. Pearson Product Moment Correlation Coefficient is a widely used statistical method for obtaining an index of the relationship between variables when this relationship is linear (Tharenou, Donohue, and Cooper, 2007). Moreover, multiple regression analysis was made as part of the overall data analysis endeavor with the aim of showing the extent to which the dimensions of supply chain management practice predicts the SCM operational performance of the MCH centers, Finally, detail interpretation and discussion of the results of the statistical analysis was provided.

3.5 Ethical Considerations

Letter of ethical clearance was obtained both from College of Business and Economics, Department of Logistics and Supply Chain Management, Addis Ababa University, and Addis Ababa Regional Health Bureau. Respective Country directors, MCH Managers were also communicated. The study considered some ethical issues. As such, each respondent is aware of having the right to respond or not, the respondent has the right to participate or not, respondents have informed the purpose of the questioner and the study considers the confidentiality of the response by not asking to state name. All data are anonymous; no individual or facility will not be identified in any reports or any publication based on this study.

CHAPTER FOUR

4. RESULT, DISSCUSION AND INTERPRETATION

In this chapter, the data collected from respondents have been analyzed and interpreted. The chapter begins by presenting reliability test, background information of respondent under the demographic variables, followed by descriptive statistics, correlation analysis and finally multiple linear regression analysis.

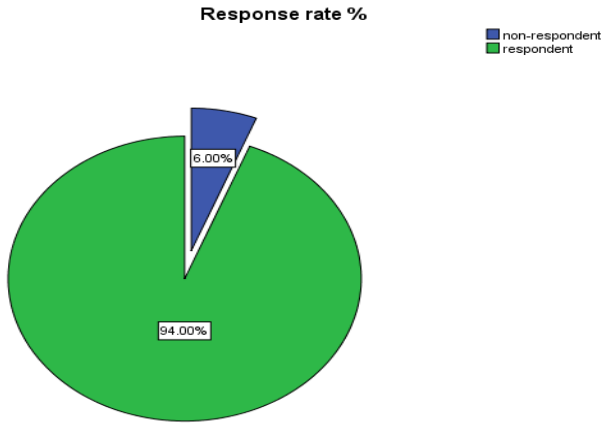
4.1 Response Rate

An analysis of the respondents who were responsive and non-responsive was as illustrated in the table 4.1 and on the below pie chart.

Table:4.1 Response Rate

Rating	Frequency	Valid Percent
non-respondent	3	6.0
Respondent	47	94.0
Total	50	100.0

Figure 4.1: Response Rate %



Source: survey ,2018

Though the total number of potential respondents was 50, only 47 respondents have filled and returned the questionnaire constituting a 94% response rate and of which 3 of them were found incomplete and hence rejected. One from NGO MCH Centers and two were from private MCH centers. The response rate was high and the findings were representative

4.2 Respondents' Demographic Information

The demographic information of the respondents collected included the respondent's gender, age, position, level of education and years of experience. Respondents who have filled and returned the questionnaire is presented on Table 4.1

61.7% of the respondents were males while the remaining 38.3% of the respondents were females. As far as respondents' age is concerned, the majority of the respondents (61.7%) were aged between 26 to 35 years followed by the age categories of 18 to 25 years and 36 and 45 years respectively with percentage scores of 25.5% and 12.8% in that order.

Regarding their position 36.2 % the responders were store managers. Followed by Pharmacy head (31.9%), inpatient head (29.8%) and Pharmaceutical & Asset manager (2.1%) respectively.

With regard to educational qualification, significantly higher percentage of the respondents (40.4%) were first degree holders in Pharmacy, whereas those having diploma in Pharmacy stand second (29.8%), Majority of inpatient heads are BSC Nurse holder with 19.1% and there are 5(10.6%) midwifes with BSC in Midwifery.

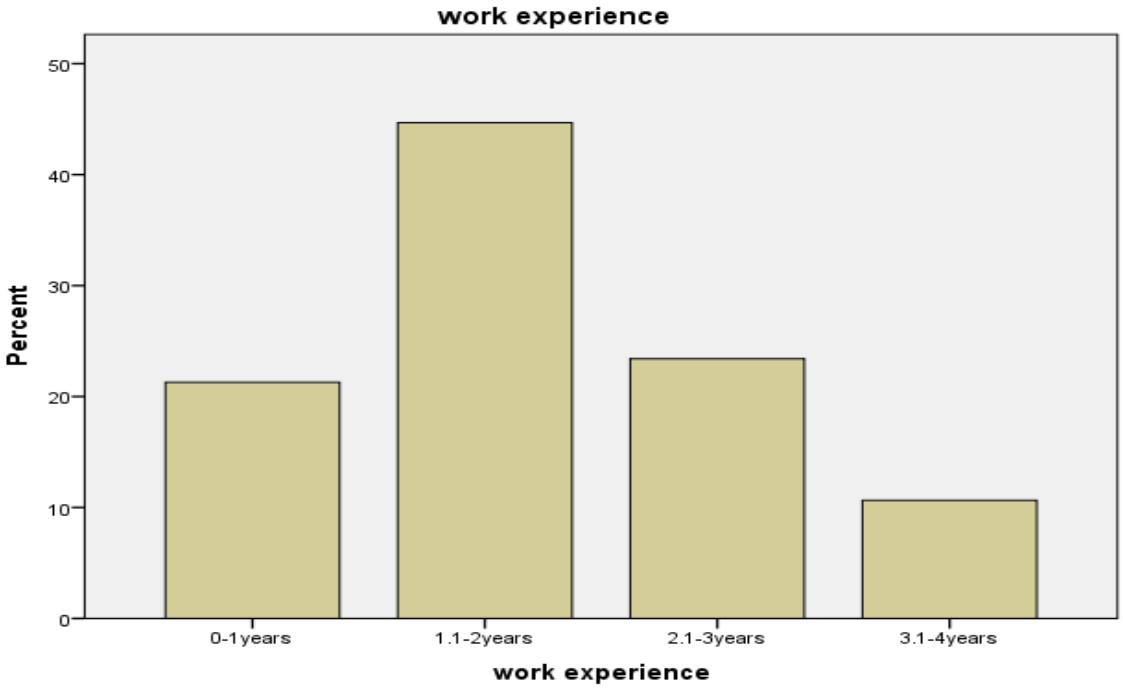
On the other hand, being an important descriptor of the profile of the respondents, years of service under the relevant job positions was also assessed and it has been revealed that those who have served 0 to 1years and 1.1 to 3 years dominate the list by taking in aggregate 89.4% of the entire respondents. Those who have served 3.1 to 5 years came third on the ladder with the percentage scores of about 10.4%. also summarized in Fig 4.2

Table 4.2: Profile information of respondents

All Responders			**Private**		**NGO**	
Variable	**Frequency**	**Percent**	**Frequency**	**Percent**	**Frequency**	**Percent**
Gender						
Female	18	38.3	14	37.8	4	40
Male	29	61.7	23	62.2	6	60
Total	***47***	***100***	***37***	***100***	***10***	***100***
Age						
18-25 Years	12	25.5	12	32.4	0	0
26-35 Years	29	61.7	20	54.1	9	90
36-45 Years	6	12.8	5	13.5	1	10
Above 45 Years	0	0		0	0	0
Total	***47***	***100***	***37***	***100***	***10***	***100***
Position						
Store Manager	17	36.2	13	35.1	4	40
Pharmacy head	14	29.8	12	32.4	2	20
Inpatient head	15	31.9	12	32.4	3	30
Pharmaceutical & Asset Manager	1	2.1		0	1	10
Total	***47***	***100***	***37***	***100***	***10***	***100***
Educational Qualification						
Nurse (BSC)	9	19.1	6	16.2	3	30
Pharmacist (BPharm)	19	40.4	16	43.2	3	30
Pharmacy Technician (Diploma in Pharmacy)	14	29.8	11	29.7	3	30
Midwifery (Bsc in Midwife)	5	10.6	4	10.8	1	10
Total	***47***	***100***	***37***	***100***	***10***	***100***
Service Year at the center						
0 to1 Years	10	21.3	8	21.6	2	20
1.1 to 3Years	32	68.1	26	70.3	6	60
3.1to 5 Years	5	10.6	3	8.1	2	20
Above 5 Years	0	0		0		0
Total	***47***	***100***	***37***	***100***	***10***	***100***

Source*: Survey Finding, 2018*

Figure 4.2 Work experience of Respondents



Source: survey, 2018

4.3 Descriptive Statistics

Concerned respondents' feedbacks were captured along the 36 items corresponding to the six dimensions, five dimensions with 30 items for quantitative data & one dimension with open-ended questionnaires for interview in order to capture qualitative data were introduced to measure the study constructs. Statistical package SPSS 20 was used. The statistical methods used were descriptive statistics, bivariate correlations and non-parametric tests. The composite mean scores and standard deviations have been also computed for all the dimensions of the independent and dependent variables

4.3.1 Procurement practice of KTDS

During this study, the procurement practices were included 8 questions that were used to evaluate respondents on their attitude towards their procurement practices. This questionnaire is designed for both private & NGO MCH center found in Addis Ababa.

The response is summarized for both Private MCH centers and NGO MCH centers with their respective mean and standard deviations for each question. 83.8% of private MCH centers agreed on the KTDS requested and delivered timely whereas,60% of the NGO MCH centers disagreed. 64.9% of private and 60% NGO MCH centers agreed on procurement is being processed based on procurement plan. 67.9% of private MCH and 50% of NGO MCH centers agreed on the availability follow up systems of forecasted quantities. 45.9% of private MCH centers strongly agree on the availability of good ethical purchasing, while 50% of NGO MCH centers were not sure. The application of the highest ethical standards would help ensure the best achievable procurement outcome. It entails more than just getting price ethics are important when considering value for money (Mlinga, 2004).

