

**INFLUENCE OF SUPPLY CHAIN MANAGEMENT STRATEGIES IN
MITIGATING CHALLENGES IN SUPPLY OF ANTI RETROVIRALS IN KENYA
HEALTH SECTOR**

MUKOLWE BETTY AWINJA

**A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTER OF BUSINESS
ADMINISTRATION UNIVERSITY OF NAIROBI**

NOVEMBER, 2016

DECLARATION

This research project is my own original work and has never been presented to any other university for the award of a degree.

Signed: _____ Date: _____

Mukolwe Betty Awinja

D61/70092/2008

This project has been submitted for examination with my approval as the University supervisor

Signed: _____ Date: _____

Prof: Bitange Ndemo

School of Business

University of Nairobi

DEDICATION

..... Thanks dad and mum

ACKNOWLEDGEMENT

My first appreciation above all is to the Almighty God for his gift of life, knowledge and all he has given.

Secondly, I acknowledge my supervisor, Prof: Bitange Ndemo, and moderator, Prof: Awino, who guided me throughout the research process and the panel of lecturers that guided my report during proposal defence stage.

I also acknowledge the support and cooperation given by the various health institutions that gave the data used in this study

Special thanks to my husband, Hanns Munyefu, my study partner, and for the support through paying my tuition fees; and my children for being beside me all the way and giving me priceless support and encouragement.

I express my warm thanks to my friends; Wesonga and Duncan, for your endless support and constructive criticism.

Thank you very much, sincere gratitude to all.

TABLE OF CONTENTS

DECLARATION	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
LIST OF TABLES	vii
LIST OF FIGURES	viii
ABBREVIATIONS AND ACRONYMS	ix
ABSTRACT	x
CHAPTER ONE: INTRODUCTION	1
1.1 Background of the Study	1
1.1.1 Supply Chain Management Strategies	2
1.1.2 Challenges of ARVs Supply Chain Management	4
1.1.3 Supply Chain Management Strategies and Challenges of ARVs Supply Chain Management.....	5
1.1.4 Health Sector in Kenya	6
1.2 Research Problem.....	7
1.3 Research Objective.....	8
1.4 Value of the Study.....	9
CHAPTER TWO: LITERATURE REVIEW	10
2.1 Introduction	10
2.2 Theoretical Foundations	10
2.2.1 Resource Based View.....	10
2.2.2 Value Chain Analysis.....	10
2.3 Supply Chain Strategy and Practices	11
2.4 Factors Affecting Supply Chain Management	12
2.5 ARVs Supply Chain Processes	13
2.6 Empirical Studies and Research Gaps.....	15

CHAPTER THREE: RESEARCH METHODOLOGY	16
3.1 Introduction	16
3.2 Research Design	16
3.3 Population of the Study	16
3.4 Sampling Design	16
3.5 Data Collection.....	17
3.6 Data Analysis	17
CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION.....	18
4.1 Introduction	18
4.2 Respondents Profiles	18
4.2.1 Analysis of the Response Rate	18
4.2.2 Number of Patients Served.....	18
4.2.3 Number of Satellites.....	19
4.2.4 Number of implementing partners	20
4.3 Supply Chain Challenges	21
4.4 Supply Chain Strategic Options	23
4.5 Quality of Service Delivery Process	25
CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS	28
5.1 Introduction	28
5.2 Summary of Findings	28
5.3 Conclusions	31
5.4 Limitations of the Study	32
5.5 Recommendations	32
5.6 Suggestions for Further Research	33
REFERENCES	34
APPENDICES	37
Appendix I: Questionnaire.....	37
Appendix II: List of Health Institutions.....	40

LIST OF TABLES

Table 3.1: Sample Size Distribution	17
Table 4.1: Analysis of the Response Rate.....	18
Table 4.2: Number of Satellites Affiliated to the Health Institutions	19
Table: 4.3: Number of Implementing Partners.....	20
Table 4.3: Supply Chain Challenges	21
Table 4.4: Supply Chain Strategic Options.....	24
Table 4.5: Quality of Service Process	25

LIST OF FIGURES

Figure 4.1: Average Number of Patients	19
Figure 4.2: Number of Satellites affiliated to the Health Institution	20
Figure 4.3: Quality of Service Processes	26

ABBREVIATIONS AND ACRONYMS

AIDS :	Acquired Immune Deficiency
ART:	Antiretroviral Therapy
ARV:	Antiretroviral
ESCM:	Electronic Supply Chain Management system
FBO:	Faith Based Organization
HIV:	Human Immunodeficiency Virus
HMIS :	Health Management Information System
IT :	Information Technology
KEMSA :	Kenya Medical Supplies Agency
LMIS :	Logistics Management Information System
MDGs :	Millennium development goals
MEDS :	Mission for Essential Drugs and Supplies
NACC:	National Aids Control Council
NGO :	Non-governmental Organization
PEPFAR:	President’s Emergency Plan for AIDS Relief
PLWHA:	People Living With HIV/AIDS
SCM:	Supply Chain Management
UNAIDS:	United Nations Programme on HIV/AIDS
UN:	United Nations
USA:	United States of America
USAID:	United States Agency for International Development
WHO:	World Health Organization

ABSTRACT

Approximately 1.6 million Kenyans are HIV Positive which poses both social and economic challenges for the country. The HIV/AIDS target set by The Joint United Nations Program states that 90% of all HIV positive people should be diagnosed, and 90 percent of those on treatment virally suppressed. (Chemonics Final report, 2015). This implies availing antiretroviral (ARV) drugs to approximately 1.3 million people. Use of Anti-retroviral Therapy was found to be a more cost-effective intercession against HIV/AIDS. Despite increase in donor funding towards the health sector, there exists challenges in the supply-chain and also at the health institution which may be restricting access to ARVs. High cost of commodities, and product quality concerns are some of the challenges affecting reliable and effective delivery of ARVs. One patients' annual treatment costing an average of US\$ 248.00. In 1999, the government stated that HIV and AIDs was a national tragedy. It set up the National Aids Control Council (NACC) to manage the multi-sectoral response to this public health threat. The study aimed to determine the effectiveness of supply chain management strategies in mitigating challenges in supply of ARVs in Kenya health. The study reviewed theoretical and empirical literature on supply chain on health service delivery institutions. Descriptive survey was used as the research design. Population of the study comprised of 345 health institutions. A sample of 34 respondents was selected using convenient random Sampling technique. A structured questionnaire was administered in the collection of Primary data. Data analysis was done using descriptive statistics. The data was presented in frequency tablets, analysed through frequency counts, percentages and cumulative percentages. The study findings concluded that ARV supply chain challenges have great negative impacts on the services of health sector in Kenya. The study concluded that supply chain strategies have been used to a large extent in mitigating challenges in supply of ARVs in the Kenyan health sector. Further, the study concluded that quality of service delivery processes have been enhanced in the health sector in Kenya. The study recommended that policy makers should obtain guidance from the study in designing appropriate policies that can ensure effective logistics management especially in the health and medical sector. The study recommends that the management of the Kenyan health sector should address shortcomings in its service delivery; challenges experienced in the supply of health care commodities, and provide guidance in the up scaling of its activities for enhanced service delivery. The study recommends that scholars and academicians should carry in-depth studies on ARV supply chain management and implementation both in the public and private health care institutions

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

The Supply chain concepts and its management are progressively being looked upon as a way of attaining and remaining competitive in a globally demanding environment. As established by De Kluyver and Pearce (2006), the objective of a strategy is to achieve the long term, sustainable higher performance. This superior performance can only be achieved by organization that is willing to be a fully integrated associate in a supply chain (Cooper et al., 1997). In essence, this makes SCM to be a connecting link between fully-vertically – integrated systems and those where each channel member functions autonomously.

Managing at the level of a supply chain requires a fresh focus coupled with a new management philosophy that requires them to work together with their supply chain partners as pointed out by Lambert et al (1998). According to Ho et al (2002), value creation, combination of main businesses and collaboration are 3 core SCM elements. This is in agreement with Stank et al (2005). According to him, supply chain is a strategic level theory. Therefore, SCM can be defined as management, the co-ordination of selected set of important business activities from end user to suppliers. All these joint works are focused towards the provision of the products, relevant information, and offering services that are all aimed to add value for the customers and stakeholders.

The resource based view proposed by Penrose (1959), Wernerfelt (1984), Rumelt (1984) and Mwilu and Mercer (1983) opine that organizational competitiveness is contributed to through the application of both tangible and intangible assets that a firm has at their disposal. According to the value chain analysis framework, value is what buyers are prepared to part with or pay for Porter (1985) According to Farrington & Lysons (1986), one can offer higher product or service value through low prices. Alternatively, offer comparable benefits or providing distinctive and imitable benefits that more than compensate for the higher prices.

In the Kenyan health sector, the UNAIDS Gap report (2014) approximate that 1.6 million Kenyans are HIV Positive which poses both social and economic challenges for the country. Through partnerships with UNAIDS and other players in the global health sector, Kenya is

committed to reversing the frightening trends in HIV deaths and infections. The HIV/AIDS target set by the Joint United Nations Program states that 90% of all HIV positive people should be diagnosed, and 90 percent of those on treatment virally suppressed (UNAIDS Gap report, 2014). This implies availing antiretroviral (ARV) drugs to approximately 1.3 million people.

Through several global initiatives such as the Presidents Emergency Plan for Aids relief (PEPFAR), Clinton Health Access Initiative, The Global Fund for AIDS, Tuberculosis and Malaria, and the Columbia University, poor countries like Kenya, have had access to financial and technical resources needed to provide ARVs. Despite increase in donor funding towards the health sector, there exists challenges in the national supply-chain and also at the health institution which may be restricting access to ARVs. It therefore becomes urgent to work towards efficient and effective supply chain management systems. Ripin, et al. (2014;Pg 77), in their work on Antiretroviral Procurement and Supply chain, state that an effective supply chain, ensures the following six rights are achieved; right product, with right order quantities placed to supplier, and stock on hand in right condition, and delivered to the right customer and within the expected timelines. This will play a role in lowering the cost of caring for the patient.

Supply of ARVs in the country is unique in that it's a service offered to the customers (patients) by the governments in partnership with donor community at no cost, with very little competition from the commercial sector due to the nature of the products. Yet the challenge remains that the government has to plan accordingly to ensure that there is constant supply of ARVs to the customers. This is how organizations like KEMSA the government pipeline and Kenya Pharma, MEDs and others that are subcontracted by USAID come into play.

1.1.1 Supply Chain Management Strategies

In their case study work of Assessing supply chain success factors, Tummala et al, (2006 : pg 179), view Supply chain management concept as “the combination of all parties both external ; (suppliers, partner organisations) and internal to the organization, (internal corporate business units). These parties are involved in meeting delivery of specified

customer requirement; inputs, outputs or outcomes. According to Lysons & Farrington (2006), the flow of material within an organisation, from their procurement, to manufacturing of the products, the distribution, sales and disposal, together with the associated transport and storage is referred to as Supply Chain Management.

Supply chain refers to the linkages of an organization, involved in getting product from suppliers to customers. These are personnel in charge of the works, the processes established and systems in use. By virtue of being an all inclusive approach, SCM begins with material preparation and organisation of materials from supplier, followed by the logistics of getting the materials to the organisation. This is aided by services and flow of information from suppliers to producers or service providers to the final customer. The management of these business processes is SCM. If well managed, it can be the beginning of important transformation in business management. (Fantazy et al., 2010). As pointed out by Porter (2002), operational efficacy is concerned with achieving superiority at an entity's activities or functions, whereas supply chain strategy defines the linkages and combination of activities and functions throughout the value chain.

Accordingly, as opined by Perez H.D (2013) in his work of "The Supply chain roadmap", there is an interrelation amongst four elements within an organisation. These are very key on the growth and shaping of the supply chain strategy of an organization. The first one is the industry framework which refers to the interface between the Manufacturers, and the customer's technological developments. It also shapes the trade and industry elements that impact industrial competition. This is followed by the organization's unique value proposal. What unique value does the organisation have that makes the customers choose it instead of its competitors. This is closely related to the Value chain analysis of the organisation. The third element is the organisation's managerial focus. This element is important as it's the link between the execution, which is the supply chain process, and the business unique value proposal, its strategy. If this element is not well executed, it can easily lead to failure resulting the organisations' management not taking into account its competitive positioning while pursuing a different strategy. For example, being very focused on using efficiency-oriented performance indicators without taking into account the defined organisation competitive positioning. Lastly, is its internal processes. These are the same as

the supply chain processes which need to be reflected properly with the organisations' supply chain activities focused on a given customer group with specific characteristics.

