INTEGRATION OF SUPPLY CHAIN SYSTEMS AND HEALTHCARE PERFORMANCE: A CASE OF AFYA UGAVI PROJECT, MIGORI COUNTY, KENYA

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A Research Project Report Submitted in Partial Fulfilment of the Requirements for the Award of the Degree of Master of Arts in Project Planning and Management of the University of Nairobi

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DECLARATION

This research project report is my original work and has not been submitted for award of a degree in any other university.

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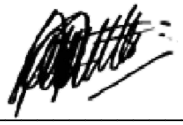
Signature:  Date 9th December 2022

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DEDICATION

This research project report is dedicated to my family members; my wife Rachel and children Fidel, Alvin & Theo for their patience, understanding and moral support during the period of my research writing.

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ABSTRACT

Integration of Supply Chain Systems improves Supply Chain Performance ensuring commodity security. Effective Health Supply Chains are critical in provision of health services therefore improving Healthcare Performance. Kenyan public hospitals have employed parallel vertical Health Supply Chain Systems over a very long period which have been experiencing many challenges leading to disruptions in the Supply Chain. Consequently, many hospitals have faced high stock out rates, uncoordinated procurement of health commodities in most of the counties, poor or incomplete data for decision making and lack of basic commodity management training among staff manning supply chain activities. The aim of the research was to determine the influence of Integration of Supply Chain Systems on Healthcare performance in Migori County, Kenya. This study was guided by four research objectives as follows: integration of Inventory Management Systems, integration of Quantification Systems, integration of Logistics Management Information Systems and integration of Human Resource Management (HRM) Systems. The research design for this study was descriptive survey. The study focused on 23 hospitals where the sample size was 275 respondents comprising of 133 supply chain managers, 142 key interview informants. A questionnaire and interview schedule were used for data collection. Statistical Package for Social Science was employed in data analysis. The results established that even though integration of all the four systems of health supply chain have a positive effect on healthcare performance, only Logistics Management Information Systems ($\beta = 0.392$; P-Value < 0.05) and HRM Systems ($\beta = 0.321$; P-Value < 0.05) have a significant effect on healthcare performance. On the contrary, integration of Inventory Management Systems ($\beta = 0.071$; P-Value > 0.05) and integration of Quantification Systems ($\beta = 0.059$; P-Value > 0.05) have an insignificant effect. This therefore leads to the conclusion that enhancing integration of HRM systems through practices such as skills development, supportive supervision and performance review can remarkably enhance healthcare performance. The study also concludes that strengthening logistics management information systems by putting in place practices aimed at ensuring availability of data, timeliness and data completeness can significantly improve healthcare performance. The study recommends to the respective managers of the hospitals to invest in practices that ensure there is good integration of inventory management systems by stocking according to plan, ensuing accuracy in stock transactions and having systems to detect early stockout rates. The study also recommends a keen and dedicated focus towards enhanced investment in integration of quantification systems. Specifically, there is a need to invest in practices such as using modern forecasting tools, resource mobilization and minimization of forecasting error by improving the quality of data used for quantification.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Supply Chain Integration (SCI) that deal with strategic alignment of roles and systems within a company has become a major area of focus over the years (Kumar, Chibuzo, Garza-Reyes, Kumari, Rocha-Lona & Lopez-Torres, 2017). According to Singh, Sohani and Marmat (2018) SCI is nowadays regarded to be of high value by both researchers and practitioners and has come out wholly as a major theme in the Supply Chain Management (SCM). Logistics network integration involves creating systematic transmission of information and products that assist companies in creating seamless procedures across the entire supply chain (Ataseven & Nair, 2017). Today, SCI is considered as a competitive strategy in the business world (Li & Chen, 2017). It is viewed as a major factor influencing supply logistics performance (Singh et al., 2018). Supply Chain Integration as a concept is interested in internal processes of an organization and its outside activities that improve the firm's performance (Kumar et al., 2017). Companies are thought to embrace integration in order to gain benefits like increased quality, lower manufacturing costs, improved logistics effeciency and strategic edge over rivals (Investopedia, 2015).

Supply Chain Management is a renowned discipline and most industries have realized competitive edge via SCI in comparison to the public health logistics networks which are still highly segmented and complex with no efficiency and effectiveness for many years (Landry, Bealieu & Roy, 2016). As a result, fragile and unreliable logistics chains continue to serve patients in undeveloped nations risking the service delivery and compromising the responsiveness of the entire health system to healthcare requirements of the populace (Gallien, Rashkova, Atun & Yadav, 2017). Many under-developed and undeveloped countries that are experiencing major demographic, epidemiologic and financial changes are now recognizing the importance of investing in strengthening their medical supply chains. Additionally, increasing presence of substandard and poor-quality medicines have cemented the need to improve supply chains systems (Nayyar, Breman, Mackey, Clark, Hajjou, Littrell & Herrington, 2019).

Globally, in Nicaragua, supply chain integration involved improvement of the forecasting, supply planning and procurement systems, strengthening the Logistics Management and Information

Systems (LMIS) to enable end to end data visibility, and capacity building of the supply chain managers to oversee these integrated systems. These has led to an effective logistics system which is a pillar in realizing the government's objectives of delivering quality health care to its people (United States Agency for International Development, USAID, 2017). Another study conducted in Philippines on 57 manufacturers and service providers, affirmed the presence of key relationship between SCI and productivity especially where supply chain actors integrated information sharing and collective decision making (Talavera, 2020). Nguyen, Doan and Phan (2020) on their study of 536 textile & garment industries in Vietnam showed that SCI had a full mediating role in the linkage between Supply Network Management Performance and Supply Chain Performance (SCP).

Regionally, research carried out by Som, Cobblah and Anyigba (2019) in Ghana established that integrating information and operations systems in supply chain improved SCP. On the other hand, relationship integration decreased the logistics performance especially if there was lack of commitment and trust. Another study carried out in Guateng Province of South Africa had consistent findings (Mofokeng & Chimona, 2019). SCI showed a major influence on Small and Medium Enterprise's (SME) Supply Chain Performance while both supply chain partnerships and collaborations had little influence on the SCP. This study was limited to SMEs in Ghana. In East Africa, Tanzania integrated Logistics Management Information Systems and Inventory Management Systems in Supply Chain which has contributed to smooth reporting, ordering and distribution processes, improved workforce productivity as well as supply chain data visibility for better planning (USAID, 2016). The net effect is a well-functioning supply chain which responds timely to the needs of the patients.

Locally, Migori County has integrated its health Supply Chain Systems through the support of Afya Ugavi a USAID funded project with the mandate of strengthening SCS in Kenya. Through the support of Afya Ugavi, the county established and operationalized Commodity Security Technical Working Groups (CS TWG) both at the county and sub county level. The project supported the county to bring together all the Supply Chain Implementing Partners to carry out joint Quantification, integrated Supportive Supervision Visits and Supply Chain Audits, integrated Data Review Meetings, and an integrated approach on Commodity Data Reporting and Human Resource Management (Kiarie, Gitonga & Kiongo, 2019).

1.1.1 Healthcare Performance

Healthcare Outcomes irrespective of one's specialty are broadly focused on the improvement of patient quality of life (Karen, Christopher & Richard, 2020). Pantaleon (2019) termed Healthcare Outcomes as patients' wellbeing over time. Healthcare outcomes are those indicators that are related to crude rates of health problems in the population and give an indication of the size of the health event while healthcare performance indicators are related to those aspects of care which can be influenced by the caregivers (Porter & Larsson, 2016). Despite the difficulty in measuring specific elements of healthcare outcomes, an improvement of patient centered care approaches has been proven to translate to an overall improvement in quality, safety and patient satisfaction (Singh, Rohit & Srivastara, 2020). Patient contentment, quality of care and use of capital efficiently provides evidence-based measurements for patient, caregivers and organizational performance (Cowing, Davino-Ramaya, Ramaya, & Szmerekovsky, 2019).

The quality of healthcare depends on resources. This calls for effective management of the existing resources and the ability to source for more to provide high quality services effectively and efficiently. Supply Chain Management (SCM) which directly manages supplies, data and resources among the SC players with the view of satisfying client's needs, offers an opportunity for improvement (Chopra & Meindl, 2016). Ineffective supply chain systems may lead to huge monetary losses, stock outs of Essential Medicines and Medical Supplies (EMMS), elevated expiry rates, increased drug treatment failure and poor health outcomes (Kamba, 2017). Well-functioning SCS influence the performance of any public medical program since they enhance quality of care, improve cost effectiveness and efficiency (John Snow Incorporation, 2017). Integration is key in building sustainable Supply Chain Systems (SCS) and managing them effectively and efficiently as supported by various studies. Core to integration of SCS is the desire to increase efficiency, reduce redundancy while also enhancing product availability (Altekar, 2016).

In Nepal, Supply Chain Integration (SCI) led to reduction in stock out rates, improved products availability, and reduced drug wastage. The uninterrupted supply of health commodities had a positive impact on health service delivery which improved health indicators and contributed to Nepal's acknowledgement as a hallmark in effective health supply chain integration (USAID, 2015b). Regionally, a study carried out in public health facilities in Zambia determined that improving supply chain performance reduced stock out rates, enhanced access to medicines

through improved availability and had an overall positive impact on healthcare performance (Vledder, Friedman, Sjöblom, Brown, & Yadav, 2019).

1.1.2 Integration of Inventory Management Systems and Healthcare Performance

Inventory management takes up a big chunk of an organizations budget (Ofori, Boison, Asiedu & Afrifah, 2019). Stock control must be executed properly if an enterprise is to achieve constructive impact on its performance. A robust inventory management system provides end to end data visibility which guarantees superior services to customers due to data accuracy. It is crucial for stock management systems to provide accurate, complete, and timely data to supply chain managers for decision making in order to save on cost and manage the supply chain properly (Mathaba, Dlodlo, Smith & Adigun, 2017). Efficient stock management increases overall gains and net income through minimizing the value of inventory plus related running costs such as. Additionally, lean inventory improves cash flow since storage charges are reduced and the savings can be directed to other expenses and expansion of services (Hidayat & Saleh, 2020). Furthermore, integration of inventory management ensures availability of health products and technologies, minimizes wastage due to expiry of inventory and pilferage. It also guarantees patient safety by ensuring there is procurement of quality products and drug formularies are regularly updated.

Globally, research carried out in Textile industries across the globe by Khurshid and Numaria (2022) established that Stock Control still remained a major challenge and a lot of focus was put in ensuring firms were stocked according to avoid stock outs. In the region, Elsayed (2015) noted there was a positive relationship between inventory control efficiency and company's productivity from empirical research on Egyptian companies. In another study, Adegbie, Nwaobia, Ogundajo and Olunuga (2020) found out that stock management systems critically impacted on economic outcome of large firms in Nigeria. Regionally, research carried out on four Ghanaian manufacturing companies found out that efficient stock control had a positive effect on firm's performance (Khadwo, 2016). Locally, a study on stock control and company's economic outcome on a few production companies in Kenya found out that there was a great influence of stock control on the company's economic outcome (Kilonzo, Memba & Njeru, 2016).

1.1.3 Integration of Quantification Systems and Healthcare Performance

The Global Supply Chain Forum noted quantification as one of the eight major enterprise systems involved in SCM functions in an organization. It is the primary stage of quantification that prioritize client's fulfillment through the resilient and robust supply networks. Forecasting has the effect of satisfying the consumer's needs, minimizing risks and determining supply chain systems (Croxton, Sebastian, Garcia & Lambert, 2016). Olankule (2015) noted that better estimation precision can result in considerable cost reduction, improved client/vendor associations and decrease in stock out rates thereby enhancing consumer contentment which is the major focus of successful stock control systems.

Globally, research carried out in Bangladesh on cement company determined that forecasting tools if properly implemented reduced inventory costs several folds (Kibria, Khan, Malek & Biswas, 2019). Regionally, a study on identified production companied in Nigeria to determine the relationship between forecasting and supply planning on customer satisfaction noted that there was a constructive correlation between quantification management systems and client contentment in the companies studied (Agu, Ozioma, Anike & Nnate, 2016). Locally, Onchoke and Wanyoike (2016) studied on the effect of procurement management on firm"s accomplishment on agrichemical suppliers in Nakuru Central Subcounty. The result showed that use of proper forecasting tools and mainstream suppliers improved returns on investment. Additionally, Ochelle, Muturi and Atambo (2017) looked at the role of procurement process in Kenya's Western region sugar companies. The paper focused on lean stock system, Just in Time, use of innovation in stock control and vendor relationship and company financial performance. The result was consistent with similar studies that integration of quantification systems improved firm's performance.

1.1.4 Integration of Logistics Management Information Systems and Healthcare Performance

Logistics Management Information System (LMIS) is key over all supply network tiers hence it influences program performance since it determines product availability which in turn impacts on medical attention of the population, improves healthcare quality and leads to professional fulfillment on the part of the staff. Inspired workers are bound to offer better services and improve productivity (Kumurya, 2015). Creating and running a HMIS/LMIS integration needs efforts as well as expertise from different team of people. Involving partners with a wide range of various

specialty and roles is paramount in setting the basis of an integrated HMIS/LMIS Dashboard (UN, 2016). These actors should include Ministry of Health (MOH), Non-Governmental Organization (NGOs) and other Implementing Partners (Ips), medical and other health care workers who would assist in linking Health Products and Technologies (HPTs) to health services, logisticians, and pharmacy personnel to advise on procurement and data analysis, (Village Reach, 2016).

Globally, research conducted in UK on food processing firms sought to find out the effects of inward integration, vendor integration, client integration and information integration on Supply Chain Performance (SCP). It found out that these indicators had a constructive and significant correlation to SCP (Kumar et al., 2017). It confirmed that information integration was focal in SC processes and was a vital enabling factor in improving SCP. This was in line with literature review which denotes the key role played by information systems integration in realizing SCP (Kumar et al., 2017). In the region, research by Systems for Improved Access to Pharmaceuticals and Services (SIAPS) in 2016 to assess the implementation and use of LMIS in Mali identified issues facing the supply chain management in Lesotho to be inaccurate data capture on bin cards and reports as the main source of late reporting. Lack of clear and structured primary source documents made data capture difficult hence poor supply chain decisions which led to high stock out rates of drugs and medical products (USAID, 2017).

