Influence of Pharmaceutical Logistics Management Information Systems as an Enabler of Universal Health Coverage Implementation in Nyamira County

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DECLARATION

I declare that this MBA thesis has not been previously submitted and approved for the award of a degree by this or any other university and does not contain material previously published or written by any person except where due reference is made in the thesis itself.

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DEDICATION

The research thesis is dedicated; To my cherished parents for their diligence to bring me up and providing me with education in my life, to my brothers and sisters for always believing in me - may you be inspired and reach your visions and to my loving family for their never-ending support and encouragement

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ABSTRACT

One of the key determinants of the success of the UHC programme in Kenya is likely to be timely availability of pharmaceutical products at the facilities. However, there are currently no plans to assess the challenges faced by counties regarding the logistics of supplying pharmaceutical products. This prompted the researcher to conduct a study with general objective being to establish the influence of pharmaceutical logistics management information systems as an enabler of universal health coverage implementation. The study utilizedboth qualitative and quantitative approach inanalysing the data. The population of the study was drawn from Nyamira County with 120 health facilities and the sample size was 74 respondents. The researcher adopted the use of the questionnaire in gathering information, the findings clearly indicate that there was no proper selection supports system that ensures the high quality product selection, appropriate quantity of the product to be selected and the need satisfaction of the product also the County drug policy document are not being used irrespective of being a very important document, procurement support system was discussed to check whether it accommodates the element of planning in terms of budget and supply planning though the one in place is not that effective in the County, forecast and development a system using dispensed user data in the procurement support system in universal health coverage is not effective. Medical practitioners are even not aware of distribution data in the issue of the procurement support system and are not even aware of forecast being done using distribution data, on distribution support system, there is no written provisions for the redistribution of overstocked supplies and a program accommodating policy of storing & issuing stock according to first to expire that should be address by the system and Utility support system that is in place to manage the use of inventory and ensure waste reduction is not efficient, the study recommends that for logistic management information system to be implemented in the UHC facilities the system must have selection, distribution procurement and utility system which is effective and the study further suggests that more studies be conducted oninfluence of pharmaceutical logistics management information systems on the performance of public hospital in Kenya. This will help give a holistic idea on the causes of logistic management process delays that could be due to the use of substandard systems used in record

keeping, material handling and Distribution or could be due to the use of poorly trained medical professional

LIST OF ABBREVIATIONS AND ACRONYMS

- **UHC** Universal Health Coverage
- **LMIS** Logistics Management Information Systems
- **KEMSA** Kenya Medical Supplies Authority
- **UN** United Nations
- **SDG** Sustainable Development Goals
- **LMICs** Low Middle Income Countries
- **TAM** Technology Acceptance Model
- **TRA** Theory of Reasoned Action
- **USAID** United States Agency for International Development

CHAPTER ONE: INTRODUCTION

1.1 Introduction

It has been argued that least half of the world's population cannot access essential health services. This is why in 2012, the UN General Assembly declared that countries should start implementing Universal Health Coverage (UHC) as a way of addressing this issue. UHC ensures that essential medicines for delivery of essential medical services are available. As part of implementingthe UN General Assembly declaration on UHC, Kenya'sPresident, HE Uhuru Kenyatta launched the big 4 agenda in March 2018 focusing on UHC, affordable housing, manufacturing and food security.Universal health coverage (UHC) is part of the Sustainable Development Goals (SDGs). Sustainable development goal (SDG) 3.8 seeks to achieve UHC, including financial risk protection, access to quality essential healthcare services and access to safe, effective, quality and affordable essential medicines and vaccines for all (UNDP, 2015).

To achieve the goal of effective health service delivery that supports better health outcomes, health systems and organizations require a reliable supply of safe and affordable essential medicines, vaccines and other medical supplies of assured quality. Though pharmaceuticals can provide great benefits, their cost is substantial (Maiti, Bhatia, Padhy, & Hota, 2015). Pharmaceuticals may constitute as much as 40 percent of health care budget in developing countries, yet large portions of the population lack access to even the most essential medicines. UHC implementation provides countries with an opportunity to define and cost the list of essential medicines needed to support the provision of essential health services.

Ensuring product availability requires attention to six rights: the right goods, in the right quantities, in the right condition, delivered to the right place, at the right time, for the right cost. This can be achieved through design and implementation of a robust Pharmaceutical Logistics Management Information System (LMIS). For UHC to be successfully implemented in Kenya, there is need find out the influence of LMIS as an enabler of UHC.

1.2Backgroundto the study

UHC ensures that all people can use the promotive, preventive, curative, rehabilitative and palliative health services they need, of sufficient quality to be effective, while also ensuring that the use of these services does not expose the user

to financial hardship (Leung, Chen, Yadav, & Gallien, 2016; Okech & Lelegwe, 2015). Figure 1 shows the framework for implementing UHC which is based on answering the following 3 questions:Who should be covered? The answer is everybody, including the poor and marginalized members of the community.Which services are covered? The answer is basic essential services of acceptable quality that can be provided mainly at the primary level. Who is paying for the services? Under UHC, everybody who is covered should have access to quality essential services without financial hardships. Thus, for the poor and marginalized members of the community, the government should cover all costs, so that access to services is based on need not ability to pay.

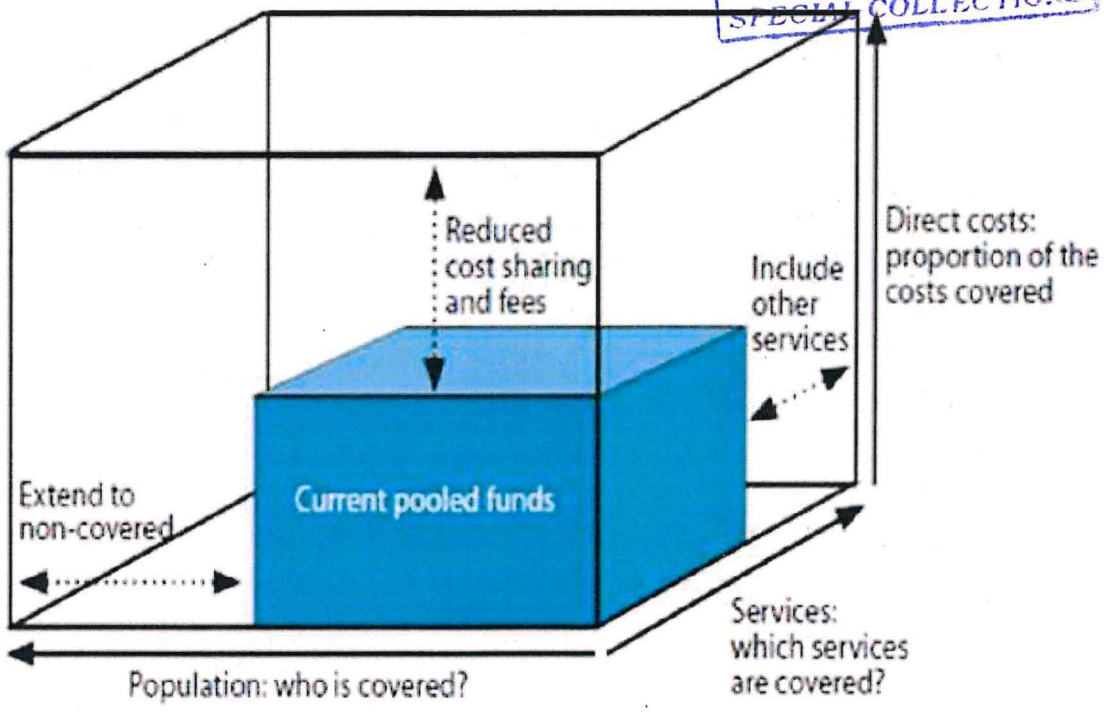


figure 0:1.1 Moving Towards UHC

Source Chisholm et al., 2010).

These 3 questions embody three related objectives namely; equity in access to health servicesi.e.those who need the services should get them and not only those who can pay for them; that the quality of health services is good enough to improve the health of those receiving services; and finally, financial risk protection which aims at ensuring that the cost of using care does not put people at risk of financial hardship.

However, this is contingent on the provision of good-quality healthcare based on functional health systems as summarised in figure 2.

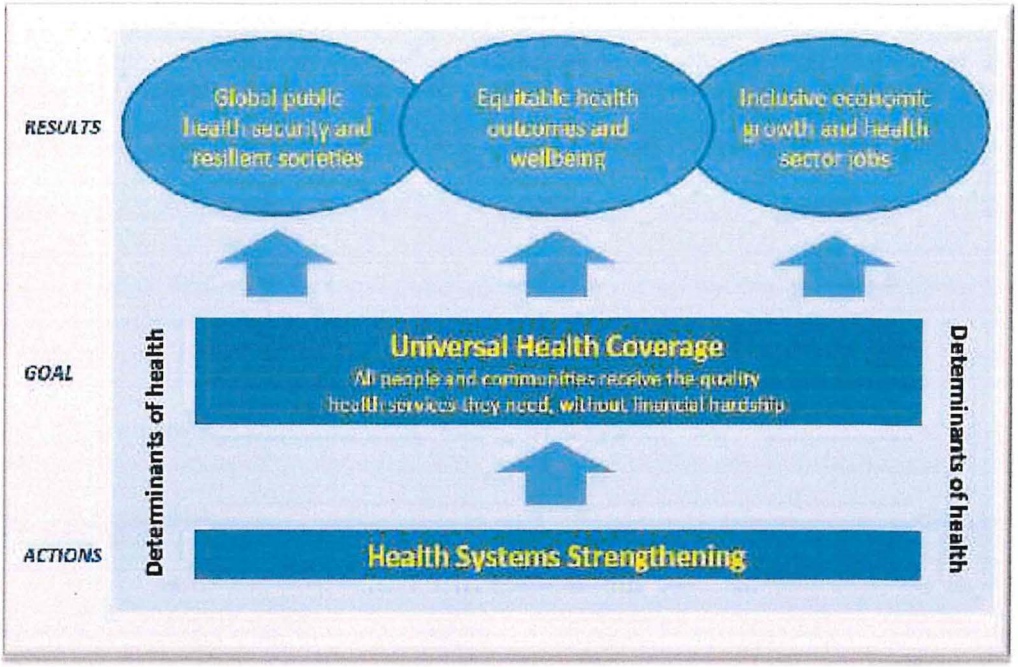


figure 1.0:2 A framework for UHC as part of the SDGs

Source: WHO

One of the ways of strengthening health systems and eventually improving quality of health services that all people need, without financial hardship is by ensuring a steady and efficient supply of medical products.

Almost 2 billion people worldwide lack access to essential medicines. Improving access to existing medicines could save 10 million lives each year, 4 million of them in Africa and South-East Asia(WHO, 2008).In Kenya, the health sector continues to face critical challenges which include: lack of essential medical products and equipment(Okech & Lelegwe, 2015).Surveys conducted between 2007 and 2011 in low and lower middle income countries found that essential medicines were available in only half of public sector and two-thirds of private sector facilities(MSH, 2012). It is therefore essential that we adopt/ adapt strategies that prevent stock-outs of essential medicines, vaccines and supplies which can compromise the performance of the health system.

Ensuringmedical product availability requires attention to six rights: the right products, in the right quantities, in the right condition, delivered to the right

place, at the right time, for the right cost. A functional Pharmaceutical Logistics Information Management System (LMIS) is needed to ensure that this goal is met. The LMIS is often depicted as a cycle with components of product selection (the right goods), forecasting and procurement (the right quantities, cost); inventory management and distribution (right place, time, and cost), and provision to customers (right place, time, and cost) (Figure 3). Information for decision-making is central to the cycle, and quality assurance and monitoring take place throughout. Meeting the needs of end users is the ultimate goal of pharmaceutical logistics systems, and attention to all six rights is essential to that effort. The key components of a Pharmaceutical Commodity Supply Chain that are enabled by a LMISare shown in figure 3.

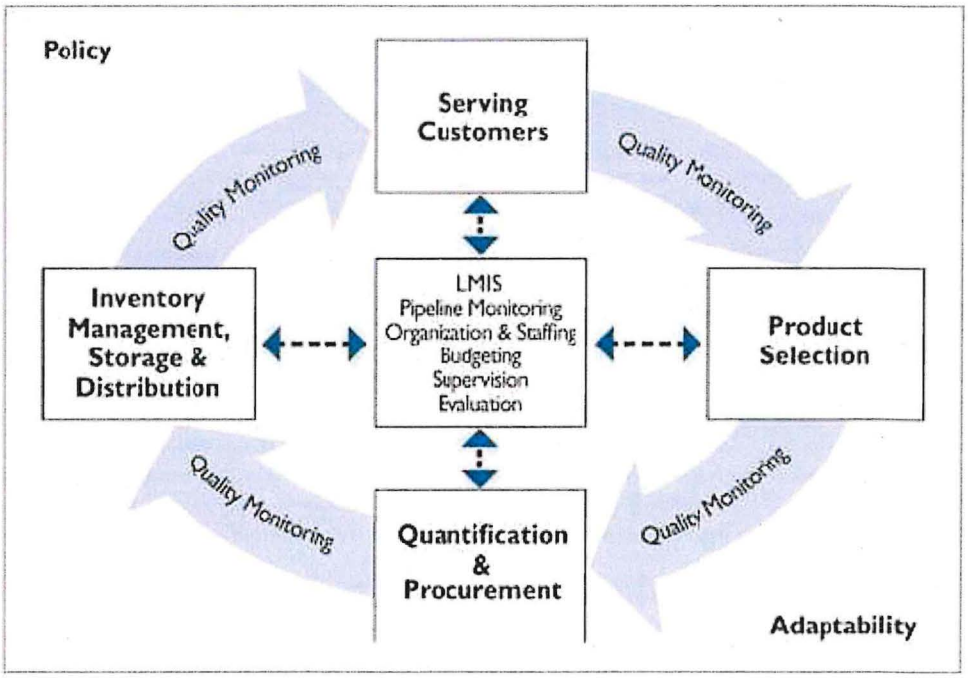


figure 1.0:3 Logistics cycle

Source: USAID deliver project

1.2.1 The Context of Nyamira County.

Nyamira County is one of the forty-seven counties in Kenya. The County borders Homabay County to the north, Kisii County to the west, Bomet County to the south east and Kericho County to the east (Figure 4).