Koh et al. (2007) proposed that SCM practices should follow these perspectives: strategic planning leading to good supply benchmarking, close partnership with few trusted suppliers with whom you shared same values and understanding. In addition need just in time supply that will enable the organisation hold just enough safety stock and hence lower costs. All these will lead to good partnership with customers. This resonates very well pharmaceutical industry practices

There are several benefits that organization can enjoy due to SCM. The sharing or integration of business processes, beginning with a firm's primary goods and service suppliers and extending it to the firm's most valued customers, allows each participant within the supply chain to know of the various plans in progress hence leading to reduction of costs, both production, inventory and delivery costs through proper planning, increase production output, raised business profits.

Eventually, the aim of SCM is to achieve higher customer satisfaction by increasing profitability through efficiency creation and value addition. (Stock and Boyer 2009, p.703). Expected benefits that will accrue when the SCM is improved are: lower costs due to reduced redundancies, shorter product lead time from suppliers, which in turn lead to lower inventory levels as organisation is assured of getting supplies within agreed upon timelines. It also leads to lessened demand uncertainties from the customers as they become assured of product availability. This leads to improved product quality, with better target market access, superior customer service and market responsiveness, (Fisher 1997; Lambert et al. 2005; Lee et al. 1997; McCarthy and Golicic 2002).

1.1.2 Challenges of ARVs Supply Chain Management

Kabiru (2012) explain that the challenges with ARVs supply chain management include counterfeits, pricing, lack of adequate storage facilities by the user hospitals and poor forecasting of the user needs and requirements. Njonjo (2013) underscore that healthcare drugs supply chain is affected by lack of adoption of IT infrastructure.

The noted reduction in HIV prevalence in general population, globally, in Africa and Kenya, was attributable to the interventions enlisted by the WHO in combating HIV/AIDS. Amongst some of the interventions was antiretroviral therapy (ART) (WHO, 2009). Which has become valuable in terms of lowering the patient care costs, enabling more people to be put on treatment, leading to decreasing HIV prevalence, decreasing incidence of orphaned children, and healthy nation has better economic performance (USAID, 2009). Anti-retroviral were not affordable to majority of HIV/AIDS patients in the country a decade ago but changes occurred once generic ARVs were allowed into the country (Industrial Property Act of July 2001). The significantly reduced cost of ARVs made the drugs became available and accessible to HIV patients through public health facilities (NASCOP, 2005).

1.1.3 Supply Chain Management Strategies and Challenges of ARVs Supply Chain Management

For Kenya to reduce the gap between demand and supply and accelerate the availability of ART services and commodities, ARV supply chains developed rapidly through set up of various programs in 2003. This rapid scale up, unfortunately gave rise to challenges in procurement and logistics of ARV supplies. These challenges needed to be managed in order for them not become becoming a hurdler to reliable, effective treatment. High cost of commodities with one patients' annual treatment costing an average of US\$ 248.00, quality of the medicinal product, untimely delivery of the commodity represent some of the key challenges experienced in the ARV supply chain. In addition, quality of product (drug), not only needs to be assured during manufacture but also during storage and dispensing at the ARV dispensing facilities (ART report). The number of ARV regimens for prescribing is high and sometimes coupled with changes in recommended ART regimens. Fragmentation of demand, forecasting and quantification inaccuracies due to low data collection and reporting of commodity use due to low use of information technology systems, production and shipping delays, product shelf-life requirement and product registrations challenges. In essence the above challenges cause interruptions of supply and hence shortages of critical ART commodities in many public-sector programs (USAID, 2006). With approximately, 1200 facilities providing treatment, some of the facilities are far away from the patients making them travel long distances to access the treatment.

Other challenges are multiple and often uncoordinated supply chains within Kenya leading to parallel and duplicated activities. Inadequate personnel with skills in SCM and logistics, high dependency on donor funding of the ARV supply chain. All the above lead to negative public health impacts such as resistance to available medicines leading to worsenin of the patients condition, extreme cases we get therapeutic failure and eventually lead to death. Consequently, these lead to diminished confidence in the health system as a whole and wastage of resources. There is critical need to manage predict and carefully manage potential supply chain interruptions.

1.1.4 Health Sector in Kenya

Kenya based on the United Nations (UN) Millennium Declaration, to which it's a signatory, has set time bound and measurable health related targets guided by the Millennium Goals (MDGs); halting and turning around HIV/AIDS infection, and other major diseases like Malaria by 2015, and to lower by two thirds the under-five mortality rate between 1990 and 2015.

Shortage of health care personnel, physicians, has been a challenge to Kenya. According to the WHO, Kenya only has 4,500 physicians. Kenya, when compared to the United States, has just one doctor per 10,000 residents. The United States has for the same number of 10,000 people, are seen by 26 physicians. As is the norm in many countries, over 50% of Kenyan physicians are based in Nairobi, and other urban centres. Due to better pay in private sector as compared to public has led to many trained health workers to move leaving approximately 1,000 physicians to work in the public sector. This greatly impacts the level of service offered. This sector serves the majority of Kenyans. This gap is filled by the 37,000 nurses, plus traditional midwives, pharmacist and community health workers. The more serious migration is that of health personnel going to other countries. 51% of net emigration rate for doctors, which is among the highest in the world, poses this as a big challenge to challenge to Kenya.

Some of the challenges posed by few healthcare personnel are; government is not able to carry out adequate disease surveillance, maintain accurate statistics regarding disease outbreaks, and report relevant findings to neighbouring countries and international

organizations. To enhance collection of timely, accurate, and relevant data and information collection, Kenya, through support of partners has developed of a Health Management Information system, (HMIS).

Kenya's approach in meeting the supply challenges and demands for ARV's has been three fold, based on creation of supply chain management system, the ARV drugs (inventory) management and lastly and very important, the teamwork and alliance between the public, Faith Based organizations (FBO), the private-for-profit, and lastly, non-governmental organizations (NGO). (Guidelines for Antiretroviral drug therapy in Kenya; 3rd edition; 2005)

1.2 Research Problem

Adoption of supply chain best practices, application of the techniques and methods has time and again proved to be problematic for use by the many health organizations that would like to. This is so because they were developed in the industrial setting. Organizations even with most efficient internal processes do not facilitate supply chain management across borders. Collaboration is minimized and other players resort to traditional methods of operations that may not be cost effective (Muturi, 2010).

Approximately, 5.25 million people living with HIV in the world had been put on treatment by 2009. Out of the 5.25 million patients, 3.9 million live in sub-Saharan Africa. (Schouten et al, 2011). In 1999, the Kenyan government stated that HIV and AIDs was a national tragedy. It created the National Aids Control Council (NACC), with role of managing the multi-sectoral response to this public health threat. By 2013, 1.6 million people were HIV positive, an increase from 1.4 million in 2009. (UNAIDS, Gap report, 2014). The challenge here is that while it's acknowledged that the HIV prevalence has declined over the past years, it's projected that due to reduced mortality rate attributed to the ART program, there will be an increase in the number of people living with HIV.

In health sector, effective SCM can lead to efficient resource utilization and patients' satisfaction of the services offered. According to Chemonics final report (2015), the core challenge to many patients is the continuous availability of ARVs at health facilities. For many patients, due to health institutions being far from their residents, this commuting

sometimes proves to be unaffordable. Also obtaining ARV drugs carries with it the risk of stigma. Health facilities commodity stock outs are a result of unsecure SC. To overcome this challenge, Kenya Pharma through a number of best practices, were able to create a safe, and consistent national pharmaceutical supply chain. (USAID, 2015).

Locally Kazi (2012) studied the practices and impact of Supply Chain Management on Performance at Kenya Medical Supplies Agency and found that effective SCM impact positively on the operational performance at KEMSA. Mwilu (2013), studies on Supply chain management practices and Performance among public research institutions found that the public research institutions had adopted some SCM best practices to a large extent and some to a moderate extent which left gaps in the adoption of SCM practices, he also noted strong positive relationships in logistics, lean suppliers and information technology have with firm performance among the publicly funded research institutions. These researches focused on SCM practices and general performance. Wambui (2013) studied effect of counterfeit drugs on the pharmaceutical distribution and retailing in Mombasa County and observed that counterfeit impact negatively to government collection of tax, they also led to low rate of investors into the county; investor's funds were rated above average. Counterfeits lead to low sales; loss of goodwill of the affected brand, and low product innovation and advancement. Njojo (2012) studied challenges in distribution of ARVs amongst the remand prisons and indicated that uncoordinated supply chain processes affect uptake of the treatment. As evidenced by the above studies, a study purposely carried out to establish the role of strategies of supply chain management in mitigating the challenges of in supply of ARVs, has not been done. This research project therefore sought to fill this research gap by answering the question: what is the influence of supply chain management strategies in mitigating challenges in supply of ARVs in Kenya's health sector?

1.3 Research Objective

The research's objective was to determine the effectiveness of supply chain management strategies in mitigating challenges in supply of ARVs in Kenya health sector.

1.4 Value of the Study

The information obtained from the study will aid the Kenyan health sector management to address the weakness in its service delivery; improve on challenges that have been identified in the supply of health care commodities, and offer direction in the up scaling of its activities to improve provision service delivery.

Various policy makers such as the government will find the study invaluable in the execution of guidelines with focus on making public organisation have effective supply chain management practices.

The study is also useful to scholars and academicians. Future and current scholars of supply chain will get information on execution of supply chain in various organizations. The findings can be used a basis for further research by those who wish to do so.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The chapter review of supply chain management work done by previous researchers concerning supply chain management strategies in public and private set ups. Theoretical and empirical reviews are done in this chapter. Theories that underpin the concept of supply chain management strategy have been reviewed. The chapter then presents an empirical review of both the factors affecting supply chain generally and specifically in the health sector. The research gap is also identified and discussed.

2.2 Theoretical Foundations

The study looks at Supply Chain Management in two perspectives, namely: resource-based view and value chain analysis. The perspectives are discussed as follows:

2.2.1 Resource Based View

Proponents of this theory, notably Mwaitu and Mercer (1983), Wernerfelt (1984), and Rumelt (1984) see SCM as a foundation for an organisation to develop an advantage or an edge over its competitors. This lies in how the organisation is able to use the various resources at its disposal to create an edge for itself. According to Barney (1991), SCM can successfully generate valuable non imitable or substitutable resources without use of a lot of effort.

Odeny (2015) explain that SCM impacts on effective resource utilization and realization of organization goals and objectives. SC process become streamlined and eventually, guide day-to-day product flows. Through tools and techniques available in SCM, data collection improves and can be used to manage unforeseen natural disasters. It can be used to accurately identify problems, solve disruptions and determine how to practically move products to those in an emergency situation. Health Institutions require properly instituted SCM with minimal bottlenecks.

2.2.2 Value Chain Analysis

This concept was developed by Porter (1985). According to Porter (1985), customers or buyers are willing to pay for value. Farrington and Lysons (2006) defines value chain as the means by which value is added to product or service through a process from conversion

of raw materials till finished product. This includes delivery and after service. They visualised this as a linear map. For service organizations like hospitals, this would imply mapping patients' needs correctly and offering satisfactory Medicare services. According to Farrington and Lysons (2006), organisations should continuously strive to create value addition to their customers by identifying what they can do best. In this way, they will be able to lower costs of the products or services. Alternatively, they will be able to provide equivalent benefits or unique benefits at a price the customer will be willing to pay for.

For an organisation to achieve a strategic fit, Chopra, et al. (2010), argues that it has to ensure that all its supply chain capabilities are in sync with needs of the targeted customer group. It thus follow that organization should continuously analyze activities along the value chain systems to identify what they can uniquely deliver to the customer segments and out-do their competitors.