1.1.5 Integration of Human Resources Management Systems and Healthcare Performance

According to Global Health Supply Chain – Procurement Supply Management (GHSC-PSM, 2019) upgrading systems and technologies alone cannot achieve much without a strong and skilled human resource. In order to raise morale of the workforce, the organization's systems, processes and workplace must be strengthened as well. Lack of skilled staff and non-commitment by health care workers are the main hindrances of LMIS performance (Tiye & Gudeta, 2018). Poor data quality was attributed to ineffective supportive supervision and use of non-pharmacy experts in logistics data management as was found out in an investigation on LMIS performance for program drugs in Ethiopian public hospitals (Tiye et al., 2018). Supply chain systems are affected by commodity availability and management support functions such as supportive supervisions and monitoring and evaluations (Chen, Hailey, Wang & Yu, 2015). This is augmented by results of a study cconducted out in Ghana where inadequate healthcare workers, lack of logistics data capture and reporting tools, poor quality data from hospitals and lack of interest from the staff were

reported as some of the main problems affecting supply chain systems in service delivery points (OCED, 2017).

1.2 Problem Statement

According to World Health Organization (2018), good health is fundamental in economic, social development and poverty eradication in any society. Improving health access, increasing services and healthcare affordability are key in improving population health (Alkire, Peters, Shrime & Meara, 2017). Quality of life is influenced by access to health care services contributing significantly to improving health outcomes (Kruk, Pate & Mullan, 2017). Access to essential health commodities for all is a fundamental right to health and Universal Health Coverage (UHC), as captured in the Sustainable Development Goal (SDG) 3 for health and SDG 3.8 (United Nations, 2015).

More than 10 million deaths of under five-year children occurring in low- and middle-income countries worldwide are associated with ineffective supply chain systems that fail to deliver much needed essential drugs and medical supplies to the service delivery points. (World Health Organization, WHO, 2015). Approximately a third of the world populace including about a half in the most underdeveloped countries especially in Africa cannot access health products and technologies occasioned by poor public health supply chain systems (Perehudoff, Alexandrov & Hogerzeil, 2019), despite the international donors investing over 27 billion in strengthening the global supply chain systems (Yadav, 2015). SCS in developing nations are blotted with gross setbacks that reduce health systems ability to respond to healthcare requirements of the populace (Abdallah, Abdullah & Mahmoud, 2017).

Supply Chains costs consume up to 25% of pharmaceutical costs (Donata et al., 2016). In Kenya, the percentage budgetary allocation for health commodities procurement from both national and sponsors had remained constant at 15%. The current expenditure on Health Products and Technologies amount to 22% of the budget requirement, with 20.7% allocated to essential medicines (Kenya Ministry of Health, 2021). Donors contribute about Kenya Shillings (KES) 77 billion each year for the three leading communicable diseases (Human Immuno-Deficiency Virus (HIV), Tuberclosis (TB) & Malaria). This shows that Health Products and Technologies (HPTs)

take a large chuck of money and therefore without proper management it could lead to significant losses of taxpayer's money.

Kenya has had parallel vertical Supply Chain Systems each supported by different donors or implementing partners for a very long time (Government of Kenya, 2021). This has had major challenges in that various programs have been reporting for each program commodities separately leading to poor reporting of health commodities. In addition, different staff have been involved in management of different program items (Malaria, ARV, Family Planning) Supply Chain Management Systems which have been difficult to coordinate. Supply Chain Strengthening activities like Supportive Supervision, Data Review Meetings, Quantification and even Commodity Security Technical Working Groups have had their own funding and conducted separately for each program. This has led to wastage of resources and poor service delivery. On most occasions facility staff are out of their workstations attending these meetings hence disruption of services, staff working in one program cannot support other programs even when the need is clear, and there is skewed allocation of resources depending on which program funds quantification.

A study conducted in Tanzania by Zakiyah, Asselt, Roijmans and Postma (2016) showed that lack of proper integration of the various supply chain functions from procurement to stock control were the cause of poor data visibility among the central medical store, regional stores, and hospitals. The study however presented a contextual research gap since it was limited to Tanzania supply chain. Another study conducted in Uganda by Lugada, Komakech, Ochola, Mwebaze, Oteba and Ladwar (2022) showed that lack of coordination structure for planning and administration, shortage of skilled staff, less usage of LMIS for decision making as well as fragile governance and regulatory structures both at national and regional levels were the major problems preventing HPT supply chain in the country from performing effectively. It similarly presented a contextual research gap since the findings in Uganda cannot be generalized to Kenya.

Other studies have presented a conceptual research gap. For instance, a study conducted in Malawi by USAID (2015a) demonstrated that lack of integrated information systems led to poor data visibility and made decisions made often without data support. This presented a conceptual research gap since the focus was limited to Logistics Management Information Systems. Other local studies for instance a study by Odeny (2015) in Kenya, indicated that absence of integration

of supply chain players, limited financial resources, lack of management support, poor data sharing as well as late information dissemination had negative impacts on the functioning of the logistics. However, the study was linked to supply network performance thus presenting a conceptual research gap because this study focuses on healthcare performance.

Methodological research gaps were also established in some of the reviewed studies. A study by Agu, Ozioma, Anike and Nnate (2016) which suggested that a firm's performance is greatly influenced by proper stock control, reviewed literature only. Another local study by Shajema (2018) which found out that inventory management systems such as supplier managed inventory, lean practices, physical stock-take and deliberate provider control practices have a constructive and major impact on the firm performance relied on quantitative data only which highlights a methodological research gap. This study fills this gap by focusing on a mixed methodology.

Migori County Government has embarked on integration of their Supply Chain Management Systems through the support of Afya Ugavi Project to cater for past mishaps. Evidently, a lot of revenue have been employed in strengthening Supply Chain Systems and none of the interventions has been assessed to show the impact on Healthcare Performance hence a need for this study. The study desired to bridge the current conceptual, contextual and methodological research gaps on the topic.

1.3 Purpose of the Study

This study's aim was to determine the influence of integration of health Supply Chain Systems on Healthcare Performance in Migori County, Kenya.

1.4 Objectives of the Study

The guiding objectives of the study were as follows:

i. To examine the influence of Integration of Inventory Management Systems in Supply Chain on Healthcare Performance in Migori County, Kenya

ii. To determine the influence of Integration of Quantification Systems in Supply Chain on Healthcare Performance in Migori County, Kenya

iii. To establish the influence of Integration of Logistics Management Information Systems in Supply Chain on Healthcare Performance in Migori County, Kenya

iv. To determine the influence of Integration of Human Resource Management Systems in Supply Chain on Healthcare Performance in Migori County, Kenya.

1.5 Research Questions

This study answered the following research questions:

i. What is the influence of Integration of Inventory Management Systems on Healthcare Performance in Migori County, Kenya?

ii. How does Integration of Quantification Systems influence Healthcare Performance in Migori County, Kenya?

iii. What is the influence of Integration of Logistics Management Information Systems on Healthcare Performance in Migori County, Kenya?

iv. How does Integration of Human Resource Management Systems influence Healthcare Performance in Migori County, Kenya?

1.6 Significance of the Study

Increasing efforts, both from state and non-state actors, are being made to establish sustainable processes that are robust enough and responsive to changes in the public hospital landscape. Therefore, given that a lot still needs to be done in regard to achievement of Universal Health Coverage (UHC), the results of this research will be beneficial to the stakeholders involved. Non-Governmental Organizations (NGOs) involved in strengthening healthcare systems in developing economies may find the findings useful in unearthing important areas that requires focus in regard to SCM integration.

In addition, findings of this research will be relevant to policy developers among them Ministry of Health, Department of Health Products and Technologies (DHPT), Council of Governors (COG) and other related health organizations in providing information on integration of supply chain systems and healthcare performance. It would also assist in formulating public strategies, policies, and guidelines on health commodities supply chain systems by the authorities to ensure health sustainability.

The findings can also be significant to health-related professions such as Logisticians and Health Products and Technologies Managers through integration among systems and health supply chain partners. Moreover, the results of this research will also be hoped to contribute to the current literature and expertise on the supply network systems. The study would act as a basis from which other similar research could be anchored. Lastly, it is wished that this document would become a resource to all scholars and interested researchers on the topic.

1.7 Assumptions of the Study

The study assumed that respondents would give truthful and complete answers. In addition, the study assumed availability of participants and that they took time to respond to the questionnaire especially during this period of Coronavirus disease (COVID-19). An email was sent to each participant with the questionnaire to minimize contact due to corona virus and the participants were guaranteed of confidentiality as well as assured that the information would be used for scholarly reasons and their identities would not be indicated in the poll to ensure that they gave honest answers.

1.8 Limitations of the Study

Migori county has many public and private hospitals scattered across the vast county. This research was conducted in public hospitals only, in Migori County since the procurement of health products and technologies is standardized and supported by the government as well as clear guidelines on stocking levels of health products whereas there are no clear guidelines governing Supply Chain of the private hospitals. The results were generalized to public hospitals only.

Another limitation was availability of the intended audience especially for group discussions due to COVID 19 guidelines. The researcher however conducted virtual meetings with the target group.

1.9 Delimitations of the Study

This research was delimited to integration of four Supply Chain Systems. Specifically, Inventory Management Systems narrowing down to inventory accuracy rate, stocked according to plan and stockout rates; Quantification Systems narrowing down to forecasting tools, resource mobilization and forecasting error; Logistics Management Information Systems narrowing down to availability of data, timeliness and data completeness as well as Human Resource Management Systems

narrowing down to skills development, supportive supervision and performance review. Contextually, the study was delimited to Migori County where data was collected from 23 hospitals.

1.10 Definition of Significant Terms

Supply Chain Systems: Framework of entities that plan, source and move goods, information, and funds connected to a service or commodity, starting with procurement of basic materials up to the distribution of the commodity to the last mile at the service delivery points.

Supply Chain Integration: An extent of institution's inner processes and other supply network actors strategically and operationally come together to collaboratively manage commodities movement, communications and information sharing as well as supply chain systems, etc., to achieve highest standards of quality-based performance at efficiently.

Integration of Supply Chain Systems: A process in which various actors, levels, and functions of a health system are interconnected with the aim of enhancing performance and developing continuous linkages between stakeholders to optimize customer service delivery.

Inventory Management Systems: This is a mixture of technology, functions and procedures that manage, monitor and maintain supplied products. In this study, IMS refers to the ordering, receiving, issuing, storage of commodities and all the transactions involved before the commodities reach the end user i.e., receiving of delivered commodities, maintenance of updated commodity records e.g., bin cards and S11, issuing to other departments.

Quantification Systems: These are all the processes involved in determining the amounts and value of products for a particular sector and planning on delivery of those commodities to guarantee a smooth supply for the program. It is thus comprised of forecasting and supply planning.

Logistics Management Information Systems: A structure of records and reports which can be manual or electronic and used to aggregate, examine, authenticate, and show data on stocks for decision making in supply chain. In this study, LMIS would be considered as all the commodity source documents, monthly reporting summary tools, transaction tools and commodity dashboards that provide data for decision making.

Healthcare Performance: These are aggregated, quantified, and analyzed data measurements on a certain healthcare – associated activity with the objective of minimizing costs, improving quality of care and advancing efficiency of service delivery. They are useful in determining the impact of the process by comparing specific events before and after the intervention. These events can be tested using clinical methods, patient reported or observed. In this study, healthcare performance measurements will focus on three aspects namely: quality, safety, and affordability of care as some of the aspects that influence health of the population.

Quality of Care: The operational approach used in this study brings together three key healthcare operational performance aspects which are: availability, effectiveness, and efficiency. Provision of supplies would mean that the health care workers would provide the care and treatment required by patients/clients where, when, and how they are needed. Consistent availability of drugs minimizes cases of microbial resistance since the patients can complete their doses as prescribed. In addition, product availability increases healthcare service seeking behavior of patients/clients. Finally, staff morale is improved by availability of commodities and thus offer good patient care hence improving the quality of care.

Safety of Care: This is prevention of treatment errors and adverse effects to patients during provision of health services. In this study, Safety of Care considers all the structures put into place to curb counterfeit and substandard health commodities in the pipeline that may affect the health of clients, systems for capacity building staff to ensure rational use of medicines as well as abiding to standard treatment guidelines and pharmacovigilance aspects.

Affordability of Care: This is the capability for an individual or organization to have enough earnings to cater for healthcare expenses. This study however looks at the costs involved in procurement, distribution, and storage of health commodities in hospitals and associated costs of providing health care services to clients and how they can be minimized by strengthening the supply chain systems. It also includes the benefits of commodity availability in rural health public facilities to patients/clients based on distances vis a vis resources spend in accessing these hospitals.

1.11 Organization of the Study

This research was arranged in five chapters. Chapter one composed of the research background, problem statement, purpose of the study, research objectives, research questions, significance of the research, basic assumptions of the study, limitations of the study, delimitations of the study, definition of important terms and organization of the study.

Chapter two consisted of literature review, theoretical framework, and conceptual framework. Research methodology was captured in chapter three which included the design the study, target population, sample size and sampling techniques, research instruments, data collection procedures and data analysis techniques. Chapter four presented data, data analysis, and interpretation while chapter five which is the final chapter of the study gave summary findings, recommendations, and conclusion of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The chapter reviewed literature of themes relevant to the problem of the study. It explored information from different academics and researchers on supply chain integration and healthcare performance. The chapter covered literature on healthcare performance, integration of the four supply chain systems, intervening variable, theoretical foundation of the study, conceptual framework guiding the study, knowledge gap and lastly the chapter summary.

2.2 Healthcare Performance.

The need for top notch medical care services continues to expand globally. There is need to relook on ways to enhance the efficiency and effectiveness of health logistics since they take up to 25% of medical supplies costs (Donata, Parry & Roth, 2016). The cost of treatment in the world is in an increasing trend every day. In the United States of America (USA) alone, the cost of treatment jumped from $27.5 billion to $3.2 trillion between 1960 and 2015. According to Luoma (2018) there will be an extra $5.5 trillion in medical care costs by 2025. The WHO has assessed that, countries are spending up to 5% of their total health budget on avoidable medical supplies costs (WHO, 2016).

Organization performance has been described as the degree an enterprise or firm can attain its productivity and systematic targets (Ofori, Boison, Asiedu & Afrifah, 2019). Improving supply chain performance is important and recently, identifying ways of creating a competitive edge in supply chain has become a trend (Um, Lyons, Lam, Cheng & Dominguez-Perry, 2017). Performance estimation of public health supply networks is concerned with the efficiency of achieving mission and objectives of the institution (Chorfi, Bernabbou & Berrado, 2018). The focus is the long-term improvement in both effectiveness (service quality) and efficiency (cost of service).