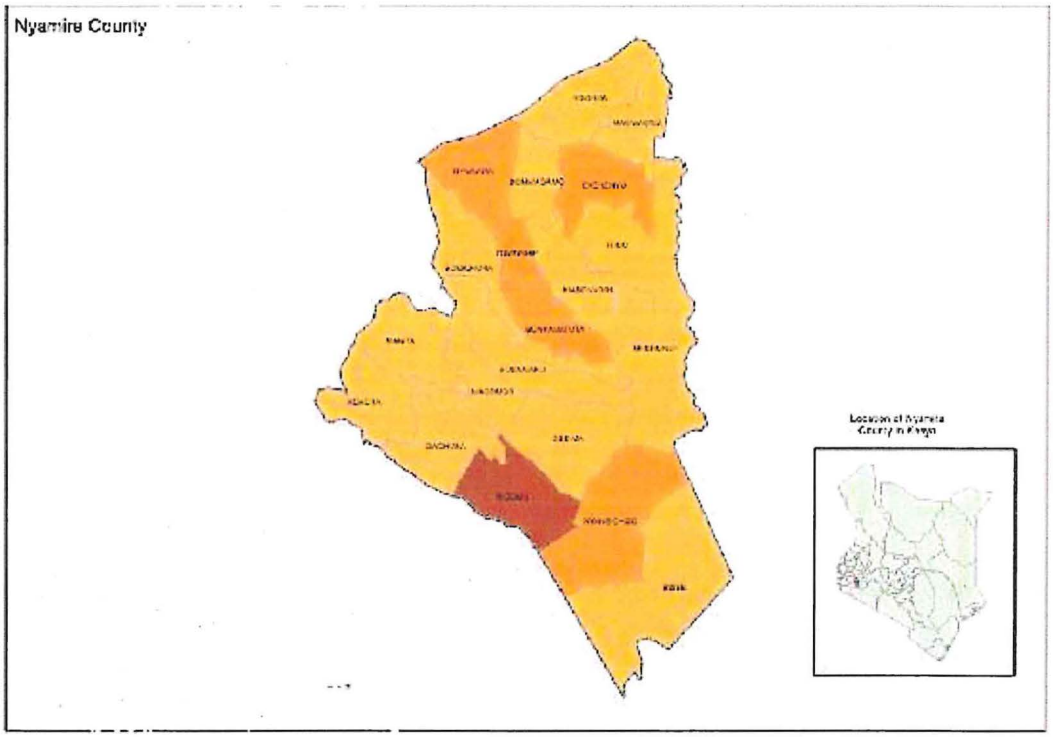


Figure1. 0:4 Map of Nyamira

source: KNBS

The County covers an area of 899.4km2. It lies between latitude 00 30'and 00 45'south and between longitude 340 45' and 350 00' east(County Government of Nyamira, 2013). Tables 1-7 summarise the healthsystem structure in the County (CIDP, 2017).Nyamira county has a total population of at least seven hundred and thirty thousand with a total of at least one hundred and forty-six thousand households. It has at least one hundred and forty thousand children below 5 years and women of child bearing age(15-49) are at least three hundred and twenty thousand.

Table.1:1 Population breakdown and description

	Description	Population Segment Estimates	County Projected Population
1	Total population in County		730,018
2	Total Number of Households		146004
3	Children under 1 year (12 months)	3.2488	23717
4	Children under 5 years (60 months)	16.2124	118353
5	Under 15-year population	44.0552	321611
6	Women of child bearing age (15 – 49 Years)	25.0784	183077

Table 1.2 Health sector catchment population for Sub Counties

	Sub-County/ Constituency	Population at Beginning of FY	Number of New Outpatients (past 12 months)	Outpatient Utilization per Person
	(A)	(B)	(C)	(D = C/B X 100)
1	Borabu	142879	80,494	56%
2	Manga	107210	49,412	46%
3	Masaba North	135786	49,144	36%
4	Nyamira	194841	117,870	60%
5	Nyamira North	149302	62,564	42%
	County Totals	730018	**359,484**	**49%**

Table 1.3: Distribution of health workforce involved in commodity management

	Staff cadres	Total Number Available	Number Available by Type of Provider			
			Public	FBO	NGO	Private
1	Pharmacists	18	18	0	0	0

2	Pharm. Technologist	24	24	0	0	0
3	Clinical Officers (general)	102	102	0	0	0
4	Nursing staff (KRCHNs)	418	245	16	1	23
5	Nursing staff (KECHN)	150	107	6	0	17

The county government of Nyamira spent of Nyamira spent a total of one hundred and seventy million and one hundred and thirty million on pharmaceuticals and non-pharmaceuticals supplies respectively in the past twelve months.

1.2.2 Overview of the pharmaceutical supply chain

A well-functioning health system ensures equitable access to essential medical products, vaccines and technologies of assured quality, safety, efficacy and cost-effectiveness, and their scientifically sound and cost-effective use (Tromp & Baltussen, 2012) which is aligned to one of the goals of UHC, to ensure that individuals are able to afford health services and medicines.

The Health Systems Performance Framework reflects criteria that indicate the goals of intervention in health, i.e. to improve the level and distribution of health, to improve responsiveness, to offer financial protection and to make efficient use of resources. This can be loosely defined as addressing the question: "What should a health system do?", while the health systems block reflects criteria that relate to the feasibility of the intervention, i.e. addressing the question " What can a health system do? (Tromp & Baltussen, 2012) as shown in figure 6.

One of the health systems building blocks in figure 6 is the medical products, vaccines and technology requirements. For UHC to succeed, this building block must be strengthened. One of the ways of strengthening the building block is development and implementation of an LMIS.

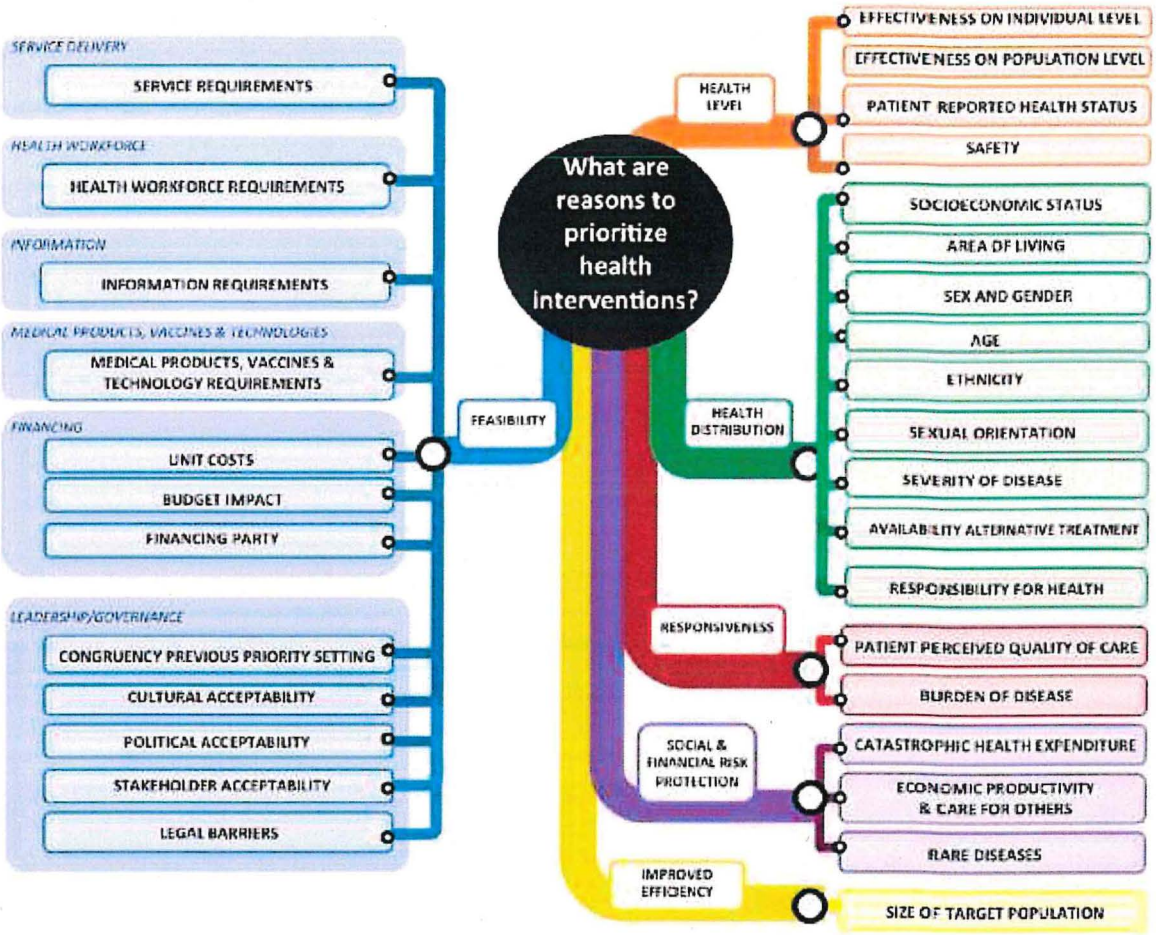


figure 1.0:5 Mapping of priority setting criteria

Source: Tromp & Baltussen, 2012

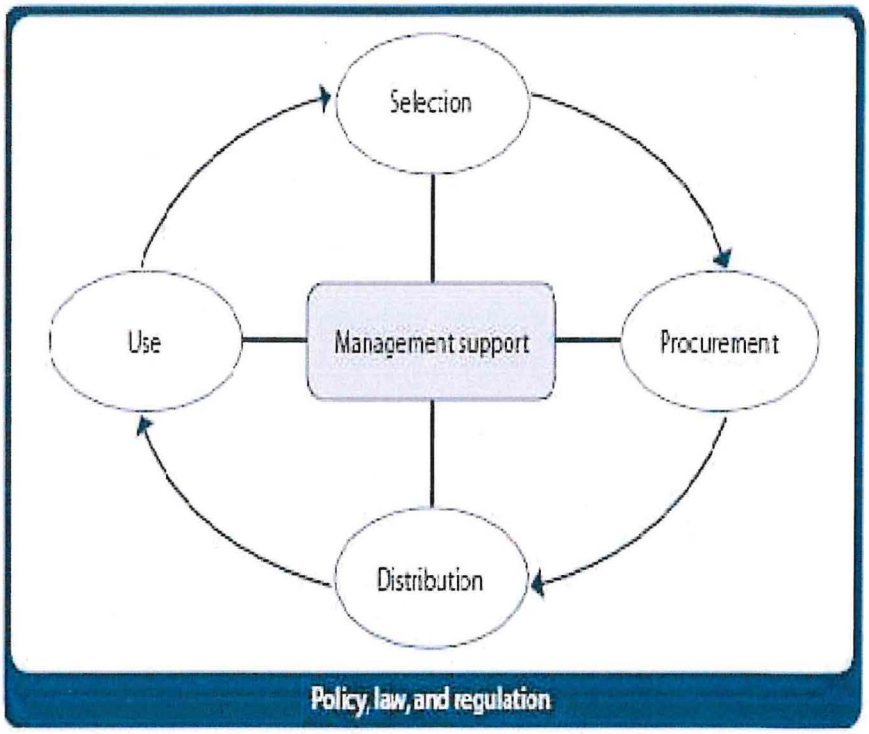
Essential medicines are considered an integral part of UHC, they are an indispensable element for delivery of services and are also a requirement for high-quality care. It is obvious that careful consideration must be given to ensuring reliable access to quality assured essential medicines when designing benefit packages.

Aside from being a commodity that is required for service delivery, medicines also contribute significantly to government and household spending on health. Medicines account for over a quarter of total health expenditures with some Low and Middle Income Countries (LMICs) spending up to 67% of their total health expenditures on pharmaceuticals (Lu, Hernandez, & Edejer, 2011). In low and middle income countries, more than half and sometimes up to 90% of expenditures on medicines are out of pocket (Lu et al., 2011), putting the most vulnerable households at great risk of financial hardship and catastrophic health expenditures.While part of this

spending brings good value for money, medicines contribute to the leading sources of health system inefficiency (Chisholm et al., 2010). Some health financing arrangements try to address the issue of high medicines expenditures and medicines waste through cost containment strategies such as limiting access to some medicines categories or putting higher co-payment levels. These measures must be implemented with caution to avoid compromising equity and quality of care (Bigdeli, Laing, Tomson, & Babar, 2015). Universal Health Coverage has however the leverage to implement sound medicines management strategies that would ensure an effective use of health budgets while maintaining the objective of equitable access to quality assured well selected essential medicines used rationally (Garabedian, Vialle-Valentin, Ross-Degnan, & Wagner,). These strategies range from evidence-based medicines selection; transparent procurement mechanisms and pricing policies; contracting arrangements with prescribers and dispensers; and strategies to achieve appropriate utilization of medicines including within specific disease programs.

The World Health Report 2013 highlighted the importance of research to support UHC implementation (Christopher Dye, Ties Boerma, David Evans, Anthony Harries, Christian Lienhardt, Joanne McManus, Tikki Pang, Robert Terry, 2013) in terms of providing sound evidence for decision making; monitoring impact of policies and interventions; and documenting implementation challenges and successful implementation arrangements. How to ensure reliable access to existing pharmaceuticals and promote innovation for medicines to meet existing unmet needs must be included on this research agenda. This is also vital in improving medicines integration in health system strengthening and towards attaining the goal of UHC.

The Pharmaceutical Management Framework shown in figure 6 summarizes key components of the system that can be enhanced using a LMIS.



Source: CPM/MSH 2011.

figure 1.0:6 Pharmaceutical Management framework

Pharmaceutical Management involves 4 basic functions: a) **Selection:** - reviewing the prevalent health problems, identifying treatments of choice, choosing individual medicines and dosage forms, and deciding which medicines will be available at each level of the healthcare system , b) **Procurement**:- includes quantifying medicines requirements, selecting procurement methods, managing tenders, establishing contract terms, assuring pharmaceutical quality, and ensuring adherence to contract terms; c) **Distribution:-** encompasses clearing customs, stock control, stock management, and delivery to drug depots and health facilities; and d) **Use:-** comprises diagnosis, dispensing, and proper use of drugs by patients. Better Pharmaceutical Management leads to increased access to essential medicines (next slide). The entire framework relies on a core Management Support System, Organization, Financing and Sustainability, Information Management and Human Resource Management. These are anchored on a strong Leadership and Governance structure and guided by Policies, Laws and Regulations.

1.3Statement of the problem

In the financial year 2014-2015 110 million was requested for but only 75 million was allocated, in the financial year 2015-2016 120 million was requested for

but only 86 million was allocatedand in the financial year 2016-2017 130 million was requested for but only 103 million was allocated.

This confirms that the there is a budget deficit and that combined efforts have to be made to ensure that the population in Nyamira county have and gain access to essential medicines. The paucity of resources in Nyamira has led to low budgetary allocation to the department of health services. Currently, budgetary allocations for pharmaceuticals are not based on accurate estimates of drug requirements due to lack of a LMIS in Nyamira County. This in turn has led to inadequate funding for pharmaceutical supply chain leading to stockouts. Drug shortages affect every stakeholder of healthcare system and collaborative efforts are required to manage and mitigate shortages(Pauwels, Simoens, Casteels, & Huys, 2015).

Kenya is set to roll out UHC for the entire country by 2022, beginning with a pilot covering four counties: Kisumu, Machakos, Isiolo, and Nyeri. One of the key determinants of the success of the UHC programme in Kenya is likely to be timely availability of pharmaceutical products at the facilities.However, there are currently no plans to assess the challenges faced by counties regarding the logistics of supplying pharmaceutical products from the Kenya Medical Supplies Authority (KEMSA) to the facilities in the counties and to address these problem the researcher was prompted to research on LMIS to strengthen commodity security, which with UHC achievement.