2.3 Supply Chain Strategy and Practices

Lee (2002) explains that every specific supply chain has its objectives and goals; these are reflected in SC strategy that they will adopt. Supply chain strategies can be classified based on whether it's mainly focused on cost efficiencies and leanness, these are efficient supply; on flexibility and quick response, these are responsive and agile supply chains; or on a contingent mix of both. In addition we risk hedging supply chains Vonderembse, et al. (2006)

According to Wang, et al (2004) and Vonderembse, et al. (2006) explain that a lean SC strategy aims at improving the efficiency of the organisation by improving on commodity lead times from the manufacturer or supplier and also generally reducing waste. This eventually leads to cost reduction. Qi et al. (2009) opines that the strategy works well with moderately stable and expected demand. The product variety in most cases should be small. Gunasekaran et al. (2008) and Lin et al. (2006) advance that an Agile SC strategy is designed at achieving elasticity in the face of shifting customer needs and increased rivalry within the environments through rapid, and frequent responses. SCM practices involve a set of processes undertaken in an organization to advance successful management of its supply chain (Koh et al., 2007). SCM practices can be defined in various ways. Alvarodo and Kotzab (2001) viewed SCM practices where the organisation focusing on its core

competencies and use inter-organizational standards such as activity-based costing or electronic data interchange, and remove unwanted inventory level by postponing customizations towards the end of the supply chain. Koh et al. (2007) proposed that SCM practices should follow these perspectives: strategic planning leading to good supply benchmarking, close partnership with few trusted suppliers with whom you shared same values and understanding. In addition, need just in time supply that will enable the organisation hold just enough safety stock and hence lower costs. All these will lead to good partnership with customers.

2.4 Factors Affecting Supply Chain Management

A study by Marien (2000), identified the following as main enablers for an organisation's SCM to be successful: organizational infrastructure, technology, strategic alliances and human resource management. These are discussed as follows:

According to Macleod (1994), there is an increasing need by the supply chain managers wanting to automate and link all the related activities. This forms the basis of an integrated solution, which gives them a view of the whole supply chain at once. According to Cooper (2003), firms in supply chain can use Electronic Data Interchange (EDI) technology to aid transactions and information exchanges.

Festus (2000), states that effective value chains generate profits. Value Chains, in their many views are one that receives an order from a customer, one that processes a customer requirement. It has to define that product or service. A company's value chain success or failure depends on its entire processes and functions. (Chopra et al., 2010).

Enterprises, more than ever before, are being faced with intricate and multifaceted tasks and changing competitive environments. To sustain enhanced organisational performance, firms must be able to align their organizational structure, to its business strategy, and information system. (Bergeron, 2004; Sabherwal and Chan, 2001; Sanders, 2005; Stock et al., 2000; Venkatraman and Prescott, 1990; pp 1003-1020).

The following dimensions impact heavily on environmental uncertainty. Supplier uncertainty arises when the supplier is not able to process the order by either not supplying it at all or not supplying within the agreed upon delivery timelines. Demand uncertainty is

from the customer perspective. Chopra and Meindl (2010) pointed out that if firms' order is urgent and rapid, then firms will face the high level of implied demand uncertainty. In opposite, if firms' order lead time is long orientation then the company face the implied demand uncertainty is lower than emergency.

In view of the above, and as expressed by Giunipero et al 2009, an effective supply chain will only be achieved when there is good collaboration among the partners, supported with co-ordinated co-ordination of their internal activities. This calls for unqualified support and commitment from management.

2.5 ARVs Supply Chain Processes

Supply chain processes for ARVs have been classified into six discrete steps namely; quality monitoring, inventory management, serving customers, forecasting and procurement, product selection and logistics information money people. To ensure an efficient and uninterrupted supply chain of products, each process in the procurement cycle should have its own monitoring and evaluation process throughout (Guidelines for Antiretroviral Therapy in Kenya, 2005).

According to Ripin et al (2014), two main processes; strategic and operating processes exist under the procurement and supply chain cycle management. Strategic processes happen at expected planned intervals. The planning element is important and it provides the basis for successful supply chain operations. Their strong supply market implications if well used by organizations can strategically drive market shifts in prices. Examples of strategic processes are: forecasting and quantification and supplier selection. These are key processes as they determine the short and long term quantity of products needed to ensure uninterrupted supply of any products. Any inaccuracy in the data collected in terms of consumptions or stock on hand will have a major impact on the level of under-stocking or overstocking of the product. The supplier also plays an important role as their performance in executing an order with regards to delivery timeliness determines the stock level of the organization. Operating processes are repeated in nature and in progress. They aid with progress of drugs from manufacturers to customers. These are order placement to suppliers, pre-shipment quality checks, primary transportation from suppliers, customs clearance, and in country distribution to the customer (Guidelines for Antiretroviral Therapy in Kenya, 2005).

The supply chain processes or functions are interdependent and may be performed by different organizations necessitating a need for shared understanding by the organisations. As pointed by Cohen and Roussel (2005), it's in the organisation's interest to ensure it develops strategies that will enable it integrate the external business processes and at the same time maximise on the internal process to help serve customers better and enhance performance of individual partners. Strategies and efforts adopted to mitigate risks within a process will have considerable effect on other processes. For example, while an organization can adopt a pooled procurement strategy to mitigate supply risks and maximize on both product availability, this same strategy will impact positively on cost related risks by reducing shipping costs and through economies of scale, will also reduce cost of drugs.

The ARV supply chain management system is made up of key components namely, the patients requiring ART and hence being the source of demand, the medical facilities offering ART, the local or national warehouses (affiliated to KEMSA and agents for donor partners), ART program managers and policy makers and lastly the manufacturers (Guidelines for Antiretroviral Therapy in Kenya, 2005). The management of ARVs in Kenya follows as series of interdependent activities. The aim is to mitigate both the supply risks in addition to the demand risk as explained in section 1.1.2 above. Supply risks, which basically deals with production and shipping delays can be mitigated through use of a number of strategies. These are use of numerous – source procurement, pooled (collective) procurement based on proposed future demand and flexible specifications for presentation of ARVs. All the above activities if well coordinated lead to economies of scale, freight consolidation and hence reduction in cost of ARVs to both country and patient.

This cycle is supported by management functions such as ART program organization, financing of drugs procurement, trained staff, information management through use of LMIS/ESCM, monitoring and evaluation all operating within a policy and legal framework. The “buyer” responsibility for ARVs in various low income countries as well as Kenya is divided between the financier who pays for the products and the beneficiary who receives the products. They are supported by their procurement agents and

programme implementers who in most cases are usually nationalised HIV control programs or designated partners. Ripin et al (2014). The collaboration and partnership between the public, private for profit, NGO and FBO has been the turning point for ARV distribution strategies in Kenya through creation of various ART task forces that have been able to guide the country on various technical and non-technical issues.

2.6 Empirical Studies and Research Gaps

Nsimba (2008) studied on the effect of counterfeits and fake in both the developed and less developing countries. He focused particularly on antiretroviral (ARVs), anti-malarias and other drugs. He found out that counterfeit drugs can adversely affect the patient's life, patients lose confidence in health care professionals, and the society is greatly affected not only in terms of health but also in terms of trade relations and investment, and hence affecting economy in various ways. Lastly, its causes of global pandemics.

Mungu (2013) assessed how the inventory levels of essential drugs in public health institutions are impacted by various supply chain practices adopted. Market price fluctuations were identified as the most challenging factor that could affect stock levels. He concluded that based on the current public procurement practices, are not effectual in reducing the cost of drugs at the institution. Therefore there is need to evolve to practices and methods, like e-procurement which leads to cost reduction in the preparation and transmission of paper purchase requests and invoices.

Odhiambo (2014) studied the SCM practices among public hospitals in Nairobi County and found that SCM practices implemented to a large extent were; after procurement service, specifications and specifications and the practice to be fully implemented was relationship with suppliers. The research established a positive correlation between service quality and SCM practices namely; relationship with suppliers, compatibility, standards and specifications, delivery and after procurement services. No Study has thus focussed on supply of ARVs and challenges thereon.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The chapter explains the definition of research design, its type, and justification for the adopting it. It further describes how the population was identified, and target population, sampling frame, sampling technique, research instrument, data collection procedure and data processing and analysis.

3.2 Research Design

The study used a descriptive survey as it's the only means for collection of respondents' opinions, their attitudes, and views. This information is also used for suggestions of improvement of practices collected. Koul (1992). The primary data's collection tool was by way of a questionnaire. The descriptive survey was considered appropriate because collection of data on same parameters from respondents.

3.3 Population of the Study

The study population was comprised of 345 health institutions spread across the country supplied by KEMSA and Kenya Pharma as attached as appendix (II). The health institutions largely fall into 7 categories, namely Level 4, Faith Based Organisation, Level 2, Non-governmental organisations, Private Hospitals, Level 5 and 6, and lastly level 3. These were the health institutions being supplied by KEMSA and Kenya Pharma as at May 2015.

3.4 Sampling Design

Sampling procedure is used by a researcher to assemble the objects of interest of the study. They objects can be a varied as they come like people or places among others. Through this process, a number of individuals or objects from population are selected ensuring that the characteristics of elements of the selected group are a representation of the population. A sample is a part of a statistical population. Sample properties are researched on with aim of acquiring useful information that will inform about the population. (Orodho and Kombo, 2002).

This study used convenient Sampling. The population was segregated into homogenous groups that were relevant. This was then followed by random selection of subjects from each category. (Mbwesa, 2006). Mbwesa (2006) and Mugenda and Mugenda (2003) explain that 10% of the population is a representative sample.

Table 3.1: Sample Size Distribution

No.	Type of Institution	No. of Institutions	Sample Size (10%)
1.	Level 4	125	12
2.	Faith Based Organization	65	6
3.	Level 2	75	7
4.	Nongovernmental Organizations	25	3
5.	Private Hospital	3	3
6.	Level 6&5	10	3
7	Level 3	42	4
Total		345	34

3.5 Data Collection

The primary data collection was by way of a structured questionnaire set in a Likert scale format as attached in appendix (I). The questionnaire was divided into two parts. Part A was used to gather general information about the respondents. Part B was used to gather information that enabled conclusion of the research.

The researcher administered the questionnaires using face to face guided interviews as well as self-administered questionnaires. These methods enabled the respondent to read and understand the questions before answering them. This raised the success of the number of questionnaires filled and returned.

3.6 Data Analysis

Descriptive statistics was used to analyse data after editing for completeness. The data was coded and entered into spreadsheet before being analysed. The data is presented in frequency tablets, analysed through frequency counts, percentages and cumulative percentages. The computed percentages were used to determine the; supply chain management strategies applied for ARVs in Kenya, challenges faced while implementing the supply chain strategies.

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

The objective of the study was to determine the effectiveness of supply chain management strategies in mitigating challenges in supply of ARVs in Kenya's health sector. This objective has been addressed by collecting correspondents opinions and perceptions on three variables namely; challenges in supply of ARVs in Kenya, Supply Chain management strategies and satisfactory supply of ARVs to the health institutions providing ART services in Kenya

4.2 Respondents Profiles

4.2.1 Analysis of the Response Rate

The sample was 38 respondents from various health care institutions. Research questionnaires of 31 respondents out of 34 questionnaires given out were returned. This represented 91.17% of the sample hence the analysis was done using 31 questionnaires received from the respondents.

Table 4.1 Analysis of the Response Rate

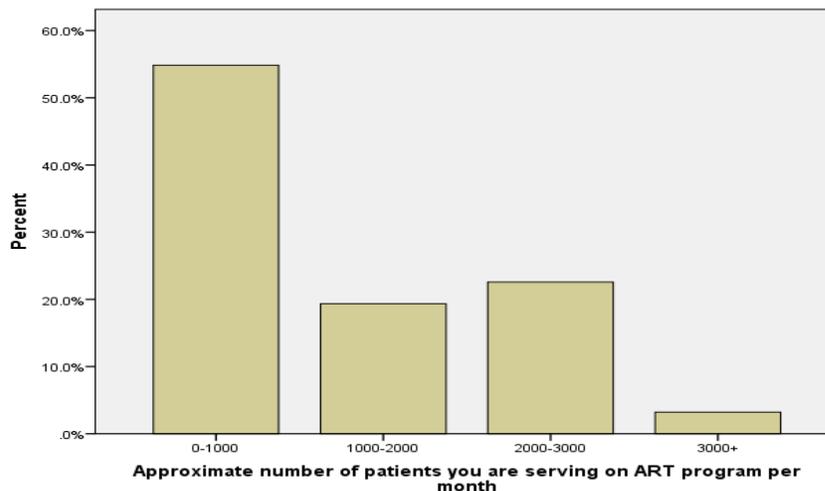
	Frequency	Percentage
Questionnaire sent	34	100
Questionnaire returned	31	91.17

Source: Primary data

4.2.2 Number of Patients Served

The researcher asked the respondents the number of patients that they serve on the ART program per month. As presented in figure one below, 54% of the institutions serve approximately 1000 patients, 18% of the institutions serve between 1,000 to 2,000 patients per month, 22% of the institutions serve between 2,000 to 3,000 patients per month, 6% of the institutions serve more than 3,000 patients per month. The health institutions serving above 2000 patients in a month are the level 4, 5 and 6. Some established FBO institutions also are in this category. While the ones serving 1000 and below patients numbers are level 3, and 2.