Implementing Supply Chains Integration (SCI) enhances an organization’s operational performance, increases customer satisfaction, and improves financial performance according to a study carried out on Indian manufacturing organizations (Garone & Kant, 2017). A study

conducted on telecom companies in United Arab Emirates showed that supply chain quality management practices (SCQM) positively impacted on innovation and operational conduct (Hussain, Khan, Ajmal & Khan, 2019). Furthermore, client contentment had a powerful effect on operational performance.

Integrating Supply Chain Systems has been noted to improve an organization's performance hence it has become important for the firm to lay down indicators on what to measure (Kumar, Chibuzo, Garza-Reyes, Kumari, Rocha-Lona & Lopez-Torres, 2017). Some of the indicators of SCP are superior quality, Stock-out rates, and short lead times. Singh, Gopal, Bahadur and Pandey (2019) sought to explain SCP and focused on direct returns of supply chain performance measurement like agility: quicker response times, orders delivered on timely basis and cuts on logistic costs. They also looked at some of the indirect benefits which might be hard to measure like customer satisfaction and customer retention rates.

Additionally, Modgil and Sharma (2017) sought to examine correlation of Total Quality Management (TQM) and SCM and found out that synchronizing these practices would support organizations in attaining higher performance. Many studies have been carried out to show that SCI led to higher profits and improved monetary performance. In a study of 195 companies in India by Zhao, Feng and Wang (2015), found out that supply chain integration majorly influenced monetary performance. A study on relationship between SCI indicators and SCP in the United Kingdom food sector showed that customer, supplier, internal and information integration had a positive and a great correlation on SCP (Kumar et al. 2017).

Globally, research conducted on 152 Indonesian medium and Large Manufacturing Enterprises (LMEs) by Siagian, Mochtar and Tarigan (2021) attempted to investigate the relationship between effective management and organizational achievement by integration of supply chain. It found out that there was increased supply chain quality, operational performance and organizational capabilities. In the region, a study on SMEs in Liberia by Annan, Boso, Mensah and Nagbe (2016) showed that an increase in SCI had enabled the companies in the country to increase customer value and enhance operational efficiency. Locally, research by Owiti (2015) on the Supply Chain Management Practices (SCMP) of SMEs supplying stationary in Nairobi Kenya. The resaerch aimed to find out the SCMP endorsed by stationary business in Nairobi, to determine advantages and problems encountered by these companies in implementation of the SCMP. Findings from the

study noted that most SMEs had embraced the said practices. The highest benefit of the SCI was noted as improved response to customer needs.

There have been a lot of discussion over the various types of integration that would better supply chain performance (Kumar et al., 2017). Crisan (2018) distinguished seven conceptual systems of service supply chains consisting of information management, human resource management, demand management, client's relations control, providers association control, service delivery management and capital. This research project developed a conceptual framework from literature review and defined four integration constructs (Inventory Management, Quantification, LMIS Management & Human Resource Management) to examine how it affects public health supply chains performance and eventually the healthcare performance.

2.3 Inventory Management Systems and Healthcare Performance

Inventory Management Systems have been noted down and their influence on performance monitored (Agu, Ozioma, Anike & Nnate, 2016). Inventory Management is a challenging process of supply chain since it has direct effects on both cost and services. Stock Control Systems (SCS) is an integrated process of organizing and managing stocks along the whole logistics chain with the intention of improving service delivery, broaden commodities range, and minimize operational cost (Olakunle, 2015). It comprises of planning, procurement, storage and stock transactions processes.

Inventory control takes up a big chunk of an organizations budget (Ofori, Boison, Asiedu & Afrifah, 2019). Shajema (2018) studied on the Vendor Management Inventory Systems (VMI) and lean practices. Proper stock control is significant in delivery of services at minimized costs (Meng, 2016; Olakunle, 2015). Stock control must be executed properly if an enterprise is to achieve constructive impact on its performance.

Collaborative Planning, Forecasting and Replenishment (CPFR) consists of jointly planning for actions and exercises in supply chain with an aim of availing commodities to clients Olankule (2015). There is sharing of information between suppliers and retailers in order to manage several logistics activities in the chain. According to qualitative research by Olankule (2015) on grocery stores in Aberdeen, UK, successful stock control systems increase a firm's returns, minimize cost and create competitive edge and facilitates availability of proper amounts of inventory thus building client contentment levels due to enhanced service delivery.

Internationally, a paper by Meng (2016) sought to identify price issues, evaluating price elements, determining amounts that minimizes the total cost and impact of stock control on supply chain performance. The investigation recommends association between stock control cost and execution. The experimental research was carried out in Sandviks Electricity company. The investigation results depicted that in successful stock control systems would result in proper procurement which would ultimately enhance the supply chain. This study focused on Sandviks Electricity plant in Sweden.

In African context, a paper by Agu et al. (2016) provides details regarding examination of the effect of appropriate stock control on the firm productivity. The research suggests that a firm's performance is greatly influenced by proper stock control. The empirical research was carried out in Nigeria on bottling companies and used survey and case study to carry out the investigation. The paper deduced that proper stock control increased a firm's profit margins and thus contributed to the success and expansion of the enterprise. Nonetheless, he suggested that institutions should expand their stock control systems corresponding to unique production requirements, and that management support was key in aligning these systems in order to sustain production for organizational performance (Agu et al., 2016).

In the country, a study by Shajema (2018) aimed at establishing the impact of stock control systems on productivity of supermarkets in Nairobi County, Kenya realized that inventory control systems such as supplier managed inventory, lean practices, physical stock-take and deliberate provider control practices have a constructive and major impact on the firm performance.

Another research to investigate the influence of stock management systems on flour processing companies was consistent with other studies that proper stock control systems influence organizational performance positively (Mumo & Moronge, 2019). The findings showed that there is a constructive and strong interconnection of enterprise performance and stock control systems. Moreover, mishandling of commodities results in avoidable expenses on the operating costs. Good stock control practices minimize storage space and reduce wastage due to expiries and phasing out of products. Proper inventory management improves a firm's profitability which in turn enhances client satisfaction.

2.4 Quantification Systems and Healthcare Performance

Quantification is an integral part of an organization in order to maintain a competitive edge (Onkal, Gonul & De Beats, 2019). It is the major steering factor in planning and management of the SCP as well as policy making for the enterprise (Albarune & Habib, 2015). Irrespective of whether it a demand or damping system of supply chain, quantification is the beginning level in all exercises and management systems in supply chain (Merkuryeva, Valberga & Smirnov, 2019).

Quantification is a crucial SC exercise that connects data on services and products from service delivery points to the sector policy and planning at the central level and it provides useful data for guiding budgetary allocations and purchase of products (USAID, 2015a). Quantification reports can assist supply chain managers to allocate scarce funds for procurement optimally, justify for the allocated resources, lobby for more funds when there is gap and guide on manufacturing periods as well as delivery plans (USAID, 2015b).

Forecasting, a key and often assumed element of SCM, was discovered to be a vital aspect in supply network overall performance. It is the initial step which drives all other roles of the SCM. The role of demand forecasting is to give approximately correct estimates of future needs for goods and services using past information and existing conditions; for instance (political, cultural, and financial) to plan and make sound business decisions (Durbha, 2016).

Data quality and availability is a major determinant of the quality of quantification. Systematic forecasting and supply planning have assisted nations in aligning their assets on advancing information systems and overall SCM. Forecasting error is still a major challenge in drug business (Durbha, 2016). Forecasting errors depend on the level/ stage forecasting is taking place along the supply chain. Errors created downstream are smaller and increase as you go up the logistics ladder. Firms on top of the chain reduce this error by collaborating in forecasting based on consumption of the consumers (Chopra & Meindl, 2016) Forecasting process can leverage on resources and produce desired results if it involves all stakeholders in the supply network (Albarune et al., 2015)

A study by Kamalapur (2018) to determine the effects of forecast errors in Collaborative Planning, Forecasting and Replenishment (CPFR) Strategy determined that both random and bias forecasting errors resulted in an increase in cost of stock control for both producers and sellers. Positive forecast errors result in overstocking which increases storage costs while negative forecasts errors cause stock outs which attracts backorder penalty costs. Based on the findings, he recommended

that for both producers and sellers to realize highest advantage of CPFR Strategy, it was paramount to reduce the random estimate errors for need uncertainty and abstain from negative bias estimates in the quantification.

2.5 Logistics Management Information Systems and Healthcare Performance

Logistics Management Information Systems (LMIS) gather and avail data on Health Products and Technologies (HPTs) on a routine basis, (Greenwell & Salentine, 2018). The major focus of the LMIS is stock control to make sure there is uninterrupted supply of health commodities and provide information useful for assessing relevant supply chain indicators for Essential Medicines and Medical Supplies (EMMS). These are health products and technologies described as fulfilling the key healthcare requirements of the populace, (John Snow Incorporation, 2017). These HPTs should be in the precise quantity, in the correct dosage form, good quality, at the proper time and the fair cost to clients (WHO, 2016). Access to HPTs, monitored through the availability and affordability of the commodities, has been termed as one of the building blocks of the health systems strengthening, (WHO, 2016). Unfortunately, majority of Low - and Middle - Income Countries have poor data for monitoring health commodities indicators (WHO, 2015b).

Nowadays, companies that plan to align their business activities with different SC players depend on information systems (IS) to help their overall operations (Yu, Huo, & Zhang, 2021). IS application in SC enables the sharing of data by creating a link between staff, products and functions (Agyei-Owusu, Marfo, Quansah, & Kumi, 2021). To address the issue of poor data in Low – and Middle – Income Countries (LMICs), various electronic LMIS (eLMIS) applications have been developed. Some of them includes: Health Commodity Management Information System (HCMIS) deployed in Ethiopia, Logistimo which is in use in India, Myanmar and South Sudan, OpenLMIS being used by Benin, Côte d'Ivoire, Mozambique, Tanzania & Zambia, and OneNetwork applied in Rwanda, (OpenLMIS,n.d.; Logistimo,n.d.; Village Reach , 2017; JSI, 2017). The purpose of these systems is to assist in stock control, forecasting, ordering, order allocation, order fill rates, confirmation of supply receipts and supply chain visibility, (JSI, 2017).

Health Information Management System (HMIS) on the other hand is used to collect service data from hospitals (John Snow Inc., 2017). It consists of disease incidence, client/ patient data, & health services offered. It is used in planning, monitoring and administration in HFs and institutions. Most LMICs have digitized their data management systems where District Health

Information Software 2 (DHIS2) is the preferred choice since it is freely available, open source, ability to offer superb adaptability and data visualization tools, (JSI, 2016). On top of availing high quality and accurate HPT data on time, eLMIS is able integrate with an HMIS like DHIS2 to effectively map health commodities availability and requirement to health services delivery, (Village Reach, 2017; JSI, 2017). Integration between HMIS and eLMIS occurs at the Service Delivery Point (SDP) and at the policy level. Stock outs of essential medicines and medical supplies experienced in LMIC more so in sub-Saharan Africa is majorly due to poor supply chain data including lack of timely data for decision making (Demessie, Workneh, Mohammed, & Hailu, 2020).

It has been found necessary to integrate information for companies intending on integrating clients and vendors (Kumar et al., 2017). Information integration goes beyond the efficiency and use of technology to include the contributions and functions employed by staff and information systems in initiating, sorting, analyzing and disseminating data to the intended audience at optimal time for effective decision-making procedure (Sandler, 2017). Information sharing across SC, enables on spot gathering of data since it creates better communication among players in the SC and this would result in customer service improvement and better need prediction (Kumar et al., 2017).

The public health sector from LMIC has been increasingly looking for creative avenues of applying data interpretations to enhance health systems especially by use of eLMIS (Village Reach, 2016). Most public health supply chain systems have been considering integrating automated analysis of LMIS and HMIS data with an aim of improving SCP and service delivery. This kind of integration has the capacity to augment regular communication and information dissemination between various departments which would lead to improved SCP and enhanced health services by improving data visibility and providing data for decision making among all key players in the healthcare system (Village Reach, 2016).

In the region, the first successful attempt of developing a consolidated dashboard using statistics form both eLMIS and DHIS2 was done in Tanzania in 2015 and has been used to provide learning lessons for other African countries willing to integrate LMIS with HMIS, (JSI, 2017). An assessment study carried out in Ghana 2021 sought to provide a clear picture of the structural systems concerned with the management of health commodities and define needs for establishment and operationalization of an integrated LMIS. The report captured existence of silos,

uncoordinated players using the LMIS at different levels, lack of timely data for making decisions, use of manual tools and inaccessibility of data at various levels among other issues affecting the supply chain and advised the MOH to put in place an integrated electronic LMIS system with supply chain data visibility across all levels for better supply logistics productivity and healthcare service delivery (Ghana, 2021)

2.6 Human Resource Management Systems and Healthcare Performance

Literature review shows that there are few studies on the impact of Human Resource Management (HRM) on supply chain performance despite its importance (Hohenstein, Feisel & Hartmann, 2014). Despite most firms knowing the significance of strategically administering their SC, they often do not recognize that effective SCM depends on the efficiency of the human resource in the SC (Hirudayaraj, & Matić, 2021). This implies that HR & SC heads should work together in creating tactics and action plans since this provides an assured means to initiate a distinctive beneficial edge to firms (Jena, & Ghadge, 2021).

A study by Magova and Kessy (2020), sought to investigate the influence of HRM systems on SC flexibility on tourist's hotels in Tanzania. It was noted that competitive hiring process, job assurance procedures and a culture of team building had a beneficial impact on supply chain flexibility (Magova et al., 2020). The findings denoted that staff with necessary expertise, capacity, capabilities, and ethnic mix were useful in guaranteeing SC flexibility. HRM come out as a major tactical priority in supply chain integration and institutions attempting to obtain sustainable development should capitalize on human resource (Jena et al., 2021)

A study by Huo, Han, Chen and Zhao (2015) on high involvement of HRM systems and integrations of supply logistics. The findings provided an experimental proof that there was a connection between a group of high-engagement HRM processes that focus on enhancing staff conducts, achievement and supply chain integration. Further, it found out that high-engagement human resource management systems developed for the whole firm may promote supply chain integration. The study proposed that HRM could act as a positive promoter of SCI and that various HRM systems had a varying influence on the types of SCI across different institutions and countries (Huo et al., 2015).