62.2 % of private MCH centers strongly agree on the use of VEN/ABC analysis methods, whereas 30% of NGO MCH Center disagree on the use of VEN/ABC methods for procurement and budget allocation. 62.2% of private MCH centers strongly agree that they rely on small high-quality suppliers and 81.1% of them agree on the availability of good relationship with suppliers contributed for the timely delivery of those KTDS, whereas 30% of NGO MCH centers disagree and 30% were not sure that they rely on high quality small number of suppliers also 60% of them were disagreed on the on the availability of good relationship with suppliers contributed for the timely delivery of those KTDS. Finally, 45.9 % of private MCH and 40% of NGO MCH centers dissatisfied on the local supplier's service. Dealing with a limited number of quality suppliers would create a suitable platform for closer partnership and venue for better understanding of the needs and requirements of the parties involved in the relationship, which in turn could ensure quality of relationship (Yeung, Selen, Zhang and Huo, 2008).

According to Stanley and Wisner (2001), establishing close relationships with a limited number of suppliers, when properly and selectively used, has been directly linked to responsiveness/flexibility and financial performance. Many companies have achieved substantial cost savings by reducing the number of suppliers in their supplier base and deepening the relationships with remaining suppliers and in doing so, they also expect to improve their customer responsiveness/flexibility (Johnston et al., 2004).

Majority of respondents from NGO MCH centers (MSIE) responded the interview question by *"in order to fulfill the gap of those suppliers on stock out of some KTDS we directly purchase and*

import through headquarter office which is located at London. Although it will take sometimes long period like from 1 month to 5 months."

Table 4.3: Summary of responses on Procurement practice of Key tracer Drugs & supplies in Private & NGOs' MCH centers.

S.no	Procurement Practices			SD	D	NS	A	SA	Mean	Std Deviation
1	Key Tracer Drugs & supplies (KTDS) requested and delivered timely with less lead time	Private	F	0	4	1	31	1		
			%	0.0	10.8	2.7	83.8	2.7	3.78	.67
		NGO	F	0	6	3	1	0		
			%	0.0	60.0	30.0	10.0	0.0	2.50	.71
2	Procurement is being processed based on procurement plan	Private	F	0	0	13	24	0		
			%	0.0	0.0	35.1	64.9	0.0	3.64	.48
		NGO	F	0	4	0	6	0		
			%	0.0	40.0	0.0	60.0	0.0	3.20	1.03
3	There is follow up system to the forecasted quantity to purchase KTDS efficiently & effectively	Private	F	0	0	12	25	0		
			%	0.0	0.0	32.4	67.6	0.0	3.66	.47
		NGO	F	0	4	1	5	0		
			%	0.0	40.0	10.0	50.0	0.0	3.10	.99
4	Our organization has good ethical Purchasing practice which contrributes for the availabilities of KTDS	Private	F	0	2	5	13	17		
			%	0.0	5.4	13.5	35.1	45.9	4.22	.88
		NGO	F	1	1	5	2	1		
			%	10.0	10.0	50.0	20.0	10.0	3.10	1.10
5	VEN/ABC analysis is used for items procurement & Budget allocation	Private	F	0	14	0	0	23		
			%	0.0	37.8	0.0	0.0	62.2	3.86	1.48
		NGO	F	1	3	3	2	1		
			%	10.0	30.0	30.0	20.0	10.0	2.90	1.20
6	We rely on small number of high-quality suppliers	Private	F	0	0	0	14	23		
			%	0.0	0.0	0.0	37.8	62.2	4.62	.49
		NGO	F	1	3	3	3	0		
			%	10.0	30.0	30.0	30.0	0.0	2.80	1.03
7	Having a good working relation with suppliers results in timely delivery of Pharmaceuticals (KTDS	Private	F	1	1	4	30	1		
			%	2.7	2.7	10.8	81.1	2.7	3.78	.67
		NGO	F	1	4	3	2	0		
			%	0.0	60.0	30.0	10.0	0.0	3.60	.97
8	Local suppliers' services are satisfactory to the facility	Private	F	12	17	4	3	1		
			%	32.4	45.9	10.8	8.1	2.7	2.02	1.01
		NGO	F	4	4	1	1	0	1.90	.99

*SD=strongly disagree D=Disagree NS=Not sure A=Agree SA=Strongly Agree F=Frequency

Source: survey, 2018

4.3.2 Inventory Management practice of KTDS

To study the inventory management practices of both private and NGO MCH centers 7 question were used. The following table summarizes their response.

40.5% of private MCH centers were agreed on the availability of essential drug list and proper documentation of KTDS, whereas 30% of NGO MCH centers strongly disagreed on this issue. 45.9% of private MCH center strongly agree on the proper usage of stock keeping logistic forms, whereas 40% of NGO MCH centers agreed, the feedback of respondents from the interview questionnaires showed that they are using all logistic forms except IFRR and RRF which are not used on both private and NGO MCH centers, but only used on government health facilities. 59.5% of private MCH centers were strongly agree on the availability of physical inventory at least ones per year, they agreed on the interview responses also support the result as majority of private MCH centers told the count twice per year and 70% of NGO MCH centers were agreed on the availability of physical inventory at least ones, the interview result also support this data as they do have more than one count per year, during the interview they said *"we do count quarterly and report stock balance"*. 40.5% of private MCH center disagree on the availability of KTDS all the time, they responded the interview as there are some times stock out of these essential medicines. whereas 40% of NGO responders agreed & 40% disagree on the KTDS are not frequently out of stock within the facility, the interviewee responses also support this result as they explain "*there are frequent stock out of some essential items within the facilities*".43.2% of private MCH centers disagree on KTDS are not frequently wasted, while 30%agreed & 30% disagreed from NGO MCH side. 54.5% of private MCH centers agree on the proper implementation and usage of electronic inventory management (EIM), whereas 40% of NGO MCH centers disagree & 30% strongly disagree.

Private MCH center inventory management practice is satisfactory with responder's view, which is around 67.5% of responders agreed. Whereas 60% of NGO MCH center responders perceive as their inventory management practice is not satisfactory. The study on determinates of pharmaceuticals inventory control system in North Wollo and Waghmare in 2015 showed that the overall health facilities pharmaceuticals inventory management system performance in the study area is not satisfactory with only 36 (43%) health facility performed with acceptable level of performance with the mean performance of 51%. (Samuel G., 2015)

Table 4.4 Summary of responses on Inventory Management Practice of Key tracer Drugs & supplies in Private & NGOs' MCH centers.

S.no	Inventory Management Practices			SD	D	NS	A	SA	Total	Mean	Std. Deviation
1	All available KTDS are listed and appropriately documented in the Essential drug list of the facility	Private	F	1	6	4	15	11	37	3.78	1.13
			%	2.7	16.2	10.8	40.5	29.7	100		
		NGO	F	3	1	3	3.0	0	10	2.60	1.26
			%	30	10	30	30	0	100		
2	Stock keeping logistics forms like BIN Cards, stock cards, Models, IFRR & RRRF are properly used	Private	F		5	2	13.0	17	37	4.14	1.03
			%	0.0	13.5	5.4	35.1	45.9	100.0		
		NGO	F	0	2	3	4.0	1	10	3.40	.97
			%	0	20	30	40	10	100		
3	Physical inventory is done at least ones per year	Private	F				15.0	22	37	4.59	.50
			%	0.0	0.0	0.0	40.5	59.5	100.0		
		NGO	F	0	0	1	7.0	2	10	4.10	.57
			%	0	0	10	70	20	100		
4	There are no frequent stock outs of KTDS within the facility	Private	F	3	15	9	9.0	1	37	2.73	1.01
			%	8.1	40.5	24.3	24.3	2.7	100.0		
		NGO	F	2	4	0	4.0	0	10	2.60	1.26
			%	20	40	0	40	0	100		
5	There are no frequent wastage and expiry of KTDS	Private	F	4	16	6	11.0		37	2.64	1.03
			%	10.8	43.2	16.2	29.7	0.0	100.0		
		NGO	F	2	3	2	3.0	0	10	2.60	1.17
			%	20	30	20	30	0	100		
6	Electronic inventory management system is well implemented for proper management of stock	Private	F	3	5	2	20.0	7	37	3.62	1.19
			%	8.1	13.5	5.4	54.1	18.9	100.0		
		NGO	F	3	4	0	2.0	1	10	2.40	1.43
			%	30	40	0	20	10	100		
7	Overall inventory management of KTDS of the organization is satisfactory	Private	F	1	5	6	12.0	13	37	3.84	1.14
			%	2.7	13.5	16.2	32.4	35.1	100.0		
		NGO	F	2	4	1	3.0	0	10	2.50	1.18
			%	20	40	10	30	0	100		

*SD=strongly disagree D=Disagree NS=Not sure A=Agree SA=Strongly Agree F=Frequency

Source: survey, 2018

4.3.3 Warehousing and storage practice of KTDS

Total of 6 question were used to investigate the warehouse storage practices of both private MCH and NGO MCH centers and descriptive statistics in form of frequencies and percentages were used to summarize the findings as shown in Table 4.5.A frequency of 62.2% responders from private & 60% from NGO MCH centers agree that there exist special storage areas, 51.4% from private

Table 4.5: Summary of responses Warehouse & storage Practice of Key tracer Drugs & supplies in Private & NGOs' MCH center.