Figure 4.1: Average Number of Patients



4.2.3 Number of Satellites

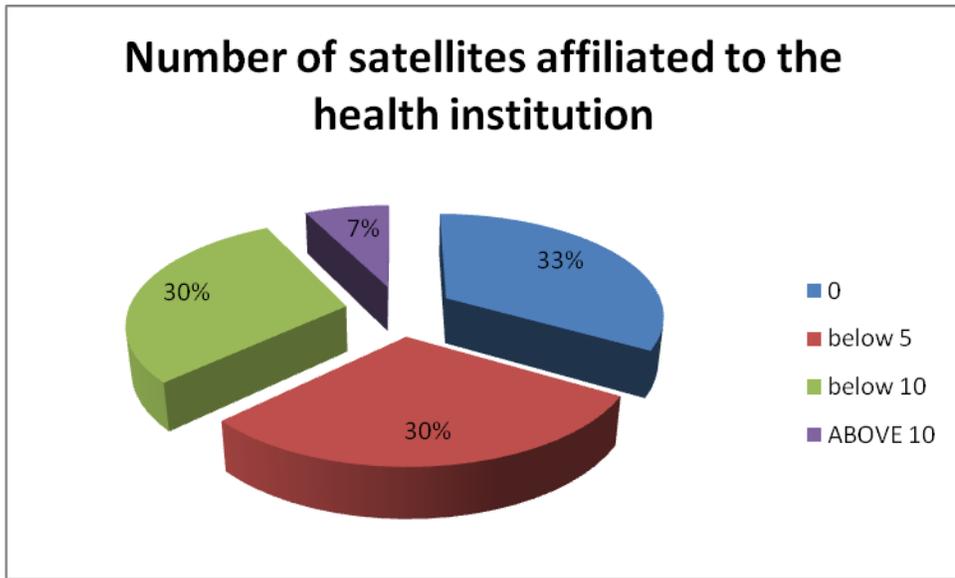
The study sought to find out the number of satellites supported by the health institutions. The satellites forward their patient data and ARV consumption reports to the health institutions that in this case become the central sites. The central sites include the satellite data and quantities of ARVs that have been requested for. It then supplies to the satellites once the stock/inventory has been received. As depicted in the table. 4.2, majority of the respondents 66.67% have satellites, while 33.33% don't have.

Table 4.2: Number of satellites affiliated to the health institutions

Number satellites	Frequency	Percent
0	9	33.33
Below 5	6	29.63
Below 10	8	7.41
Above 10	2	7.41
Total	27	100.0

Source: Research data

Figure 4.2: Number of satellites affiliated to the Health institution



Source: Research data

4.2.4 Number of implementing partners

Table: 4.3: Number of implementing partners

Number of implementing Partners	Frequency	Percent
1	17	54.84
2	6	19.35
3	3	9.68
Above 4	5	16.13
Total	31	100.0

Source: Research data

Table 4.3 above summarizes the researcher’s findings on the number of implementing partners the institutions collaborate with. From the findings, 54.84% of the respondents have 1 implementing partner, 19.35% have 2 implementing partners, and 9.68 % have 3 while 16.13% have more than 4 implementing partners. Implementing partners play a critical role in provision of capacity building for personnel, addition of personnel, additional resources like infrastructure depending on their focus and area of specialization.

4.3 Supply Chain Challenges

The researcher sought to establish to what extent has ARV supply chain challenges impacted on the services of hospitals in Kenya.

From the study, the supply chain challenge impacting the health institutions service delivery to the largest extent were: The procurement and patient flow processes within the health institutions which are not smooth and simple as shown by a mean score of 2.09. This is followed by 3 challenges with the same mean score of 3.19; inadequate information flow to and from suppliers leading to uncertainty in terms of supplies affect services at the hospital, the untimely and unreliable delivery of ARVs from supplier affect services at the hospital, and poor infrastructure affect services at the hospital. Large number of ARV's regimens for prescribing as shown by mean score of 3.29. Low data collection due to low use of IT leading to forecasting and quantification challenges affect services at the hospital, the product-shelf life requirement affect services at the hospital, lack of qualified personnel affect services at the hospital as shown by a mean of 3.35 each, lack of inadequate funding /resources to the facility affect services at the hospitals as shown by a mean of 3.39 and lack of management support affect services at the hospital as shown by a mean of 3.42. The variation as evidenced by the low standard deviation shows that the supply chain challenges to a large extent impact on the services of all the health institutions researched on. See table 4.4

Table 4.3: Supply Chain Challenges

	Supply chain challenges	N	Mean	Std. Deviation
1	To what extent does the market price fluctuation of ARVs affect your services at the hospital?	31	4.36	1.253
2	To what extent does the poor management of supply chain inventory affect your services at the hospital?	29	3.93	1.33
3	To what extent does pilferage at the facility affect your services at the hospital?	31	3.9	1.35
4	To what extent does the poor quality of drugs supplied affect your services at the hospital?	30	3.83	1.642
5	To what extent does loyalty to certain products by prescribers affect your services at the hospital?	31	3.68	1.492
6	To what extent does the uncertainty in terms of demand affect your services at the hospital?	31	3.58	1.285

	Supply chain challenges	N	Mean	Std. Deviation
7	To what extent does the lack of cooperation from supply chain members affect your services at the hospital?	31	3.55	1.588
8	To what extent does the lack of management support affect your services at the hospital?	31	3.42	1.311
9	To what extent do inadequate funding /resources to the facility affect your services at the hospital?	31	3.39	1.606
10	To what extent does the low data collection due to low use of IT leading to Forecasting and quantification challenges and affect your services at the hospital?	31	3.35	1.582
11	To what extent does the product-shelf life requirement affect your services at the hospital?	31	3.35	1.518
12	To what extent does the lack of qualified personnel affect your services at the hospital?	31	3.35	1.624
13	To what extent does the high number of ARV's regimens for prescribing affect your services at the hospital?	31	3.29	1.07
14	To what extent does poor infrastructure affect your services at the hospital?	31	3.19	1.447
15	To what extent does the untimely and unreliable delivery of ARVs from supplier affect your services at the hospital?	31	3.19	1.327
16	To what extent does inadequate information flow to and from suppliers leading to uncertainty in terms of supplies affect your services at the hospital?	31	3.19	1.4
17	To what extent do your hospital procurement and patient flow processes are smooth and simple?	31	2.1	1.076
	Valid N (list wise)	28		

The supply chain challenges with least impact on the services at the health institutions is the Market price fluctuation of ARVs as shown by a mean of 4.56. Most of the ARVs are donor funded and not paid for by the Health Institutions. This is followed by poor management of supply inventory (stock) with a mean score of 3.93, indicating that most of the inventory is well managed.

Further the respondents indicated that to a moderate extent, lack of cooperation from supply chain members affect services at the hospital as shown by a mean of 3.55 and the uncertainty in terms of demand affects services at the hospital as shown by a mean of 3.58. The respondents revealed that to a small extent loyalty to certain products by prescribers affect services at the hospital as shown by a mean of 3.68, poor quality of drugs supplied affect services at the hospital as shown by a mean of 3.83, pilferage at the facility affect services at the hospital as shown by a mean of 3.90.

4.4 Supply Chain Strategic Options

The study sought to establish the extent to which the respondents' hospitals and medical supply agencies use various strategic options presented in Table 4.5 below in mitigating ARVs supply chain challenges. From the study majority of the respondents noted that clear understanding of ARV drug regimens options were used to a very large extent as shown by a mean of 1.35. Further, the researcher observed that various strategic options to mitigate ARV supply chain challenges were used to a large extent including; presence of qualified and competent workers as shown by a mean of 1.71, proper warehousing and inventory practices as shown by a mean of 1.73, Use of health information management systems as well as electronic supply chain management systems to collect, report and analyze data as shown by a mean of 1.74, continuous information sharing with suppliers and clients as shown by a mean of 1.79, creating an effective communication and information system with suppliers and clients as shown by a mean of 1.84, availability of support and collaboration from donor or implementing partners as shown by a mean of 1.90, Adherence to on time delivery of ARVs from suppliers as shown by a mean of 1.97, monitoring and evaluation on compliance with regulatory security issues, alerting customers on product availability and also notifying them on when their next appointment is due as shown by a mean of 2.06 each, involving all members of the hospital's supply chain in product planning and service planning activities as shown by a mean of 2.26, on time delivery of ARVs to the hospitals satellites as shown by a mean of 2.29 and extending supply chain to include close collaboration with national programs, donor partners, suppliers and clients as shown by a mean of 2.48.

Table 4.4 Supply Chain Strategic Options

	Strategic Options	N	Mean	Std. Deviation
1	Contacting the client to get feedback on hospitals' performance and customer service	31	3.06	1.481
2	Communicating customers strategic needs to your suppliers	31	2.84	1.267
3	Improving integration of activities across your supply chain	31	2.68	1.194
4	Extending your supply chain to include close collaboration with national programs, donor partners, suppliers and clients	31	2.48	1.15
5	Support from both national and county governments	31	2.39	1.174
6	Incorporation of quality assurance processes at the facility	31	2.35	1.252
7	On time delivery of ARVs to your satellites	27	2.29	1.325
8	Involving all members of your hospital supply chain in product/service/planning activities	31	2.26	0.893
9	Monitoring of compliance to regulatory security issues	31	2.06	1.152
10	Alerting customers on product availability and when their next appointment is due	31	2.06	1.388
11	On time delivery of ARVs from your suppliers	31	1.97	0.836
12	Availability of support and collaboration from donor/implementing partners	31	1.9	1.044
13	Creating an effective communication /information system with your suppliers and clients	31	1.84	1.128
14	Information sharing with suppliers and clients	29	1.79	1.013
15	Use of health Information system / electronic supply chain management system to collect , report and analyze data	31	1.74	0.773
16	Proper warehousing and inventory practices	30	1.73	0.907
17	Presence of qualified and competent workers	31	1.71	1.006
18	Clear understanding of ARV drug regimens	31	1.35	0.877
	Valid N (list wise)	24		

The above findings are supported by a low standard deviation which was an indication that the strategic options cut across to a large extent to all the health institutions researched on. On the other hand, improving integration of activities across the supply chain as shown by a mean of 2.68, communicating customers' strategic needs to the hospitals' suppliers as

shown by a mean of 2.84 and contacting the client to get feedback on hospitals' performance and customer service as shown by a mean of 3.06 options were used to a moderate extent.