Health products and technologies of sound quality are required at all levels of service delivery to obtain best health outcomes (OECD 2017; MOH, 2015). To strengthen public health supply chain systems and health commodities overview capacity, Ugandan Ministry of Health (MOH) initiated a multifront approach: Supportive supervision, Performance Assessment and Recognition Strategy (SPARS) (MOH, 2015). An assessment of this approach carried out by Ladwar, Sembatya, Amony, Seru, Ross-Degnan, Garabedian and Trap (2021) revealed that after only one year of implementation, SPARS was generally beneficial in improving SCM, improved rural hospitals' staff capacity on inventory management as well as requesting and reporting. The researchers went ahead to recommend adoption of SPARS by low-income countries planning on improving the supply chain systems in their countries.

2.7 Health Commodities Financing

Supply Chains costs consume up to 25% of pharmaceutical costs (Donata et al., 2016). In Kenya, the percentage budgetary allocation for health commodities procurement from both national and sponsors has remained constant at 15%. The current expenditure on Health Products and Technologies amount to 22 percent of the budget requirement, with 21% allocated to essential drugs (GOK, 2021). Sponsors contribute almost 77 billion Kenya Shillings (KES) yearly for the three leading infectious diseases (HIV, TB & Malaria) achieving a 92% of those program commodities requirements while the Kenyan Government provides the remainder. For example, in 2015/16 Fiscal Year (FY), the government allocation for HPT was 2.9% of the current health expenditures (GOK, 2021).

On the other hand, County Governments allocated 14.6% of the health budget towards procurement of HPTs in FY 2016/17. Unfortunately, the same allocation decreased to 10.1% in FY 2018/19 (GOK, 2019). However, the absolute figures on health commodities expenditure by counties from Kenya Medical Supplies Authority (KEMSA) rose from KES 2.2 billion in 2013/14 fiscal year to 6b Kenya Shillings in 2018/19 (KEMSA, 2019). This amounted to only 46 % of the total HPT need as shown by a review of nine counties namely, Homa Bay, Kilifi, Lamu, Mandera, Marsabit, Migori, Nairobi, Samburu, and Tana River quantification reports (GOK, 2021). Furthermore, the amounts given above were mainly for procurement of the health commodities and none was for other supply chain activities like inventory management, quantification, supportive supervision visits, human resource management as well as monitoring and evaluation.

2.8 Theoretical Frameworks

The debates on role of integrated supply chain systems on healthcare performance can be addressed considering two theories in literature: relational view and the resource-based view theories.

2.8.1 Relational View Theory

The relational view theory was first published by Dyer and Singh in 1998. This theory looks at dyads including networks of organizations as major units of review for explaining superior individual firm's performance. It focuses on companies that constitutes the elements of review (Wieland & Wallenbang, 2013). This perspective denotes that a competitive edge is realized by inter-linkages among stakeholders who share unique expertise (Kumar, Banerjee, Meena & Ganguly, 2017). These specialties are natured as the relationship permits companies to invest in relation-specific assets, come up with inter-company knowledge transfer routines, use of effective leadership systems and applying synergistic expertise (Dyer & Singh, 1998). This partnership works through embracing cooperation which involves joint planning and division of duties in order to perform efficiently (Kumar et al., 2017)

Public health supply chain stakeholders work collaboratively to ensure there is improved service delivery to the clients. In accordance with the relational view theory, higher results can be attained when these partners enter into linkages that offers the advantages mentioned above. Since integration, partnership and collaboration are characteristics of networking (Kumar et al., 2017) they are necessary for members to enhance operations of the supply network as denoted in the literature of relational view.

Supply chain integration helps firms in a relationship achieve their objectives since it introduces a fierce competition among members (Li & Chen, 2017) in contrast to standard group work. As a result, integration of logistics network has a more important connection with SCP given that institutions in a relationship portray a fierce contesting which generally increases the flexibility of the whole logistics network in respect to each other (Mofokeng et al., 2019). This theory has been applied by Som, Cobblah and Anyigba (2019) in their research, "The effect of Supply Chain Integration on Supply Chain Performance."

The theory was applicable to this study in explaining the important role of networks and information exchange between stakeholders so as to realize better organizational performance.

This theory is relevant to this research since it is covering all four SC systems under study as follows: both Quantification Systems and Inventory Management Systems depends on strong LMIS systems which provide high quality, timely and complete data for decision making. At the same time, good LMIS and Inventory Management Systems depends on effective Human Resource Systems. It argues that information exchange, which can be enhanced through integration, leads to better performance. In the healthcare context, the stakeholders in a public health supply chain can work collaboratively through networks so as to ensure there is improved service delivery to the clients. These networks can be enhanced through integration of SCM systems.

2.8.2 Resource-Based View Theory

The Resource-Based View Theory can be traced as far back as 1959 to Penrose. Major proponents were Wernerfelt (1994), Prahalad and Hamel (1990) and Barney (1991). This theory argues that firms are made of physical and non-physical assets. By combining the physical assets, core competencies are realized by the firm also known as strategic capabilities that provide a sustainable competitive advantage. Firms transform intangible resources into useful outcomes that achieve their objectives. These resources include, expertise, strength, tangible resources, etc., and companies are seen as comprising a set of assets (Barney, 2012). A firm's powers can be mapped to two classes that is cost advantage and specialization. Using the firm's strengths will lead in better costing, specialization and focus (Kaleka, & Morgan, 2017). All strength and expertise created and maintained by an organization, or a bundle of organizations could be considered as a resource. Logistics integration can be viewed as an important resource with the capacity of giving the company a favorable performance (Barney, 2012).

The Resource Based theory portrays organizations as resource sets which are diverse meaning that, strengths and expertise involved in bringing benefit within or among an association of organizations is dispersed through differentiated companies inside the partnership (Kozlenkova, Samaha & Plamatier, 2015) and no probable single company have all values that will facilitate it to maintain a favorable edge for a long period. Mutual assets created through SCI, permits organizations utilize their own assets alongside those of allied stakeholders in achieving the SCP (Kozlenkova et al., 2015).

Inter-linked companies are able to benefit from assets that are accessible to other companies in the alliance. (Ratajczak-Mrozek, 2017), and incase these cross-assets are accepted and applied strategically, then they lead to achievement of shared objectives (Hunt & Davis, 2012). Integrated information systems, connections, and processes of a company lead to uninterrupted transmission of information and materials and create supply chain visibility throughout the chain (Liu & Liang, 2015). Kwamega, Li and Abrokwah (2018) used the RBV theory in their study titled, "Study on supply chain management practices and agribusiness firms 'performance: Meditating role of supply chain integration." and Som, Cobblah and Anyigba (2019) in their research, "The effect of Supply Chain Integration on Supply Chain Performance."

This theory is applicable in this research in emphasizing the function of diverse and dynamic resources in enhancing performance. It posits that a firm with resources such as expertise, strength and tangible resources will perform better. By investing in Inventory Management Systems, the hospitals would be ensuring there will be no wastage of commodities, there will be no stock outs and ensure availability of products which would improve healthcare performance. Secondly, integration of Quantification Systems would avail the required resources for procurement of health commodities and improve on health project performance. Integration of LMIS and HRMS would bring both technology and expertise resources to supply chain and improve performance. The theory therefore hypothesizes a positive relationship between integration of SCM systems and healthcare performance.

2.9 Conceptual Framework

The figure below presents conceptual framework displaying independent variables, intervening variable, and dependent variable.

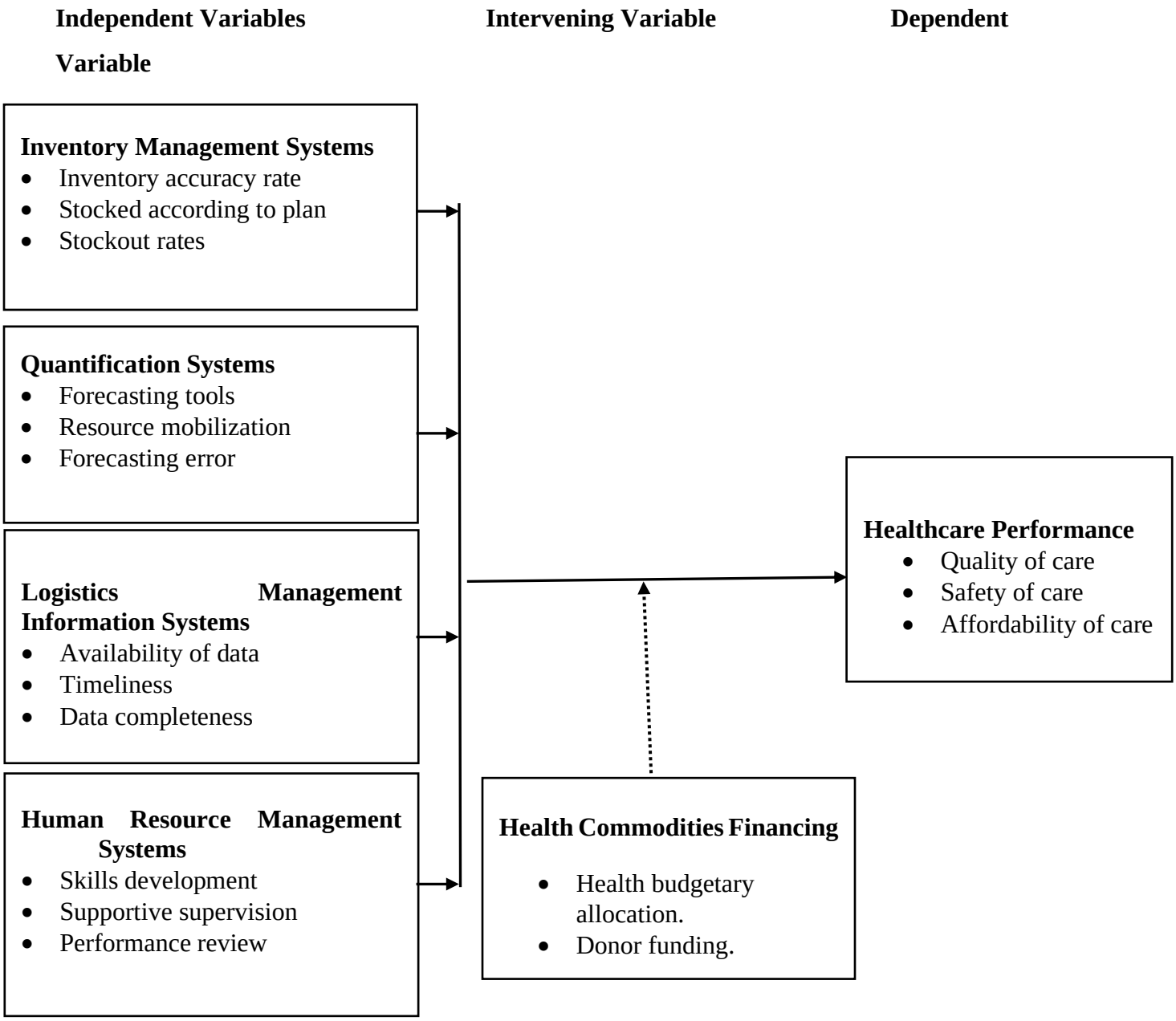

Figure 1: Conceptual Framework

Independent variables in the research are the components of health supply chain systems while the dependent variable is healthcare performance. Andrade (2021) argued that changes in independent variables directly influences the dependent variables. It is postulated that the independent variable with its elements, inventory management systems, quantification systems, LMIS systems, and HRM systems, have a direct effect on the dependent variable which is healthcare performance; however, intervening variable, health commodities financing with its components health budgetary allocation and donor funding may accelerate or delay healthcare performance.

2.10 Knowledge Gap

Table 2.1: Knowledge Gap

Variable	Author (s)	Study	Objectives	Major Findings	Gap
Relationship between Integration of Inventory Management Systems and Healthcare Performance.	Agu, Ozioma, Anike & Nnate (2016).	Effect of inventory management on the organizational performance of the selected manufacturing firms.	The research wanted to investigate the impact of stock management on the organizational performance of the selected production companies.	High beneficial relationship between effective stock control and organizational cost reduction.	The research was confined to manufacturing companies in Nigeria and has not been tested on health supply chain systems in Kenya.
	Mumo & Moronge, (2019).	Influence of inventory management practices on performance.	To determine the effect of inventory management practices on performance	The results showed that there is a constructive and vibrant interconnection between enterprise performance and stock control systems.	The research was restricted to flour processing firms in Kenya and has not been tested on health supply chain systems.

Variable	Author (s)	Study	Objectives	Major Findings	Gap
Relationship Between Integration of Quantification Systems and Healthcare Performance.	Kamalapur, (2018).	Impact of Forecast Errors in CPFR Collaboration Strategy.	To investigate the impact of forecast errors in Collaborative Planning, Forecasting and Replenishment Strategy.	The study determined that both random and bias forecasting errors resulted in an increase in cost of stock control for both producers and sellers.	
Relationship Between Integration of Logistics Management Information Systems and Healthcare Performance.	Kumar, Chibuzo, Garza-Reyes, Kumari, Rocha-Lona and Lopez-Torres (2017).	Impact of Supply Chain Integration on Performance.	To investigate the impact of internal integration, supplier integration, customer integration and information integration on supply chain performance.	The study confirmed that information integration was focal in SC processes and was a vital enabling factor in improving Supply Chain Performance.	The study was limited to UK food processing firms and has not been tested on health supply chain systems in Kenya.
Relationship Between Integration of Human Resource Management Systems and Healthcare Performance.	Magova and Kessy (2020).	Effects of human resources management practices on supply chain flexibility.	To determine the effects of Human Resource Management practices on Supply Chain flexibility.	It was noted that competitive hiring process, job assurance procedures and a culture of team building had a beneficial impact on supply chain flexibility.	The research was limited only to tourist's hotels in Tanzania and has not been tested on health supply chain systems in Kenya.
	Huo, Han, Chen and Zhao (2015).	The effect of high-involvement human resource management practices on	To find out the effect of high-involvement human resource management practices on	The findings provided an experimental proof that there was a connection between a group of high-	The study was limited to three production fields namely: machinery, electronics, and transportation and has not

Variable	Author (s)	Study	Objectives	Major Findings	Gap
		supply chain integration.	Supply Chain Integration.	engagement HRM processes that focus on enhancing staff conducts, achievement and supply chain integration.	been tested on health supply chain systems in Kenya.