S.No	Warehouse & storage Management Practices			SD	D	NS	A	SA	Total	Mean	Std. deviation
1	Special storage area for cold chain items of KTDS is available within the facility	Private	F	0	0	1	23	13	37	4.32	.53
			%	0	0.0	2.7	62.2	35.1	100		
		NGO	F	0	1	1	6.0	2	10	3.90	.88
			%	0	10	10	60	20	100		
2	Storage space is Enough to store KTDS within the facility	Private	F	2	7	5	19.0	4	37	3.43	1.09
			%	5.4	18.9	13.5	51.4	10.8	100		
		NGO	F	3	5	0	2.0	0	10	2.10	1.10
			%	30	50	0	20	0	100		
3	Storage equipment are Fully functional	Private	F	0	2	3	25.0	7	37	4.00	.71
			%	0.0	5.4	8.1	67.6	18.9	100		
		NGO	F		3	0	7.0	0	10	3.40	.97
			%	0	30	0	70	0	100		
4	Storage equipment are regularly checked for compliance	Private	F	6	11	9	10.0	1	37	2.70	1.13
			%	16.2	29.7	24.3	27.0	2.7	100		
		NGO	F	4	1	2	3.0	0	10	2.40	1.35
			%	40	10	20	30	0	100		
5	There are Measures in place to ensure KTDS don't wasted and expired	Private	F	1	10	13	12.0	1	37	3.05	.91
			%	2.7	27.0	35.1	32.4	2.7	100		
		NGO	F	1	4	0	5.0	0	10	2.90	1.20
			%	10	40	0	50	0	100		
6	Existing SOPs that are followed to ensure proper storage	Private	F	2	4	6	14.0	11	37	3.76	1.16
			%	5.4	10.8	16.2	37.8	29.7	100		
		NGO	F	2	3	1	4.0		10	2.70	1.25
			%	20	30	10	40	0	100		

*SD=strongly disagree D=Disagree NS=Not sure A=Agree SA=Strongly Agree F=Frequency

Source: survey, 2018

MCH centers agreed on the availability of enough storage space while, 50% were disagreed from NGO MCH centers. 67.6% & 70% of respondents from private MCH & NGO MCH respectively agreed to functionality of storage equipment's but 29.7% from private MCH center disagreed on regular checking of equipment for compliance and 40% of NGO MCH responders strongly disagreed on regular checking of equipment for compliance. Respondent's in the interview also agreed, they said "*there is lack of frequent maintenance and calibration of refrigerators to store cold chain items".* While Majority of NGO MCH respondents in the interview mention that *"there is lack of enough storage space to store pharmaceuticals"*

35.1% of private MCH were not sure on whether there is measure to ensure KTDS not get wasted but 50% of NGO MCH responders agreed on the availability of measure to ensure KTDS not get wasted.37.8% of private MCH center and 40% of NGO MCH centers agree to the use of SOPs in storage of KTDS.

Majority of average responses, 46.4% of private MCH centers and 45% of NGO MCH center responses shows that the storage management practice of both sectors is on agreeable good level. But research in Kenya Nairobi county showed that the storage condition for vaccines were poor (Monicah W. Njuguna1 *et al.,2015).* Control of storage conditions and temperature is essential in maintaining the quality of cold chain items and in helping to protect patients from sub-standard or ineffective medicines that may result from inadequate storage control (Blake, 2008).

4.3.4 Transportation management practice of KTDS

Private sector responders perceived that 10.8% strongly disagree on the availability of special vehicle for transportation of cold chain items of KTDS but NGO MCH centers perceived that 50% of responders were Strongly disagree. 45.9 % disagreed & 8.1% strongly disagree on the availability of vehicles fitted with functional temperature and humidity monitoring devices, whereas 90% of NGO MCH center strongly disagree. as there are special vehicles for transportation of cold chain items and 10% of the responders agreed as there is vehicles fitted with functional temperature and humidity monitor. Refrigerated transport is also recommended for deliveries provide assurance that temperatures in all parts of the load remain acceptable and hence vaccine potency maintained (Craig, 2007).

From private MCH sector responders, only around 10.8% disagree on the availability of enough vehicles to transport procured pharmaceuticals/KTDS/, but only 8.1% agreed & 56.1% were not sure on the delivery is done within recommended timeline. While 50% of NGO MCH center responders strongly disagree on the availability of vehicles to transport KTDS, meanwhile 70% of NGO MCH center respond as KTDS are not delivered within recommended timelines. Supporting this result NGO MCH Respondents in the interview also agreed that there are shortage of vehicles and they are using Ambulances for delivery of pharmaceuticals, this shows how much the shortage of vehicle is extreme.

On average 40% of NGO responders strongly disagree to having proper transportation system to ensure SCM performances of KTDS. Similar to the study done in Kenya on safety of vaccines which states on average a majority of 42 % strongly disagree to having proper transport systems to ensure safety of cold chain items (Monicah W. Njuguna1 *et al.,2015).*

Study in Kenya by Monicah W. Njuguna1 *et al.,(2015)* also showed that, 55% strongly disagree to the vehicles being fitted with functional temperature and humidity measuring devices and 52% of the respondents strongly disagree on the availability of special vehicles to transport cold chain items but are satisfied with the vehicles available to meet the demand .However, only 17% are satisfied with the deliveries being done within the recommended timelines and only 7% strongly agree to following transport SOPs while 5% of the respondents agree to having satisfactory cold chain transport systems.

Table 4.6: Summary of responses Transportation management Practice of Key tracer Drugs & supplies in Private & NGOs' MCH center.

	Transportation practices			SD	D	NS	A	SA	Total	Mean	Std. Devation
1	There is Special Vehicles for transportation of cold chain items	Private	F	4	2	7	18	6	37	3.54	1.17
			%	10.8	5.4	18.9	48.6	16.2	100		
		NGO	F	5	3	0	2.0	0	10	1.90	1.20
			%	50	30	0	20	0	100		
2	Transport vehicles are fitted with functional temperature and humidity monitoring device	Private	F	3	17	8	9.0	0	37	2.62	.95
			%	8.1	45.9	21.6	24.3	0	100		
		NGO	F	9	0	0	1.0	0	10	1.30	.95
			%	90	0	0	10	0	100		
3	Enough vehicles to meet demand for delivery of procured Pharmaceuticals and KTDS	Private	F	0	4	15	16.0	2	37	3.43	.77
			%	0.0	10.8	40.5	43.2	5.4	100		
		NGO	F	5	1	1	3.0	0	10	2.20	1.40
			%	50	10	10	30	0	100		
4	Delivery is done within recommended timelines	Private	F	7	6	21	3.0	0	37	3.54	.90
			%	18.9	16.2	56.8	8.1	0	100		
		NGO	F	0	7	1	0.0	2	10	2.70	1.25
			%	0	70	10	0	20	100		
5	Transport and distribution practices are satisfactory	Private	F	0	6	7	21.0	3	37	3.57	.87
			%	0.0	16.2	18.9	56.8	8.1	100		
		NGO	F	1	5	1	3.0	0	10	2.60	1.07
			%	10	50	10	30	0	100		

*SD=strongly disagree D=Disagree NS=Not sure A=Agree SA=Strongly Agree F=Frequency

source: survey, 2018

4.3.5 Challenges of SCM Practices

The composite mean scores and standard deviations have been computed for all the dimensions of the independent and dependent variables. The rule of thumb pertaining to the intervals for breaking the range in measuring variables that are captured with five-point scale (that ranges from strongly disagree to strongly agree) is 0.8, which is actually found by dividing the difference between the

maximum and minimum scores to the maximum score Kidane (2012). Hence, a calculated composite mean value that ranges from 1 to 1.80 implies strong disagreement, whereas the remaining ranges of 1.81 to 2.6, 2.61 to 3.4, 3.41 to 4.2 and 4.21 to 5.00 representing respondents' perceptions of disagreement, neutrality, agreement and strong agreement respectively.

Based the composite mean of the response collected from private centers on lack of technology like different software's of SCM will affect the procurement practices the composite mean is found to be 4.05 with less standard deviation of 0. 700.Responders from private MCH centers agreed that lack of technologies like SCM software's significantly affect the procurement practice. Regarding Inventory management mean of 3.51 with standard largest standard deviation of 1.17 was found and this implies that there is high number of responders agreed that lack of technologies affect the inventory management systems. But no body agreed that technology can affect storage practices in their MCH centers, with mean of 2.54. while on transportation practice the mean was 3.05 with less standard deviation of 0.700, so this implies that technology will affect modestly the transportation practices of KTDS on the private sectors.

On the other hand, NGO responders perceived that lack of technologies like different SCM software's extremely affect the inventory management practices than warehouse and storage practice with mean & standard deviation of 4.6/1.06 & 4.3/1.06 respectively. They also respond that since SCM is not supported by technologies this significantly affect the procurement practices and transportation practices with mean and standard deviation of 3.9/1.29 and 3.6/1.51 respectively

Regarding Political factors such as lack of appropriate uses of different policies and guidelines imposed by government or their Owen policies responders from private sectors reflected their ideas and composite mean & standard deviation of 4.3/ 0.85, 3.57/ 0.83, 3.27/0.45 and 3.57/0.83 for procurement practice, inventory management, warehouse-storage management practice and transportation management practice respectively. Based on this response political factors will strongly affect the procurement practice than others. While inventory management and transport management are also affected significantly by political factors. But political factors affect moderately the warehouse/storage management practices.

On the other hand, NGO responders perceived that political factors significantly affect the procurement practice of NGO MCH centers with mean of 3.90 & standard deviation of 1.29. they

respond that political factor extremely affects the inventory management, warehousing & storage practice and transportation practices of KTDS with mean & Standard deviation of 4.3/0.82, 4.3/1.25, & 4.2/1.032, respectively.

Economic factors like lack of enough budget /funding of private MCH centers strongly affect the procurement practices with mean of 4.49 and standard deviation of 0.51. while economic factors also significantly affect the inventory management, storage and transportation management practices with mean/standard deviation of 3.78/0.85, 3.78/0.85 & 3.76/0.86 respectively. On the other hands NGO responders perceive that lack of budget is extremely affecting all the supply chain practices with mean and standard deviation of 4.4/0.52, 4.3/1.25, 4.2/1.03, 4.2/1.03 for procurement practice, inventory management practice, warehouse-Storage management and transportation practices respectively.

The responders perceive that there is little support of top-level management on storage management and transportation management practices. Whereas there is moderate on procurement practice and inventory management practices. On the other hand, NGO responders perceive that there is little support of top-level management on all of supply chain management practices, specially there is highest level of agreement on lack of transportation support for those KTDS on NGO MCH centers. Executive support has been cited by many authors, including (Dong and Zhu, 2009) as a key characteristic for successful supply chains performance

Regarding the challenges of key tracer drugs and supplies SCM the interviewee from NGO MCH centers explains that "*lack of appropriate professionals on the logistics and supply chain departments which make the supply chain practice poorly managed, very little support on providing trainings on the overall supply chain management of pharmaceuticals".* Whereas Most of the interviewed Private MCH respondents explain that "*there is no well-established SCM department and all of the duties is lied on pharmacy personnel's only, there is little support of in updating on inventory management, warehouse management practices, no training is provided for us on those areas."*

On the other way, Majority of interviewed respondents from both private and NGO MCH centers were told "*the government commitment to exempt any tax on Pharmaceuticals is encouraging but*

the shortage of foreign currencies has been a major challenge that affected our SCM practices in past 2 years because, many of Importers are out of stock for the vey vital Key tracer drugs."