1.4Objectivesof the study

The study was guided by the following objectives;

1.4.1 General Objective

To establish the influence of pharmaceutical logistics management information systems as an enabler of universal health coverage implementation in Nyamira County

1.4.2 Specific objectives

I. To establish the role of commodity selection support systems as an enabler of universal health coverage implementation
II. To establish the role of commodity Procurement support systems as an enabler of universal health coverage implementation
III. To establish the role of commodity distribution support systems as an enabler of universal health coverage implementation

IV. To establish the role of utility support systems as an enabler of universal health coverage implementation

1.5 Research questions

I. What is therole of commodityselection support systems as an enabler of universal health coverage implementation?
II. What is the role of commodity Procurement support systems as an enabler of universal health coverage implementation?
III. What is the role of commodity distribution Support systems as an enabler of universal health coverage implementation?
IV. What is the role of commodityutility support systems as an enabler of universal health coverage implementation ?

1.6 Scope of study

This studycovered the five components of the pharmaceutical cycle which include product selection, procurement, distribution, medicine use and LMIS as part of management support. Information was gathered from pharmacists, pharmaceutical technologists, and nurses in charge of drugs in their respective facilities. The study was limited to the three levels of facilities in the counties which include, level 2, 3 and 4 facilities.

1.7Justificationof the study

Access to quality pharmaceuticals is one key factor to successful implementation of UHC. To these end research on the role of LMIS is key to ensuring commodity security thus ensuring access to quality medicine to everyone without financial hardship.

The results from this study will help Nyamira County to improve supply of essential medicines to support delivery of quality essential health services under the UHC programme. The study will help pharmaceutical practitioners improve pharmaceutical supply chain in a bid to make medicines accessible to everybody who needs them. To researchers and the broader academic communities, the findings will add to a growing body of knowledgeon how UHC can be achieved through understanding the influence of LMIS as an enabler of UHC.

1.8 Limitation of the Study

The limitation encountered while collecting data were inadequate finance, the financial resource was not enough since the scope of the study was broader and gathering information was costly, some of the respondents were also reluctant to give

the information needed with the fear of fired from their respective jobs but the researcher gave them an assurance that their response was to be treated with high degree of confidence.

1.9 Operational Definition of Key Terms

Selection support system:

This is a network of elements providing the user with practical or emotional support in selection of the facilities in need (Sugiyarti, Jasmi, Basiron, Huda, Shankar, &Maseleno, 2018)

Procurement support system:

Is a system provided to facilitate process of finding and agreeing to terms, and acquiring goods, services, or works from an external source, often via a tendering or competitive bidding process. The system is used to ensure the buyer receives goods, services, or works at the best possible price when aspects such as quality, quantity, time, and location are compared (Moynihan, Saxena, & Fonseca, 2005)

Distribution upport system:

Entire set-up consisting of procedures, methods, equipment and facilities, designed and interconnected to facilitate and check the flow of goods and services from the source to the final consumer (Jiang, Zhang, Muljadi, Zhang, & Gao, 2018)

Utility support system:

Is a support program, hardware, or combination to perform basic functions and giving the use of a program that is needed by the user, routine operations in support of a larger system. (Mellert, Jackson, &Pestano, 2018)

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of relevant literature on the LMIS and how such a system can facilitate the successful roll out of UHC.It also presents both theoretical and conceptual frameworks upon which the research is based.

2.2 Theoretical framework

This literature focuses on underlying theoretical basis of efficient supply chains used in medical healthcare. The theories include; Information theory and Technology Acceptance Model.

2.2.1 Information Theory

For organizations that take part in pharmaceutical supply chain management to perform optimally, they must interconnect, cooperate and share information (Sanders, Autry, &Gligor, 2011; Tokar, Aloysius, Waller, & Williams, 2011). Information sharing is also crucial in ending supply disruptions through coordination and consolidation of the supply chain (Mohd, Banwet, & Ravi, 2007), so as to enable better forecasting. In this theory, organizations must acknowledge that uncertainties in the pharmaceutical supply chain are brought about by mutual or reciprocal influence amongst themselves and also by functions that are carried out by supply chain players, functions that are interdependent in nature (Casey, Allison, Yun, & Benjamin, 2012). Information theory mainly focuses on uncertainty and information quantities (Beckstead& Beckie, 2011) during the selection, procurement, distribution and medicine use information becomes vital and information theory becomes relevant and being the unifying element.

2.3.1 Selection Support System

The selection of medicine has a considerable impact on the quality of care and the cost of treatment, and is therefore one of the areas where intervention is most cost effective (MSH, 2012).Prioritizing particular products can be a tool for supply chain managers to ensure availability of those products. Product selection facilitates access to more affordable commodity prices through economies of scale and reduction of cost for some supplies, because a larger quantity of a smaller number of products is required. Selecting products is a prerequisite to quantification, because it identifies the products that should be quantified.With regards to procurement,

purchasing power is significantly lessened by the large number of duplicative and nonessential pharmaceutical products on the market.

Quantification is the process of estimating the quantities and cost of the products required for a specific health program and determining when the products should be delivered to ensure an uninterrupted supply for the program (Usaid & Project, 2015). Quantification takes into account the expected demand for commodities, unit costs, existing stocks, stock already on order, expiries, lead time, minimum and maximum stock levels, and shipping costs (Jsi, 2017).

Quantification consists of three steps: planning, forecasting, and supply planning. Quantification is not a one-time, annual exercise that ends after you determine the final quantities and costs of the commodities (Usaid & Project, 2015). Rather, it is a continuous process of continuous monitoring and regular updating of the quantification results. Supply planning involves determining the product quantities required to fill the supply pipeline, scheduling, shipments and estimating costs (Usaid & Project, 2015).

Quantification does not end after you determine the final product quantities and costs; it is an ongoing process of monitoring, reviewing, and updating the forecasting data and assumptions; and recalculating the total commodity requirements and costs, as needed(USAID | Task Order 1, 2011).

2.3.2Procurement Support System

Medicines represent one of the largest and fastest growing costs for healthcare systems worldwide. According to data from 161 WHO Member States from 1995 to 2006, per capita spending on pharmaceuticals has increased by approximately 50%, and these increments were more pronounced in middle-income countries, where pharmaceutical expenditure in 2006 was1.76 times greater than in 1995(Luiza et al., 2016).

The pharmaceutical procurement system is major determinant of pharmaceutical availability and total pharmaceutical cost. In most developing countries, pharmaceutical purchases represent the single largest health expenditure after personnel costs. Pharmaceuticals also consume the major share of health related foreign exchange (MSH, 2012).

It is important for supply managers, program managers, procurement units, and other stakeholders interested in supply chain management to understand how long the procurement process usually takes, to ensure continuous availability, they

must be able to plan procurement schedules and order quantities in a reasonable time(USAID | Task Order 1, 2011).

2.3.3Distribution Support System

The primary distribution management goal is to maintain a steady supply of pharmaceuticals and supplies to facilities where they are needed while ensuring that resources are used in the most effective way(MSH, 2012). Distribution costs, including storage and transportation costs, are a significant expense of running a public health supply system, often second only to personnel costs. Transportation costs alone may exceed the value of the medicines distributed to some locations, especially in countries with low population densities that cover large geographical areas(MSH, 2012).

In many public health systems, senior officials do not consider pharmaceutical distribution a high priority; it is too often placed in the hands of poorly trained and inexperienced staff members who are given responsibility but little authority. Under such circumstances, management tends to react to problems and crises rather than take a long-term, strategic view (MSH, 2012).

The distribution cycle begins when pharmaceuticals are dispatched by the manufacturer or supplier. It ends when medicine consumption information is reported back to the procurement unitmay require the use of electronic communication technology, dedicated personnel, or effective training for SDP personnel in order to support good logistics decision making (Project, 2011).

Transportation management is the buying and controlling of transportation services by either a shipper or a consignee. Today, more than ever before, organizations are concerned about transportation management because transportation represents a major expense item. Transportation is the most costly logistics activity for many organizations and is pivotal to the successful operation of any supply chain Murphy et. al.; (2008). Sople (2010) explains that the movement of goods from the point of production to the point of consumption is done through various modes of transportation. Depending on the transportation load, number of delivery points, existing distribution centres, product value, frequency of delivery, urgency and the cost economics, different types of networks are used. Shah (2009) points out that the transportation cost for a given mode of transport is a function of the distance and the quantity of the goods shipped. In general, transport rates taper with the increasing distance. This implies that with increasing distance, the rate of increase of

transportation costs will go down. For longer distances travelled, the related fixed costs at the points of origin and destination are distributed over more kilometres. Further, longer the distances travelled, the overall utilization of the vehicle is likely to be higher. This is known as the economies of distance in transportation. According to Chopra and Meindl (2007), a carrier makes investment decisions regarding the transportation equipment (locomotives, trucks,

2.3.4 Utility Support System

According to Lelegwe (2015) Utility support system is used in making decisions concerning the use of complex systems (like the management of organizational operations, industrial processes, or investment portfolios; the command and control of military units; or the control of nuclear power plants) often strains our cognitive capabilities. Even though individual interactions among a system's variables may be well understood, predicting how the system reacts to an external manipulation such as a policy decision is often difficult. The system addresses factors such as additional wages, reduction of cases of machine wear down, maintenance breaks, raw material usage, supply logistics, and future demand need are considered, however, this also impact the total financial outcome of this decision. Many variables are involved in complex and often subtle interdependencies and predicting the total outcome may be daunting. There is a substantial amount of empirical evidence that human intuitive judgment and decision making can be far from optimal based on the utility support system, and it deteriorates even further with complexity and stress. Because in many situations the quality of decisions is important and is derived from the expected use, aiding the deficiencies of human judgment and decision making has been a major focus of science throughout history leading to the invention of logistic management information system which considers the utility of the products procured in an organization.

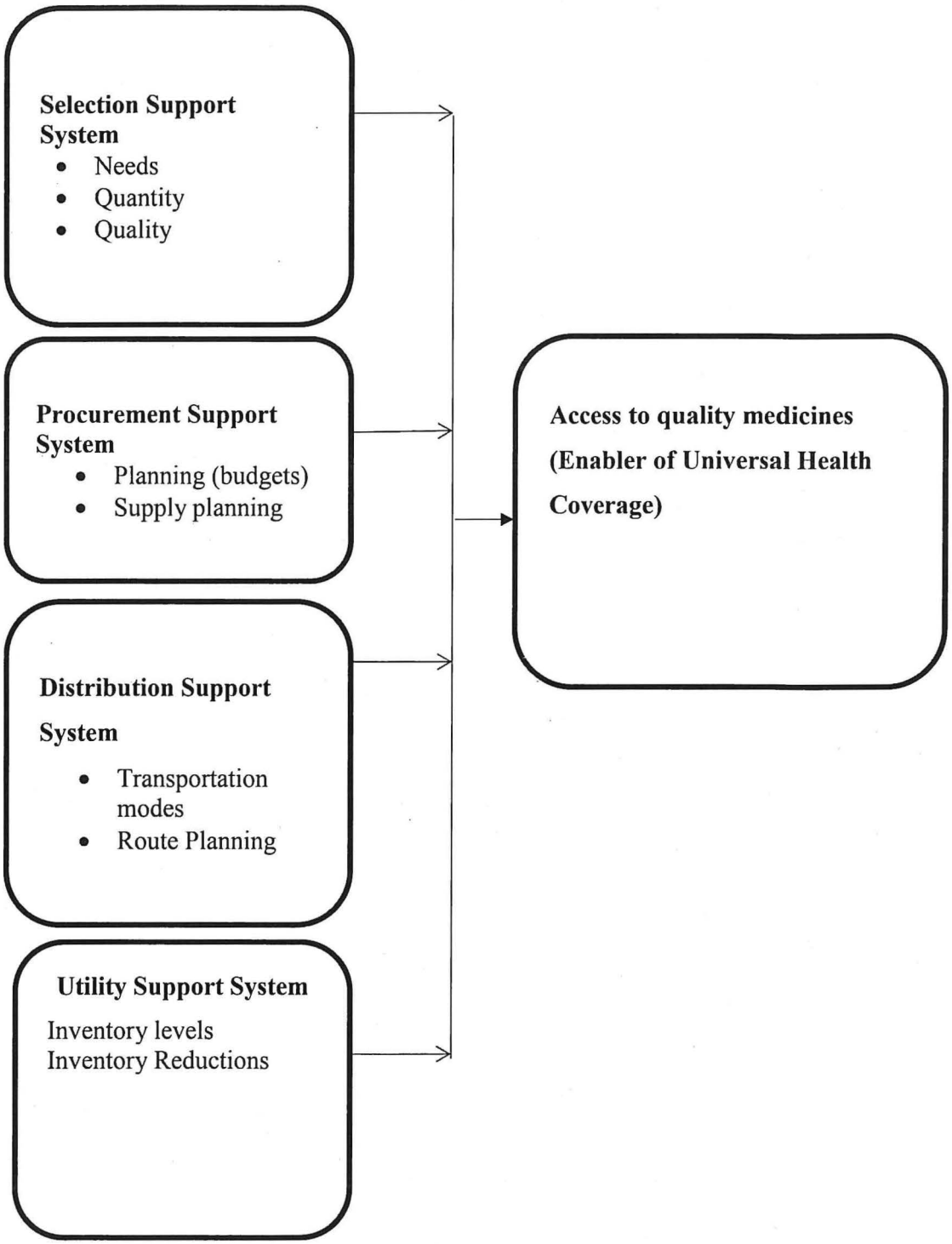
Operations research developed various methods for making rational choices and to choose a system, one must analyse its use (the outcome) which the utility support system tends to address. More recently, these methods, often enhanced by a variety of techniques originating from information science, cognitive psychology, and artificial intelligence, have been implemented in the form of computer programs and other logistic management information systems, either as stand-alone tools or as integrated computing environments for complex decision making. Such environments are often given the common name of decision support systems (DSSs)

of which the utility support system is included. The concept of DSS is extremely broad, and its definitions vary, depending on the author's point of view. To avoid exclusion of any of the existing types of DSSs, we will define them roughly as interactive computer-based systems that aid users in judgment and choice activities. Another name sometimes used as a synonym for DSS is knowledge-based systems, which refers to their attempt to formalize domain knowledge so that it is amenable to mechanized reasoning for the use in an organization.

Utility support systems are gaining an increased popularity in various domains, including business, engineering, the military, and medicine. They are especially valuable in situations in which the amount of available information is prohibitive for the intuition of an unaided human decision maker and in which precision and optimality are of importance. Utility support systems can aid human cognitive deficiencies by integrating various sources of information, providing intelligent access to relevant knowledge and how the system can aid in the implementation of UHC in the county, and aiding the process of structuring decisions. They can also support choice among well-defined alternatives and build on formal approaches, such as the methods of engineering decision theory. They can also employ artificial intelligence methods to address heuristically problems that are intractable by formal techniques. Proper application of Utility support system as a decision-making tools increases productivity, efficiency, and effectiveness and gives many businesses a comparative advantage over their competitors, allowing them to make optimal choices for technological processes and their parameters, planning business operations, logistics, or investments (Jsi, 2017).