4.5 Quality of Service Delivery Process

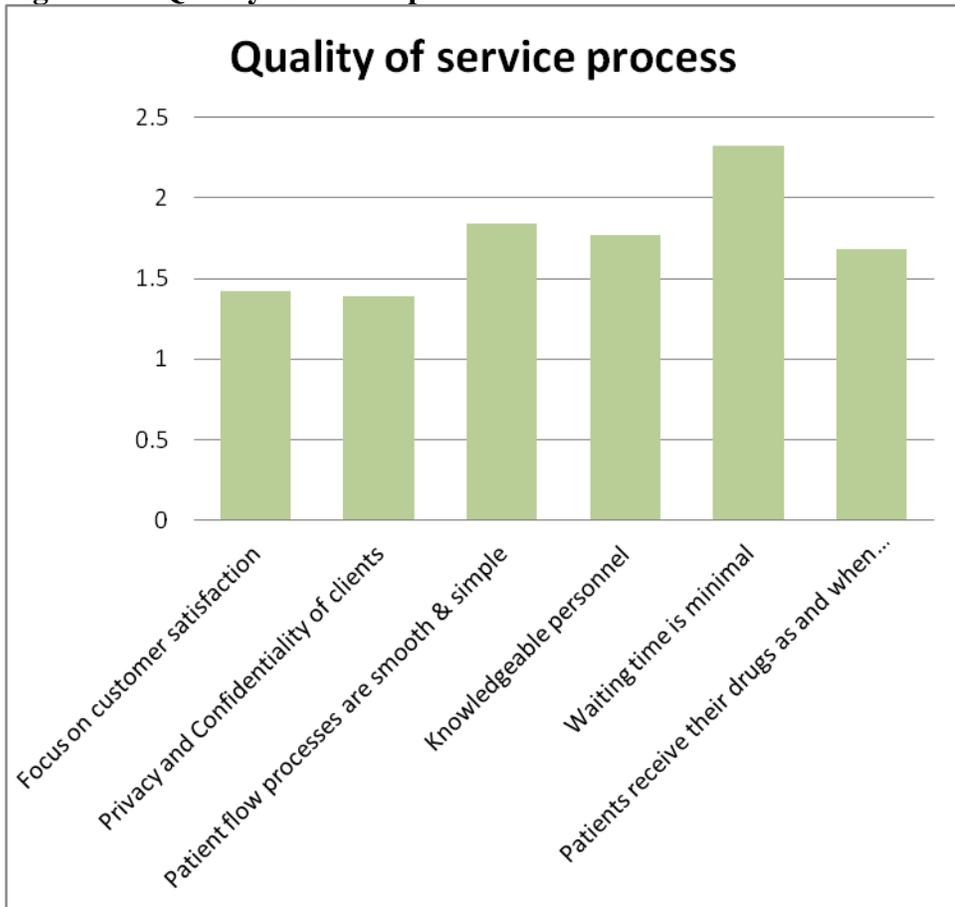
The researcher sought to establish the extent to which the statements presented in table 4.6 below described the quality of service delivery processes in health institutions researched on. From the results in table below, it's very clear that the health care revolves around those elements patients perceive as providing quality service delivery. It's important for patient confidentiality to be kept especially with the perceived stigma still associated with this disease. The results showed that to very large extent, privacy and confidentiality of clients is kept at the institutions facility as shown by a mean of 1.39 and the institutions focuses on customer satisfaction as shown by a mean of 1.42. Further the study noted that to a large extent, health institutions ensure that patients receive their drugs as and when required as shown by a mean of 1.68, the hospitals have knowledgeable personnel as shown by a mean of 1.77, the patient flow processes are smooth and simple as shown by a mean of 1.84 and waiting time is minimal as shown by a mean of 2.32. The low standard deviation is an indication that the statements described the quality of service delivery processes to a very large extent and large extent across all the health institutions researched on.

Table 4.5 Quality of Service Process

	N	Mean	Std. Deviation
1. To what extent do you ensure waiting time is minimal	31	2.32	.832
2. To what extent are the patient flow processes smooth and simple	31	1.84	1.128
3. To what extent do you have knowledgeable personnel	31	1.77	.990
4. To what extent do you ensure that patients receive their drugs as and when required	31	1.68	.701
5. To what extent do you focus on customer satisfaction	31	1.42	.620
6. To what extent do you ensure privacy and confidentiality of clients is kept at your facility	31	1.39	.715
Valid N (list wise)	31		

This is summarized in Figure 4.3 below:

Figure 4.3: Quality of service processes



Source: Primary data

4.6 Interpretation of Findings

The study established that most health institutions serve approximately 1000 ARV patients per month while others serve more than 3,000 ARV patients per month. This high rate of ARV patients is a proof that a large number of Kenyans living with HIV have sought to a proper medical attention. This is consistent with the UNAIDS Gap report (2014) which reported that approximately 1.6 million Kenyans are HIV Positive and that 90% of all HIV positive people should be diagnosed, and 90 percent of those on treatment virally suppressed thus availing antiretroviral (ARV) drugs to approximately 1.3 million people. The significantly reduced cost of ARVs made the drugs became available and accessible to HIV patients through public health facilities (NASCO, 2005).

The study established that ARV supply chain challenge has impacted on the services of hospitals in Kenya the most in the procurement and patient flow processes while it had the least impact on market price fluctuation of ARVs. The findings on the statements of supply chain challenges partly do not concur with Kabiru (2012) who explained that the challenges with ARVs supply chain management include counterfeits, and high pricing of commodities.. It does however, concur with her conclusions on challenges of lack of adequate storage facilities by the user hospitals and poor forecasting of the user needs. Njonjo (2013) underscore that healthcare drugs supply chain is affected by lack of adoption of IT infrastructure.

Clear understanding of ARV drug regimens options were used to a very large extent while contacting the client to get feedback on hospitals' performance and customer service were used to moderate extent. The findings on the statements of supply chain strategic options are consistent with the findings of Koh et al. (2007) who proposed that SCM practices should follow these perspectives: close partnership with suppliers, close partnerships with customers, just-in-time supply, strategic planning, supply chain benchmarking, few suppliers, holding safety stock and sub-contracting, e-procurement, outsourcing and many suppliers

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the key findings of the study as well as the conclusions, limitations of the study, and recommendations for further research.

5.2 Summary of Findings

The study objective was to determine the effectiveness of supply chain management strategies in mitigating challenges in supply of ARVs in the Kenya health sector.

The study sought to determine the effectiveness of supply chain management strategies in mitigating challenges in supply of ARVs in the Kenya health sector. It finds that most health institutions serve approximately 1,000 ARV patients per month while others serve more than 3,000 ARV patients per month. The significantly reduced cost of ARVs made the drugs become available and accessible to HIV patients through public health facilities as outlined in the publications by NASCOP (2005).

The study found that ARV supply chain challenges impacted on the services of hospitals in Kenya from a large extent to a small extent. Hospital procurement and patient flow processes are smooth and simple. The factors that affect services at the hospitals include; inadequate information flow to and from suppliers leading to uncertainty in terms of supplies, untimely and unreliable delivery of ARVs from suppliers, poor infrastructure, high number of ARV's regimens for prescriptions, low data collection due to low use of IT leading to forecasting and quantification challenges, the product-shelf life requirement, lack of qualified personnel, lack of inadequate funding and or resources to the health facility, lack of management support, lack of cooperation from supply chain members, uncertainty in terms of demand, loyalty to certain products by prescribers, poor quality of drugs supplied, pilferage at the facility, poor management of supply chain inventory and market price fluctuation of ARVs. These findings concur with arguments by Kabiru (2012) who explained that the challenges with ARVs supply chain management include counterfeits, pricing, lack of adequate storage facilities by the user hospitals and poor forecasting of the user needs and requirements.

On satellites, the study, established that 33% of the health institutions are stand alone. Many level 2, some Faith Based and KNH hospital do not have satellites. 29.63% have below 5 satellites, while 7.41% have more than 10 satellites, with one particular institution have 28 satellites. Satellites play a strong supportive role to the main health institutions and are able to offer service to patients who are far from the main health institution. This indicates that a lot of effort has been put in to bring services closer to the people.

The study also sought to know the number of implementing partners collaborating with the health institution. All respondents acknowledged having partner support. 54.84% of the respondents have one (1) implementing partner, while 16.13% have more than four (4) partners. This means that the health institutions have other support apart from the government. This support may be in terms of resources for infrastructure, I.T support, capacity building and personnel support among others. This support from implementing partners plays a key role in mitigating some of the supply chain challenges as indicated above.

The study found that ARV supply chain challenges impacted on the services of hospitals in Kenya from a large extent to a small extent. Hospital procurement and patient flow processes pose the largest challenge with a mean score of 2.10. Yet these 2 factors are at the core of any supply chain processes. Other challenges that affect services at the hospitals include; inadequate information flow to and from suppliers leading to uncertainty in terms of supplies, untimely and unreliable delivery of ARVs from suppliers. From 2009 –June 2015, ARVs were supplied by Kenya Pharma (Chemonics) and KEMSA to health Institutions. Currently all health institutions are getting their ARV commodities from KEMSA. These two challenges if not well managed can lead to stock outs and patients not getting their drugs.

The other challenges; poor infrastructure, high number of ARV's regimens for prescriptions, low data collection due to low use of IT leading to forecasting and quantification challenges, the product-shelf life requirement, lack of qualified personnel, lack of inadequate funding and or resources to the health facility, lack of management support, lack of cooperation from supply chain members, uncertainty in terms of demand, loyalty to certain products by prescribers, also impact on ARV supply chain.

It was established that poor quality of drugs supplied pilferage at the facility, management of supply chain inventory and lastly market price fluctuation of ARVs have been in a way mitigated well. As indicated earlier, all ARVs are supplied by KEMSA; secondly, they are procured with donor funds mostly from PEPFAR and Global Fund. The two bodies have clearly set out and stringent guidelines of procurement and manufacturing standards guided by the FDA. This means that quality of drugs is acceptable. This particular finding does not concur with arguments by Kabiru (2012) who explained that the challenges with ARVs supply chain management include counterfeits, pricing, lack of adequate storage facilities by the user hospitals and poor forecasting of the user needs and requirements.

The study found that various strategic options were used from a very large extent to a moderate extent by the health institutions in Kenya in mitigating ARVs supply chain challenges. The strategic options starts with clear understanding of ARV drug regimens, with having the largest impact, followed by presence of qualified and competent workers proper warehousing and inventory practices, use of health management information systems and or electronic supply chain management systems to collect, report and analyze data Information sharing with suppliers and clients, creating an effective communication and or information system with suppliers and clients, availability of support and collaboration from donors and implementers, on time delivery of ARVs from suppliers. The above strategies options have greatly mitigated the supply chain experienced by the health institutions as expressed by the respondents. They are interconnected in a way. Understanding of the ARV drug regimens ensure that the correct treatment is given to the patients and this can only be executed by knowledgeable personnel. Most health institutions through collaboration with the implementing partners are able to get this support in terms of capacity building and other needed resources. The government also plays a role in this.

The other strategies being used to mitigate the challenges are monitoring of compliance to regulatory security issues, alerting customers on product availability and when their next appointment is due, involving all members of the hospital supply chain in product or service or planning activities, on time delivery of ARVs to the hospitals, extending supply chain to include close collaboration with national programs, donor partners, suppliers and clients,

improving integration of activities across the supply chain, communicating customers' strategic needs to the hospitals' suppliers, contacting the client to get feedback on hospitals' performance and customer service.

This is in line with Koh et al. (2007) who proposed that SCM practices should follow these perspectives: close partnership with suppliers, close partnerships with customers, just-in-time supply, strategic planning, supply chain benchmarking, few suppliers, holding safety stock and sub-contracting, e-procurement, and outsourcing.

The study found that the health facilities strive to improve the quality of the services and their processes. This is attained through; First, ensuring privacy and confidentiality of clients information that is kept at the health institutions, Secondly, the health institutions focus on attaining customer satisfaction, Thirdly, health institutions ensure that patients receive their drugs as and when required, Fourthly, hospitals have knowledgeable personnel, Fifth, patient flow processes are smooth and simple and Lastly, waiting time is minimal.

5.3 Conclusions

The research revealed that ARV supply chain challenges impacted on the services of hospitals in Kenya and the identified ARV supply chain challenges have great negative impacts on the services of health sector in Kenya. The study found that strategic options have been used from very large extent to a moderate extent by the health institutions in mitigating ARVs supply chain challenges therefore the study concludes that supply chain strategies have been used to a large extent in mitigating challenges in supply of ARVs in the Kenyan health sector.

The study found that quality of service processes in health institutions have been observed with respect to privacy and confidentiality of clients. Customer satisfaction is a consideration in the ARV supply chain process taking into account matters of how patients receive drugs, knowledgeable personnel, patient flow processes and considerable waiting time. The study thus concludes that the quality of service delivery processes especially for ARVs treatment has been enhanced in the health sector in Kenya.

5.4 Limitations of the Study

The issues concerning ARVs are considered sensitive and confidential especially when looking at the instances of patient's stigmatization. Thus, some of the respondents approached were reluctant in giving information for fear that the information sought would be used without cautionary measures. This limitation affected the response rate and the objectivity of the respondents as well.