Table 4.7 SCM Challenges of KTDS in private and NGOs MCH centers

S. no	challenges			Procurement practice						Inventory management						Warehouse and storage practice						Transportation practice					
				1	2	3	4	5	Total	1	2	3	4	5	Total	1	2	3	4	5	Total	1	2	3	4	5	Total
1	Lack of technologies like different SCM software's affects	Private	F			8	19	10	37		9	10	8	10	37		17	20			37		8	19	10		37
			%			22	51	27	100		24	27	22	27	100		46	54			100		22	51	27		100
			mean	4.05						3.51						2.54						3.05					
			Stdv	0.7						1.15						0.51						0.7					
		NGO	F		2	2	1	5	10	0	0	0	4	6	10	0	1	1	2	6	10	1	2	1	2	4	10
			%	0	20	20	10	50	100	0	0	0	40	60	100	0	10	10	20	60	100	10	20	10	20	40	100
			mean	3.9						4.6						4.3						3.6					
			Stdv	1.29						1.06						1.06						1.51					
2	Lack of appropriate use of Policies & guide lines affects	Private	F	0	0	9	8	20	37		8	0	29		37			27	10		37		8		29		37
			%			24	22	54	100		22	0	78		100			73	27		100		22		78		100
			mean	4.3						3.57						3.27						3.57					
			Stdv	0.85						0.83						0.45						0.83					
		NGO	F	0	2	2	1	5	10	0	1	1	2	6	10	0	2	1	7	0	10	0	1	1	3	5	10
			%	0	20	20	10	50	100	0	10	10	20	60	100	0	20	10	70	0	100	0	10	10	30	50	100
			mean	3.9						4.3						4.3						4.2					
			Stdv	1.29						0.82						1.25						1.03					
3	Lack of enough fund/budget affect	Private	F				19	18	37			18	9	10	37			18	9	10	37			19	8	10	37
			%				51	49	100			49	24	27	100			49	24	27	100			51	22	27	100
			mean	4.49						3.78						3.78						3.76					
			Stdv	0.51						0.85						0.86						0.86					
		NGO	F	0	0	0	6	4	10	0	0	2	3	5	10	0	1	1	3	5	10	0	1	1	3	5	10
			%	0	0	0	60	40	100	0	0	20	30	50	100	0	10	10	30	50	100	0	10	10	30	50	100
			mean	4.4						4.3						4.2						4.2					
			Stdv	0.52						1.25						1.03						1.03					
4	Little Top level management support for KTDS	Private	F		8	19	0	10	37		17		10	10	37		8		19	10	37			19	8	10	37
			%		22	51	0	27	100		46		27	27	100		22		51	27	100			51	22	27	100
			mean	3.32						3.35						3.84						3.76					
			Stdv	1.11						1.32						1.07						0.86					
		NGO	F	1	1	3	2	3	10	1	2	2	1	4	10	1	2	0	3	4	10	0	1	1	2	6	10
			%	10	10	30	20	30	100	10	20	20	10	40	100	10	20	0	30	40	100	0	10	10	20	60	100
			mean	3.5						3.5						3.7						4.3					
			Stdv	1.35						1.51						1.49						1.06					

*1=SD=strongly disagree, 2=D=Disagree, 3=NS=Not sure, 4=A=Agree, 5=SA=Strongly Agree

Source: survey, 2018

4.3.6 Independent samples t-test, Composite Mean and Standard deviation of SCM practices & SCM performances of KTDS

The composite mean scores and standard deviations have been computed for all the dimensions of the independent and dependent variables. The composite mean value shows the average of all respondents' perceptions on a certain dimension. While, standard deviation shows how diverse are the perceptions of respondents for a given dimension. For instance, high standard deviation means that the data are wide spread, which means that respondents give variety of opinion and low standard deviation implies that respondents express close opinion.

The rule of thumb pertaining to the intervals for breaking the range in measuring variables that are captured with five-point scale (that ranges from strongly disagree to strongly agree) is 0.8, which is actually found by dividing the difference between the maximum and minimum scores to the maximum score (Kidane (2012). Hence, a calculated composite mean value that ranges from 1 to 1.80 implies strong disagreement, whereas the remaining ranges of 1.81 to 2.6, 2.61 to 3.4, 3.41 to 4.2 and 4.21 to 5.00 representing respondents' perceptions of disagreement, neutrality, agreement and strong agreement respectively.

Therefore, Private & NGOs' MCH centers were compared using Independent t-test, composite scores of mean and standard deviations on four scales of supply chain management practices of key tracer drugs & supplies namely, procurement practice, inventory management practice, warehouse & storage practice, transportation practice, and for the scale of Supply Chain management performance. The resulting independent t-test, composite scores of mean and standard deviations are presented on the following tables.

Table 4.8: Mean and standard deviation SCM practice & SCM Operational performances of Private & NGOs' MCH centers

Group Statistics								
	Private & NGOs'			Independent group(Private & NGOS' MCH Center separately)				
Dimensions	N	Mean	deviations		N	Mean	Std. Deviation	Error Mean
Procurement Practice	47	3.53	0.547	Private	37	3.70	0.465	0.076
				NGO	10	2.89	0.285	0.090
Inventory Management Practice	47	3.47	0.672	Private	37	3.62	0.621	0.102
				NGO	10	2.89	0.542	0.171
Warehouse & Storage Practice	47	3.41	0.658	Private	37	3.55	0.595	0.098
				NGO	10	2.90	0.658	0.208
transportation Practice	47	3.09	0.853	Private	37	3.34	0.691	0.114
				NGO	10	2.14	0.743	0.235
SCM Operational Performance	47	3.45	0.814	Private	37	3.65	0.724	0.119
				NGO	10	2.70	0.711	0.225
Average Composite mean	3.4		Private	3.6				
			NGO	2.7				

Source: *survey finding, 2018*

Table: 4.9: Independent Samples T- Test for comparing Private & NGOS' MCH centers SCMP & SCMOP

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
Items		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Procurement	Equal variances assumed	6.859	.012	5.255	45	.000	.815	.155	.503	1.128
	Equal variances not assumed			6.892	23.540	.000	.815	.118	.571	1.060
Inventory Management	Equal variances assumed	.861	.358	3.407	45	.001	.736	.216	.301	1.171
	Equal variances not assumed			3.688	16.014	.002	.736	.200	.313	1.159
Warehouse Storage	Equal variances assumed	.018	.895	2.975	45	.005	.645	.217	.208	1.082
	Equal variances not assumed			2.804	13.256	.015	.645	.230	.149	1.141
transportation	Equal variances assumed	.006	.937	4.801	45	.000	1.201	.250	.697	1.704
	Equal variances not assumed			4.602	13.519	.000	1.201	.261	.639	1.762
SCM Operational Performance	Equal variances assumed	.138	.712	3.689	45	.001	.949	.257	.431	1.467
	Equal variances not assumed			3.731	14.476	.002	.949	.254	.405	1.492

Source: survey finding, 2018

A clear portrayal of the calculated composite mean values of each of the scales of supply chain management practice for both NGO & private MCH centers were found to be between 3.09 and 3.53 with relatively smaller scores of standard deviations that range between 0.547 and 0.853. The lowest composite mean value is registered in the case of transportation practices followed by the composite mean score for warehouse & storage practices. Whereas the composite mean scores of 3.53 and 3.47 respectively for procurement practices & inventory management practice are relatively larger. This means that the SCM performance of Key tracer drugs especially cold chain items are greatly compromised during transportation because, specialized vehicles should be used to transport cold chain products and be fitted with monitoring devices, temperature monitors depending on the size of the load (John, 2007).

The composite mean scores of the dimensions of supply chain management practices of private MCH centers were found to be between 3.34 and 3.70 with relatively smaller score of standard deviation that ranges between 0.465 and 0.724. While for NGO MCH centers the mean lies between 2.14 to 2.90 & standard deviation between 0.285 to 0.743. Which indicate significant difference of mean between the two groups Namely Private & NGOs' MCH centers (t=2.804-6.892, $p<0.05$ and the df=45). This indicates that private MCH centers employee responders perceive that their organization has been so far making best significant efforts to promote Supply Chain Management Operational Performance compared to NGOS'. This implies the fact that the attempts made by those private MCH centers were significant pertaining to championing the supply chain management performances of those key tracer drugs & supplies within their MCHs. Their warehouse management, procurement practices and inventory management are significant for the performance of effective, efficient & responsive SCM as implied by the composite mean scores of the respective dimensions. Their transportation management practice is seen as best moderate. The private sector MCH center overall SCM of those KTDS were rated their performance the significant level of improved SCM performances.

On the other way the composite mean score of the dimensions of supply chain management practices of NGO MCH centers were found to be between 2.14 and 2.90 with standard deviation between 0.285 to 0.743, relatively the lowest standard deviation of 0.285 at the procurement practices compared to private sectors was seen. This implies that the NGO MCH employee responders perceive that their organization has been so far making moderate efforts to promote the

SCM practices. This implies that the attempts made by those NGO MCH centers were modest in improving the SCM performances of those KTDS. But when compared to private its less effort. Their transportation management practices are seen to be poor, while others parameters such as procurement practices, warehouse & storage practices and their inventory management practices seen to be modest for improved SCM practices/ performances. Their Overall SCM performances seen to be moderate level.

On the other hand, the composite mean score of the scale of SCM performance for both private & NGO MCH centers are 3.45 with relatively greater standard deviation of 0.814. Similar to what has been witnessed in the case of the status of SCM practice at both organizations, respondents were rating the SCM performance is at significant agreeable level. But when compared each other the private sector have composite mean of 3.65 & standard deviation of 0.724 which is at better level of SCM practice/performance than that of NGOs with composite mean of 2.70 and standard deviation of 0.711, which is at moderate level of SCM performance.