2.4Conceptual framework

According to Mugenda and Mugenda, (2003), conceptual framework involves forming ideas about relationships between variables in the study and showing these relationships diagrammatically in the study, the main independent variables are Selection support system, Procurement support system, Distribution Support system and Utility support system. The dependent variable is the enabler of universal health coverage implementation. For the purpose of this research, a figure 2.1 below has been developed to display on how the independent variables impact on the dependent variable.



Independent Variable **Dependent variable**

2.5 Empirical Review

In the early 1990s, the national government developed market-oriented economic, social and health policies with their respective systems that was to help in logistic management and monitored over a long period of time and the report was

that the system was not functioning effectively and efficiently (Giraldo, 2007; Vega-Romeroet al., 2009), on transforming logistic management system in 1993 noted that the health as a diverse system lack a proper system used and took the old National Health System into the current General System of Social Security in Health (GSSSH) (Republica de Colombia, 1993), which is financed through a combination of payroll contributions and general taxation was intended to bring the change in the sectors where all records selection and procurement was to be done online, the system did not go well (Glassmanet al., 2009) and suggested a new reform aimed to make the system more efficient by reducing the state's role as health care provider, decentralising health service administration to local governments, privatising health and increasing labour market flexibility (Corchoet al., 2000). These changes sought to facilitate marketcompetition and to increase the profitability of health care enterprises.

The process excluded state actions on the broader determinants of health facilities procurement logistics and dismissed the original principles of PHC. This resulted in a model that mixed managed care and health care assistance, promoted a biomedical and selective model of primary care and focused on the prevention of individual risk (Vega-Romero et al., 2009) and further integrate the system where GSSSH was introduced including individual health care services are the responsibility of insurance companies, whereas a system was introduced to monitor public health activities and it was noted that the responsibility of the local government health authorities were not properly checked (Corchoet al., 2000). Individual health care services can be provided through either a contributory regime for those able to pay, where formally employed and independent workers contribute a proportion of their incomes, or a subsidised regime, funded by general tax revenue, where poor people do not make any insurance contribution. People are usually enrolled with public or private insurers and receive care from a mix of providers. Those still uninsured and classified as poor only have free access to emergency care (Glassmanet al., 2009).

According to Laurell, (2010) Individuals in both the contributory and subsidised regimes receive a health benefits package. Public health programmes are provided through a collective intervention plan which complements health care insurance. Local health authorities provide health promotion and disease prevention

services included in the collective intervention plan through contracts between health secretariats and public health providers (Glassmanet al., 2009).

2.6 Critique of existing Literature

Several studies on the concept was done a decade years ago where in the early 1990s, the national government developed market-oriented economic, social and health policies with their respective systems that was to help in logistic management and monitored over a long period of time and the report was that the system was not functioning effectively and efficiently (Giraldo, 2007; Vega-Romeroet al., 2009) the study fails to accommodate the best system which ought to be recommended for the implantation of the UHC implementation,

The system was on transforming logistic management system but not treated as an enabler of UHC implementation in Nyamira county, Kenya leading to geographical gap, and study was also conducted in 1993 in Colombia not in Kenya where the innovation of the system is needed the most and it was also noted that the health as a diverse system lack a proper system used and took the old National Health System into the current General System of Social Security in Health (GSSSH) (Republica de Colombia, 1993), which is financed through a combination of payroll contributions and general taxation was intended to bring the change in the sectors where all records selection and procurement was to be done online, the system did not go well (Glassmanet al., 2009) and suggested a new reform aimed to make the system more efficient by reducing the state's role as health care provider, decentralising health service administration to local governments, privatising health and increasing labour market flexibility (Corchoet al., 2000). These changes sought to facilitate market competition and to increase the profitability of health care enterprises.

The process excluded state actions on the broader determinants of health facilities procurement logistics and dismissed the original principles of PHC which was not of the great impact to UHC system. This resulted in a model that mixed managed care and health care assistance, promoted a biomedical and selective model of primary care and focused on the prevention of individual risk (Vega-Romero et al., 2009) and further integrate the system where GSSSH was introduced including individual health care services are the responsibility of insurance companies, whereas a system was introduced to monitor public health activities and it was noted

that the responsibility of the local government health authorities were not properly checked the system fails to address issues relating to selection support system, Procurement support system, distribution support system and utility support system which the paper tend to address in the logistic management system (Corchoet al., 2000). Individual health care services can be provided through either a contributory regime for those able to pay, where formally employed and independent workers contribute a proportion of their incomes, or a subsidised regime, funded by general tax revenue, where poor people do not make any insurance contribution. People are usually enrolled with public or private insurers and receive care from a mix of providers. Those still uninsured and classified as poor only have free access to emergency care (Glassmanet al., 2009).

2.7 Research Gap

Having considering the studies that have been performed by other scholars like the study of implementation of the PHC strategy takes place within the structure of the GSSSH and is monitored by the Ministry of Health, which is responsible for the coordination of the District health authorities a lot still needs to be done for the hospitals to come up with the system which will aid in monitoring the logistics in terms of selection, procurement, distribution and utility and this is what prompted the researcher to search on influence of pharmaceutical logistics management information systems as an enabler of universal health coverage implementation in Nyamira County

2.8 Summary

The chapter discussed the literature review and how the existing literature are connected to the study variables, theoretical framework where different theories have been discussed, critique of the theory is done and linking the theory to the study variables done efficiently and effectively, conceptual framework drawn showing the relationship between the independent variables to that of the dependent variable, empirical review also done to check what other scholars have found, critique done to aid in coming up with the research gap which was then discussed.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter specifies the nature of the research methodology that was used in the study. The studyadopted the following structure: Research Design, Target Population, Data collection techniques and data analysis methods that were followed in the research process.

3.2 Research Design

A mixed-method research design wasadopted for this research. This approach combined the strengths of both quantitative and qualitative research approaches to present a more enhanced insight into the research problem, trustworthiness of inferences from the data acquired, providing flexibility for the researcher to highlight the similarities, differences and to ensure total representation of particular aspects of a phenomenon (Morrow &Fassinger, 2013).Additionally, the merging of both methods is deemed complement to each other and reduces the weaknesses in both quantitative and qualitative designs, the study will also adopt cross sectional survey approach in collecting the data.

3.3Population and Sampling

The target population of the study was 12health facilities in Nyamira County. These facilities are the largest facilities in the public sector where UHC is to be implemented. In terms of pharmaceutical commodities, these facilities consume almost 80% of the total budgetary allocation for pharmaceuticals in Nyamira County.

3.3 Sample and Sampling Techniques

The sample size of this study was drawn from the 120 medical facilities through the grouping the facilities into 3, where in each of the 5 sub-county 2 tier 2 facilities were chosen and 1subcounty hospital. 12 facilities were selected representing 10% of the 120 facilities in the county. And the process is shown in the table 3.1

Table 3.1: Sample facilities to be used in the study

S.NO	SUB-COUNTY	SUB-COUNTY HOSPITAL	HEALTH CENTER	DISPENSARY
1	NYAMIRA	Nyamira County Referral hospital	Nyamaiya Health Center	
2	NYAMIRA NORTH	Ekerenyo Sub-county hospital	Kerobo Health Center	
3	MANGA	Manga Sub-County Hospital	Tombe Health Center	Ogango dispensary
4	Borabu	Kijauri Sub-County Hospital	Isoge Health Centre	
5	MASABA NORTH	Keroka Sub-County hospital	Gesima Health Center	Mochenwa Dispensary

3.4 Sample size

According to Carol and Roberts (2004), the main factor considered in determining the sample size is the need to keep it manageable enough. Patton (1980) further argues that the sample size adopted depends on what one wants to know, the purpose of the study enquiry, what is at stake, what will be useful, what will have credibility and what can be done with available time and resources.

The sample population was proportionally allocated to the 5 Sub-counties purposively sampled to avoid bias in sampling. And 70 employees working in the sub-county hospital and four individual from level five hospital within the county making it to be 74 respondents were sampled as shown in the table 3.2.

Table 3. 2 Sample Size

	Staff cadres	**Total Number Available**	**10% Sample Size**
1	Pharmacists	18	2
2	Pharm. Technologist	24	3
3	Clinical Officers (general)	102	11
4	Nursing staff (KRCHNs)	418	42
5	Nursing staff (KECHN) Level five managers	120	12 4
Total		**712**	**74**

3.5Data Collectiontools

The study used both quantitative and qualitative primary data. Quantitative data was collected through closed questions in questionnaires. The closed questions were obtained through a likert scale on a rating of 1 to 5 ranging from strongly disagree to strongly agree. The intent of this scale was that the statement represents different aspects of the same attitude (Brace, 2004). Likert scale is simple to construct, and is easy for the respondents to read, understand and respond appropriately to the statements put across. Qualitative data was collected through key informant interviews where managers of level five hospital were interviewed.

3.5.1 Interview Guide

A key informant interview was developed and used by the study to bring out key and relevant information that were not captured in the questionnaire. This was generated non- numerical data, rather than a measure of their feeling and thereafter interpreted accordingly for the purpose of the study. The interview was free flowing and allow for probing thus yielding in-depth information. The approach brought out target groups with valuable insights being gained regarding people's subjective perceptions; their deep-rooted beliefs and feelings on UHC service.

3.6 Data collection Procedure

Questionnaires used in the study was designed based on the research objectives and pre-tested to ascertain the suitability of the tool before the actual

administration.The questionnaire consisted of questions on the demographic characteristics of the respondents and questions covering the study objectives. The use of questionnaires was to enable the respondents remain anonymous and be honest in their responses (Cooper &Schindler, 2003).The choice of the questionnaire were based on the fact that it was easy analysing the collected data statistically. Further it is not biased, and the responses are gathered in a standardized manner, so they are more objective in their results. The study also used research assistance in the data collection process.

3.7 Pilot Test

To determine and improve the validity and reliability of the questionnaires, a pilot study was carried out from a representative sample. Mugenda and Mugenda (2003), states that a pre-test sample should be between 1% and 10% depending on the sample size. Kothari (2004), and for this study 8 respondents were chosen which was 10% 0f the sample size being 74, the result describes a pilot test as a replica and rehearsal of the main survey which established the reliability and validity of the instruments. The researcher corrected ambiguity of questions with the assistance of the supervisors. This was done to allow for the preparation of the final questionnaire.

3.7.1 Validity

Validity on the other hand refers to the degree to which results obtained from the analysis of the data actually represent the phenomenon under study, (Franklin, 2022). It is the degree to which research tools measure what it purports to be measuring. The study used face validity to ascertain the validity of the questionnaires. To confirm face validity, survey items were sent to 5 sub-counties with each targeting 1 respondents adding up to 5 respondents and 2 managers from level five hospital were used to obtain suggestions for modification (Rousson, Gasser &Seifer, 2002). On the basis of the evaluation, the instrument was adjusted appropriately before subjecting it to the final data collection exercise. Their review comments were used to ensure that content validity enhanced

3.7.2 Reliability

According to Sekaran and Bougie (2010), reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials. An instrument is reliable when it can measure a variable accurately and consistently and obtain the same results under the same condition over time. Reliability was estimated in several ways, Cronbach alpha being a test of internal

consistency and frequency was used to calculate the correlation values among the answers on an assessment tool. From Cronbach, a score above 0.7 was viewed to be critical because it indicated that the instrument was reliable but a maximum value of 0.9 was recommended (Tarakal & Dennick, 2011).

3.8 Data analysis and Presentation

Data analysis and presentation was done based on qualitative and quantitative methods as follows;

3.8.1 Quantitative Data Analysis

Quantitative data was analyzed by use of the Statistical Package for Social Sciences (SPSS version 21). The analysis involved loadings of the various items of the main variables of the research. Data on Mean, Standard Deviation and Variance, were done to the collected data.

Quantitative data was analyzed by use of the Statistical Package for Social Sciences (SPSS version 21). The analysis involved loadings of the various items of the main variables of the research. Data on Mean, Standard Deviation and Variance, were done to the collected data.

A multivariate regression model was used to link both the independent and dependent variables as outlined below.

$Y = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + u$ Where:

Y = Universal health coverage implementation

α = Constant

Term β1, β2, β3, and β4= Regression coefficients of the independent variables (for Selection support system, Procurement support system, Distribution support system and Utility support system respectively)

X1=Selection support system

X2= Procurement support system

X3 Distribution support System

X4= Utility support system

u = Error term

Using SPSS (version 21), a regression model was used to depict the relationship between the dependent variable and independent variables. The values of B1 to B4 were the coefficients that measures the enablers for Universal health coverage implementation to a unit change in the independent variable.

3.8.2 Qualitative Data Analysis

Qualitative data gathered by use of questionnaires and interviews were analyzedby means of comparison with documented information based on the variables of the study. It formed an integral part of the discussion and subsequent recommendations. The method of comparison was deliberately chosen because no conventional methods such as distributive analysis and normalcy of responses were done to this type of data. Similarly, the ranges of responses were found to be highly varied in accordance to individual perceptions of the respondents, due to the open-ended questions.

3.8Ethical Issues

The researcher upheld ethical issues in the process of the study and respondents got assurance on confidentiality which was then observed, and data collected was to be used for academic research purposes only. The researcher obtained approval from Strathmore University Ethics Committee and informed consent from every respondent and all the relevant authorities were consulted. The researcher also sought permission to collect all the necessary data required. A letter from the National council for science, technology and innovation was obtained before commencing the data collection process.

CHAPTER FOUR: RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents analysed data together with discussions of the research findings. The purpose of the study was to establish the influence of pharmaceutical logistics management information systems as an enabler of universal health coverage implementation in Nyamira County. Data was gathered through the administration of questionnaires and interviews and interpreted according to the research questions and objectives. The data collected was both qualitative and quantitative in nature, which was analysed using spreadsheet (excel) and SPSS version 21.0 and presentation of report was done through the use of tables, figures and chats as indicated here below in the chapter.

4.2 Response Rate

The researcher went about to collect information from 74 respondents in the organization. However, 68 questionnaires were dully filled and returned. Only 6 questionnaires were not returned. This translates to 92% response rate. Many scholars observes that a response rate of above 50% contributes towards gathering of sufficient data that could be generalized to represent the opinions of respondents about the study problem.

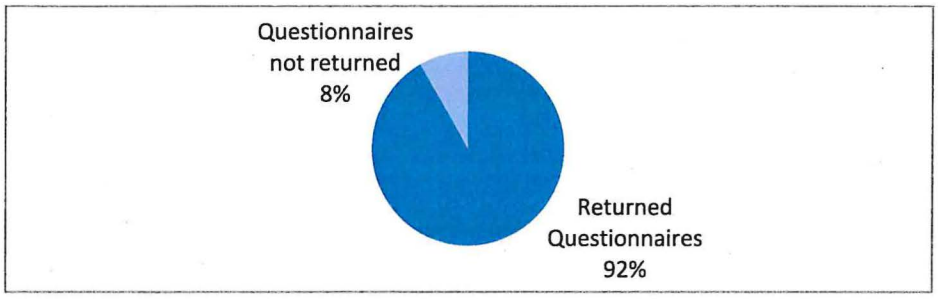


Figure 4. 1 Response Rate

The study also sought to know the gender of the respondents where the study found out that there were 53.33% of the respondents as male while 46.67% were female.