2.11 Summary of the Literature

Based on the reviewed literature in this chapter, there is evidence that many research have been carried out supply chain integration. Supply Chain Integration (SCI) that deal with strategic alignment of roles and systems within a company has become a major area of focus over the years. The significance of SCI is mostly without doubt and is considered as a competitive strategy in the business world. SCI comprises of sharing functions as well as joint planning between supply chain stakeholders.

Integrating supply chain systems has been noted to improve an organization's performance. Organization performance has been described as the rate at which an enterprise or organization is able to achieve its productivity and efficiency targets. SCI enhances an organization's operational performance, increases client contentment, and improves return on investment. Some indicators of supply chain performance (SCP) have been identified as superior quality, Stock-out rates, and product availability. Another supply chain performance measurement is agility: quicker response times, orders delivered on timely basis and cuts on logistic costs while healthcare performance indicators were identified as quality of care, safety, and affordability of healthcare and patient fulfilment.

Particularly, on integration of LMIS in supply chain systems, the function of innovation in the integration systems and its importance associated has been reviewed widely. Past studies have demonstrated how the sharing of quality LMIS data reduces forecasting errors and improves on accuracy of inventory, stocking according to plan and minimizes the bull wick effect. This points to an overall gain in sharing of strategic information, like knowledge on manufacturing strategies,

fiscal operations, and merchandise, which is over and above the supply-related knowledge needed for business.

Some scholars have denoted that firms are increasingly searching for competitive advantage by integration of internal company processes as well as through the integration and alignment of inter-company processes. Inventory Management Systems have been noted down and their influence on performance monitored. The cost of stock control and its impact on logistics outcome was investigated whereby the research portrayed the way proper stock control is significant in delivery of services at minimized costs.

Quantification was shown to be a major steering factor in planning and management of the SCP as well as policy making for the enterprise. The Global Supply Chain Forum noted quantification as one of the eight major enterprise systems involved in SCM functions in an organization. It is the primary stage of quantification that prioritize client's fulfillment through the supply chain strength. Forecasting has the effect of satisfying the consumer's needs, minimizing risks and determining supply chain systems success.

Effective SCM depends on the efficiency of the Human Resource in the SC. Four major areas in Human Resource Management are of importance: Strategy, Planning and Recruitment, Training & Performance Review. It was noted that competitive hiring process, job assurance procedures and a culture of team building had a beneficial impact on supply chain flexibility. Implementing Supportive supervision, Performance Assessment and Recognition Strategy (SPARS) was generally beneficial in improving SCM, improved rural hospitals' staff capacity on inventory management as well as requesting and reporting accordingly.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlined the technique that was utilized in conducting the research. This contains the study design, target population, test size and sampling procedures, instruments, data collection process and data analysis methods, ethical considerations and operationalization of the variables.

3.2 Research Design

This study adopted a descriptive survey design. Descriptive survey designs are useful in fundamental and interpretive studies since it enables the scientists to collect data, aggregate, analyze and portray in a manner which is comprehensible (Oyewobi, Ibironke, Ganiyu & Ola-Awo, 2016). Coopers and Schindler (2014) denoted that the aim of descriptive survey research is to generate statistical information. The aim of the design is to compare relationships that exists, watch, portray and present processes as they normally happen (Calmorin, 2015; Gakuu, Kidombo, & Keiyoro, 2018, Mutinda, Gatotoh & Keiyoro, 2019). There is no influence from the observer (Kombo & Tromp, 2016). The study will employ mixed method through the use of both qualitative and quantitative data which was figured to provide comprehensive understanding of research problem than each approach individually (Gatotoh, Gakuu & Keiyoro, 2020).

3.3 Target Population

The study targeted all the health supply chain managers from the County Referral Hospital (CRH), 7 Sub County Hospitals (SCH), 7 Health Centres (HC), and 8 dispensaries (Disp.) who will include: 13 Pharmacists, 34 Pharmaceutical Technologists (Pharmtechs), 15 Nurses, 54 Laboratory Technologists (Labtechs), 9 Nutritionists, and 8 Health Records & Information Officers (HRIOs).

Additionally, the study targeted to interview 200 patients picked from the 23 hospitals allocated based on service workload and 9 members of county and sub county Commodity Security Technical Working Group (C S TWG) who formed the Key Interview Informants (KII). The study focused on 23 hospitals selected based on workload and level of care to include a Sub County Hospital, Health Centre (HC), and Dispensary (Disp.) from each of the 8 sub counties in Migori County as shown in the table below. All individuals of an actual or imaginary set of persons,

incidents or articles to which an investigator intents to generalise the findings of the research (Coopers & Schindler, 2014).

Table 3.1: Target Population

Hospitals	Pharmacist	Pharm Techs	Nurses	Lab Techs	Nutritionists	HRIOs	S/CSTWG	Patients	Totals
Migori CRH	8	5	1	16	3	1	2	57	**93**
Awendo SCH	1	3	1	5	1	1	1	10	**23**
Kehancha SCH	1	3	1	5	1	1	1	16	**29**
Kegonga SCH	0	2	1	3	0	1	1	7	**15**
Macalder SCH	1	2	1	5	1	1	1	5	**17**
Nyamaraga HC	1	2	1	3	1	1	1	8	**18**
Rongo SCH	1	3	1	7	1	1	1	19	**34**
Uriri SCH	0	4	1	3	1	1	1	8	**19**
Bugumbe HC	0	1	0	1	0	0	0	8	**10**
Bware HC	0	1	0	1	0	0	0	3	**5**
Chinato HC	0	1	0	1	0	0	0	4	**6**
Mariwa HC	0	1	0	1	0	0	0	5	**7**
Muhuru HC	0	2	1	1	0	0	0	5	**9**
Ogwedhi HC	0	1	0	1	0	0	0	8	**10**
Ongo HC	0	1	0	1	0	0	0	5	**7**
Getongoroma Disp.	0	0	1	0	0	0	0	5	**6**
God Jope Disp	0	0	1	0	0	0	0	3	**4**
God Kwer Disp	0	1	0	0	0	0	0	5	**6**
Kitere Disp	0	0	1	0	0	0	0	4	**5**
Maeta Disp	0	0	1	0	0	0	0	5	**6**
Sibuoche Disp	0	0	1	0	0	0	0	4	**5**
Siruti Disp	0	0	1	0	0	0	0	3	**4**
Wath Onger Disp	0	1	0	0	0	0	0	3	**4**
Total	**13**	**34**	**15**	**54**	**9**	**8**	**9**	**200**	**342**

Source: Migori County Consolidated Annual Wok Plan (2021/2022)

Target population = 142 Supply Chain Managers (**13** Pharmacists, **34** Pharmaceutical Technologists , **15** Nurses , **54** Laboratory Technologists, **9** Nutrionists, and **8** Health Records & Information Officers and **9** S/CSTWG members), **200** Key Interview Informants (Patients) giving a total of **342**

3.4 Sample Size and Sampling Procedures

This part is comprised of the test range and sampling technique of the research. Sampling is the exercise of choosing some part of a cluster or the entire society from which a conclusion or inference about the population is made (Gill, Johnson & Clark, 2019).

3.4.1 Sample Size

This research used all the Supply Chain Managers and a sample of patients determined using simple random sampling. Yamane (1967) formula was used to determine the sample size. The formula is suitable for qualitative variables and is useful with a 95% confidence level and 0.5 population proportion (Adam, 2020). Yamane (1967) formula for establishing the size of the sample in random sampling was used to calculate patient sample size as follows:

$$\mathbf{n} = \frac{N}{N\varepsilon^2}$$

Where:

n = Sample size

N = Target Population (200)

ε = Error set at 5% (0.05)

Replacing the values in the formula gives,

$$\mathrm{n} = \frac{200}{200(0.05)^2}$$

n = 133

The study size therefore constituted of **275** respondents (**133** Supply Chain Managers, **142** Key Interview Informants). The patients were picked randomly from the **23** hospitals.

3.4.2 Sampling Procedure

The sampling method applied was simple random sampling for the patients and census for the supply chain managers. Elements in the population were picked randomly. Due to high degree of similarity among the focus group in respect to operations and difficulties, a simple random sampling procedure will be used in selecting 55% of the population. Sampling of elements for research is carried out in a manner that the units chosen are a representation of the enormous population from which they were picked (Calmorin, 2015).

3.5 Research Instruments

A questionnaires and interview schedules were used to gather data. Questionnaires were chosen due to their suitability and ease of administration. The survey used both open and closed questions. The standardized questions were rated on a 5-point Likert scale and given numerical values to facilitate quantitative analysis. The questionnaire was divided into six sections to collect data.

The questionnaire gathered data on; demographic and respondents' profile, Integration of Inventory Management Systems, Quantification Systems, Logistics Management Information Systems and Human Resource Management Systems and Healthcare Performance in Migori County, Kenya**.** The research instruments addressed the aspect of bias by making the questions to be one sided. Classification of data removed the chance for using the data against the respondents wish or for personal or malicious motives other than for academic purposes.

3.5.1 Piloting of the Instruments

The study instruments were trialled on a small sample comparable to the real sample which is homogeneous (Coopers et al., 2014). A 10% sample (Saunders, Lewis & Thornbill, 2007) selected from Kitui County Referral Hospital consisting of 2 Pharmacists, 2 Pharmaceutical Technologists, 1 Nurse, 1 Nutritionists, 4 Laboratory Technologists, 2 HRIOs and 8 patients was piloted. This facility has similar settings as the facilities selected for the study.

Pre-testing was carried out by discussing the questionnaire and the interview schedule with the supervisor, friends and colleagues to determine if the investigations measured what they were designed to test and if the respondents were able to decipher all the inquiries, similarly, establish if the statements and language of the survey were clear and if there was any specialist

predisposition. After the steering exercise, errors identified were revised consequently improving the instrument's reliability and legitimacy.

3.5.2 Validity

Three components of validity were observed for the instruments. Face validity was set up by evaluating the things on the instrument and guaranteeing that they were appropriate, comprehensive, adequate, and proper for the study. Content validity was established by the researcher by reviewing the testing procedure and determining whether it is accurately testing what it was designed to test. The items in the instruments were analyzed to make sure that they contained enough attributes expected to gauge the area under research. The researcher altogether assessed the pertinent resource materials to come up with a primary list of items denoting each of the research's theories in order to guarantee construct validity of the instruments. This list was shared with the supervisor for review and adoption.

3.5.3 Reliability

Reliability was ensured by employing a test-retest reliability coefficient. Dependability of the tool looked at the degree to which the instrument gave similar outcomes repeatedly to establish consistence. In this research, reliability was realized through internal consistency measure suggested by Calmorin (2015) who argued that internal consistency can be achieved by Cronbach Alpha.

When using the method, a recommended threshold of reliability is 0.7 (Saunders, Lewis & Thornbill, 2007). This study adopted this method to establish the reliability and when the collected data was analysed, the Cronbach Alpha coefficient achieved was 0.7 which is within the threshold recommended by Saunders, Lewis and Thornbill (2007).

3.6 Data Collection Procedures

The researcher requested permission to perform this research from the University of Nairobi. After obtaining approval and an introductory letter, then the researcher proceeded to gather data. The researcher sent questionnaires to respondents via email after calling them and explaining the intentions of the study. Some respondents were interviewed especially the patients. The researcher used two research assistants in data collection to make sure that all the sample size was reached within the shortest time possible.

3.7 Data Analysis Techniques

Raw data collected from the field was then edited, coded and entered into Statistical Package for Social Sciences (SPSS). The findings were then then analyzed using descriptive statistics, using the frequency distribution; percentages and means. According to Coopers and Coopers et al., (2014), descriptive statistics permit for meaningful explanation of distribution scores or observations by means of indices or statistics. Frequency distributions were generated from frequency counts of the responses by statistical tally process . Descriptive statistics such as means, standard deviation, frequencies and percentages were used to describe the data.

Means were determined for respective items. The mean was used as a measure of central tendancy, to determine the concentration of responses within the 5-point Likert rating scale range per item. Standard deviation was used to determine variations in the responces. The composite mean was calculated from individual means to give an overall mean for each objective. After analyzing the data, the results were presented in form of tables. The interview schedule was analysed and presented in a narrative format. The findings were presented depending on objectives and research questions. Each table was presided by a brief introduction. Descriptions, inferences and interpretations of the results were given after the table in reference to relevant literature reviewed earlier. Regression and Pearson correlation were also done (Calmorin, 2015). The overall multiple regression model adopted by this research was:

$Y= \beta_0+ \beta_1X_1+\beta_2X_2+ \beta_3X_3+ \beta_4X_4 + \varepsilon$ where:

Y is Healthcare Performance

X_1 is Integration of Inventory Management Systems

X_2 is Integration of Quantification Systems

X_3 is Integration of Logistics Management Systems

X_4 is Integration of Human Resource Management Systems

β_0 is the regression constant or intercept,

β_1, β_2, β_3, and β_4 are the unknown parameters (regression coefficients)

ε is the error term

3.8 Ethical Considerations

The researcher obtained approval to proceed with the study from the Ministry of Education, National Commission for Science Technology and Innovation (NACOSTI). A research permit allowing the student to conduct a study on this topic and in the given field of study with instructions to protect those who participates in the research was given. Consent form respondents was sought before participation in the study and every participant was assured of confidentiality. Voluntary participation was encouraged. In addition, the research did not collect any respondent's personal identification data to ensure that the privacy of the participants was not compromised.

The researcher guaranteed participants that the data collected was for scholarly purposes only and that it would be classified. This was done to guarantee that fair data was obtained and improved smooth cycle of information gathering. Lastly, the analyst guaranteed the members that no one would be misled about any data provided, and no names or individual identifiers would appear in the survey, the numbering of the surveys would be for academic reasons only. Other moral issues that emerged included plagiarism which was evaded through editing.