4.4 Inferential Statistics

4.4.1 Correlation Analysis of KTDS SCM practice and Operational Performances

In this section, correlation analysis was conducted in an effort to answer one of the basic research questions. The relationship between supply chain management practice and supply chain management performance was investigated using two-tailed Pearson correlation analysis. This provided correlation coefficients that indicate the strength and direction of relationship. The coefficient of correlation could take values ranging from -1 to +1, where the signs signifying the direction of relationship. As per the guide line suggested by Field (2005), the strength of relationship that ranges from 0.1to 0.29 shows week relationship; 0.3 to 0.49 is moderate; and >0.5 shows strong relationship between the two variables.

The following part table presents the correlation analysis between the four dimensions of supply chain management practice, namely Procurement practice, inventory management, warehouse-store management, transport management and supply chain management performances of private and NGO MCH centers

Table:4.10 Correlation analysis of SCM practices and SCM operational performances of KTDS

Items	Pearson correlation	SCM operational Performance	Procurement practice	Inventory management practice	Warehouse & storage management practice	Transportation practice
SCM Operational Performance	Rho	1				
	Sig.(2-tailed)					
Procurement practice	Rho	.688**	1			
	Sig.(2-tailed)	.000				
Inventory management practice	Rho	.955**	.624**	1		
	Sig.(2-tailed)	.000	.000			
Warehouse & storage management practice	Rho	.883**	.531**	.857**	1	
	Sig.(2-tailed)	.000	.000	.000		
Transportation practice	Rho	.814**	.538**	.801**	.748**	1
	Sig.(2-tailed)	.000	.000	.000	.000	
N=47						

Source: *Survey Finding, 2018*

As seen from the results table, procurement practice has a statistically significant strong positive correlation with operational performance (with r=0.688, p-value=.0.000). The relationship indicates that as the focus on procurement practices increases so do operational performance.

This implies that procurement practice initiatives, such as KTDS requested and delivered timely, involving purchasing in the organizational planning process, creating a suitable platform for following the forecasted quantity , good ethical procurement practice for organization's strategic goals, using VEN/ABC analysis for procurement process, relying on small number high quality suppliers, good relationship with those supplier in delivering those KTDS with less time and satisfactory procurement processes for the organization goal, are somehow positively related to how organizations of both private and NGO MCH centers performs in assuring reduced cost of purchased items, items quality & quantity and on-time delivery to satisfy customers need.

The correlation matrix in the above table indicates that a statistically significant strongest positive relationship was observed between Inventory management and Supply chain management performance (r=0.955, p-value=0.000).From this result it has been identified that engagement in KTDS are properly documented on essential drug lists, properly used logistics forms, availability of physical inventories at least ones per year, availability of KTDS which are not frequently out stock and not frequently wasted inventory management practices within the facilities of both private & NGO MCH centers, are strongly related to how those organization performs in assuring reduced cost of purchased items, proper items quantity and quality, on-time delivery of items for overall satisfaction customers demand.

Similar to the above two cases here also Warehouse & storage practices has been identified to have a statistically significant strong positive relationship with operational performance (r=0.883, p-value=0.000).

Though all the dimensions of Supply chain management practice have found to have a strong correlation with SCM performance, the relative strength of the correlation is even better in the case of transportation practices as evidenced by the statistically significant and strong positive relationship that the two have exhibited (r=0.814, p-value=0.000).

4.4.2 Test for Linear Regression Model Assumption

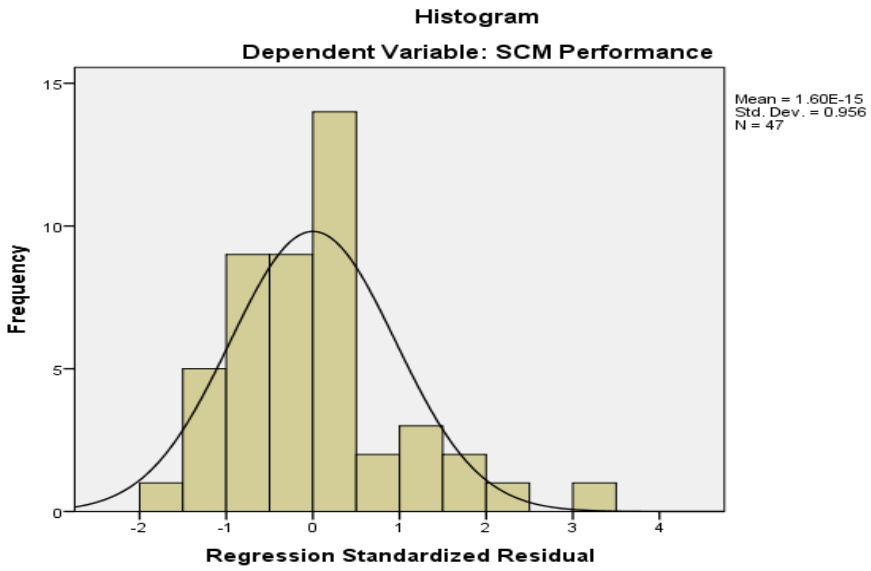
First, regression analysis is sensitive to outliers. Outliers can be identified by standardizing the scores and checking the standardized scores for absolute values higher than 3.29. Such values may be considered outliers and may need to be removed from the data.

Second, the main assumptions of regression are normality, homoscedasticity, and absence of multicollinearity. Normality can be assessed by examining a normal P-P plot. If the data form a straight line along the diagonal, then normality can be assumed. To assess homoscedasticity, the scatterplot of standardized residuals verses standardized predicted values can be created. If the plot shows random scatter, the assumption is met. However, if the scatter has a cone shape, then the assumption is not met. Multicollinearity can be assessed by calculated variance inflation factors (VIFs). VIF values higher than 10 indicates that multicollinearity may be a problem.

4.4.2.1 Normality Test/ Test for Normal Errors

After completing the model and the parameters, the results indicating that they fitted a model and the model assumptions bias needs to be checked. This is done in three ways: the histogram, the normal probability plot and the Zresid vs. Zpred scatterplot. The best way to evaluate how far the used data are from a Gaussian (normal) is to look at a graph and see if the distribution grossly deviates from a bell-shaped normal distribution. By looking the following graph, the researcher has realized that the histogram looks symmetric and the normal p-p plot showed fairly consistent with that of the line and the residuals are normally distributed. Therefore, according to these findings this assumption was fulfilled (see the following graph).

Figure 4.3 Model Assumptions of Histograms



Source: *Survey result, 2018*

4.4.2.2 Multicollinearity Analysis

According to (Dillon, 1993) when independent variables are highly correlated, there is overlap or sharing of predictive power. This may lead to the paradoxical effect, whereby the regression model fits the data well, but none of the predictor variables has a significant impact in predicting the dependent variable (Robert, 2006). This is because when the predictor variables are highly correlated, they share essentially the same information. Thus, together, they may explain a great deal of the dependent variable, but may not individually contribute significantly to the model. The impact of multicollinearity is, therefore, to reduce any individual independent variable's predictive power by the extent to which it is associated with the other independent variables (Beyan, 2014).

Before conducting the regression analysis Tolerance and Variance Inflation Factor (VIF) values were calculated to check multicollinearity. According to (Robert, 2006) Tolerance value is an indication of the percentage of variance in the predictor that cannot be accounted for by the other predictors implying the fact that very small values indicate overlap or sharing of predictive power, whereas VIF is the reciprocal of Tolerance. In this study the VIF of all variables are less than 10 which means there is strong Co- linearity between the explanatory variables. So, this assumption is fulfilled.

4.4.2.3 Test for Interval Level/ Continuous Scale Data

To robustness of parametric statistical analysis, data should be measured by continuous interval level (Kothari, 2004). The study used a four to eight level Likert scale to measure each variable. Then each variable consists of the sum of many items averaged to give the mean score. Since the data were created by calculating a composite score of mean from multiple items than a single mean for procurement practice, inventory management, warehouse management and transportation practices. Therefore, a series of multiple items was averaged and used to test dependent, and independents, meaning, numbers can be added, subtracted, multiplied and divided. Hence these assumptions were fulfilled.

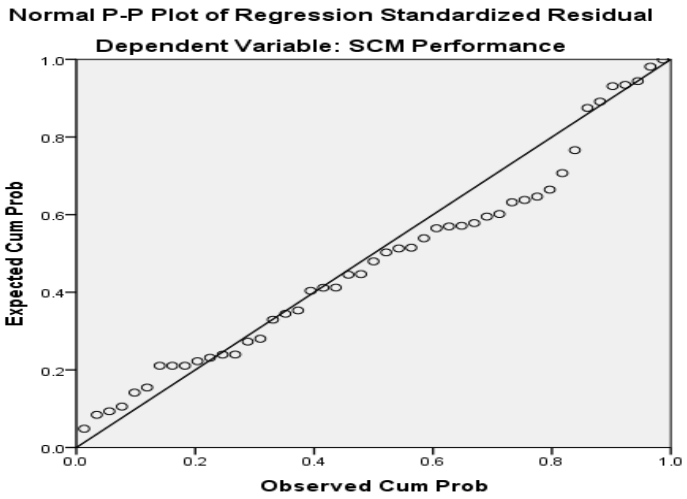
4.4.2.4 Independence Observation

Two observations are independent if the occurrence of one observation provides no information about the occurrence of the other observation. In other words, it is the correlation between errors. The independence observations are tested by Durbin-Watson coefficient (Robert B. Burns and Richard A. Burns, 2008). The test statistic coefficient should be between 1.5 and 2.5, which mean residual are uncorrelated. As indicated in figure 4.4 below (multiple regression, result regression), the Durbin-Watson coefficient was 2.028. Therefore, this assumption is fulfilled.