The study was limited to a sample size of 34 respondents. This sample was very minimum in to drawing conclusions the issues on ARV supply chain since HIV/Aids is considered to be the largest epidemic in Kenya. The findings are therefore from the focus of the health institutions and not the patients. Time and resources allocated to this study could not allow the study to be conducted as deeply as possible. Being a descriptive research, the study was exposed to the possibility of error and subjectivity of both the researcher and the respondents.

5.5 Recommendations

The study recommends that policy makers should obtain guidance from this study in designing appropriate policies that can ensure effective logistics management especially in the health and medical sector. Due to the criticality of the drugs under supply, the identified challenges and supply chain weaknesses should be reconsidered to ensure beneficiary satisfaction and attainment of the sustainable development goal milestones.

The study recommends that the management of KEMSA and NASCOP should address shortcomings in its service delivery, challenges experienced in the supply of ARV's especially with respect to delivery timelines, to provide guidance in the up scaling of its activities for enhanced service delivery and reduce staff turnover at the health institutions. This may be through holistic adoption of Health information systems, data forecasting and quantification.

The study also recommends that management of the health institutions should improve their hospital procurement and patient flow processes by adopting the Quality Management Systems. This can be achieved through partnering with stakeholders who can provide

support in terms of resources and capacity building as it has been seen above. Further close collaboration and relationship with suppliers and customers is recommended for improved information flow.

5.6 Suggestions for Further Research

This study did not examine the ART clients' perception of the quality of the services examined in this study. The study thus recommends that scholars and academicians should carry an in-depth investigation on ARV supply chain management and implementation with respect to the client. Is it possible that even after all the effort is made to perfect the systems of supply chain management, the beneficiaries of the ART program could still be dissatisfied?

Further studies drawn on a large sample size should focus on the satisfaction of the patients and the beneficiaries of the ARV supply chain. Attempts should focus on investigating any deviations by matching the expectations with the observations of the service delivery.

REFERENCES

- Bergonon, F., Raymond, L., & Rivard, S. (2004). Ideal patterns of Strategic alignment and Business performance: *Information and Management Journal*, 41, 1003-1020.
- Chandani, Y., Felling, B., Allers, C., Alt, D., Noguera, M. & Zuber, A. (2006). Supply Chain Management of Antiretroviral Drugs: *Considerations for Initiating and Expanding National Supply chain*, Arlington, VA: DELIVER for U.S. Agency for International Development.
- Chen, Y. Y., Tsai, M. C., Huang, H. L. & Liang, J. (2012) Supply Chain Integration and Environment Uncertainty: A Conceptual Fit Model; orsc.edu.cn
- Chopra S. & Meindl, T. (2001). Supply Chain Management Strategy Plan and Operations: Upper Seattle River NJ Prentice Hall
- Cooper, M. C., Lambert, M. D. & Pagh, J. D. (1997). Supply chain management: *More than a new name for logistics*. 8, 1-4. *The International Journal of Logistics Management*
- Davis, T. (1993). Effective Supply Chain Management: *Sloan Management Review*, PP 35-46
- Ghuri, P. & Gronhaug, K. (2005). *Research Methods in Business Studies*.
- Guidelines for Antiretroviral drug therapy in Kenya, 2005; Nairobi (NASCOP)
- Gunasekaran, A., Lai, K., Cheng, E., (2008). Responsive supply chain: *a competitive strategy in a networked economy*. OMEGA 36 (4), 549–564.
- Joel. D. & Stanley L, (2008); *Process Management: Creating value along the supply chain*, South- Western *Journal of Management Policy and Practice* vol. 11(4) 2010
- Kenya Pharma Final report (2015), www.chemonics.com
- Krejcie, R. V., & Morgan, D. W. (1970). Table for determining sample size from a given population. *Educational and Psychological Measurement*, 30(3), 607-610.
- Lavani et al, (2010). *Increasing Patient Access to Antiretrovirals*. Recommended Actions for a more Efficient Global Supply Chain

- Lee, H.L., (2002). *Aligning supply chain strategies with product uncertainties*. California *Management Review*, 44 (3), 105–119.
- Lin, C., Chiu, H., Chu, P., (2006). Agility index in the supply chain. *International Journal of Production Economics* 100 (2), 285–299.
- Lysons, K. & Farrington, B. (2006). *Purchasing and Supply Chain Management*. Seventh edition. Prentice Hall
- Mbwesa, K. J. (2006). Introduction to management research, a student hand book. Jomo Kenyatta Foundation, Nairobi, Kenya.
- Mwenda J (2002); Managing health supply chains in Africa: www.africachap.org
- Orodho, A.J & Kombo, D.K. (2002). Research Methods. Nairobi: Kenyatta University, Institute of Open Learning
- Perez, D. H, (2013), Strategy; CSCMP's Supply Chain Quarterly; Quarter 1 (2013) www.supplychainquarterly.com
- Perez, D. H, (2013). *Supply Chain Roadmap: aligning supply chain with Business strategy*, Columbia
- Porter, R. (2002), *Arcs of integration: An international study of supply chain*
- Qi, Y., Boyer, K.K., Zhao, X., (2009). *Supply chain strategy, product characteristics, and performance impact: evidence from Chinese manufacturers*. *Decision Sciences* 40 (4), 667–695.
- Ripin, J., Jamison, D., Meyers, A., Warty, U., Dain, M. & Khams C. (2014). Antiretroviral procurement and supply chain; *Boston, Antiretroviral Therapy*, 19 Supply 3;79-80
- Schoute, J., Jahn A.& Chimbwandira, F. (2011). Antiretroviral drug Supply chain in Era of scaling up of ART in Malawi. Doi:10:1186/1758-2652-14-S1-S4
- Tummala, R. V. M., Cheryl, L. M., Johnson, P., Johnson, P. (2006). Assessing supply chain management success factors: A case study. *Supply Chain Management: An International Journal*, 11(2), 179-92.

UNAIDS, GAP report 2014

USAID 2006 REPORT

Vonderembse, M.A., Uppal, M., Huang, S.H., & Dismukes, J.P. (2006). Designing supply chains: towards theory development. *International Journal of Production Economics* 100 (2), 223–238.

Wang, G., Huang, S.H., Dismukes, J.P., (2004). Product-driven supply chain selection using integrated multi-criteria decision-making methodology. *International Journal of Production Economics* 91 (1), 1–15.

Yap, L. & Tan, C. (2012). The effect of Service Supply Chain Management Practices on the Public Healthcare Organizational Performance, *International Journal of Business and Social Science, Vol, 3 No 16 special issue 213*

APPENDICES

Appendix I: Questionnaire

PART 1: GENERAL BACKGROUND INFORMATION

1. What is the name of the Health Institution?
2. Name of Respondent.....(optional)
3. Title/Position of Respondent.....
4. What is the approximate number of Patients you are serving on ART program per month
 - 0 – 1000
 - 1000 – 2000
 - 2000 – 3000
5. What is the number of Satellite centres affiliated to your Health Institution? -----
6. What is the number of implementing support partners collaborating with your Health institution?

PART 2: SUPPLY CHAIN STRATEGIES AND CHALLENGES

1. To what extend do the following ARV supply chain challenges impact your services at the hospital.

(Kindly indicate tick using the scale below: **(1. Very large extent, 2. Large extent 3. Moderate Extent 4. Small Extent 5. No Extent)**)

	1	2	3	4	5
Poor quality of drugs supplied					
Product shelf-life requirement					
Inadequate information flow to and from suppliers leading to uncertainty in terms of supplies					

Lack of cooperation from supply chain members					
Market price fluctuations of ARVs					
Inadequate funding/resources to the facility					
High number of ARV's regimens for prescribing					
Untimely and unreliable delivery of ARVs from supplier					
Poor management of supply chain inventory (Stock)					
Pilferage at the facility					
Lack of qualified personnel					
Low data collection due to low use of information technology leading to Forecasting and quantification challenges					
Uncertainty in terms of demand					
Loyalty to certain products by prescribers					
Poor infrastructure					
Lack of management support					

2. To what extent do you use the following strategic options in mitigating the above challenges?

(1. Very large extent, 2. Large extent 3. Moderate Extent 4. Small Extent 5. No Extent)

	1	2	3	4	5
Hospital procurement and patient flow processes are smooth and simple					
Creating an effective communication/information system with your suppliers and clients					
Involving all members of your hospital's supply chain in your product/service/ planning activities					
Extending your supply chain to include close collaboration with national programs, donor partners suppliers and clients					
Information sharing with suppliers and clients					
Improving the integration of activities across your supply chain					
Incorporation of Quality Assurance processes at the facility					
Use of Health Information System /Electronic Supply Chain Management System to collect, report and analyse data					
Clear understanding of ARV drug regimens					

On time delivery of ARVs from your suppliers					
Proper warehousing and inventory practices					
On time delivery of ARVs to your satellites					
Communicating customers strategic needs to your suppliers					
Contacting the clients to get feedback on hospitals' performance and customer service					
Alerting customers on product availability and when their next appointment is due					
Presence of qualified and competent workers					
Availability of support and collaboration from donor/implementing partners					
Support from both national and county governments					
Monitoring of compliance to regulatory and security issues					

3. Indicate the extent to which the following statement describes the quality of your service delivery processes:

(1. Very large extent, 2. Large extent 3. Moderate Extent 4. Small Extent 5. No Extent

	1	2	3	4	5
Focus on customer satisfaction					
Privacy and Confidentiality of clients					
Patient flow processes are smooth & simple					
Knowledgeable personnel					
Waiting time is minimal					
Patients receive their drugs as and when required					

Thank you

Appendix II: List of Health Institutions

No.	Name	Type	Supplier	County
1	Consolata Nkubu Mission Hospital	Faith Based Organisation	KEMSA	Meru
2	Coptic Church Hospital - Nairobi Central Site	Faith Based Organisation	KEMSA	Nairobi
3	Cottolengo Mission Hospital	Faith Based Organisation	KEMSA	Meru
4	Holy Family Oriang Mission Dispensary	Faith Based Organisation	KEMSA	Homa Bay
5	Kaplong Mission Hospital	Faith Based Organisation	KEMSA	Bomet
6	Likoni Catholic Dispensary	Faith Based Organisation	KEMSA	Mombasa
7	Mary Help of the Sick Mission Hospital	Faith Based Organisation	KEMSA	Kiambu
8	Mugunda Catholic Dispensary (Mugunda Mission Hospital)	Faith Based Organisation	KEMSA	Nyeri
9	Naro Moru Catholic Dispensary	Faith Based Organisation	KEMSA	Nyeri
10	St. Mary's Mission Hospital - Langata	Faith Based Organisation	KEMSA	Nairobi
11	St. Mathias Mulumba Mission Hospital	Faith Based Organisation	KEMSA	Kiambu
12	AIC Litein Mission Hospital	Faith Based Organisation	KP	Kericho
13	AIC Lokichogio Health Centre	Faith Based Organisation	KP	Turkana
14	AMURT Health Centre	Faith Based Organisation	KP	Nairobi
15	Asumbi Mission Hospital	Faith Based Organisation	KP	Homa Bay
16	Baraka Dispensary (Nairobi)	Faith Based Organisation	KP	Nairobi
17	Bomu Medical Hospital (Changamwe)	Faith Based Organisation	KP	Mombasa
18	Chogoria (PCEA) Mission Hospital	Faith Based Organisation	KP	Tharaka Nithi
19	Consolata Hospital Kyeni	Faith Based Organisation	KP	Embu
20	Consolata Mission Hospital (Mathari)	Faith Based Organisation	KP	Nyeri
21	Cottolengo Children's Centre	Faith Based Organisation	KP	Nairobi