3.9 Operationalization of Variables

Table 3.2: Operationalization of Variables

Question	Indicators	Scale:1) Nominal:2) Ordinal:3)	Instrument	Statistics text
Inventory Management Systems	Updated bin cards, 3-6 months of stock, stock out rate	3	Interview and questionnaire	Qualitative & Quantitative
Quantification Systems	Forecasting tools availability, resource mobilization, forecasting errors	3	Interview and questionnaire	Qualitative & Quantitative
Logistics Management Information Systems	Availability of reports, reports on time, complete reports	3	Interview and questionnaire	Qualitative & Quantitative
Human Resource Management System	Commodity managers trained on basic commodity management, supportive supervision visits, performance review	3	Interview and questionnaire	Qualitative & Quantitative
Healthcare Performance (Dependent variable)	Access to health commodities, medical errors reported, number of advance events reported, and poor-quality medicines, efficiency of services	3	Interview and questionnaire	Qualitative & Quantitative

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter includes data analysis and findings for the research; the findings are displayed in terms of figures and tables. Tables were used to present findings descriptive and inferential analysis while Figures were used to show results on demographics. The analyzed data was presented under topics depicting each research objective.

4.2 Questionnaire Return Rate

The target population of the research questionnaire was 133 supply chain managers. The feedback rate is presented in Table 4.1.

Table 4.1: Return Rate

	Questionnaire	**Percentage**
Returned	102	77
Non-Returned	31	23
Total	**275**	**100**

Out of the 133 questionnaires issued, 102 were properly filled and returned while 31 were not returned. This gave a feedback rate of 77% as presented in Table 4.1which was satisfactory according to an argument by Coopers and Coopers et al. (2014) that a feedback rate above 60% is acceptable for a descriptive study. 100 KII were interviewed.

4.3 Demographic Findings

This section contains results on demographic analysis which included the respondent's information as well as information on the unit of analysis, that is the hospitals. It was considered important since categorical variables give crucial information about the respondents and the units under study.

4.3.1 Distribution of Respondent's Demographic Findings

This section contains results on respondent's demographic analysis which included the respondent's gender, highest level of education, present position at the hospital, duration of their current position as well as their cadre.

Table 4.2 Respondent's Demographic Findings

	Category	Frequency	Percent
Gender	Male	57	55.9
	Female	45	44.1
	Total	**102**	**100**
Education	Diploma	67	65.7
	Undergraduate	25	24.5
	Masters	9	8.8
	Doctorate	1	1
	Total	**102**	**100**
Cadre	Pharmacist	13	12.7
	Pharmaceutical Technologist	30	29.4
	Health Records & Information Officer	10	9.8
	Nurse	9	8.8
	Nutritionist	8	7.8
	Laboratory Technologist	32	31.4
	Total	**102**	**100**
Position	CHMT Member	1	1
	SCHMT Member	43	42.2
	Facility in Charge	3	2.9
	Facility Staff	55	53.9
	Total	**102**	**100**

Respondent's Duration in the current Position (Years)	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
	1	35	5.44	4.401

The results in Table 4.2 established that majority of the respondents 55.9% were males while females were 44.1%. This shows that there were more males working in Migori hospitals than females however the results met the requirements of the Kenyan 2010 Constitution requirement of one third gender rule. The respondents were also literate since majority of them, 65.7% had a Diploma. Those with a Degree were 24.5% while the respondents with a master's Degree were 8.8% and only 1% had a Doctorate. This implies that a large number of the staff in the public hospitals have a Diploma as their highest level of education.

The study findings also revealed that there was representativeness in the respondents across work position and cadre. Majority, of the respondents, 31.4% were however Lab Technologists, 29.4%

were Pharmaceutical Technologists, 12.7% Pharmacists, 9.8% HRIOs, 8.8% Nurses while the remaining 7.8% were Nutritionists. It was revealed that on average, the respondents had been in their current positions for an average of 5 years with the least being 1 year and the maximum duration being 35 years. A high standard deviation of 4.44 demonstrated high variability in work duration among the respondents. These findings generally demonstrated a wealth of experience and technical knowhow in the healthcare sector among the respondents as well as high literacy level to imply suitability in responding to the questionnaire.

The results also showed that there was good representation of all positions in the hospitals sampled with majority of the respondents reported to be Facility Staff at 53.9% followed by SCHMT members at 42.2%, then Facility in Charge 2.9% and finally CHMT members at 1% which was a good representation to imply that results were from a wide range of experience and interactions at different levels of management.

4.3.2 Demographic Findings on the Hospitals

This section contains results on demographic analysis of the unit of analysis, that is the hospitals describing their level, duration of operation and the number of staffs working in the supply chain department. The results are presented and explained in the subsection.

Table 4.3 Demographic Findings on the Hospitals

		Frequency	**Percent**	
Facility Level	County Referral Hospital	15	14.7	
	Sub County Hospital	67	65.7	
	Health Centre	16	15.7	
	Dispensary	4	3.9	
	Total	**102**	**100**	
	Minimum	**Maximum**	**Mean**	**Std. Deviation**
Number of Supply Chain Staff	1	46	5.15	7.13

The results in Table 4.3 indicated that respondents who participated in the study were sampled across hospitals from various levels ranging from the County Referral Hospital, Sub County Hospital, Health Centre and Dispensary. Majority of them, 65.7% were sampled from the Sub County Hospital's, followed by 15.7% from the Health Centre's and 14.7% from the County

Referral Hospital and 3.9% from Dispensary's. This demonstrated representativeness in the responses across healthcare facility level. It was also established each healthcare facility has an average of 5 staff in the supply chain department. The least facility had one staff and the maximum has 46. This implies that regardless of the level of healthcare facility, each has a supply chain staff.

4.4 Descriptive Findings

This section gives the response for each of the questions per variable. Descriptive statistics describes the response given in a Likert form. Mean and Standard deviations were adopted, and the standard deviations were used to indicate the variations in responses. The results were classified as follows: 1.0 – 2.4 was taken as a disagreement, 2.5 – 3.4 was classified as neutral and 3.5 – 5.0 was denoted as an agreement.

4.4.1 Integration of Inventory Management Systems

Statements on Integration of Inventory Management Systems were rated on a Likert scale and the measures of central tendency results are presented in Table 4.4.

Table 4.4 Descriptive Findings of Integration of Inventory Management Systems

Statement	Mean	Standard Deviation
Integration of Inventory Management Systems improves the number of products with updated bin cards.	4.66	0.52
Integration of Inventory Management Systems improves receiving of health products.	4.58	0.59
Integration of Inventory Management Systems improves issuing of health products.	4.53	0.56
Integration of Inventory Management Systems has led to introduction of order rationalization.	4.47	0.62
Integration of Inventory Management Systems increases order accuracy rate.	4.65	0.50
Integration of Inventory Management Systems influences availability of quality health products.	4.18	0.84
Integration of Inventory Management Systems reduces overstocking of health products in the hospital.	4.62	0.61
Integration of Inventory Management Systems leads to good storage conditions.	4.28	0.83
Integration of Inventory Management Systems improves on frequency of delivery of health products.	4.04	0.88
Order accuracy rate ensures hospitals are stocked according to plan.	4.62	0.63
Integration of Inventory Management Systems leads to fewer number of health products stocked out.	4.14	0.87

Integration of Inventory Management Systems reduces the number days health products are stocked out.	3.96	0.93
Integration of Inventory Management Systems reduces the number of hospitals stocked out health products.	4.02	0.84
Integration of Inventory Management Systems reduces wastage due to expiries of health products at the hospital.	4.55	0.59
Integration of Inventory Management Systems reduces wastage due to pilferage of health products at the hospital.	4.37	0.74
Total	**65.67**	**10.55**
Composite Mean and SD	**4.38**	**0.70**

From Table 4.4, most of the participants interviewed agreed that integration of inventory management systems improves the number of products with updated bin cards (Mean = 4.66), receiving of health products (Mean = 4.58) and issuing of health products (Mean = 4.53). It was also agreed that integration of inventory management systems has led to introduction of order rationalization (Mean = 4.47), an increase in order accuracy rate (Mean = 4.65), has influenced availability of quality health products (Mean = 4.18), has reduced overstocking of health products in the hospital (Mean = 4.62) as well as led to good storage conditions (Mean = 4.28).

The respondents also agreed that integration of stock control systems improves on frequency of delivery of health products (Mean = 4.04), leads to fewer number of health products stocked out (Mean = 4.62), reduces the number days health products are stocked out (Mean = 4.14), reduces wastage due to expiries of health products at the hospital (Mean = 4.02) as well as reduces wastage due to pilferage of health products at the hospital (Mean = 4.55). It was also indicated that it has integration of Inventory Management Systems reduces wastage due to pilferage of health products at the hospital (Mean = 4.37). Most of the respondents however expressed neutrality with the statement that inventory management systems reduce the number hospitals stocked out of health products (Mean = 3.96). The standard deviation was high at (SD = 0.93) showing that there was mixed feeling from the respondents on the association between inventory management systems and stock out rates. Overall, there was an agreement that integration of inventory management improves healthcare performance in Migori County (Composite Mean = 4.38). The overall standard deviation was small to demonstrate that there was a small variation in the responses (SD = 0.70).

In addition, the respondents were asked an open-ended question to explain how else integration of inventory management systems has influenced healthcare performance in their hospital. It was

established that other ways in which inventory management systems influenced healthcare performance was by highlighting overstocked facilities for redistribution, enhancing good inventory management, ensuring reports are easily availed, enhancing forecasting and quantification, enhancing accountability of commodity usage, facilitating easy ordering of commodities.

These results are consistent with that of a study by Olankule (2015) who found out that successful stock control systems increase a firm's returns, minimize cost and create competitive edge and facilitates availability of proper amounts of inventory thus building client contentment levels due to enhanced service delivery.

A KII interview was also conducted for the interviewees to discuss their feelings in detail in relation to the influence of integration of inventory control systems on healthcare performance in Migori County in terms of accessibility of medicine, comprehensive care & full dosages. Generally, majority of the interviewees stated that access to medicines was still a challenge even though the delivery of services had improved as a result of the integration. This was supported by some of the sampled interviewees below who had the following to say:

> ... accessibility is good and I got all the service but lacked some of the doses prescribed and had to buy from outside.... *KII, Female respondent, Patient.*
>
> ... Yes, I got medicine, but sometimes it's not available. No, I didn't get all the services in the hospital. And I didn't get all the medicine prescribed.... *KII, Male respondent, Patient.*
>
> ... accessibility is not easy but I got all services although I didn't get all the drugs as prescribed had to buy some from chemist.... *KII, Female respondent, Patient.*
>
> ... accessibility is hard. It is not possible to get all the services and doses as required.... *KII, Male respondent, Patient.*

On the other hand, some interviewees felt that integration of inventory management systems had greatly improved access to medicines, comprehensive care & full dosages. This was supported by some of the sampled interviewees below who had the following to say:

... I am able to get all the commodities I require whenever I go for treatment.... *KII, Female respondent, Patient.*

... yes, I got all the prescribed medicines.... *KII, Male respondent, Patient.*

... accessibility is good and was able to get all the services and doses as prescribed.... *KII, Female respondent, Patient.*

... yes, I got all the prescribed medicines.... *KII, Male respondent, Patient.*

... medicine is easily accessed from pharmacy.... *KII, Female respondent, Patient.*

4.4.2 Integration of Quantification Systems

Statements on Integration of Quantification Systems were constructed on a Likert scale and the measures of central tendency findings are shown in Table 4.5.

Table 4.5 Descriptive Findings of Integration of Quantification Systems

Statement	Mean	Standard Deviation
Integration of Quantification Systems leads to availability of bin cards.	4.19	0.86
Integration of Quantification Systems leads to availability of delivery notes.	4.25	0.85
Integration of Quantification Systems leads to availability of DARs.	4.21	0.76
Integration of Quantification Systems leads to availability of CDRRs.	4.21	0.84
Availability of forecasting tools reduces the time needed when forecasting for health products.	4.53	0.58
Integration of Quantification Systems leads to decrease in forecasting errors.	4.45	0.57
Proper forecasting and supply planning leads to availability of right health products for health care.	4.58	0.65
Integration of Quantification Systems ensures availability of health products in all levels of healthcare.	4.28	0.84
Integration of Quantification Systems reduces the number of counterfeit products in hospitals.	3.81	1.08
Proper forecasting and supply planning reduces the number of emergency orders.	4.50	0.61
Integration of Quantification Systems streamlines procurement of commodities from qualified suppliers	4.16	0.94
Integration of Quantification Systems provides data useful in planning, mobilizing and securing financial resources.	4.61	0.69

Integration of Quantification Systems leads to prioritization of the most critical requirements.	4.51	0.66
Integration of Quantification Systems reduces the cost of carrying out quantification process	4.23	0.79
Increased funding for health products ensures availability of the commodities.	4.43	0.72
Total	**64.95**	**11.44**
Composite Mean and SD	**4.33**	**0.76**

Results in Table 4.5 indicated that most respondents are in agreed that integration of quantification systems leads to availability of bin cards (Mean = 4.19), delivery notes (Mean = 4.25), DARs (Mean = 4.21) and CDRRs (Mean = 4.21). The results also showed an agreement that availability of forecasting tools reduces the time needed when forecasting for health products (Mean = 4.53), integration of quantification systems leads to decrease in forecasting errors (Mean = 4.45), proper forecasting (Mean = 4.58) and supply planning leads to availability of right health products for health care (Mean = 4.28). However, the respondents felt slightly convinced that integration of quantification systems reduces the number of counterfeit products in hospitals (Mean = 3.81) which was below the Composite Mean = 4.33 and had high standard deviation of 1.08 meaning that the responses were widely varied among the participants.

It was also demonstrated that proper forecasting and supply planning reduces the number of emergency orders (Mean = 4.50), integration of Quantification Systems streamlines procurement of commodities from qualified suppliers (Mean = 4.16), provides data useful in planning, mobilizing and securing financial resources (Mean = 4.61), prioritization of the most critical requirements (Mean = 4.51), reduces the cost of carrying out quantification process (Mean = 4.23) as well as increased funding for health products which ensures availability of the commodities (Mean = 4.43). Overall, there was an agreement that integration of quantification systems enhances healthcare performance in Migori County (Composite Mean = 4.33). The overall standard deviation was small to demonstrate that there was a small variation in the responses (SD = 0.76).

The respondents were also asked through an open-ended question to explain how else integration of quantification systems has influenced healthcare performance in their hospitals. In addition to the above responses, the respondents linked implementation of quantification systems to improved budgetary allocation for healthcare products thus availability of commodities, maintained lead

time, help in planning and therefore ensuring availability of commodities at all levels of service delivery points ensuring reduced stockouts.