4.4.2.5 Test of linearity

The plot is shown below. The P-P plot compares the observed cumulative distribution function (CDF) of the standardized residual to the expected CDF of the normal distribution. Simple linear regression is based on finding the straight line on a scatter graph that ‘fits ‘the scatter points best, i.e. as closely possible (Robert B. Burns and Richard A. Burns, 2008). Regression procedures assume that the dispersion of points is linear. Where the amount of scatter around the line varies markedly at different points and forms a pattern, then the use of regression is questionable. As we can see from the output graph below, the regression line sloping from bottom right to top left, which indicates a positive relationship between the dependent and independent variables. Moreover; The P-P plots look like a diagonal line; dots lie almost exactly along the diagonal line. Therefore, this assumption is fulfilled

Figure 4.4 Model Assumptions of linearity



Source: survey, 2018

4.4.3 Regression Analysis

For the purposes of determining the extent to which the explanatory variables predict the variance in the explained variable, multiple linear regression analysis was conducted. Multiple Regression analysis is a statistical method through which one can analyze the relationship between a dependent or criterion variable with the set of independent or prediction variable/s. Unlike correlation, however, the primary purpose of regression is prediction (Marczyk G, DE Matteo D, and Festinger D, 2005).

As a statistical tool multiple regression is frequently used to achieve best predictive relationship for a given set of both dependent and predictor variables, with the aim of evaluating the contribution of specific variables or set of variables and find structural relationship and provide explanation for multiple relationship (Robert, 2006).Therefore, in this particular study multiple linear regression method was used to determine the unique contribution of each dimension of the independent variable to the dependent variable

The following model summary table shows how much of the variance in SCM operational is performance explained by the explanatory variables considered in the model.

Table 4.11: Model Summary of private & NGO MCH centers (a) independent variables as predictor to SCM performances of KTDS

Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Durbin-Watson**
1	.971[a]	.944	.938	.20236	2.028
a. Predictors: (Constant), procurement practice, inventory management, warehouse& storage, transportation practice					b. Dependent variable: SCM OP

Source: *Survey Finding, 2018*

The Adjusted R Square value on the model summary table is a representation of the correlation between the observed values of the dependent variable, i.e. SCM performance of MCH centers, and the values of the same dependent variable predicted by the multiple regression models. Hence, the Adjusted R Square value obtained indicates that 93.8% of the variation in the SCM operational performance can be explained by the combined variance in the dimensions of the independent variable, namely procurement practice, inventory management, warehouse storage management and transportation practice. Whereas the remaining 6.2% of the variations operational performance is explained by factors not considered in this model.

Table 4.12: ANOVA of private & NGO MCH centers (b) independent variables as predictor to SCM performances of KTDS

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	28.786	4	7.197	175.745	.000b
	Residual	1.720	42	.041		
	Total	30.506	46			
a. Dependent Variable: SCM Operational Performance						
b. Predictors: (Constant), procurement practice, inventory management, warehouse & storage, transportation practice						

Source: *Survey Finding, 2018*

ANOVA test shows the acceptability of the model from statistical perspective. Accordingly, the regression row indicates the extent of variation explained by the model, whereas the residual row indicates information about the variation that is not accounted for the model, i.e. variation on the dependent variable explained by factors not included in the model.

On the above table it is clearly indicated that the computed F statistic is 175.745 with an observed significance level of 0.000, implying the statistical fitness of the regression model to the data.

Table 4.13: Analysis of overall SCM practice dimensions

Model	**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
	B	**Std. Error**	**Beta**		
(Constant)	1.054	.210		5.028	.000
Procurement Practices (PP)	.219	.070	.147	3.127	.003
Inventory Management Practices (IMP)	.730	.103	.603	7.116	.000
Warehouse & Storage Practices (WHSP)	.281	.90	.227	3.129	.003
Transportation Practices (TP)	.078	.060	.082	1.307	.198
Dependent Variable: SCM operational Performance (SCMOP)					

Source: *Survey Finding, 2018*

Based on the above results (table 4.05 & 4.16) the following general formulas of regression model has been generated. The regression equation is for the overall SCM practice dimension of combined all MCH centers the following formula is generated:

X1=PP, X2=IMP, X3=WHSP and e, represents for error terms

$SCMOP = \alpha + \beta1(X1) + \beta2(X2) + \beta3(X3) + e$

$SCMOP = \alpha + \beta1(PP) + \beta2(IMP) + \beta3(WHSP) + e$

SCMOP = 1.054 + (0.147PP) + (0.603IMP) + (0.227WHSP) + e

As far as the predictive power of the dimensions of the independent variable is concerned, a closer look at the coefficients of the independent variable shows that three of the dimensions of the independent variable, namely procurement practice, inventory management practice and warehouse storage practice have statistically significant beta values. The standardized coefficients (beta values) of these three dimensions indicate the relative importance of all the three dimensions in predicting the dependent variable, namely SCM operational performance. This implies that the remaining one dimension of the independent variable, namely transportation practice couldn't make statistically significant contribution in predicting SCM operational performance of the MCH Centers. As far as the strength of the predicting power of the three statistically significant dimensions are concerned, it is revealed that inventory management practice has the strongest positive predicting power on the dependent variable with standardized coefficient of 0.603, followed by procurement practice and warehouse storage management practice with respective standardized coefficients of 0.147 and 0.227.

Table 4.14: Coefficients for private & NGO MCH centers

Coefficients[a]											
Model		Unstandardized Coefficients				Standardized Coefficients		t		Sig.	
		B		Std. Error		Beta					
		NGO	Private	NGO	private	NGO	Private	NGO	Private	NGO	Private
1	(Constant)	1.867	1.177	.516	.313			3.621	3.762	.011	.001
	Procurement	.413	.262	.197	.090	.166	.168	2.101	2.912	.020	.006
	Inventory	.986	.661	.214	.120	.752	.567	4.606	5.502	.006	.000
	Warehouse & Storage	.261	.268	.188	.103	.242	.220	1.388	2.595	.224	.014
	transportation	.107	.154	.102	.079	.112	.147	1.049	1.939	.342	.061
a. Dependent Variable: SCMOP											

Source: Survey, 2018

Based on the above table 4.14 result the following formulas have been generated for private and NGO MCH centers separately.

For NGO MCH centers:

X1=PP, X2=IMP, X3=WHSP and e, represents for error terms

$SCMOP = \alpha + \beta1(X1) + \beta2(X2) + e$

$SCMOP = \alpha + \beta1(PP) + \beta2(IMP) + e$

$SCMOP = 1.867+ (0.166PP) + (0.752IMP) + e$

Whereas for Private MCH centers:

X1=PP, X2=IMP, X3=WHSP and e, represents for error terms

$SCMOP = \alpha + \beta1(X1) + \beta2(X2) + \beta3(X3) + e$

$SCMOP = \alpha + \beta1(PP) + \beta2(IMP) + \beta3(WHSP) + e$

$SCMOP = 1.177 + (0.168PP) + (0.567IMP) + (0.220WHSP) + e$

Looking at NGO MCH centers, as far as the predictive power of the dimensions of the independent variable is concerned, a closer look at the coefficients of the independent variable shows that only two of the dimensions of the independent variable, namely procurement practice and inventory management practice have statistically significant beta values. Inventory management is more significant positive predictive power than procurement practices with beta value of 0.752 and 0.166 respectively. The standardized coefficients (beta values) of these two dimensions indicate the relative importance of all the two dimensions in predicting the dependent variable, namely SCM operational performance. This implies that the remaining two dimension of the independent variable, namely warehouse & storage management practices with beta value of 0.242 and transportation practice with beta value of 0.112 respectively, couldn't make statistically significant contribution in predicting SCM operational performance of NGOS' MCH Centers.

Whereas Private MCH centers result shows that, three dimensions namely procurement practice, inventory management practices and warehouse & storage management practice have statistically significant beta values and they do have significant predictive power on the dependent variable As far as the strength of the predicting power of the three statistically significant dimensions are concerned, it is revealed that similar to NGO MCH centers inventory management practice has the

strongest positive predicting power on the dependent variable with standardized coefficient of 0.567, followed by procurement practice and warehouse storage management practice with respective standardized coefficients of 0.168 and 0.220. This implies that only transportation practice with beta value of 0.147, couldn't make statistically significant contribution in predicting SCM operational performance of the private MCH Centers.

CHAPTER FIVE

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

This research was conducted towards an attempt to investigate the status of Supply chain management practice and its relationship with supply chain management operational performance in the private MCH center and NGO MCH centers found in Addis Ababa, Ethiopia. The following Summary have been drawn on the bases of the findings of the data analysis effort.

A total of 47 respondents have filled and returned the survey questionnaire making the response rate about 94% and of which 10 of them from 11 sample were from NGO MCH center while 37 from 39 sample were from private MCH centers and all are found to be complete and hence qualified for being processed. About 63.7% of the respondents are males, while females constituting the remaining 37.3% of the total respondents. About 68.1% of the respondents have served between three to five years in their current position implying that the major portion of the response is obtained from respondents who had relatively better information regarding the collaborative supply chain management practices of their respective organizations have with their supply chain management performance.

Independent Sample T-test have been performed in order to compare the two sectors based on mean scores. The composite mean scores of the scales of the independent variables namely procurement practice, inventory management practice, warehouse storage practice and transportation practices revealed that the respondents perceive that private MCH centers exerted relatively significant level of efforts towards the improvement of these variables. While NGO MCH centers exerted relatively moderate efforts towards improvement of these variables. Similar to what has been witnessed in the case of the status of supply chain management practice at private MCH centers the respondents were rating the supply chain management performance of their organizations at significant level. Whereas, that of NGO MCH centers respondents were rating the supply chain management performance of their organizations at relatively moderate level.

The separate analyses of the relationship between the dimensions of supply chain management practice and supply chain management performance have revealed that all of the dimensions of

supply chain management practice have statically significant positive relationship with supply chain management performance.

So long as the predicting power of the dimensions of the dependent variable are concerned, it has been investigated that procurement practices, inventory management practices and warehouse storage management practices have statistically significant beta values indicating that only these three dimensions have an effect on the dependent variable, i.e. Supply chain management performance of private and NGO MCH centers in addis Ababa, Ethiopia. The strength of influence is highest in the case of inventory management practice relative to the influence, procurement practices and warehouse storage management practices have on supply chain management performance. On the other hand, transportation practices found to have no statistically significant predictive power on the supply chain management performance of the MCH centers. In separate analysis, in the case of NGO MCH centers only two dimensions namely procurement practices and inventory management practices have significant predictive power on dependent variables. While in case of private MCH center all three dimensions, except transportation management practice have positive predictive power on SCM operational Performances.