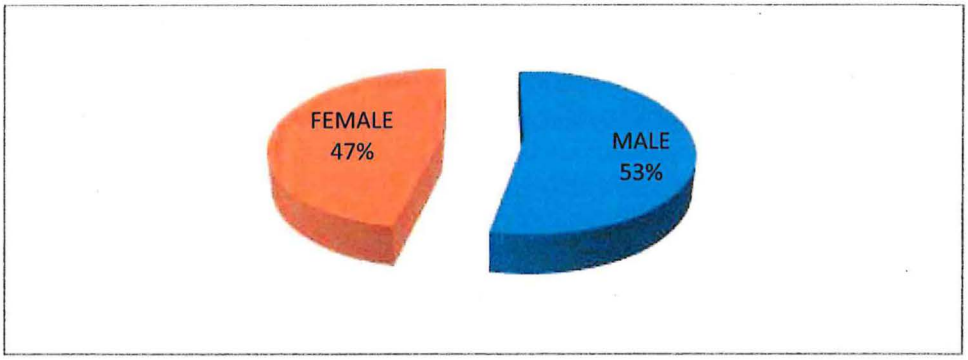


Figure 4. 2 Gender of the Respondents

The study sought to know the level of education of the respondents and from the response 69% of the managers were undergraduates. Those who were master holders were 28 % and only one respondent had a PhD taking the least percentage of 2% and this shows that those with the idea about the product specification strategy and who were resourceful in this study were the majority holding their first degree.

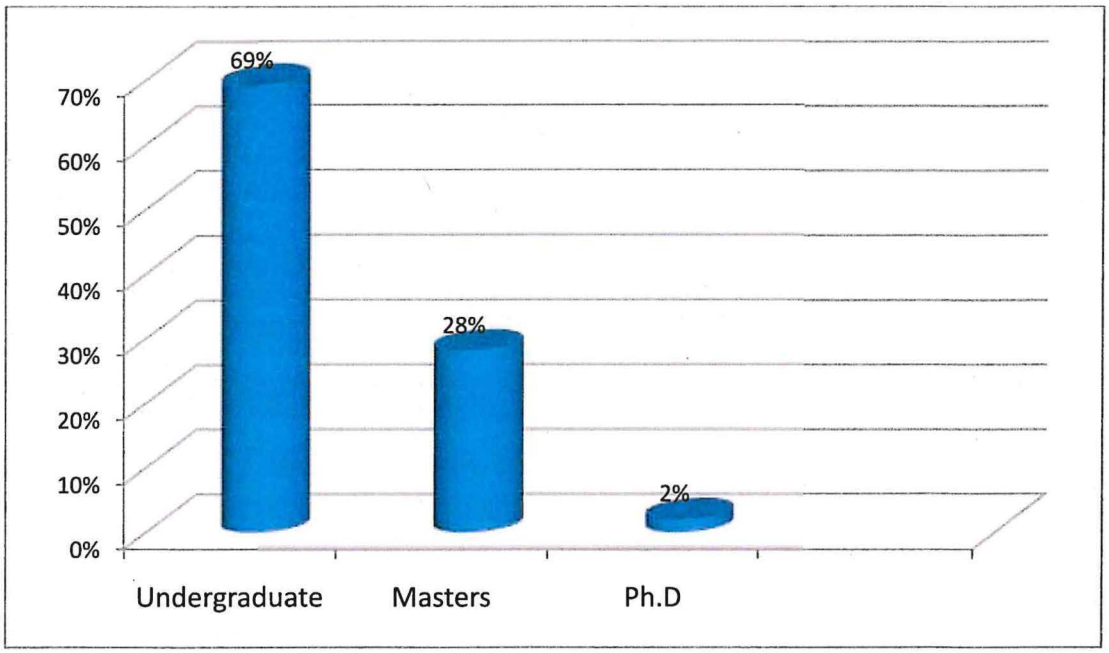


Figure 4.3Educational Qualification

On the duration the respondents have held the positions, the study found out that the 13.33% of the respondents have held the current positions for less than 2 years, 23.33% between 2-5 years, 46.67% between 6-10 years while only 16.67% have above 10 years. The longer they had stayed in the company had given them the experience on pharmaceutical logistics management information systems as an enabler of universal health coverage implementation

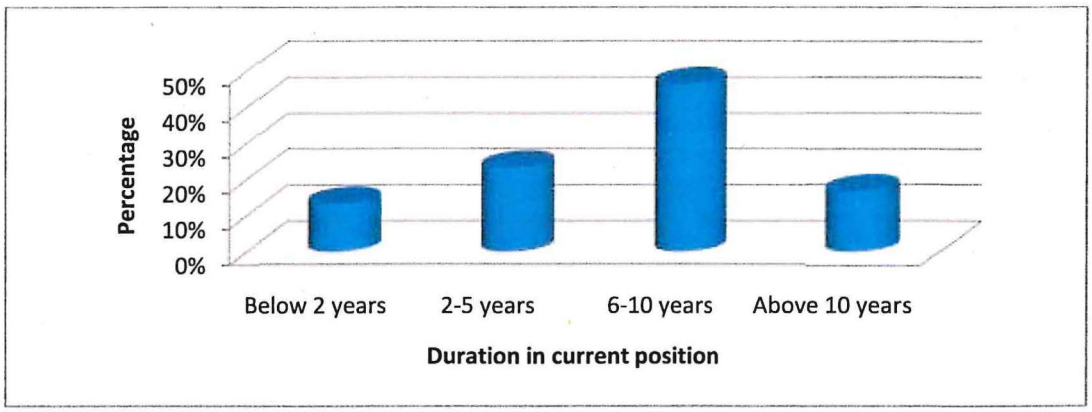


Figure 4. 4 Duration of position held in the organization

4.3Reliability Test Results

Reliability is the extent to which data collection techniques or analysis procedures yields consistent results, it is where similar observations are made or conclusions reached by other researchers or there is transparency in how sense was made from the raw data. Reliability of an instrument refers to its ability to produce consistent and stable measures. A reliable measurement consistently assigns the same score to the same phenomena.

Creswell (2008) referred to reliability as stability or consistency of measurements; that is whether or not the same results would be achieved if the test or measure is applied repeatedly. The most common reliability coefficient is Cronbach's alpha which estimates internal consistency by determining how all constructs on a test relate to all other items and to the total tests internal coherence of data. The reliability is expressed as a coefficient between 0 and 1.00 with high coefficient being more reliable.

Reliability of the questionnaire was assessed based on Cronbach Alpha where values greater than 0.7 indicate that the construct is reliable otherwise it is unreliable. The summary findings indicate that Selection support systems had a coefficient of 0.788, Procurement support systems had a coefficient of 0.802, Distribution Support systems had a coefficient of 0.821 while Utility support systemshad a coefficient of 0.804 respectively. All the variable constructs depict that the value of Cronbach's Alpha was above 0.7 thus the instrument was reliable (Castilllio, 2009). The overall reliability statistics for all items was 0.802 which represents high level reliability.

4.3.1 Reliability Results for Selection support systems

The findings obtained in the study indicate that all the constructs for selection support systems were reliable since the Cronbach Alpha coefficient for all items was above the threshold of 0.7. Findings are as shown in Table 1.

Table 4. 1: Cronbach's Alpha for Selection support systems

	Cronbach's Alpha
There is a county drug policy document that must be followed before selection of the supplier firms of medical equipment	.806
The program has a written policy for monitoring continuity of brands and avoiding unnecessary duplication of interchangeable products	.775
Are all products in the supply chain being assessed included on the essential drug list	.817

Table 4. 2 Overall Reliability Statistics for Policy Framework

Cronbach's Alpha	N of Items
.824	7

4.3.2 Reliability Results for procurement support systems

The findings obtained in the study indicate that all the constructs for procurement support systems were reliable since the Cronbach Alpha coefficient for all items was above the threshold of 0.7.

The overall reliability statistics for the procurement support systems indicated that the questionnaire was reliable as a Cronbach alpha coefficient of 0.799 was obtained.

Table 4. 3 Overall Reliability Statistics for Distribution Support systems

Cronbach's Alpha	N of Items
.799	7

4.3.3 Reliability Results for utility support systems

The findings obtained in the study indicate a Cronbach Alpha coefficient of more than 0.7 for all items of utility support systems. Therefore, the items under utility support systems were reliable. Table shows the reliability results for utility support systems.

Table 4. 4: Cronbach's Alpha for utility support systems

Cronbach's Alpha	N of Items
.799	7

The overall reliability results for Project Relevancy indicated that Cronbach alpha coefficient was 0.815 which is above the recommended 0.7 as shown in Table 6.

Table 4. 5 Overall Reliability Statistics for universal health coverage implementation

Cronbach's Alpha	N of Items
.815	7

4.2.4 Reliability Results

The study findings indicated that all questions under universal health coverage implementationwere reliable as the Cronbach alpha coefficient of more than 0.7 was obtained for all constructs.

Table 4. 6 Reliability Statistics for all Items

Cronbach's Alpha	N of Items
.801	5

4.4Validity Test Results

Validity is a characteristic of measurement concerned with the extent that the test measures what the researcher actually wishes to measure, and that the difference found with a measurement tool reflect the true differences among participants drawn from a population (Cooper & Schindler, 2014). The study used face validity to ascertain the validity of the questionnaires. To confirm face validity, survey items were sent to 7 respondents to obtain suggestions for modification. In addition, the

expert review comments including supervisors review comments were used to ensure that content validity was enhanced.

4.4.1 Inferential Analysis

The study used regression analysis to determine the relationship between the independent and the dependent variables of the study. The dependent variable was universal health coverage implementation while the independent variables were Selection support systems, Procurement support systems, Distribution Support systems, and Utility support systems.

4.4.2 Linearity Test

The study conducted linearity test to determine whether the relationship between the independent and dependent variables of the study was linear or not. If the significant deviation from linearity is greater than 0.05, then the relationship between the independent variable is linearly dependent. If the significant deviation from linearity is less than 0.05, then the relationship between the independent variable and the dependent variable is not linear, the significant deviation from linearity is greater than 0.05 for all variables implying that there is a linear relationship between Selection support systems, Procurement support systems, Distribution Support systems, and Utility support systems and to universal health coverage implementation

4.5Logistics Management Information System

To explore more on the logistic management system, several statement leading to more enquiries were used and different reaction have been observed and on the question of if there is a logistics management information system in your organization 38% of the respondents were in agreement and claimed that there was a logistic management information system in the medical facilities in the County, 32% of the respondents were of a contrary opinion claiming that there is no such a system in their premise and lastly 30% were not sure of the existence of such a system.

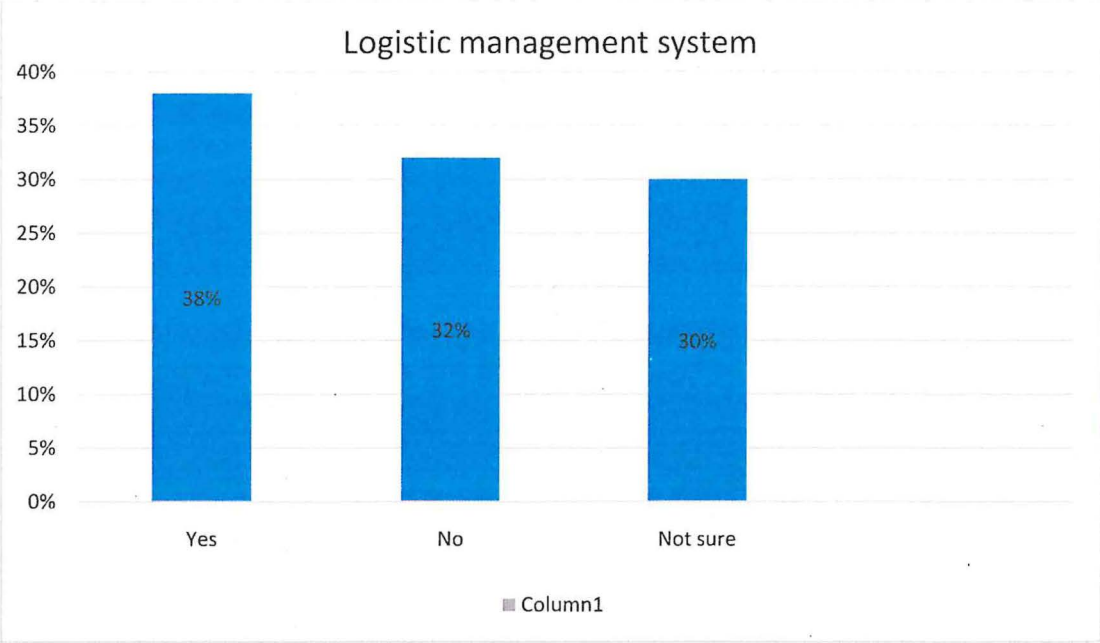


Figure 4. 5 Logistics Management Information System

On the question of whether the system includes stock keeping records 62% of the respondents agreed that the organization had stock keeping records which comprises of inventory control cards which was at 21%,bin cards at 52% and stock registers at 27%. However, 38% of the respondents were of a contrary opinion that the organization didn't have the stock keeping records.

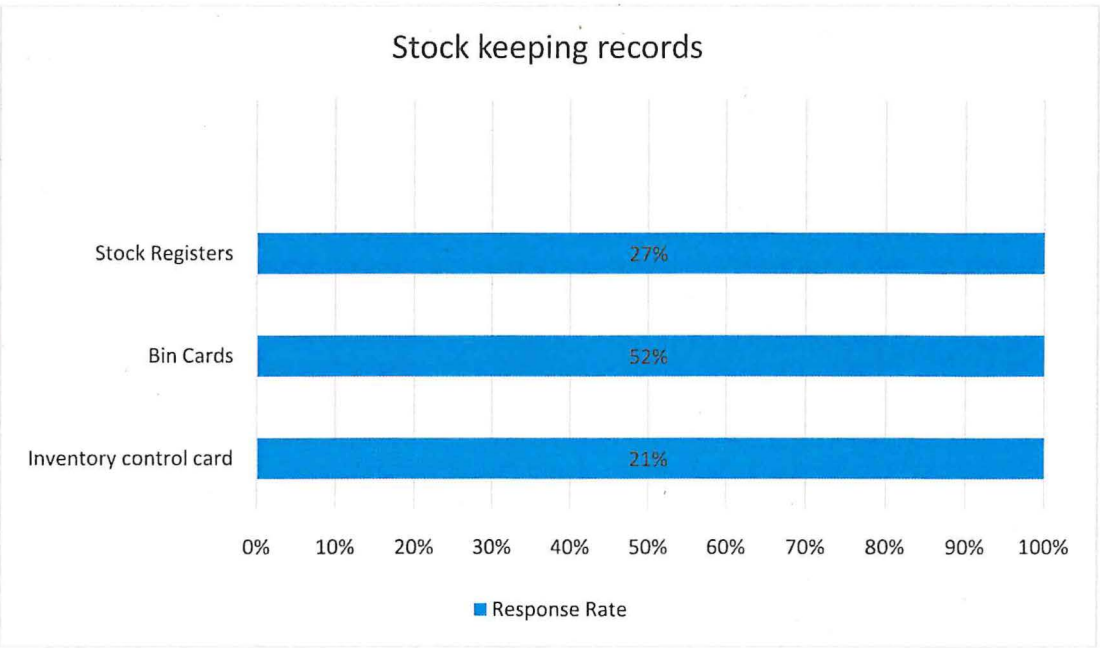


Figure 4. 6 Stock Keeping Records

When the respondents were asked on whether the organizations system had requisition and issue records 52% agreed to it and they said that system supports requisition at 56% and issuance of records at 44% however 48% of the respondents disagreed with the idea that the organization system had requisition and issues records.