The respondents also indicated that implementation of quantification systems ensure that there is availability of quality forecasting data which enhances quick decision making, timely ordering and restocking which ultimately improves delivery of healthcare. This is also agreed with Kamalapur (2018) who indicated that proper forecasting helped to minimize forecast errors resulting in decreased cases of overstocking which then decreases storage costs.

A KII interview was also conducted for the interviewees to discuss their feelings in detail regarding how integration of quantification systems influences healthcare performance in Migori County in terms of drug availability, type, and formulation in public hospitals. Generally, majority of the interviewees stated that availability of all types of medicines and categories was still a challenge even though the delivery of services had improved as a result of the integration. This was supported by some of the sampled interviewees below who had the following to say:

> ... Availability of drugs is not consistent, and children are given children drugs.... *KII, Female respondent, Nurse.*
>
> ... medicines availability is poor but services are there.... *KII, Female respondent, Nutritionist.*
>
> ... Drugs availability is good but not all the types, so we buy some from outside chemists. Kids do get their formulations.... *KII, Male respondent, Pharmacist.*
>
> ... Medicine availability is low since most of the drugs we don't get from the hospital, and we have to buy. Most available medicines are for HIV clients.... *KII, Female respondent, Patient.*
>
> ... There is shortage of medicine since most of the time we are told to buy from the chemist outside. Sometimes even Panadol is not there. The children are able to get their medicines.... *KII, Male respondent, Patient*

On the other hand, some interviewees felt that integration of quantification systems had greatly improved availability of all types of medicines and categories. This was supported by some of the sampled interviewees below who had the following to say;

> ... there is availability of most drugs prescribed. Yes, children are able to get syrups.... *KII, Male respondent, Pharmacist.*
>
> ... Medicines are readily available. I was able to get all the medicines prescribed by the doctor and children also get their type of medicines.... *KII, Female respondent, Patient.*

4.4.3 Logistics Management Information Systems

Statements on Integration of Logistics Management Information Systems were evaluated on a Likert scale and the measures of central tendency results are shown in Table 4.6.

Table 4.6 Descriptive Findings of Integration of Logistics Management Information Systems

Statement	Mean	Standard Deviation
Integration of LMIS improves health commodity reporting rate.	4.67	0.59
Availability of data provides information for decision making.	4.80	0.40
Integration of LMIS makes it easier to access commodity data at all levels.	4.68	0.58
Availability of data helps in development of dashboards for commodity data visibility.	4.67	0.60
Data visibility helps in targeted commodity redistribution.	4.64	0.66
Integration of LMIS improves health commodity on time reporting.	4.55	0.65
Integration of LMIS has led to improved timely exchange of data between supplier and hospital.	4.31	0.81
Timelines of reporting influences resupply of health products.	4.61	0.62
Timely resupply of health products improves efficiency of health care.	4.75	0.43
Constant sharing of logistics data among partners improves on targeted support.	4.73	0.45
Integration of LMIS improves data completeness.	4.56	0.54
Integration of LMIS improves data collection/documentation.	4.54	0.62
Complete data ensures availability of the right medicine in the correct dosage for health care.	4.41	0.72
Integration of LMIS improves data accuracy	4.58	0.53
Data accuracy improves on the right medication.	4.42	0.78
Total	**68.92**	**8.98**
Composite Mean and SD	**4.59**	**0.60**

The results presented in Table 4.6 showed that most of the respondents were in agreement with the statements that integration of LMIS improves health commodity reporting rate (Mean = 4.67), makes it easier to access commodity data at all levels (Mean = 4.68), improves health commodity

on time reporting (Mean = 4.55) as well as timely exchange of data between supplier and hospital (Mean = 4.31). The respondents also agreed that integration of LMIS improves data completeness (Mean = 4.55), data collection/documentation as well as improves data accuracy (Mean = 4.58).

Furthermore, it was agreed that availability of data helps in development of dashboards for commodity data visibility (Mean = 4.67), data visibility helps in targeted commodity redistribution (Mean = 4.64) and availability of data provides information for decision making (Mean = 4.80). From the study it was also determined that timelines of reporting influences resupply of health products (Mean = 4.61), timely resupply of health products improves efficiency of health care (Mean = 4.75), constant sharing of logistics data among partners improves on targeted support (Mean = 4.73), complete data ensures availability of the right medicine in the correct dosage for health care (Mean = 4.41) and data accuracy improves on the right medication (Mean = 4.42). Overall, there was an agreement that integration of logistics management systems improved healthcare performance in Migori County (Composite Mean = 4.59). The average standard deviation was small to demonstrate that there was a small variation in the responses (SD = 0.60).

The respondents further explained how else integration of logistics management information systems has influenced healthcare performance in their hospitals. They stated that integration of logistics management information systems has led to efficiency, improved turnaround time which has improved availability of commodities and reduced stockouts, has improved data availability and quality which enhances reporting, planning, accuracy, accountability and decision making thus overall improving delivery of healthcare services. Similarly, WHO (2016) linked better healthcare service delivery, efficiency, improved turnaround time which has improved availability of commodities and reduced stockouts to integration of logistics management information systems.

Moreover, a KII was conducted for the interviewees to discuss their opinion in detail on the influence of integration of logistics management information systems on healthcare performance in Migori County in terms of accuracy, and timeliness of care. Most of the interviewees argued that integration of information management systems had greatly improved healthcare performance in Migori County in terms of accuracy and timeliness of care. They cited an average of one hour as the maximum queuing time they had, but generally, the time taken to receive healthcare services very small. This was supported by some of the sampled interviewees below who had the following to say;

... I have taken short time. The doctors in the hospital are very thorough.... *KII, Male respondent, Patient.*

... It took short time to get treatment. I believe the treatment was accurate.... *KII, Female respondent, Patient.*

... Approximately five minutes..... *KII, Female respondent, Nurse.*

... It took short time to get treatment. I believe the treatment was accurate.... *KII, Female respondent, Patient.*

On the contrary, other interviews felt that integration of LMIS has not greatly enhanced healthcare performance in Migori County in terms of accuracy, and timeliness of care. These respondents cited long queuing time and average services. This was supported by some of the sampled interviewees below who had the following to say;

... waiting time takes a bit longer, the services are average.... *KII, Male respondent, Patient.*

... waiting time sometimes takes longer, and the service offered is fair.... *KII, Male respondent, Patient.*

... It took very long since there are a few doctors. Treatment is good..... *KII, Female respondent, Patient.*

... Quality of care is not good but the services are given in good time.... *KII, Male respondent, Patient.*

4.4.4 Integration of Human Resource Management Systems

Statements on Integration of Logistics Management Information Systems were assessed on a Likert scale and the measures of central tendency results are shown in Table 4.7.

Table 4.7 Descriptive Findings of Integration of Human Resource Management Systems

Statement	Mean	Standard Deviation
Integration of HRM Systems improves availability of supply chain staffs.	4.18	0.91
Integration of HRM Systems helps in providing training courses for workers in the hospitals.	4.23	0.81

Integration of HRM Systems empowers staff to provide comprehensive health care.	4.34	0.68
Integration of HRM Systems leads to reduced medical errors.	4.11	0.77
Integration of HRM Systems improves adherence to standard treatment guidelines (STGs).	4.25	0.74
Integration of HRM Systems leads to establishment of staff performance review plan.	4.36	0.66
Integration of HRM Systems improves management support to healthcare workers.	4.34	0.71
Integration of HRM Systems improves working conditions to hospital's staff.	3.95	0.92
Integration of HRM Systems provides material and moral incentives for employees working in government hospitals.	3.66	1.04
Availability of health products boosts the morale of healthcare workers.	4.53	0.69
Integration of HRM Systems increases the rate of integrated Supportive Supervision Visits (iSSVs).	4.07	0.91
On job trainings are carried out during supportive supervision visits.	4.48	0.67
ISSVs help in boosting confidence of health care workers.	4.37	0.64
Integration of SSV reduces the time-of-service interruption by the supervision team.	3.98	0.95
Integration of SSV provides a platform for recognition and reward for good performance.	4.12	0.79
Total	**62.97**	**11.89**
Composite Mean and SD	**4.20**	**0.79**

The findings in Table 4.7 showed that the participants agreed that integration of HRM Systems improves availability of supply chain staffs (Mean = 4.18), helps in providing training courses for workers in the hospitals (Mean = 4.23), empowers staff to provide comprehensive health care (Mean = 4.34), leads to reduced medical errors (Mean = 4.11) and improves adherence to standard treatment guidelines (STGs) (Mean = 4.25).

The respondents also agreed that integration of HRM systems leads to establishment of staff performance review plan (Mean = 4.36), improves management support to healthcare workers (Mean = 4.34), as well as increases the rate of integrated Supportive Supervision Visits (iSSVs) (Mean = 4.07). Integration of SSV provides a platform for recognition and reward for good performance (Mean = 4.12), on job trainings are carried out during supportive supervision visits (Mean = 4.48) and integrated supportive supervision visits help in boosting confidence of health care workers (Mean = 4.37.

However, respondents slightly felt that integration of SSV reduces the time-of-service interruption by the supervision team (Mean = 3.98). The standard deviation was high (SD = 0.95) showing that there was high variation in the responses. Additionally, the respondents felt that integration of HRM systems slightly improves working conditions to hospital's staff (Mean = 3.95) whereby the responses were widely varied (SD = 0.920. Further, the respondents were not sure whether integration of HRM systems provided material and moral incentives for employees working in government hospitals or not (Mean = 3.66). The standard deviation was high (SD = 1.04) showing that there were high variations in the responses. This shows that some hospitals reward their employees while others don't. Overall, there was an agreement integration of human resource management systems enhances healthcare performance in Migori County (Composite Mean = 4.20). The overall standard deviation was small to demonstrate that there was a small variation in the responses (Composite SD = 0.79).

In addition, the respondents were requested to explain how else integration of human resource management systems has influenced healthcare performance in their hospital. They indicated that integration of human resource management systems has enhanced employment decision making, staff knowledge and skills on matters inventory management, enabled skill classification per department, proper placement of the right staff to do the right job as well as re-distribution of specialized staff to the areas where they are most required.

The respondents also indicated that it has led to an improved teamwork and cohesion, ensured availability of qualified personnel in the health facilities, ensures there is enough personnel is the hospital, ensures proper and efficient management of staff, reduces excuses among the health care providers and promotes timely feedback.

Moreover, a KII was conducted for the interviewees to discuss their opinion in detail on how Integration of Human Resource Management Systems influence Healthcare Performance in Migori County in terms of staff availability, attitude, feedback, expertise, and customer care. It was determined that most of the participants expressed dissatisfaction with the current staffing citing cases of shortages. Most of the interviewees argued that despite integration of HRM systems, the solution to staff shortages was far from being over. This was supported by some of the sampled interviewees below who had the following to say;

> ... staff are not enough here. The few who are working in this hospital relate well with clients. They explain very well on all medication.... *KII, Female respondent, Laboratory Technologist.*
>
> ... there is under staffing.... *KII, Male respondent, Pharmaceutical Technologist.*
>
> ... there staff are not enough at all since sometimes there is only one health care worker sometimes and the patients are many. The staff give good feedback. Some of the staff are not well qualified since they are not able to explain properly to the patients about their conditions. Customer care is not good..... *KII, Female respondent, patient.*
>
> ... there is under staff in MCH but feedback is given well. They are well qualified on their area. Customer care is good.... *KII, Male respondent, Patient.*

On the contrary, a few indicated that integration of HRM systems has greatly improved staff availability, attitude, feedback, expertise, and customer care. This was supported by some of the sampled interviewees below who had the following to say;

> ... there is good customer care.... *KII, Male respondent, Patient.*
>
> ... there is good customer care but the problem is lack of drugs.... *KII, Female respondent, Patient.*
>
> ... the staff are enough. They work and relate well with clients. They are experts..... *KII, Male respondent, Health and Records Officer.*
>
> ... Yes, the hospital has enough staff. Yes, there was counselling at all level. There is good customer care in this hospital.... *KII, Female respondent, Nutritionist.*

4.4.5 Healthcare Performance

Statements on Healthcare Performance were evaluated on a Likert scale and the measures of central tendency findings are shown in Table 4.8.

Table 4.8 Descriptive Findings of Healthcare Performance

Statement	Mean	Standard Deviation
Availability of enough supply chain staff leads to improved healthcare.	4.64	0.52
Availability of specialized personnel help to deliver efficient and timely services to customers.	4.65	0.50
Availability of health products leads to efficiency in provision of health services.	4.66	0.50
Availability of medicines ensures that patients can be given full dosage improving health care effectiveness.	4.73	0.47
Motivated healthcare workers provide quality health services.	4.71	0.57
Availability of high-quality commodities ensures safety of care.	4.63	0.56
Availability of health products increases adherence to medication hence reduced drug resistance.	4.25	0.93
Availability of health products ensures that patients/clients can access healthcare services whenever needed.	4.63	0.66
Reduced medical errors guarantees safety of healthcare.	4.60	0.65
Adherence to standard treatment guidelines leads to quality healthcare.	4.75	0.48
Comprehensive health care reduces the time needed for hospital visits.	4.42	0.80
Availability of health products in all levels reduces the amount of money used in search of care.	4.48	0.81
Availability of health products in lower levels reduces the cost of treatment.	4.42	0.72
Reduced cost of inventory management frees up funds for other health services.	4.18	0.87
Procurement of health products from conventional suppliers reduces the cost of commodities.	3.97	0.93
Total	**67.72**	**9.97**
Composite Mean and SD	**4.51**	**0.66**

Results in Table 4.8 established that among the participants, availability of enough supply chain staff leads to improved healthcare (Mean = 4.64), availability of specialized personnel help to deliver efficient and timely services to customers (Mean = 4.65), availability of health products leads to efficiency in provision of health services (Mean = 4.66) and that availability of medicines also ensures that patients can be given full dosage improving health care effectiveness (Mean = 4.73).

It was also established that motivated healthcare workers provide quality health services (Mean = 4.71), availability of high-quality commodities ensures safety of care (Mean = 4.63), availability of health products increases adherence to medication hence reduced drug resistance (Mean = 4.25), availability of health products ensures that patients/clients can access healthcare services whenever needed (Mean = 4.63) and that reduced medical errors guarantees safety of healthcare (Mean = 4.60). The respondents also stated that adherence to standard treatment guidelines leads to quality healthcare (Mean = 4.75), comprehensive health care reduces the time needed for hospital visits (Mean = 4.42), availability of health products in all levels reduces the amount of money used in search of care (Mean = 4.48), availability of health products in lower levels reduces the cost of treatment (Mean = 4.42), reduced cost of inventory management frees up funds for other health services (Mean = 4.18). The respondents however, agreed to a lesser extent that procurement of health products from conventional suppliers reduces the cost of commodities (Mean = 3.97). The standard deviation was high (0.93) showing that there was high variation in the responses.