Regarding challenges of supply chain management practice within the responders from NGO MCH centers perceived as there are lack of software technologies, political factors such as shortage of use of different policies imposed by government and their own centers, and economic factors like shortage of adequate budget for KTDS affected very significantly the procurement practices, inventory management practice, warehouse storage practices and transportation practices. The NGO responders also revealed that there is less top-level management support on those supply chain management areas. Those challenges also significantly affect the supply chain management performances.

Whereas the responders from private MCH centers perceived that the challenges such as lack of usage of technologies like different software's, proper usage of policies and guidelines, adequate budget/funding/ and the support from top level management significantly affects the four dimensions of supply chain management practices within their centers. This also significantly affects the supply chain management performances

5.2 Conclusions

Generally, the study findings have suggested that the levels of supply chain management practices and supply chain management performance of both private & NGO MCH centers were found to be encouraging (at moderate level) but not performing as desired level. While, it is better within private MCH centers than NGO MCH centers found in Addis Ababa Ethiopia as the perceived evaluation of the respondents reply. The relationship between the dimensions of supply chain management practice and supply chain management performance have revealed that all of the dimensions of supply chain management practice have statically significant positive relationship with supply chain management performance.

It has also revealed that, though all of the dimensions of supply chain management practices have statistically significant positive relationship with supply chain management performance, transportation practices was found to have no statistically significant predictive power on supply chain management performance of the MCH centers, while the remaining three dimensions have found to have a statistically significant predictive power on Supply chain management performance of both private and NGO MCH centers.

In General:

- ❖ According to the perceived evaluation of the respondents, NGO MCH Centers exerts relatively:
  - ✓ moderate effort in procurement practice, Inventory management practice and warehouse storage management practice,
  - ✓ Less efforts on transportation practices
  - ✓ Sometimes they transport and distribute using *"AMBULANCES instead of separate vehicles"*
  - ✓ Pertaining to supply chain management Performance, the respondents' perceived evaluation implies that the Supply chain management Performance is still moderate.
- ❖ According to the perceived evaluation of the respondents, private MCH Centers exerts relatively:

- ✓ Significant effort in procurement practice, Inventory management practice and warehouse storage management practice,
- ✓ Modest efforts on transportation practices
- ✓ Pertaining to supply chain management Performance, the respondents' perceived evaluation implies that the supply chain management Performance is still best modest.

5.3 Recommendations

NGO MCH & Private MCH centers are required to review their existing SCM practices and make the necessary modifications in order to benefit from the performance improvements in terms of improved quantity and quality, reduced cost of goods, and swift delivery time of KTDS for satisfaction of customers' demands. Here, some suggestions are forwarded on the basis of the findings of the study: Supply chain management practices of NGO MCH Centers exerts relatively moderate effort in improvement of procurement practice, Inventory management practice and warehouse & storage management practice, but poor improvement on transportation practices of KTDS.

- ✓ So, the top management levels starting from the country director should focus on having good ethical procurement practice, follow up on forecasted quantities and delivery periods of procured items, and budget utilization using ABC/VEN should be practiced. In addition, they should have prequalified lists of suppliers and they should build much stronger relationship with their key suppliers in order to minimize the lead time and to maintain stock availabilities of those KTDS.
- ✓ Lack of measures to reduce risk of wastage and frequent stock out have been examined in the study. so relevant training to improve the inventory control functions and supply chain management activities should be coordinated regularly with need based and delivered to the appropriate professional. In addition, Essential drug lists should be prepared and updated in collaboration with the MOH and the clinical quality departments of their organization. Proper inventory management software's and consumption data should be available in order to timely request/forecast/ the needs to procurement unit and to avoid frequent stock outs of KTDS

- ✓ Lack of adequate storage spaces and lack of regular checkup of functionalities of storage equipment's have been sited. All storage equipment needs to be properly calibrated and frequently checked for their functionalities up to standard as recommended by regulatory bodies. SOPs in place should be updated and strictly followed by those MCH centers since; one of the challenges identified was the poor adherence and implementation. The MCH center managers should obey the protocol or standard set by FMHACA and to fulfill the appropriate storage equipment and to have enough storage space.

- ✓ Less efforts on transportation practices have been shown on the study. The transport systems for KTDS specially for cold chain items need to be improved put and to use temperature and humidity monitor fitted vehicles in order to reduces risks of spoilage of those temperature sensitive items. The safety of KTDS is guaranteed in having fully functional and enough vehicles for transport of pharmaceuticals (KTDS). It is recommended also to use Cold chain box during transportation for cold chain KTDS in vehicles not fitted with temperature monitoring devices, which is used only for short distances.

The apparent moderate SCM practices and the corresponding SCM performance together with the significant positive relationship that has been witnessed between the two, implicated that NGO MCH centers in Addis Ababa, Ethiopia need to work on its SCM practices namely procurement practice, inventory management practice, warehouse/storage management practice and transportation practice in order to enhance its SCM performance.

The finding of the study of those private MCH centers revealed that SCM performance of private MCH centers is at relatively significantly improved level compared to NGOs MCH centers found in Addis Ababa Ethiopia. According to the perceived evaluation of the respondents, private MCH Centers exerts relatively Significantly improved effort in procurement practice, Inventory management practice and warehouse storage management practice, where as there is Modest efforts on transportation practices. But the private sectors also need to be improved in order to make their supply chain management performance at best significantly improved performance and the following recommendation have been drawn:

- ✓ All storage equipment needs to be properly calibrated and frequently checked for their functionalities up to standard as recommended by regulatory bodies. SOPs & FMHACA guidelines in place should be updated and strictly followed since; one of the challenges identified was the poor adherence and implementation.

- ✓ The transport systems for KTDS specially for cold chain items need to be improved put and to use temperature and humidity monitor fitted vehicles in order to reduces risks of spoilage of those temperature sensitive items. The safety of KTDS is guaranteed in having fully functional and enough vehicles for transport of pharmaceuticals (KTDS). So, the management should consider in having additional vehicles for proper delivery of items. Cold chain boxes are also recommended to deliver cold chain items in short distances.

Both private and NGO MCH centers are also should focus on the improvement of SCM challenges such as lack of use technologies, policies, lack of adequate budget and top-level management support, those challenges are still affecting the SCM practices of both NGO & private MCH centers. But from the analysis, the NGO MCH centers were affected more than the private MCH centers. So top level management teams should focus on those challenges and appropriate professionals should be assigned to improve the SCM performances. The importance of having different software's, adequate funding, customized policies and guidelines from MOH and the organization themselves, and management support should be addressed to improve those Supply chain management practices of the organizations.

Based on interview responses, the government commitment of exempt of any tax on Pharmaceuticals is encouraging but the shortage of foreign currencies has been a major challenge in past 2 years so many of Importers are out of stock for the vey vital Key tracer drugs. So, this is the government responsibilities to correct this Currency shortage and priority to Vital Drugs importers should be given during permission of Currency. Marie stopes international Ethiopia is doing well as they directly procure through head office found at London and import those vital drugs when importers found in Ethiopia are out of stock. This trend is encouraging and others may consider it.

5.4 Limitation and Suggestions for Future Studies

One of the major limitations of this study that worth mentioning is the fact that it does not comprehensively capture all aspects of supply chain management practices rather it made emphasis in revealing the associations and relationships that four-supply chain management practice dimensions namely procurement practices, Inventory management practices, warehouse & storage management practices and Transportation management practices, have with supply chain management performance of MCH centers. In researcher knowledge there is limitation on finding empirical data to support and discuss the result of SCM practices standard deviations of MCH centers.

The result showed that 6.2% of the variations SCM performance is explained by factors not considered in this model. So, in order to benefit from a comprehensive assessment of the factors that truly affect the SCM operational performance of private and NGO MCH centers, future studies may consider some others dimensions of supply chain management practice that haven't been considered in this particular study.

The other point not well covered by this study were the remaining SCM Challenges that may affect the SCM Practices. So, the researcher suggests for future studies to incorporate other internal and external factors that may affect the SCM practices, and relationship to their operational performances.

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ANNEX

Table 1: List of Private & NGO MCH centers found in Addis Ababa

1.Semah MCH Specialty center	11. Bethel MCH center
2.Woubserk Trading P.L.C Nain Maternal and Child Health Specialty Center	12. Ethio-Tebibe MCH center
3. Anania MCH Center	13. Addis MCH center
4. BGM MCH Center	14. Maria stopes International Ethiopia Gotera MCH specialty center
5. Grace MCH Center	15. Maria stopes International Ethiopia Arada MCH specialty center
6. Hemen MCH Specialized Center	16. Abebech Gobena MCH center, Local NGO
7. Dinberuwa MCH center	
8. Abrak MCH center	
9. Betsega MCH center	
10. Brass MCH center	

Source: FMHACA a, 2018. List of active and registered Health facilities in Ethiopia.