Dispensed to user record at service delivery point within the organization was at 43% to those who agreed that the organization system supported the service while majority of our respondents strongly disagreed with the organization having such systems.

55% of the responded agreed that the summary of consumption of data at level above delivery service was working perfectly and was fully within the organizations systems while 45% of the responded were against the fact that the system was working perfectly and summary of consumption of data at level above delivery service was still a problem.

Stock on hand seems to be a major problem within the organization as only 39% of the respondents agreed that the organization's system supports these while majority of those asked on the issue disagreed with the fact that the organizations system supports stock on hand.

Different reactions continued to be drawn as more questions were asked to the respondents to elaborate more on the logistic management system and we wanted to know if the information system reports at all levels of the system show, first the respondents reacted to:

Inventory balance where 33% of the respondents said that the systems reports to all levels of the system show while 67% of the respondents refuted to the claims and stated that the system does not report to all the systems show.

On the other side when asked about the quantity dispensed or issue minority which was at 41% respondents agreed to it while the remaining responded which are the majority disagreed with the fact that the system supports the quantity dispense or issue thus claiming that improvements need to be done on the system.

Losses and adjustments were still a major problem within the organization logic management system where 37% of the respondents agreed that the system can perfectly handle the issue to do losses and adjustments within the organization while

53% of the respondents disagreed to the system solving the losses and adjustment issue.

Matters to do with quantities received 49% of those who responded said that they didn't see any problem with the way the system handles quantities received and agreed with it whereas 51% disagreed with these and said that the system doesn't handle the quantities received the way it is supposed to.

4.6Selection support systems as an enabler of universal health coverage implementation

On the statement relating to selection support system several statements were made and different reaction were observed, and agreement levels were as indicated in the table 4.1

Table 4. 7 Selection support systems as an enabler of universal health coverage implementation

Statement	1	2	3	4	5
There is a county drug policy document that must be followed before selection of the supplier firms of medical equipment	32%	20%	4%	32%	12%
The program has a written policy for monitoring continuity of brands and avoiding unnecessary duplication of interchangeable products	48%	16%	7%	20%	9%
Are all products in the supply chain being assessed included on the essential drug list	54%	25%	5%	10%	6%

On the statement of whether there is a county drug policy document that must be followed before selection of the supplier firms of medical equipment 52% disagreed with the fact that there was a county drug policy for monitoring continuity of brands and assert that it is upon the PPB is the body setting the policies relation to monitoring of brands. 4% neither agreed nor disagreed with the fact that the county drug policy document had to be followed before the selection of the supplier firm of the medical equipment Still on the same issues 44% agreed to the statement that the county drug policy had to be followed before selection of the supplier firms of medical equipment and that they don't see the need of PPB being involved in the matter in the drug policy.

Still on the statement on whether the program have a written policy for monitoring continuity of brands and avoiding unnecessary duplication of interchangeable products 64% of the respondents disagreed with the statement claiming that the county had the written policies in which they use in monitoring the duplication of the interchangeable products whereas 7% of the respondents neither agreed nor disagreed with the fact that the county had the written policies required for monitoring of brands and avoiding unnecessary duplication of interchangeable products 29% of the respondents agreed that the county had looked into the issue and had the written policies that monitor continuity of brands and there is no unnecessary duplication of interchangeable products within the county system.

Whether all the products in the supply chain were being assessed and included on the essential drug list on the statement 79% disagreed with such policy within the county system and said that the products are not assessed and most of the time are not included in the essential drug list statement, 5% neither agreed nor disagreed on the statement as they were not aware of such a thing and if they were aware they didn't know if what was done was the right or the wrong procedure. 16% agreed to the statement and supported the fact that all the products in the supply chain are being assessed and included on the essential drug list statement thus there nothing wrong with the system and the procedures that were being followed.

And on the question of other than the mentioned above statement how else selection support systems viewed as an enabler of universal health coverage and its subsequent effect on UHC implementation majority of the respondent collectively asserts that selection support system needs to be introduced in the hospital facilities as this will enable the choosing of the firms supplying medical equipment to county hospital easy and quality will also be checked with ease.

4.7Procurement support systems as an enabler of universal health coverage implementation

Table 4. 8 Procurement support systems as an enabler of universal health coverage implementation

Statement	1	2	3	4	5
Forecasts are developed using dispensed user data	46%	23%	9%	20%	2%
Forecasts are developed using distribution data	40%	22%	8%	18%	12%
Forecasts are developed using stock on hand at all levels	51%	17%	10%	13%	9%
Forecasts are developed using demographic data/ disease prevalence/ morbidity	49%	19%	11%	10%	11%
Forecasts are developed using service statistics	53%	15%	7%	8%	17%
Forecasts are done by comparing previous estimates with actual consumption	41%	18%	11%	15%	15%
Forecasts are updated at least annually in the procurement support system	50%	12%	10%	20%	8%
Forecasts are prepared on a schedule that coincides with local budgeting and procurement	43%	20%	13%	14%	10%
Short term procurement needs are based on forecasted needs provided by procurement support system	48%	16%	6%	19%	11%
Procurement plans consider have the logistics systems element with current inventory levels	54%	10%	12%	12%	12%
Do the procurement plans consider the following logistics systems element consumption	44%	14%	14%	13%	16%
Do the procurement plans consider the following logistics systems element losses and adjustments	57%	20%	10%	7%	6%
Do the procurement plans consider the following logistics systems element need for safety stock	45%	18%	14%	13%	10%
Is the pipeline status regularly monitored so procurement can be made to avoid stockouts	52%	24%	11%	6%	7%

On the Statement on forecasting using dispensed user data in the procurement support system as an enabler of the universal health coverage implementation 69% of the respondents disagreed to the above mentioned statement and said that there was no such a thing while on the same issue 9% neither agreed or disagreed on the statement while 22% the least of the responded were of a different opinion and agreed with the statement saying that in the procurement support system, forecast are developed using dispensed user data was used in the county system.

With regards to whether forecast are developed using distribution data in the issue of the procurement support system as an enabler of the universal health coverage implementations 62% of the respondents disagreed with the statement and said that there was no such thing in the systems and wanted the same to be implemented, 8% of those whom we talked to didn't have a full opinion of their own as they neither agreed nor disagreed whether the forecast are developed using distribution data. 30% agreed with the statement that forecastsare developed using distribution data.

The respondents were also asked on the issue of whether the Forecast are developed using the stock on hand at all levels within the county procurement system 68% of those whom we asked the within the county said that they disagreed with the statement in that within the county there was no development of forecast using stock on hand at all levels within the county procurement systems,10% neither agreed nor disagreed with the fact that there was development of the forecast using stock on hand while on the other side 22% agreed to the statement that indeed the county systems developed forecast using the stock on hand.

On the other statement that the procurement systems with the county that the forecast are being developed using the demographic data / disease prevalence and morbidity 68% of the respondents strongly disagreed with the statement and said that within the county system there was no such a thing like the procurement support system does not consider demographic data disease prevalence nor morbidity. 11% neither agreed nor disagreed to the statement while the remaining 21% agreed to the statement that the procurement system is developed using the demographic data, disease prevalence and morbidity. They agreed that indeed when the procurement system as an enabler of the universal health coverage implementation develops their forecast they consider the demographic data, disease prevalence and morbidity.

68% of the respondents disagreed to statement that forecast is developed using the service statistics within the county system in the procurement support system as an enabler of the universal health coverage implementation within the county system while 7% of those who responded to our questionnaire neither agreed or disagreed with the forecast being developed using the service statistics. 25% agreed to the fact that the county system considers using the service statistics forecast development.

When we asked on whether the systems develop their forecast by comparing the previous estimates with the actual consumption, 59% of those who responded said that the procurement system as enabler of universal health coverage implementation does not consider the comparison of the previous estimates with the actual consumption. 11% said that they don't agree or disagree with the statement 30% of those who responded said that it is true that the county systems do compare the previous estimates with the actual consumption when they are developing their forecast.

A statement was made on whether the forecast is updated at least annually in the procurement support system within the county universal health coverage implementation and 62% of those who responded disagreed with the fact the procurement systems are updated at least annually to support the system. 10% of our responded neither agreed nor disagreed that the systems are at least updated annually in the procurement support system within the county. 28% agreed that it is true that the system is at least updated annually in the procurement support system thus they are okay with the system.

Forecast are being prepared on a schedule that coincides with the local budgeting and procurement didn't go well with the many of the responds with the county system and they strongly disagreed where 74% said that the they disagreed with the statement that forecast are being prepared on a schedule that coincides with the local budgeting as they said that such procedures are not followed and nothing like that happens within the systems 6% neither agreed nor disagreed to the opinion as they didn't see the need to talk about the matter. 30% which was the remaining responded s said that the agreed that it was indeed true that the forecast are being prepared on a schedule that coincides with the local budgeting and procurement.

On this particular statement that the short-term procurement need is based on the forecast needs provided by the procurement support systems 62% disagreed to

the statement and said that in the procurement support system the short-term need is not based on the forecast needs provided. 6% were of the opinion that they neither agreed nor disagreed with the statement and that the remaining 30% agreed that the short-term procurement needs are based on the forecast need provided by the procurement support systems.

64% of the responded disagreed with the statement that the procurement plans consider the logistics systems elements with the current inventory levels while 12% were neither on agreement or disagreement that the procurement plans take into account the logistics system element with the current inventory level 24% agreed with the statement saying that it was okay, and they concurred the county system on the procurement plans.

On accounts if the procurement plans consider the following logistics system element consumption the statement were made and 58% disagreed to the fact that there is such consideration within the procurement system, 14% neither agreed or disagreed with the procurement plans take into account following logistics system element consumption while 28% agreed to the statement that the procurement plans consider the logistics element of consumption.

The question on whether procurement plans take into account the following logistics systems elements losses and adjustments the statement was that 77% of the responded disagreed with it and said that the county systems thus not take into account the logistic systems elements of losses and adjustment while 10% were neither agreeing or disagreeing with the statement the remaining 13% agreed to the statement and said that the procurement system takes into account the logistics system elements of losses and adjustments.

Many of the responded disagreed to the statement that the procurement plans take into account the element of need and safety stock. The 63% of these disagreeing responded said that the procurement systems do not consider such a thing 14% agreed nor disagreed to the statement while 23% said that the procurement systems put into account the element need for safety stock.

The statement on whether the pipeline status regular monitoring so that the procurement can be made to avoid the stock outs where 76% of the responded disagreed that there was a pipeline status that monitored to ensure that the procurement can be made to avoid the stock outs 11% neither agreed nor disagreed

with the statement while 13% agreed that there was a pipeline status that monitored the procurement so as to avoid the stock outs.

On the statement seeking to enquire whether apart from those mentioned above there is other ways where procurement support systems are being viewed as an enabler of universal health coverage implementation, and majority of the respondents asserts that the health facilities within the counties lack other ways and if there will be more adverse ways they will accept and adopt as first as possible.

4.8Distribution Support systems as an enabler of universal health coverage implementation

To explore more on distribution management support system as enabler of Universal coverage implementation several statements were made, and different reactions were observed

Table 4. 9 Distribution Support systems as an enabler of universal health coverage implementation

Statement	1	2	3	4	5
Are there guidelines and established policies for maximum and minimum stock levels at which full supply product is maintained at the Sub-county level of supply chain	49%	22%	13%	9%	7%
Are there guidelines and established policies for maximum and minimum stock levels at which full supply product is maintained at the service delivery point level of the supply chain	51%	20%	10%	11%	8%
Are there written provisions for the redistribution of overstocked supplies	46%	18%	14%	12%	10%
Does the program have a policy of storing & issuing stock according to first to expire, first out (FEFO) inventory control at all levels	45%	23%	15%	8%	9%
In practice does the program issue stock according to FEFO inventory control procedure	40%	19%	11%	17%	13%
Are damaged/expired products physically separate from inventory and removed from stock	48%	20%	9%	16%	7%

record					
Does the program have a system for tracking product loses and other adjustment	43%	14%	12%	20%	11%
Have stockout occurred for any products in the past 12 months	52%	20%	10%	10%	8%
Are these establishment procedures for placing emergency orders	54%	18%	12%	6%	10%
Does the program have written guidelines for storage and handling of all products at all levels of the system	50%	14%	13%	14%	9%
Are there written guidelines for disposal of sharps biohazards material and other medical wastes	47%	13%	9%	19%	12%
Does the program conduct at least one physical inventory of all product annually at storage facility	55%	13%	11%	11%	10%
Is the existing storage capacity adequate to handle the current quantities	51%	19%	15%	10%	5%
Do written procedures specify what types of distribution system should be used to distribute products between each level	49%	15%	12%	11%	13%
Is there a documented distribution schedule for all levels	47%	13%	10%	18%	12%
Are sufficient number of vehicles available, with petrol and drivers at appropriate levels to meet the desired distribution schedule	42%	17%	13%	15%	13%

On whether there are guidelines and established policies for maximum and minimum stock levels at which full supply product is maintained at the Sub-county level of supply chain majority of the respondents summing up to 71% disagreed with the opinion 13% neither agreed nor disagreed with the opinion. The remaining 16% were of the opinion that there are guidelines and established policies for maximum and minimum stock levels and said that the full supply of the products are maintained at the sub-county level.

On whether there are guidelines and established policies for maximum and minimum stock levels at which full supply product is maintained at the service delivery point level of the supply chain majority of the responded 71% strongly disagreed to the statement and said that the county system does not in any way have the established policies for maximum and minimum stock levels at which full supply levels are maintained at the sub-county level, 10% neither agreed nor disagreed to the statement while the remaining 19% agreed that there were guidelines that established policies that ensured maximum and minimum stock levels at the sub-county.

The statement on whether there are written provisions for the redistribution of overstocked supplies 22% agreed to the statement and said that indeed there were written provisions for the redistributions of overstocked supplies and everything was accounted for in the distribution support system, still on the same statement 14% of the responded were neither agreeing nor disagreeing to the fact that there was such a thing. 64% disagreed with the statement and said that as much as people say that there are written provisions for the redistribution of overstocked supplies nothing of the sort has been implemented.