22	Diocese of Lodwar HIV/AIDS Programme	Faith Based Organisation	KP	Turkana
23	Dream Center Dispensary	Faith Based Organisation	KP	Nairobi
24	Eastern Deanery Aids Relief Program	Faith Based Organisation	KP	Nairobi
25	Friends Lugulu Mission Hospital	Faith Based Organisation	KP	Bungoma
26	Holy Family Nangina Mission Hospital	Faith Based Organisation	KP	Busia
27	Jamaa Hospital	Faith Based Organisation	KP	Nairobi
28	Kakuma Mission Hospital	Faith Based Organisation	KP	Turkana
29	Kapsowar (AIC) Mission Hospital	Faith Based Organisation	KP	Elgeyo Marakwet
30	Kendu Adventist Hospital	Faith Based Organisation	KP	Homa Bay
31	Kijabe (AIC) Hospital	Faith Based Organisation	KP	Kiambu
32	Kikoko Mission Hospital	Faith Based Organisation	KP	Makueni
33	Kikuyu (PCEA) Hospital	Faith Based Organisation	KP	Kiambu
34	Kima Mission Hosp, Kisumu	Faith Based Organisation	KP	Vihiga
35	Kiria-ini Mission Hospital	Faith Based Organisation	KP	Murang'a
36	Maseno Mission Hospital	Faith Based Organisation	KP	Kisumu
37	Mater Hospital	Faith Based Organisation	KP	Nairobi
38	Maua Methodist Hospital	Faith Based Organisation	KP	Meru
39	Mombasa CBHC	Faith Based Organisation	KP	Mombasa
40	Mukuru Kwa Reuben FBO Clinic	Faith Based Organisation	KP	Nairobi
41	Muthale Mission Hospital	Faith Based Organisation	KP	Kitui
42	Mutomo Mission Hospital	Faith Based Organisation	KP	Kitui
43	Nazareth Hospital	Faith Based Organisation	KP	Kiambu

44	North Kinangop Catholic Hospital	Faith Based Organisation	KP	Nyandarua
45	Nyabondo Mission Hospital	Faith Based Organisation	KP	Kisumu
46	Nyumbani Children's Home	Faith Based Organisation	KP	Nairobi
47	Our Lady of Lourdes Mwea Hospital	Faith Based Organisation	KP	Kirinyaga
48	St Elizabeth Chiga Health Centre	Faith Based Organisation	KP	Kisumu
49	St Elizabeth Hospital, Mukumu	Faith Based Organisation	KP	Kakamega
50	St Elizabeth Lwak Mission Hospital	Faith Based Organisation	KP	Siaya
51	St Joseph Mission Hospital Migori	Faith Based Organisation	KP	Migori
52	St Joseph's Shelter Of Hope	Faith Based Organisation	KP	Taita Taveta
53	St Ladislaus Dispensary	Faith Based Organisation	KP	Uasin Gishu
54	St Luke's Mission Hospital ACK (Kaloleni)	Faith Based Organisation	KP	Kilifi
55	St Mary's Hospital (Mumias)	Faith Based Organisation	KP	Kakamega
56	St Mary's Hospital (Naivasha)	Faith Based Organisation	KP	Nakuru
57	St Monica's Mission Hospital, Kisumu	Faith Based Organisation	KP	Kisumu
58	St. Camillus Mission Hospital (karungu)	Faith Based Organisation	KP	Migori
59	St. Francis Community Hospital	Faith Based Organisation	KP	Nairobi
60	St. Joseph Mukasa Dispensary	Faith Based Organisation	KP	Nairobi
61	St. Orsola Mission Hospital (community of St. Egidio)	Faith Based Organisation	KP	Tharaka Nithi
62	Tabaka Mission Hospital	Faith Based Organisation	KP	Kisii
63	Tenwek Mission Hospital	Faith Based Organisation	KP	Bomet
64	Tumutumu (PCEA) Hospital	Faith Based Organisation	KP	Nyeri
65	Wamba Mission Hospital	Faith Based Organisation	KP	Samburu
66	Ogongo Health Centre (Suba)	Level 2	KEMSA	Homa Bay

67	JKUAT Hospital	Level 2	KEMSA	Kiambu
68	Samburu Health Centre	Level 2	KEMSA	Kwale
69	Lungalunga Health Centre	Level 2	KEMSA	Kwale
70	Diani Health centre	Level 2	KEMSA	Kwale
71	Mkongani Model Health Centre	Level 2	KEMSA	Kwale
72	Kenya Ports Authority (KPA) Health Centre	Level 2	KEMSA	Mombasa
73	Magongo Health Centre	Level 2	KEMSA	Mombasa
74	Shimo La Tewa Prison Health Centre	Level 2	KEMSA	Mombasa
75	Tiwi Rural Training Health Centre	Level 2	KEMSA	Kwale
76	Athi River Health Centre Central Site	Level 2	KEMSA	Machakos
77	Mutomo Health Centre Central Site	Level 2	KEMSA	Kitui
78	Kiritiri Health centre	Level 2	KEMSA	Embu
79	Masii Health Centre	Level 2	KEMSA	Machakos
80	Nzeveni HC	Level 2	KEMSA	Makueni
81	Sa/Ahf Kithituni Health Clinic	Level 2	KEMSA	Makueni
82	Mathare North Health Centre Central Site	Level 2	KEMSA	Nairobi
83	Kibera D.O Dispensary Central Site	Level 2	KEMSA	Nairobi
84	Makadara Health Centre Central Site	Level 2	KEMSA	Nairobi
85	Bahati Health Centre-Nairobi	Level 2	KEMSA	Nairobi
86	Pumwani -Majengo Health Centre	Level 2	KEMSA	Nairobi
87	Kamiti Prison Health Centre	Level 2	KEMSA	Nairobi
88	Kariobangi Health Centre	Level 2	KEMSA	Nairobi
89	Kasarani Health Centre	Level 2	KEMSA	Nairobi
90	Uhuru AP Camp Dispensary	Level 2	KEMSA	Nairobi
91	Jericho Health Centre	Level 2	KEMSA	Nairobi
92	Lunga Lunga Health Centre (Nairobi)	Level 2	KEMSA	Nairobi
93	Nairobi Remand Prison Health Centre	Level 2	KEMSA	Nairobi
94	Dandora II Health Centre	Level 2	KEMSA	Nairobi
95	Ukwala Health Centre Central Site	Level 2	KEMSA	Siaya

96	Mbita Health Centre Central Site	Level 2	KEMSA	Homa Bay
97	Rwambwa Health Centre Central Site	Level 2	KEMSA	Siaya
98	Kodiaga Health Centre	Level 2	KEMSA	Kisumu
99	Port Florence Clinic	Level 2	KEMSA	Kisumu
100	Maseno University Clinic	Level 2	KEMSA	Kisumu
101	Chemelil Sugar Health Centre	Level 2	KEMSA	Kisumu
102	Kabondo Health Centre	Level 2	KEMSA	Homa Bay
103	Ewaso Ngiro Health Centre Central Site	Level 2	KEMSA	Narok
104	Sotik Health Centre	Level 2	KEMSA	Bomet
105	Rongai Health centre	Level 2	KEMSA	Kajiado
106	Njoro Health Centre	Level 2	KEMSA	Nakuru
107	Sabatia Health Centre Central Site	Level 2	KEMSA	Vihiga
108	Makunga RHDC	Level 2	KEMSA	Kakamega
109	Mumias Model Health centre	Level 2	KEMSA	Kakamega
110	Namasoli Health centre	Level 2	KEMSA	Kakamega
111	Shinyalu Model health centre	Level 2	KEMSA	Kakamega
112	Bungasi Health centre	Level 2	KEMSA	Kakamega
113	Mtongwe Health Centre	Level 2	KP	Mombasa
114	Kangemi Health Centre	Level 2	KP	Nairobi
115	STC Casino, Nairobi	Level 2	KP	Nairobi
116	Riruta Health Centre Central Site	Level 2	KP	Nairobi
117	GSU HQ Dispensary (Ruaraka)	Level 2	KP	Nairobi
118	Mathare Hospital	Level 2	KP	Nairobi
119	Ngaira Rhodes Dispensary	Level 2	KP	Nairobi
120	Pumwani Maternity Hospital	Level 2	KP	Nairobi
121	Ong'ielo Health Centre	Level 2	KP	Siaya
122	Sena Health Centre	Level 2	KP	Homa Bay
123	KEMRI Clinic	Level 2	KP	Kisumu
124	Matoso Health Clinic (Lalmba)	Level 2	KP	Migori
125	Sony Medical Centre	Level 2	KP	Migori
126	Burnt Forest RHDC (Eldoret East)	Level 2	KP	Uasin Gishu
127	Chepkorio Health Centre	Level 2	KP	Elgeyo Marakwet
128	Moi's Bridge Health Centre	Level 2	KP	Uasin Gishu

129	Mosoriot RHDC	Level 2	KP	Nandi
130	Soy Health Centre	Level 2	KP	Uasin Gishu
131	Turbo Health Centre	Level 2	KP	Uasin Gishu
132	Amukura Health Centre	Level 2	KP	Busia
133	Khunyangu RHDC	Level 2	KP	Busia
134	Naitiri Health Centre	Level 2	KP	Bungoma
135	Nambale Health Centre	Level 2	KP	Busia
136	Matete Health Centre	Level 2	KP	Kakamega
137	Bumala A Health Centre	Level 2	KP	Busia
138	Bumala B Health Centre	Level 2	KP	Busia
139	Mabusi Health Centre	Level 2	KP	Kakamega
140	Mukhobola Health Centre	Level 2	KP	Busia
141	Kangema Sub District Hospital	Level 3	KEMSA	Murang'a
142	Kathiani Sub-District Hospital	Level 3	KEMSA	Machakos
143	Elburgon Sub-District Hospital	Level 3	KEMSA	Nakuru
144	Alupe Sub-District Hospital	Level 3	KEMSA	Busia
145	Kirwara Sub District	Level 3	KEMSA	Murang'a
146	Likoni Sub-District Hospital	Level 3	KEMSA	Mombasa
147	Mwatate Sub-District Hospital	Level 3	KEMSA	Taita Taveta
148	Kibwezi SDH Central Site	Level 3	KEMSA	Makueni
149	Migwani SDH Central Site	Level 3	KEMSA	Kitui
150	Garbatullah Subcounty hospital	Level 3	KEMSA	Isiolo
151	Kilungu Subcounty hospital	Level 3	KEMSA	Makueni
152	Mtito Andei Subcounty hospital	Level 3	KEMSA	Makueni
153	Sultan Hamud Subcounty hospital	Level 3	KEMSA	Makueni
154	Ishiara Sub-District Hospital	Level 3	KEMSA	Embu
155	Nyamache Sub-District Hospital Central Site	Level 3	KEMSA	Kisii
156	Gesusu Sub-District Hospital Central Site	Level 3	KEMSA	Kisii
157	Ahero Sub-District Hospital Central Site	Level 3	KEMSA	Kisumu
158	Muhoroni Sub-District Hospital Central Site	Level 3	KEMSA	Kisumu
159	Kendu SDH Central Site	Level 3	KEMSA	Homa Bay

160	Awendo Sub-District Hospital Central Site	Level 3	KEMSA	Migori
161	Ambira Sub-District Hospital Central Site	Level 3	KEMSA	Siaya
162	Yala Sub-District Hospital Central Site	Level 3	KEMSA	Siaya
163	Suba District Hospital Central Site	Level 3	KEMSA	Homa Bay
164	Keumbu Sub-District Hospital	Level 3	KEMSA	Kisii
165	Isibania Sub-District Hospital	Level 3	KEMSA	Migori
166	Got Agulu Sub-District Hospital	Level 3	KEMSA	Siaya
167	Kandiege Sub-District Hospital	Level 3	KEMSA	Homa Bay
168	Ngong SDH Central site, Kajiado North	Level 3	KEMSA	Kajiado
169	Gilgil Sub-District Hospital	Level 3	KEMSA	Nakuru
170	Sigor Subdistrict Hospital	Level 3	KEMSA	Bomet
171	Kitengela Subdistrict Hospital	Level 3	KEMSA	Kajiado
172	Matungu sub District Hospital Central Site	Level 3	KEMSA	Kakamega
173	Mautuma Subcounty hospital	Level 3	KEMSA	Kakamega
174	Shibwe Subcounty hospital	Level 3	KEMSA	Kakamega
175	Muriranjias Sub-District Hospital	Level 3	KP	Murang'a
176	Othaya Sub-District. Hospital	Level 3	KP	Nyeri
177	Kimbimbi Sub-District Hospital	Level 3	KP	Kirinyaga
178	Mpeketoni Sub-District Hospital	Level 3	KP	Lamu
179	Kayole II Sub-District Hospital	Level 3	KP	Nairobi
180	Chulaimbo Sub-District Hospital	Level 3	KP	Kisumu
181	Marigat Sub District Hospital	Level 3	KP	Baringo
182	Ziwa Sub-District Hospital	Level 3	KP	Uasin Gishu
183	Likuyani Sub-District Hospital	Level 3	KP	Kakamega
184	Gatundu District Hospital Central Site	Level 4	KEMSA	Kiambu
185	Maragua Hospital Central Site	Level 4	KEMSA	Murang'a
186	Kilifi District Hospital Central Site	Level 4	KEMSA	Kilifi
187	Kitui District Hospital Central Site	Level 4	KEMSA	Kitui
188	Machakos General Hospital Central Site	Level 4	KEMSA	Machakos