Table 2: Lists of Key tracer Maternity & child health Drugs & supplies (KTDS)

PE/E Anticonvulsant	MgSO4: injection 500 mg/ml in a 10-m Calcium gluconate: 100 mg/ml in a 10 ml Diazepam 5 mg Diazepam 5 mg/ in 2 ml
Antihypertensives	Methyldopa 250 mg, 500mg Hydralazine (HCl) 20 mg in 2 ml Nifedipine 10 mg
PPH Oxytocic's	Oxytocin 10 IU/ ml in 1 ml Ergometrine (hydrogen maleate) 200 micrograms/ml Misoprostol 200 micrograms Misoprostol 25 microgram
Supplies	Dipstix (urine tests) HIV test kits VDRL Tests HBS Surface antigen tests EDTA Test tubes
Neonatal sepsis Antibiotics (broad spectrum)	Ampicillin powder for injection 500 mg; 1 g

	Gentamicin injection 10 mg/ ml in 2 ml Gentamicin 40 mg /ml in a 2 ml vial Metronidazole injection 500 mg in a 100-ml vial Tetracycline eye ointment 1 percent Chlorhexidine 5 percent for dilution (liters; cord care)
PMTCT, OIT	Nevirapine 10mg/250ml TDF + 3TC + Efavirenz Cotrimoxazole 240mg/5ml, 480mg INH
Contraceptives	-Male condom - Female condom -OCP -Implant contraceptives -Depo-provera/injectables -IUD -Emergency Hormone contraceptives
Others	-Vitamin A 100,000Iu caplet -ORS -Folic acid 5mg tab - Ferrous sulphate+Folic acid -paracetamol 500mg tab

Source: WHO, 2004. Management of Drugs at Health center Level

Annex I: Respondents Profile

Table 3: Total Number of respondents

S.No.	Name of the Department	Proposed no of respondents	Actual No. of Respondents
1	Head Pharmacists	16	15
2	Store managers	17	16
4	Inpatient Head	16	15
5	Senior Asset Management Officer (pharmaceuticals management)	1	1
Total Proposed Respondents		**50**	**47**

Table 4: Demographic profile

All Responders			**Private**		**NGO**	
Variable	**Frequency**	**Percent**	**Frequency**	**Percent**	**Frequency**	**Percent**
Gender						
Female	18	38.3	14	37.8	4	40
Male	29	61.7	23	62.2	6	60
Total	***47***	***100***	***37***	***100***	***10***	***100***
Age						
18-25 Years	12	25.5	12	32.4	0	0
26-35 Years	29	61.7	20	54.1	9	90
36-45 Years	6	12.8	5	13.5	1	10
Above 45 Years	0	0		0	0	0
Total	***47***	***100***	***37***	***100***	***10***	***100***
Position						
Store Manager	17	36.2	13	35.1	4	40
Pharmacy head	14	29.8	12	32.4	2	20
Inpatient head	15	31.9	12	32.4	3	30
Pharmaceutical & Asset Manager	1	2.1		0	1	10
Total	***47***	***100***	***37***	***100***	***10***	***100***
Educational Qualification						
Nurse (BSC)	9	19.1	6	16.2	3	30
Pharmacist (BPharm)	19	40.4	16	43.2	3	30
Pharmacy Technician (Diploma in Pharmacy)	14	29.8	11	29.7	3	30
Midwifery (Bsc in Midwife)	5	10.6	4	10.8	1	10
Total	***47***	***100***	***37***	***100***	***10***	***100***
Service Year at the center						
0 to1 Years	10	21.3	8	21.6	2	20
1.1 to 3Years	32	68.1	26	70.3	6	60
3.1to 5 Years	5	10.6	3	8.1	2	20
Above 5 Years	0	0		0		0
Total	***47***	***100***	***37***	***100***	***10***	***100***

Table 5: Response Rate

Rating	Frequency	Valid Percent
non-respondent	3	6.0
Respondent	47	94.0
Total	50	100.0

Annex II: Respondents Survey

A. Questionnaire's

Addis Ababa University

School of Commerce

Questionnaire to be filled by respondents

A Study of Supply Chain Management Practices of Key tracer drugs & supplies Within Private and NGO MCH Centers in Addis Ababa, Ethiopia: Comparative Study

Dear Respondent;

Thank you for agreeing to fill this questionnaire. The study is being conducted by a student of Addis Ababa University Biniyam Takele to gather information about the **Supply Chain Management (SCM) Practices of Key tracer drugs & supplies (KTDS) Within Private and NGO MCH Centers in Addis Ababa, Ethiopia: Comparative Study**.

The questionnaire will take 10-15 minutes of your time. Your participation is voluntarily and information given will be treated with at most confidentiality and for academic research only.

Thank you for taking your time to share the insight with me.

Yours faithfully,

Do I have your permission?

1. Yes □ 2. No □. If Yes, Continue

- For comments/questions please contact Biniyam Takele (0911904229), Email-bini12tak@yahoo.com

SECTION II.

Number	Questions	Response
1	Sex	1 Male 2. Female
2	Title	1. Store Manger 2. Pharmacy Head 3. Inpatient head 4. Other specify_____
2	Your age?	1. 18-25 2. 26-30 3. 31-35 4. 36- 40 5. Above40
3	Current educational Level?	1. Nurse (BSC) 2. Pharmacy technician 3. Pharmacist 4. Other specify_____
4	Number of years and months you have worked at this facility in the current position?	1. 0-1 years 2. 1.1-2years 3. 2.1-3 years 4. 3.1-4years 5. Above 4years

1. On a Scale of 1-5 where 5= Strongly Agree, 4 = Agree, 3 = Not Sure, 2 = Disagree and 1 = strongly Disagree, please indicate your level of agreement with the following statements relating to the Procurement practice of Key tracer drugs & supplies (KTDS) of your organization.

No.	Measurement Items	Score				
		1 SD	2 D	3 NS	4 A	5 SA
Procurement Practice						
1	Pharmaceuticals (KTDS) requested and delivered timely with less lead time					
2	There is follow up system to the forecasted quantity to purchase KTDS efficiently & effectively					
3	Procurement is being processed based on procurement plan					
4	Our organization has good ethical Purchasing practice which contributes for the availabilities of KTDS					
5	VEN/ABC analysis is used for items procurement & Budget allocation					
6	We rely on small number of high-quality suppliers					
7	Having a good working relation with suppliers results in timely delivery of goods					
8	Local suppliers' services are satisfactory to the facility					

2. On a Scale of 1-5 where 5= Strongly Agree, 4 = Agree, 3 = Not Sure, 2 = Disagree and 1 = strongly Disagree, please indicate your level of agreement with the following statements relating to the Inventory Management practice of KTDS of your organization

No.	Measurement Items	Score				
		1 SD	2 D	3 NS	4 A	5 SA
	Inventory Management					
1	All available KTDS are listed and appropriately documented in the Essential drug list of the facility					
2	Stock keeping logistics forms like BIN Cards, stock cards, Models, IFRR & RRRF are properly used					
3	Physical inventory is done at least ones per year					
4	KTDS are not out of stock frequently with in the facility					
5	KTDS are not wasted and expired frequently					
6	Electronic inventory management system is well implemented for proper management of stock					
7	Overall inventory management of KTDS of the organization is satisfactory					

3. On a Scale of 1-5 where 5= Strongly Agree, 4 = Agree, 3 = Not Sure, 2 = Disagree and 1 = strongly Disagree, please indicate your level of agreement with the following statements relating to the Storage and ware house Management practice of KTDS of your organization

No.	Measurement Items	Score				
		1 SD	2 D	3 NS	4 A	5 SA
Warehouse and Storage						
1	Special storage area for cold chain items of KTDS is available within the facility					
2	Storage space is Enough to store KTDS within the facility					
3	Storage equipment are Fully functional					
4	Storage equipment are regularly checked for compliance					
5	There are Measures in place to ensure KTDS don't wasted and expired					
6	Existing SOPs that are followed to ensure proper storage					

4. On a Scale of 1-5 where 5= Strongly Agree, 4 = Agree, 3 = Not Sure, 2 = Disagree and 1 = strongly Disagree, please indicate your level of agreement with the following statements relating to the Transport Management practice of KTDS of your organization

No.	Measurement Items	Score				
		1 SD	2 D	3 NS	4 A	5 SA
Transportation Management						
1	There is Special Vehicles for transportation of cold chain items					
2	Transport vehicles are fitted with functional temperature and humidity monitoring devices					
3	Enough vehicles to meet demand for delivery of procured Pharmaceuticals and KTDS					
4	Delivery is done within recommended timelines					
5	Transport and distribution practices are satisfactory					

5. On a Scale of 1-5 where 5= Strongly Agree, 4 = Agree, 3 = Not Sure, 2 = Disagree and 1 = strongly Disagree, please indicate your level of agreement with the following statements relating to the challenges of implementing Effective, Efficient and responsive Supply Chain Management Practice in four parameters of your organization.

S.no	Challenges	**Procurement practice**					**Inventory management**					**Warehouse and storage practice**					**Transportation practice**				
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
		SD	D	NS	A	SA	SD	D	NS	A	SA	SD	D	NS	A	SA	SD	D	NS	A	SA
1	Lack of use of technologies like different IT applications (SCM software's) in your center, which affects																				
2	Lack of appropriate use of updated policies and Guidelines affects																				

3	Lack of enough budget/funds for KTDS in your center, affects																				
4	There is little support from top management towards improving																				

6. Based on the practice at your hospital concerned with SCM Operational Performance of KTDS "5" strongly agree; "4" agree; "3" not sure (which is middle value of the response); "2" disagree, and "1" strongly disagree.

S.no	Measurement items	1	2	3	4	5
1	Total cost of KTDS supply chain management is low					
2	KTDS procured and stored are enough quantity (volume and mix)					
3	The SCM is responsive to customer requests with less lead time					
4	The Centre is successful in assuring quality of KTDS being purchased and managed within the center					

B. Interview

Interview Guidelines for Pharmacy Heads and Pharmaceutical Administrators

1. What other procedures/Procurement practices/ you follow to procure KTDS and in what ways has procurement procedures affected the supply chain management practices (efficiency, effectiveness & Responsiveness) of KTDS within your facilities?

   _____

   _____

2. In what other ways that Inventory management of KTDS practiced and in what ways has it affected the supply chain practices (efficiency, effectiveness & Responsiveness) of KTDS within your facilities?

   _____

   _____

   _____

   _____

   _____

3. In what other ways Warehousing and store management of KTDS has affected the supply chain practices (efficiency, effectiveness & Responsiveness) of KTDS within your facilities?

   _____

   _____

4 Other challenges that will affect the SCM practices of KTDS within the facilities?

_____

_____

_____

_____

5 In what other ways that KTDS transportation is managed for the supply chain management Performance (efficiency, effectiveness & Responsiveness) of KTDS within your facilities? And the constraints you face in proper transportation of KTDS?

_____

_____

6 In what other ways your organization is performing in order to improve the SCM operation performances (Quality, Cost, delivery time, flexibility in volume and product mix to satisfy customers need)?

"Thank you for your cooperation"