We also wanted to know if the program have a policy of storing & issuing stock according to first to expire, first out (FEFO) inventory control at all levels within the institution and the responded strongly disagreed with the statement at 68% saying that the program does not have (FEFO) inventory control hence it is very hard for the program to issue stock according to the first or last to expire 15% neither agreed nor disagreed with the statement. 17% agreed to the fact that they said in the cases of storing and issuing of stock according to the first or last to expire the system has the inventory control (FEFO) at all levels.

Having a program that have a policy of storing and issuing stock according to the first to expire and ensuring if the program issue stock according to FEFO inventory control procedure are to different things and an according to the statement that we received 59% of those who responded said that the program does not issue stock according to FEFO inventory control procedures. 11% neither agreed nor disagreed if the right procedures according to FEFO inventory control procedures are being followed 30% agreed that the FEFO inventory control procedures are duly followed in the issuance according to first to expire.

despite the bigger percentage of those who refuted the statement still there was 23% who agreed and said that indeed the program have written guidelines for storage and handling of all the products at all the levels of the system.

Among many institution this has been the main challenge that they must have gone through or they are going through therefore we wanted to know if there are written guidelines for disposal of sharps biohazards material and other medical wastes where to those who responded to our statement 31% agreed that the program was well equipped and had arrangements and good written guidelines for disposal of sharp biohazards material and other medical wastes,9% were of the opinion that they were not sure if the program had put in place such measures whereas the remaining 60% disagreed with the statement and said that the way the disposal of biohazards materials and other medical wastes was still a bigger challenge that a onetime solution needs to be found.

Does the program conduct at least one physical inventory of all product annually at storage facility was the question that was met with mixed reactions as the majority of those who responded who were at 68% strongly disagreed and said that the program does not conduct any physical inventory of all the products annually at storage,11% said they do not know whether such a thing exists within the facility therefore they are neither agreeing nor disagreeing with the statement the remaining 21% agreed to the statement and said that the facility usually conducts the physical inventory on all the products annually therefore it was not a question in doubt.

Having enough facilities is always the best thing as all of your needs heath wise can be covered but again do this enough facilities have the existing storage capacity adequate to handle the current quantities? For this will ensure that the system runs well and whatever is administered is safe, a total of 70% of those whom we talked to disagreed to the above statement and went ahead to say that the enough facilities do not have existing storage capacity to handle the current quantities therefore what is enough is not handled well and thus a threat to health. 15% neither agreed nor disagreed to the statement. 25% agreed and said that the enough facilities are well stored as there is existing storage capacity is enough to handle the current quantities and none is being mishandled.

On whether the written procedures specify what types of distribution system should be used to distribute products between each level 64% disagreed with the statement

and said there are no such written procedures that specify what type of distribution system that should be used to distribute products between each level,12% said that they were neither agreeing nor disagreeing while 24% said that they totally agreed with the fact that the written procedures always gives specification on types of distribution system that should be used to distribute products between each level.

On the statement on whether there is a documented distribution schedule for all levels with the distribution support system 60% of those who responded disagreed to the statement and said that within the system there is no documented distribution schedule for all levels thus a times the distributions made are without documentation 10% neither agreed nor disagreed with the statement on proper documentation while 30% agreed to the statement and said that there is always a documented distribution that is scheduled for all the levels.

On question whether there are sufficient number of vehicles available, with petrol and drivers at appropriate levels to meet the desired distribution schedule on time and when emergency issues arises 59% said that the county system is not well equipped with enough vehicles, petrol and there is shortage of drivers thus in case of an emergency distribution the process would be a failure and a let-down to those who would require the services. 13% said that they can agree or disagree if the system is well equipped to meet the desired distribution,28% agreed that it is true the county system is well equipped with enough vehicles, petrol and more than enough that would be on time to meet the desired distribution schedule and in case of an emergency.

Apart from those mentioned above how else does Distribution Support systems viewed as an enabler of universal health coverage implementation and explain why, majority of the respondents were on the opinion that distribution support system is the blood life of the organization and for the quick distribution of the facilities in the hospital and the system needs to modify to monitor all the process and ensures timely supply of the facilities

4.9Utility support systems as an enabler of universal health coverage implementation

Table 4.10 Utility support as an enabler of Universal health Coverage

Statement	1	2	3	4	5
Do written standard treatment guidelines existing for conditions existing for conditions that use commodities in the supply being assessed	41%	26%	10%	14%	10%
Are there written procedures for monitoring and supervising prescribing practices	49%	22%	13%	9%	7%
Are the written procedures distributed to service providers at all levels	50%	20%	11%	10%	9%
Are prescribing practices monitored and compared to standard treatment guidelines	43%	19%	14%	11%	13%

In any running system that is a success we also wanted to know if there written standard treatment guidelines existing for conditions that use commodities in the supply being assessed and the majority at 67% of those whom responded disagreed to the statement that there were written standards treatment guidelines existing for conditions that use commodities in the supply 10% said they were neither agreeing or disagreeing to the statement while 24% agreed and said that the guidelines exists for conditions that use commodities in the supply that is being assessed .

Are there written procedures for monitoring and supervising prescribing practices within the institution or the prescribing are done without following the written procedures for prescription. 71% disagreed to the statement that there were procedures for monitoring and supervising the prescribed practices as 13% agreed nor disagreed to the statement as the remaining 16% agreed that there were procedures for monitoring and supervising prescribing practices within the institution and due process was being followed.

On whether the written procedures distributed to service providers at all levels within the institution the responded at 70% disagreed to the statement and said that the there

are no written procedure distributed to service providers at all levels within the institution therefore there are chances that most of the distributions are made without following the due procedures, 11% neither agreed nor disagreed to the statement whereas 19% agreed that there are always written procedures distributed to service providers at all levels.

On the question whether the prescribing practices are monitored and compared to standard treatment guidelines 24% agreed to it and said that its true the prescribing practices are monitored and compared to the standard treatment guidelines,14% neither agreed nor disagreed to the statement as they didn't see any issue with whether the prescribed practices were monitored and compared to standard treatment guidelines.72% disagreed to the statement and said that the due process was not followed in and there was not monitoring and comparing the prescribed practices according to the treatment guidelines

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary, conclusion and recommendations of the study. The aim of these conclusions is to answer the research questions, and recommendations are for improvement, then suggestions for the future study are presented. The main purpose of the studywas to establish the influence of pharmaceutical logistics management information systems as an enabler of universal health coverage implementation in Nyamira County.

5.2 Summary

5.2.1 Selection support systems

the statements relates to the selection supports system and ensuring the quality of the product to be selected, quantity of the product to be selected and the need of the product to be selected and to explore more on it the county drug policy document was seen as a very important document to be followed before selection of the supplier firms of medical equipment though majority of the respondents disagreed with the fact that there is a county drug policy for monitoring continuity of brands and assert that it is upon the PPB to come up with such policies relating to monitoring of brands. Majority asserts that County is having the written policies in which they use in monitoring the duplication of the interchangeable products and on the statement of whether all the products in the supply chain are being assessed and included on the essential drug list on the statement majority of the respondents disagreed stressing that the products are not assessed and most of the time are not included in the essential drug list and further recommends that selection support system needs to be introduced in the hospital facilities as this will enable the choosing of products and the firms supplying medical equipment to county hospital easy and quality will also be checked with ease.

5.2.2 Procurement support systems

On procurement support system, the system was discussed to check whether it accommodates the element of planning in terms of budget and supply planning and several statements were made and the reactions were procurement support system was seen as an enabler of the universal health coverage implementation majority of the respondents gave their different opinions on the different issues that were raised in the county systems so as to find clear answers and to find the way forward and on

Forecast and developed using dispensed user data in the procurement support system as an enabler of the universal health coverage implementation majority disagreed to the above mentioned statement and said that there was no such a thing while on the same issue recommends that forecast should be developed using dispensed user data was used in the county system, majority of the respondents disagreed that forecast are developed using distribution data in the issue of the procurement support system and are not even aware of forecast being done using distribution data.

The respondents were also asked on the issue of whether the Forecast are developed using the stock on hand at all levels within the county procurement system majority of the respondents within the county said that they disagreed with the statement and asserts that within the county there was no development of forecast using stock on hand at all levels within the county procurement systems and later asserts that procurement systems with the county that the forecast are being developed using the demographic data / disease prevalence and morbidity there was no such a thing like the procurement support system considering demographic data disease prevalence nor morbidity and on the statement that forecast are developed using the service statistics within the county system in the procurement support system majority of the respondents disagreed. A statement was also made on whether the forecast is updated at least annually in the procurement support system within the county universal health coverage implementation and the response was that yes there is but not properly done.

Forecast are being prepared on a schedule that coincides with the local budgeting and procurement didn't go well with the many of the responds with the county system and they strongly disagreed where majority that forecast are being prepared on a schedule that coincides with the local budgeting and realize that short term procurement need are not based on the forecast needs provided by the procurement support systems and further asserts that the procurement plans does not take into account the logistics systems elements with the current inventory levels and on the enquiry of whether the pipeline status regular monitoring so that the procurement can be made to avoid the stock outs majority of the respondents disagreed and whether procurement support systems are being viewed as an enabler of universal health coverage implementation, and majority of the respondents asserts that the

health facilities within the counties lack other ways and if there will be more adverse ways they will accept and adopt as first as possible.

5.2.3 Distribution Support systems

Several statements were asked on distribution support systemin exploration of transportation modes and route planning where guidelines and established policies were also checked to aid in ensuring maximum sock level controls and reduction of minimum stock levels at which full supply product is maintained at the Sub-county level of supply chain majority of the respondents assert that there is no system in place to monitor this. On whether there are guidelines and established policies for maximum and minimum stock levels at which full supply product is maintained at the service delivery point level of the supply chain majority of the respondents disagreed to the statement and said that the county system does not in any way have the established policies for maximum and minimum stock levels at which full supply levels are maintained and on whether there are written provisions for the redistribution of overstocked supplies majority disagreed with the statement and said that as much as people say that there are written provisions for the redistribution of overstocked supplies nothing of the sort has been implemented and suggest a program accommodating policy of storing & issuing stock according to first to expire, first out (FEFO) inventory control at all levels within the institution.

On whether the damaged/expired products are physically separate from inventory and removed from stock record stock majority agreed that the damaged expired products are physically separated from the inventory and removed from the stock record, but no system developed in aid of the separation.

5.2.4 Utility support systems

In any running system that is a success there must be an intended purpose to be achieved therefore the utility support system should be in place for the manage the use of inventory and ensure waste reduction hence more enquiries have been made to explain it. for the statement of whether written standard treatment guidelines existing for conditions that use commodities in the supply being assessed and the majority at majority of the respondents disagreed claiming that written standards treatment guidelines does not exist for conditions that use commodities in the supply further asserts that written procedures for monitoring and supervising prescribing practices within the institution or the prescribing are done without following the written procedures for prescription.

On the question of whether the prescribing practices are monitored and compared to standard treatment for the achievement of proper utility of the medical facilities majority of the respondents disagreed asserting that the due process normally not followed, no monitoring and comparing the prescribed practices according to the treatment guidelines for the full utilization of the facilities.

5.3 Conclusions

5.3.1 Selection support systems

There is no proper selection supports system that ensures the high quality product selection, appropriate quantity of the product to be selected and the need satisfaction of the product also the County drug policy document are not being used irrespective of being a very important document to be followed before selection of the supplier firms of medical equipment County is also having the written policies in which they use in monitoring the duplication of the interchangeable products but the medical practitioners are not using it effectively. Also, the essential drug list of the products is not assessed and most of the time are not included in the essential drug list which should be done in a proper selection support system introduced in the hospital facilities as this will enable the choosing of the products and firms supplying medical equipment to county hospital easy and quality will also be checked with ease.

5.3.2 Procurement support systems

On procurement support system, the system was discussed to check whether it accommodates the element of planning in terms of budget and supply planning though the one in place is not that effective in the County, forecast and development a system using dispensed user data in the procurement support system in universal health coverage is not effective. Medical practitioners are even not aware of distribution data in the issue of the procurement support system and are not even aware of forecast being done using distribution data.

For the forecast developed using the stock on hand within the county procurement system is not there which allow forecast being developed using the demographic data / disease prevalence and morbidity lastly though forecast is updated at least annually in the procurement support system within the county universal health coverage it is not properly done.

Forecast should be prepared on a schedule yes, it is prepared, the process coincides with the local budgeting and procurement which normally don't go well, and short-

term procurement need are not based on the forecast needs provided by the procurement support systems

5.3.3 Distribution Support systems

On distribution support system being a system that ensures transportation modes and route planning with guidelines and established policies to aid in ensuring maximum sock level controls and reduction of minimum stock levels at which full supply product is maintained at the Sub-county level of supply chain from majority of the respondents it is still lacking, guidelines and established policies for maximum and minimum stock levels at which full supply product is maintained at the service delivery point level of the supply does not in any way have established policies for maximum and minimum stock levels at which full supply levels are maintained, there is no written provisions for the redistribution of overstocked supplies and a program accommodating policy of storing & issuing stock according to first to expire, first out (FEFO) inventory control at all levels within the institution is also not effectively in use. Damaged/expired products are physically separate from inventory and removed from stock record stock.

5.3.4 Utility support systems

On Utility support system that is in place to manage the use of inventory and ensure waste reduction is not efficient, written standard treatment guidelines existing for conditions that use commodities in the supply being assessed does not exist for conditions that use commodities in the supply further written procedures for monitoring and supervising prescribing practices within the institution or the prescribing are done without following the written procedures for prescription.

There are no prescribing practices for monitoring and for comparing to standard treatment for the achievement of proper utility of the medical facilities, hence, no monitoring and comparing the prescribed practices according to the treatment guidelines for the full utilization of the facilities.

5.4 Recommendations

5.4.1 Selection support system

The study recommends that selection supports system should ensures the choice of high quality product selection, appropriate quantity of the product to be selected and the need satisfaction of the product also the County drug policy document should be adhered to since irrespective of being a very important document to be followed before selection of the supplier firms of medical equipment

County is also having the written policies in which they use in monitoring the duplication of the interchangeable products and medical practitioners should be train for the effectively use the system. also, the essential drug list of the products should be assessed and most of the time and be included in the essential drug list which should in a proper selection support system introduced in the hospital facilities for this will enable the choosing of the firms supplying medical equipment to county hospital easy and quality will also be checked with ease.

5.4.2 Procurement support systems

The study recommends that there should be a procurement support system for checking element of planning in terms of budget and supply planning and it should also be effective in the County, forecast and development a system using dispensed user data in the procurement support system in universal health coverage should also be effective. Medical practitioners should be trained on benefits of distribution data in the issue of the procurement support system for the forecast developed using the stock on hand within the county procurement system there should be a system which allow forecast being developed using the demographic data / disease prevalence and morbidity lastly forecast should be updated at least annually in the procurement support system within the county universal health coverage and be prepared on a schedule

5.4.3 Distribution Support systems

The study recommends that there should be a distribution support system that ensures transportation modes and route planning with guidelines and established policies to aid in ensuring maximum sock level controls and reduction of minimum stock levels at which full supply product is maintained at the Sub-county level of supply chain from majority of the respondents, guidelines and established policies for maximum and minimum stock levels at which full supply product is maintained at the service delivery point level of the supply should established policies for maximum and minimum stock levels at which full supply levels are maintained, there should be a written provisions for the redistribution of overstocked supplies and a program accommodating policy of storing & issuing stock according to first to expire, first out (FEFO) inventory control at all levels within the institution and should be effectively in use. Damaged/expired products should not be physically separate from inventory and removed from stock record stock but there should use a system.