189	Matuu District Hospital Central Site	Level 4	KEMSA	Machakos
190	Nyahururu District Hospital Central Site	Level 4	KEMSA	Laikipia
191	Iguhu District Hospital Central Site	Level 4	KEMSA	Kakamega
192	Kiambu District Hospital Central Site	Level 4	KEMSA	Kiambu
193	Tigoni District Hospital Central Site	Level 4	KEMSA	Kiambu
194	Kerugoya District Hospital Central Site	Level 4	KEMSA	Kirinyaga
195	Thika District Hospital Central Site	Level 4	KEMSA	Kiambu
196	Olkalou District Hospital Central Site	Level 4	KEMSA	Nyandarua
197	Kwale District Hospital Central Site	Level 4	KEMSA	Kwale
198	Tudor District Hospital Central Site	Level 4	KEMSA	Mombasa
199	Msambweni District Hospital Central Site	Level 4	KEMSA	Kwale
200	Moi Voi District Hospital Central Site	Level 4	KEMSA	Taita Taveta
201	Ngao District Hospital Central Site	Level 4	KEMSA	Tana River
202	Taveta District Hospital Central Site	Level 4	KEMSA	Taita Taveta
203	Githongo District Hospital - Meru Central Site	Level 4	KEMSA	Meru
204	Runyenjes District Hospital Central Site	Level 4	KEMSA	Embu
205	Meru District Hospital Central Site	Level 4	KEMSA	Meru
206	Kanyakine District Hospital Central Site	Level 4	KEMSA	Meru
207	Isiolo District Hospital Central Site	Level 4	KEMSA	Isiolo
208	Makueni District Hospital Central Site	Level 4	KEMSA	Makueni
209	Chuka District Hospital Central Site	Level 4	KEMSA	Tharaka Nithi
210	Mwingi District Hospital Central Site	Level 4	KEMSA	Kitui

211	Miathene District Hospital Central Site	Level 4	KEMSA	Meru
212	Mbooni District Hospital	Level 4	KEMSA	Makueni
213	Mbagathi District Hospital	Level 4	KEMSA	Nairobi
214	Ekerenyo District Hospital Central Site	Level 4	KEMSA	Nyamira
215	Bondo District Hospital Central Site	Level 4	KEMSA	Siaya
216	Kijauri District Hospital Central Site	Level 4	KEMSA	Nyamira
217	Gucha District Hospital Central Site	Level 4	KEMSA	Kisii
218	Nduru District Hospital Central Site	Level 4	KEMSA	Kisii
219	Kisii Central District Hospital Central Site	Level 4	KEMSA	Kisii
220	Kisumu District Hospital Central Site	Level 4	KEMSA	Kisumu
221	Kuria District Hospital Central Site	Level 4	KEMSA	Migori
222	Keroka District Hospital Central Site	Level 4	KEMSA	Nyamira
223	Migori District Hospital Central Site	Level 4	KEMSA	Migori
224	Nyamira District Hospital Central Site	Level 4	KEMSA	Nyamira
225	Nyando District Hospital Central Site	Level 4	KEMSA	Kisumu
226	Siaya District Hospital Central Site	Level 4	KEMSA	Siaya
227	Iyabe District Hospital Central Site	Level 4	KEMSA	Kisii
228	Marani District Hospital Central Site	Level 4	KEMSA	Kisii
229	Manga District Hospital Central Site	Level 4	KEMSA	Nyamira
230	Akala District Hospital Central Site	Level 4	KEMSA	Siaya
231	Masogo District Hospital Central Site	Level 4	KEMSA	Kisumu
232	Usigu District Hospital Central Site	Level 4	KEMSA	Siaya
233	Kegonga District Hospital	Level 4	KEMSA	Migori
234	Kenyenya District Hospital	Level 4	KEMSA	Kisii

235	Kajiado Central District Hospital Central Site	Level 4	KEMSA	Kajiado
236	Eldama Ravine District Hospital Central Site	Level 4	KEMSA	Baringo
237	Loitokitok District Hospital Central Site	Level 4	KEMSA	Kajiado
238	Chebiemit District Hospital Central Site-Marakwet	Level 4	KEMSA	Elgeyo Marakwet
239	Molo District Hospital Central Site	Level 4	KEMSA	Nakuru
240	Naivasha District Hospital Central Site	Level 4	KEMSA	Nakuru
241	Bahati District Hospital Central Site-Nakuru North	Level 4	KEMSA	Nakuru
242	Narok District Hospital Central Site	Level 4	KEMSA	Narok
243	Kapsara District Hospital Central Site	Level 4	KEMSA	Trans Nzoia
244	Endebess District Hospital	Level 4	KEMSA	Trans Nzoia
245	Ololunga District Hospital	Level 4	KEMSA	Narok
246	Bungoma District Hospital Central Site	Level 4	KEMSA	Bungoma
247	Butere District Hospital Central Site	Level 4	KEMSA	Kakamega
248	Malava District Hospital Central Site	Level 4	KEMSA	Kakamega
249	Vihiga District Hospital Central Site	Level 4	KEMSA	Vihiga
250	Emuhaya District Hospital Central Site	Level 4	KEMSA	Vihiga
251	Hamisi District Hospital Central Site	Level 4	KEMSA	Vihiga
252	Engineer District Hospital	Level 4	KP	Nyandarua
253	Karatina District Hospital	Level 4	KP	Nyeri
254	Mukurweini District Hospital	Level 4	KP	Nyeri
255	Muranga District Hospital	Level 4	KP	Murang'a
256	Hola District Hospital	Level 4	KP	Tana River
257	Kinango District Hospital	Level 4	KP	Kwale
258	Lamu District Hospital	Level 4	KP	Lamu
259	Mariakani District Hospital	Level 4	KP	Kilifi

260	Port Reitz Hospital - Kilindini District Hospital	Level 4	KP	Mombasa
261	Wesu District Hospital	Level 4	KP	Taita Taveta
262	Malindi District Hospital Central Site	Level 4	KP	Kilifi
263	Kangundo District Hospital	Level 4	KP	Machakos
264	Kyuso District Hospital	Level 4	KP	Kitui
265	Makindu District Hospital	Level 4	KP	Makueni
266	Marsabit District Hospital	Level 4	KP	Marsabit
267	Mbeere District Hospital	Level 4	KP	Embu
268	Moyale District Hospital	Level 4	KP	Marsabit
269	Mwala District Hospital	Level 4	KP	Machakos
270	Nyambene District Hospital	Level 4	KP	Meru
271	Tharaka District Hospital	Level 4	KP	Tharaka Nithi
272	Ijara District Hospital - Masalani	Level 4	KP	Garissa
273	Mandera District Hospital	Level 4	KP	Mandera
274	Wajir District Hospital	Level 4	KP	Wajir
275	Homa-Bay District Hospital	Level 4	KP	Homa Bay
276	Kombewa District Hospital	Level 4	KP	Kisumu
277	Macalder District Hospital	Level 4	KP	Migori
278	Madiany District Hospital	Level 4	KP	Siaya
279	Ndhiwa District Hospital	Level 4	KP	Homa Bay
280	Rachuonyo District Hospital	Level 4	KP	Homa Bay
281	Rongo District Hospital	Level 4	KP	Migori
282	Iten District Hospital	Level 4	KP	Elgeyo Marakwet
283	Kabarnet District Hospital	Level 4	KP	Baringo
284	Kabartonjo District Hospital	Level 4	KP	Baringo
285	Kapenguria District Hospital	Level 4	KP	West Pokot
286	Kapkatet District Hospital	Level 4	KP	Kericho
287	Kapsabet District Hospital	Level 4	KP	Nandi
288	Kericho District Hospital	Level 4	KP	Kericho
289	Kitale District Hospital	Level 4	KP	Trans Nzoia
290	Lodwar District Hospital	Level 4	KP	Turkana
291	Londiani District Hospital	Level 4	KP	Kericho

292	Longisa District Hospital	Level 4	KP	Bomet
293	Maralal District Hospital	Level 4	KP	Samburu
294	Nandi Hills District Hospital	Level 4	KP	Nandi
295	Nanyuki District Hospital	Level 4	KP	Laikipia
296	Rumuruti District Hospital	Level 4	KP	Laikipia
297	Transmara District Hospital	Level 4	KP	Narok
298	Uasin Gishu District Hospital	Level 4	KP	Uasin Gishu
299	Busia District Hospital Central Site(Ampath clinic)	Level 4	KP	Busia
300	Khwisero District Hospital	Level 4	KP	Kakamega
301	Kimilili District Hospital	Level 4	KP	Bungoma
302	Lugari District Hospital	Level 4	KP	Kakamega
303	Mt Elgon District Hospital	Level 4	KP	Bungoma
304	Port Victoria Hospital	Level 4	KP	Busia
305	Sio Port District Hospital	Level 4	KP	Busia
306	Teso District Hospital	Level 4	KP	Busia
307	Webuye District Hospital	Level 4	KP	Bungoma
308	Navakholo District Hospital Central Site	Level 4	KP	Kakamega
309	Embu PGH Central Site	Level 5	KEMSA	Embu
310	Kakamega PGH Central Site	Level 5	KEMSA	Kakamega
311	Nyeri Provincial General Hospital (PGH)	Level 5	KP	Nyeri
312	Coast Provincial General Hospital	Level 5	KP	Mombasa
313	Defence Forces Memorial Hospital, Nairobi	Level 5	KP	Nairobi
314	Garissa Provincial General Hospital	Level 5	KP	Garissa
315	Nyanza Provincial Hospital	Level 5	KP	Kisumu
316	Rift Valley Provincial General Hospital	Level 5	KP	Nakuru
317	Kenyatta National Hospital	Level 6	KP	Nairobi
318	AMPATH (Moi Teaching Referral Hospital)	Level 6	KP	Uasin Gishu
319	SOS Medical Centre - Buru Buru	NGO	KEMSA	Nairobi
320	Family Health Options (Kenya) Clinic - Kibera	NGO	KEMSA	Nairobi
321	Ganjoni Women's Health Project	NGO	KP	Mombasa
322	Tumaini Medical Centre	NGO	KP	Turkana

323	AMREF Kibera Health Centre	NGO	KP	Nairobi
324	Liverpool VCT	NGO	KP	Nairobi
325	Nairobi Women's Hospital	NGO	KP	Nairobi
326	UON/UOM Pumwani VCT Centre	NGO	KP	Nairobi
327	AHF Mathare Clinic	NGO	KP	Nairobi
328	Kayole Soweto PHC	NGO	KP	Nairobi
329	KEMRI/CRDR FACES Program	NGO	KP	Nairobi
330	Kibera South (MSF Belgium) Dispensary	NGO	KP	Nairobi
331	Pumwani Majengo Dispensary (UNITID)	NGO	KP	Nairobi
332	Refuge Point	NGO	KP	Nairobi
333	Silanga (MSF Belgium) Dispensary	NGO	KP	Nairobi
334	Tabitha Medical Centre	NGO	KP	Nairobi
335	University Health Services (UNITID)	NGO	KP	Nairobi
336	Uzima Health Centre	NGO	KP	Nairobi
337	Faces Nyanza (Lumumba)	NGO	KP	Kisumu
338	Homa Hills Health Centre	NGO	KP	Homa Bay
339	KEMRI/Walter Reed Project Kericho	NGO	KP	Kericho
340	Beacon of Hope Clinic (Kajiado)	NGO	KP	Kajiado
341	IRC Kakuma Hospital	NGO	KP	Turkana
342	Tumaini Childrens' Home (Nanyuki)	NGO	KP	Laikipia
343	Jocham Hospital	Private	KEMSA	Mombasa
344	Mewa Hospital	Private	KEMSA	Mombasa
345	Gertrude Children's Hospital	Private	KP	Nairobi