5.4.4 Utility support systems

The study recommends that Utility support system that is in place to manage the use of inventory and ensure waste reduction should be efficient, written standard treatment guidelines existing for conditions that use commodities in the supply being assessed should be there for conditions that use commodities in the supply further written procedures for monitoring and supervising prescribing practices within the institution or the prescribing are should be done in line with written procedures for prescription.

There should be a prescribing practices for monitoring and for comparing to standard treatment for the achievement of proper utility of the medical facilities, monitoring and comparing the prescribed practices according to the treatment guidelines for the full utilization of the facilities should be done using the utility support system in place.

5.5 Suggestions for further Research

Finally, the study recommends for further studies on influence of pharmaceutical logistics management information systems on the performance of public hospital in Kenya. This will help give a holistic idea on the causes of logistic management process delays that could be due to the use of substandard systems used in record keeping, material handling and Distribution or could be due to the use of poorly trained medical professionals.

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ANNEXES

ANNEX 1: Questionnaire

Questionnaire on the influence of a pharmaceutical logistics management information system as an enabler of universal health coverage

The survey will beadministered to Pharmacy Personnel, Nurses and clinicians who help manage thePharmaceutical products. The survey will beused to address research questions 1,2,3 and 4.

Background:

The hospitals, health centres and dispensaries in Nyamira County can be considered as microcosm of the larger health system in the county, sharing many of the same problems and concerns. The flow, quality and quantity of information available in these facilities are vital aspects of a drug management information system, the LMIS, in the county, and they can only be as strong as its weakest components. The following tool will be used to evaluate performance of the LMIS in this facilities.

SECTION A: BIODATA

1. Name of facility..... .....
2. Level of facility.....
3. Date.....
4. Cadre.....
5. Gender, male { } Female { }
6. How long have you worked in the organization?
   a) 1-2years { }
   b) 2-4years { }
   c) 5 – 10 years { }
   d) Over10years { }
7. What is your academic level?
   a) College { }
   b) Degree { }
   c) Masters { }

b) Are forecasts developed using distribution data
c) Are forecasts developed using stock on hand at all levels
d) Are forecasts developed using demographic data/ disease prevalence/ morbidity
e) Are forecasts developed using service statistics
f) Are forecasts done by comparing previous estimates with actual consumption
g) Are forecasts updated at least annually
h) Are forecasts prepared on a schedule that coincides with local budgeting and procurement
i) Are short term procurement needs based on forecasted needs
j) Do the procurement plans consider the following logistics systems element current inventory levels
k) Do the procurement plans take into account the , following logistics systems element consumption
l) Do the procurement plans consider the following logistics systems element losses and adjustments
m) Do the procurement plans consider the following logistics systems element need for safety stock
n) Is the pipeline status regularly monitored so procurement can be made to avoid stockouts

2. Apart from those mentioned above how else does **Procurement support systems viewed as an enabler of universal health coverage implementation**?

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Section III: Distribution Support systems as an enabler of universal health coverage implementation

1. Please indicate your level of agreement with the statements relating to **Distribution Support systems as an enabler of universal health coverage implementation**.

Statement	**1**	**2**	**3**	**4**	**5**
a) Are there guidelines and established policies for maximum and minimum stock levels at which full supply product is maintained at the Sub-county level of supply chain					
b) Are there guidelines and established policies for maximum and minimum stock levels at which full supply product is maintained at the service delivery point level of the supply chain					
c) Are there written provisions for the redistribution of overstocked supplies					
d) Does the program have a policy of storing & issuing stock according to first to expire, first out (FEFO) inventory control at all levels					
e) In practice does the program issue stock according to FEFO inventory control procedure					
f) Are damaged/expired products physically separate from inventory and removed from stock record					
g) Does the program have a system for tracking product loses and other adjustment					
h) Have stockout occurred for any products in the past 12 months					
i) Are these establishment procedure for placing emergency orders					
j) Does the program have written guidelines for storage and handling of all products at all levels of the system					
k) Are there written guidelines for disposal of sharps					

biohazards material and other medical wastes

l) Does the program conduct at least one physical inventory of all product annually at storage facility
m) Is the existing storage capacity adequate to handle the current quantities
n) Do written procedures specify what types of distribution system should be used to distribute products between each level
o) Is there a documented distribution schedule for all levels
p) Are sufficient number of vehicles available, with petrol and drivers at appropriate levels to meet the desired distribution schedule

2. Apart from those mentioned above how else does **Distribution Support systems viewed as an enabler of universal health coverage implementation and explain why?**

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Section IV Utility support systems as an enabler of universal health coverage implementation

1. Please indicate your level of agreement with the statements relating to employee relation as indicated below.

Statement	**1**	**2**	**3**	**4**	**5**
a) Do written standard treatment guidelines existing for conditions existing for conditions that use commodities in the supply being assessed					

g) Are there written procedures for monitoring and supervising prescribing practices

m) Are the written procedures distributed to service providers at all levels

s) Are prescribing practices monitored and compared to standard treatment guidelines

2. Apart from those mentioned above how else does **Utility support systems serves as an enabler of universal health coverage implementation**?

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Thank you for your time

ANNEX 2: Participant Information And Consent From

Study Title: Design and Piloting ofa County Pharmaceutical Logistics Management Information System as An Enabler of Universal Health Coverage Implementation: -A Feasibility Study in Nyamira County

SECTION 1: Information Sheet–Health Personnel

Investigator: Dr. Wando Stephen Odhiambo

Institutional affiliation: Strathmore Business School (SBS)

SECTION 2: Information Sheet–The Study

2.1: Why is this study being carried out?

This study is being carried out because access to quality pharmaceuticals is one key factor to successful implementation of UHC and by establishing the influence of pharmaceutical logistics management information systems as an enabler of universal health coverage implementation in Nyamira County the quality of the pharmaceuticals will be achieved.To that end development and implementation of a LMIS is key to ensuring access to quality medicine. While there are plans to roll out UHC in all the 47 counties in Kenya, there are no functional LMIS in all the Counties to ensure access to quality medicines. The results from this study will help Nyamira County to improve supply of essential medicines to support delivery of quality essential health services under the UHC programme.

2.2: Do I have to take part?

No. Taking part in this study is entirely optional and the decision rests only with you. If you decide to take part, you will be interviewed to get information on Logistics Management Information System(LMIS). If you are not able to answer all the questions successfully the first time, you may be asked to sit through another informational session after which you may be asked to answer the questions a second time. You are free to decline to take part in the study from this study at any time without giving any reasons.

2.3: Who is eligible to take part in this study?

- Pharmacy personnel and nurses who manage the pharmaceutical supply chain in different facility levels in the county.

- Staff at county level involved in decision making concerning pharmaceutical products

2.4: Who is not eligible to take part in this study?

- Staff who have not worked in their facility for more than a year
- People not involved in procurement, budgetary allocation and decision-making Staff at county level who have not held their position for more than a year

2.5: What will taking part in this study involve for me?

You will be approached and requested to take part in the study. If you are satisfied that you fully understand the goals behind this study, you will be asked to sign the informed consent form (this form) and then taken through an interview.

2.6: Are there any risks or dangers in taking part in this study?

There are no risks in taking part in this study. All the information you provide will be treated as confidential and will not be used in any way without your express permission.

2.7: Are there any benefits of taking part in this study?

The information will be used to improve access to medicines by patients in the county and by so doing, improve access to quality health services under UHC.

2.8: What will happen to me if I refuse to take part in this study?

Participation in this study is entirely voluntary. Even if you decide to take part at first but later change your mind, you are free to withdraw at any time without explanation.

2.9: Who will have access to my information during this research?

All research records will be stored in securely locked cabinets. That information may be transcribed into our database, but this will be sufficiently encrypted, and password protected. Only the people who are closely concerned with this study will have access to your information. All your information will be kept confidential.

2.10: Who can I contact in case I have further questions?

You can contact me, Wando Stephen, at SBS, or by e-mail (steve_wando@yahoo.com), or by phone (0714789225). You can also contact my supervisor, Prof. Gilbert Kokwaro, at the Strathmore Business School, Nairobi, or by e-mail (gkokwaro@strathmore.edu) or by phone (0722323651)

I, _____, have had the study explained to me. I have understood all that I have read and have had explained to me and had my questions answered satisfactorily. I understand that I can change my mind at any stage.

Please tick the boxes that apply to you;

Participation in the research study

☐ I AGREE to take part in this research

☐ I DO NOT AGREE to take part in this research

Storage of information on the completed interview guide

☐ I AGREE to have my completed interview stored for future data analysis

☐ I DO NOT AGREE to have my interview stored for future data analysis

Participant's Signature:

_____

Date: _____/_____/_____

DD / MM / YEAR

Participant's Name:

_____

Time: _____ /_____

(Please print name) *HR / MN*

I, _____ (Name of person taking consent) certify that I have followed the SOP for this study and have explained the study information to the study participant named above, and that she has understood the nature and the purpose of the study and consents to the participation in the study. She has been given opportunity to ask questions which have been answered satisfactorily.

Investigator's Signature:

_____

Date: _____/_____/_____

DD / MM / YEAR

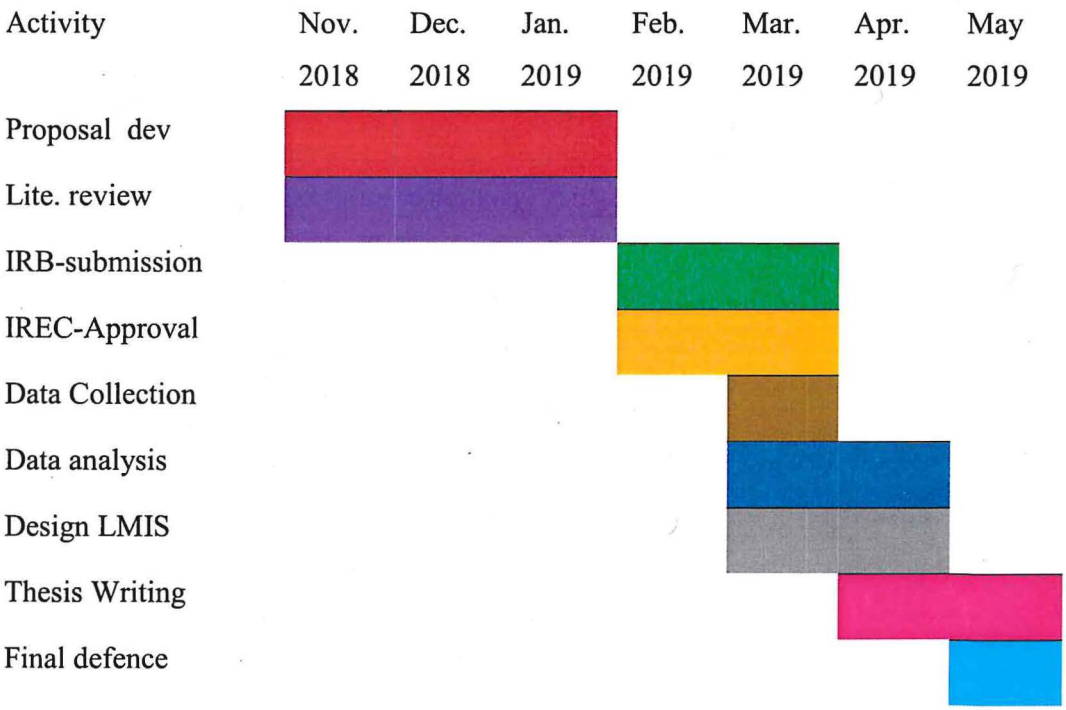
Investigator's Name:

_____

Time: _____ /_____

(Please print name) *HR / MN*

ANNEX 3: Study Timeline



ANNEX 4: Approval from Strathmore University institutional Ethics Review Committee

Strathmore UNIVERSITY

1st April 2019

Wando, Stephen Odhiambo
P.O BOX 3,
Nyamira.
steve_wando@gmail.com

Dear Stephen,

REF **Protocol ID:** SU-IERC0333/19

DESIGN AND PILOTING OF A COUNTY PHARMACEUTICAL LOGISTICS MANAGEMENT INFORMATION SYSTEM AS AN ENABLER OF UNIVERSAL HEALTH COVERAGE IMPLEMENTATION: -A FEASIBILITY STUDY IN NYAMIRA COUNTY

We acknowledge receipt of your application documents to the Strathmore University Institutional Ethics Review Committee (SU-IERC) which includes:

1. Study Protocol submitted 25 March 2019
2. Cover letter listing all submitted documents 25 March 2019
3. Proposal declaration page signed by supervisors 25 March 2019

The committee has reviewed your application, and your study "DESIGN AND PILOTING OF A COUNTY PHARMACEUTICAL LOGISTICS MANAGEMENT INFORMATION SYSTEM AS AN ENABLER OF UNIVERSAL HEALTH COVERAGE IMPLEMENTATION: -A FEASIBILITY STUDY IN NYAMIRA COUNTY." has been granted approval.

This approval is valid for one year beginning ***1st April 2019*** until ***1st April 2020***

In case the study extends beyond one year, you are required to seek an extension of the Ethics approval prior to its expiry. You are required to submit any proposed changes to this proposal to SU-IERC for review and approval prior to implementation of any change.

SU-IERC should be notified when your study is completed.

Thank you

Sincerely,

STRATHMORE UNIVERSITY INSTITUTIONAL ETHICS REVIEW COMMITTEE (SU-IERC) 2019 TEL: +254 (0)703 034 000 P. O. Box 59857 - 00200 NAIROBI - KENYA

Prof. Florence Oloo
Secretary
Strathmore University Institutional Ethics Review Committee

ANNEX 5: NACOSTI PERMIT

THIS IS TO CERTIFY THAT:
DR. STEPHEN ODHIAMBO WANDO
of STRATHMORE UNIVERSITY,
54206-200 NAIROBI,has been permitted
to conduct research in *Nyamira* County
on the topic: *DESIGN AND PILOTING OF A COUNTY PHARMACEUTICAL LOGISTICS MANAGEMENT INFORMATION SYSTEM AS AN ENABLER OF UNIVERSAL HEALTH COVERAGE IMPLEMENTATION: A FEASIBILITY STUDY IN NYAMIRA COUNTY*
for the period ending:
23rd April,2020

Permit No. : NACOSTI/P/19/27730/29366
Date Of Issue : 23rd April,2019.
Fee Recieved :Ksh 1000

Applicant's Signature

Director General
National Commission for Science, Technology & Innovation