Overall, there was an agreement that the healthcare performance of the public healthcare facilities in Migori County had improved as a result of integration of supply chain systems (Composite Mean = 4.51). The average standard deviation was small to demonstrate that there was a small variation in the responses (SD = 0.66).

Likewise, a KII was conducted for the interviewees to have their in-depth opinion on the Healthcare Performance received from Migori County public hospitals in terms of quality, safety, and affordability of care. Mixed responses were established which led to the conclusion that the healthcare offered in Migori County public hospitals in terms of quality, safety, and affordability was not satisfactory. While some patients indicated that the healthcare was affordable, they sharply contrasted its quality. This was supported by some of the sampled interviewees below who had the following to say;

> ... health services are cheap but very poor and need be taken to national Government.... *KII, Female respondent, Patient.*
>
> ... healthcare services are free the issue is lack of some drugs.... *KII, Male respondent, Patient.*
>
> ... cost of healthcare services is low. The quality of healthcare is good since mostly the standard treatment guidelines are followed but the problem is lack

> of medicines so sometimes, I don't see the need of going to the hospital.... *KII, Male respondent, Patient.*
>
> ... Every time I come, I have never found all the drugs I need and am forced to buy from outside. I don't use a lot of money in search of medicine and the cost of treatment is also low. Quality and safety of care is good.... *KII, Male respondent, Patient.*

Other interviewees stated that the healthcare was expensive and of poor quality. This was supported by some of the sampled interviewees below who had the following to say;

> ... health is very expensive and we are buying drugs outside.... *KII, Female respondent, Patient.*
>
> ... I use a lot of money before accessing healthcare services.... *KII, Male respondent, Patient.*
>
> ... I spend a lot of money to get to hospital and treatment is expensive. Healthcare services here are average but safety is guaranteed.... *KII, Male respondent, Patient.*

Others indicated that the healthcare quality was both affordable and of good quality as well as safe. This was supported by some of the sampled interviewees below who had the following to say;

> ... the quality of services is good it's not that expensive and it's safe to attend to the hospitals.... *KII, Female respondent, Patient.*
>
> ... the quality of care is of high standard.... *KII, Male respondent, Patient.*
>
> ... mostly treatment is free and quality of care is high.... *KII, Male respondent, Patient.*

On the contrary, others outrightly indicated that the healthcare quality was very bad regardless of cost. This was supported by some of the sampled interviewees below who had the following to say;

> ... health services are not good.... *KII, Male respondent, Patient.*
>
> ... Quality of care is fair.... *KII, Female respondent, Patient.*

4.5 Correlation Analysis

Correlation analysis was carried out to determine if indeed there existed any relationship between integration of health supply chain systems that is inventory management systems, quantification systems, logistics management information systems as well as human resource management systems in supply chain and healthcare performance. The findings are presented in Table 4.9.

Table 4.9 Correlation Results

		X1	X2	X3	X4	Healthcare Performance
Integration of Inventory Management Systems (X1)	Pearson Correlation	1				
	Sig. (2-tailed)					
Integration of Quantification Systems (X2)	Pearson Correlation	.707**	1			
	Sig.(2-tailed)	0.000				
Integration of Logistics Management Systems (X3)	Pearson Correlation	.644**	.719**	1		
	Sig. (2-tailed)	0.000	0.000			
Integration of HRM Systems (x4)	Pearson Correlation	.639**	.671**	.555**	1	
	Sig. (2-tailed)	0.000	0.000	0.000		
Healthcare Performance	Pearson Correlation	.612**	.648**	.681**	.696**	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	
	N	102	102	102	102	102

** Correlation is significant at the 0.01 level (2-tailed).

The findings in Table 4.9 show that integration of health supply chain systems that is inventory management systems, quantification systems, logistics management information systems as well as human resource management systems has a positive and significant effect on healthcare performance. In order of strengths, integration of HRM systems had the strongest effect on

healthcare performance followed by integration of logistics management information systems, then integration of quantification systems and lastly integration of inventory management systems.

The correlation results indicated that integration of HRM systems had a beneficial and significant effect on healthcare performance ($r = 0.696$; $P < 0.05$). This shows that enhancing integration of HRM systems through practices such as skills development, supportive supervision and performance review is associated with a significant improvement in healthcare performance. The study by Huo, Han, Chen and Zhao (2015) similarly demonstrated that there was a connection between a group of high-engagement HRM processes that focus on enhancing staff conducts, achievement and supply chain integration.

It was further demonstrated that integration of quantification systems had a positive and significant effect on healthcare performance ($r = 0.648$; $P < 0.05$). This shows that enhancing integration of quantification systems through practices such as using forecasting tools, resource mobilization and minimization of forecasting error is associated with a significant improvement in healthcare performance. This was in agreement to the observations from a study by Durbha (2016) which denoted that systematic forecasting and supply planning have assisted in advancing information systems and overall supply chain management.

The results also indicated that integration of logistics management information systems had a positive and significant effect on healthcare performance ($r = 0.681$; $P < 0.05$). This implies that putting in place practices aimed at ensuring availability of data, timeliness and data completeness is associated with a significant improvement in healthcare performance. The study by JSI (2017) indicated that integration of LMIS system is associated with supply chain data visibility across all levels to enhance supply chain performance and healthcare service delivery.

It was also established that integration of inventory management systems had a positive and significant effect on healthcare performance ($r = 0.612$; $P < 0.05$). This implies that putting in place practices that ensure there is inventory accuracy rate, stocking according to plan and having systems to detect early stockout rates is associated with a significant improvement in healthcare performance. The results were in agreement with that of Shajema (2018) who determined that inventory management systems have a constructive and major impact on the firm performance.

4.6 Multiple Regression Analysis

The study used this inferential method to establish the nature and magnitude of the influence of integration of health supply chain systems on healthcare performance. The multiple regression results present the model summary results, ANOVA and regression coefficients results.

4.6.1 Coefficient of Determination

The coefficient of determination results (R-square) denotes the variation in the dependent variable (healthcare performance) accounted for by the independent variables (inventory management systems, quantification systems, logistics management information systems as well as human resource management systems in supply chain). The findings are shown in Table 4.10.

Table 4.10 Regression Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.784	0.615	0.599	0.25327

a. Predictors: (Constant), Integration of HRM Systems, Logistics Management Information Systems, Integration of Inventory Management Systems, Integration of Quantification Systems

The results in Table 4.10 gives the model summary which imply that the four variables, that is inventory management systems, quantification systems, logistics management information systems as well as human resource management systems in supply chain accounted for up to 61.5% of the variation in healthcare performance in Migori County. This percentage is big implying the importance of this integration. Other than that, the remaining variation can be predicted by other factors.

4.6.2 ANOVA test of Model Fitness

The study also tested for the fitness of the regression model linking the variables. The results are presented in Table 4.11.

Table 4.11 ANOVA test of Model Fitness

	Sum of Squares	df	Mean Square	F	Sig.
Regression	9.951	4	2.488	38.782	.000
Residual	6.222	97	0.064		
Total	**16.173**	**101**			

a. Dependent Variable: Healthcare Performance
b. Predictors: (Constant), Integration of HRM Systems, LMIS, Integration of Inventory Management Systems, Integration of Quantification Systems

As shown in Table 4.11 and through the F test, it was established that the F-calculated value of 38.782 was larger than the F-critical ($F_{0.05,4,97}$) value of 2.465 implying that the model was significant. The P-value (Sig = 0.000 < 0.05) implied that the regression model linking integration of health supply chain systems to healthcare performance was significant and fit. Therefore, any conclusions drawn from it are relevant.

4.6.3 Multiple Regression Model Coefficients

The regression model coefficients established the relationship between variables of the study as presented in Table 4.12.

Table 4.12 Multiple Regression Model Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	0.758	0.322		2.354	0.021
Integration of Inventory Management Systems	0.071	0.09	0.076	0.787	0.433
Integration of Quantification Systems	0.059	0.103	0.063	0.579	0.564
Integration of LMIS	0.392	0.102	0.363	3.84	0.000
Integration of HRM Systems	0.321	0.071	0.404	4.508	0.000
Dependent Variable: Healthcare Performance					

Multiple Regression Equation

Healthcare Performance = 0.758 + 0.071 (Integration of Inventory Management Systems) + 0.059 (Integration of Quantification Systems) + 0.392 (Integration of Logistics Management Information Systems) + 0.321 (Integration of HRM Systems)

This equation shows that all the four integration of health supply chain systems have a positive effect on healthcare performance. However, only integration of logistics management information systems as well as human resource management systems in supply chain has a significant effect on healthcare performance. On the contrary, integration of inventory management systems and quantification systems have an insignificant effect on healthcare performance.

The regression model coefficients in Table 4.12 demonstrates that all other factors held constant at zero, healthcare performance of facilities in Migori County would be both positive and significant (Constant = 0.758; P-value < 0.05). This implies that other factors other than integration of supply chain systems have a positive effect on healthcare performance of the facilities.

In addition, it was demonstrated that integration of logistics management systems has a positive and significant effect on healthcare performance of the healthcare facilities in Migori County (β = 0.392; P-value < 0.05). It can also be established that integration of HRM systems has a positive and significant effect on healthcare performance of the healthcare facilities in Migori County (β = 0.321; P-value < 0.05). In regard to integration of inventory management systems, it was demonstrated that even though it has a positive effect on healthcare performance of the healthcare facilities in Migori County, this effect was not significant (β = 0.071; P-value > 0.05). Similarly, it was demonstrated that even though integration of quantification systems has a positive effect on healthcare performance of the healthcare facilities in Migori County, this effect was not significant (β = 0.059; P-value > 0.05).

4.7 Discussions

4.7.1 Integration of Inventory Management Systems and Healthcare Performance.

Integration of inventory management systems improves healthcare performance in Migori County (Composite Mean = 4.38). The overall standard deviation was small to demonstrate that there was a small variation in the responses (SD = 0.70). This was in agreement with a study by Shajema (2018) on the Vendor Management Inventory Systems (VMI) and lean practices stated that proper stock control is significant in delivery of services at minimized costs. Further, integration of inventory management systems has a positive and significant effect on healthcare performance ($r = 0.612$; $P < 0.05$). This implies that putting in place practices that ensure there is inventory accuracy rate, stocking according to plan and having systems to detect early stockout rates is associated with a significant improvement in healthcare performance. The results were in agreement with that of Shajema (2018) who determined that inventory management systems have a constructive and major impact on the firm performance.

However, from the regression analysis, it was demonstrated that even though integration of stock control systems has a positive effect on healthcare performance of the healthcare facilities in Migori County, this effect was not significant ($\beta = 0.071$; P-value > 0.05). This implies that the current inventory management systems have not strongly been implemented to significantly improve healthcare performance in Migori County, which calls for an improvement in its adoption. These findings agree with that of a study by Meng (2016) who established that successful stock control systems would result in proper procurement which would ultimately enhance the supply chain.

4.7.2 Integration of Quantification Systems and Healthcare Performance

Integration of quantification systems enhances healthcare performance in Migori County (Composite Mean = 4.33). The overall standard deviation was small to demonstrate that there was a small variation in the responses (SD = 0.76). A study by Chopra and Meindl (2016) established that implementation of quantification systems enhances forecasting process which then leverage on resources and produce desired results of improved supply chain performance. In addition, integration of quantification systems has a positive and significant effect on healthcare performance ($r = 0.648$; $P < 0.05$). This shows that enhancing integration of quantification systems through practices such as using forecasting tools, resource mobilization and minimization of

forecasting error is associated with a significant improvement in healthcare performance. This was in agreement to the observations from a study by Durbha (2016) which denoted that systematic forecasting and supply planning have assisted in advancing information systems and overall supply chain management.

On the contrary even though integration of quantification systems has a positive effect on healthcare performance of the healthcare facilities in Migori County, this effect was not significant ($\beta = 0.059$; P-value > 0.05). This similarly implies that the current quantification systems have not strongly been implemented to significantly improve healthcare performance in Migori County, which calls for an improvement in its adoption. This is in agreement with the results from research by Durbha (2016) which established that systematic forecasting and supply planning have assisted in advancing information systems and overall supply chain management.

4.7.3 Integration of Logistics Management Information Systems on Healthcare Performance.

Integration of logistics management systems improved healthcare performance in Migori County (Composite Mean = 4.59). The average standard deviation was small to demonstrate that there was a small variation in the responses (SD = 0.60). The results were in agreement with the argument by Greenwell and Salentine (2018) that the main aim of the LMIS is stock control to ensure uninterrupted supply of health commodities and provide information useful for assessing relevant indicators of health system performance. Furthermore, integration of logistics management information systems had a positive and significant effect on healthcare performance ($r = 0.681$; $P < 0.05$). This implies that putting in place practices aimed at ensuring availability of data, timeliness and data completeness is associated with a significant improvement in healthcare performance. This was consistent with findings from a study by JSI (2017) indicated that integration of LMIS system is associated with supply chain data visibility across all levels to enhance supply chain performance and healthcare service delivery. In addition, integration of logistics management systems has a positive and significant effect on healthcare performance of the healthcare facilities in Migori County ($\beta = 0.392$; P-value < 0.05). This implies that a unit increase in integration of logistics management systems leads to a significant improvement in healthcare performance of the healthcare facilities in Migori County by 0.392 units. The results agree with that of research by JSI (2017) indicated that integration of LMIS

system is associated with supply chain data visibility across all levels in order to better supply chain performance and health service delivery.

4.7.4 Integration of Human Resource Management Systems and Healthcare Performance

Integration of human resource management systems enhances healthcare performance in Migori County (Composite Mean = 4.20). The overall standard deviation was small to demonstrate that there was a small variation in the responses (Composite SD = 0.79). The findings were in agreement to that of a study by Hirudayaraj and Matic (2021) which established that effective SCM depends on the efficiency of the human resource in the SC. Additionally, integration of HRM systems has a beneficial and significant effect on healthcare performance ($r = 0.696$; $P < 0.05$). This shows that enhancing integration of HRM systems through practices such as skills development, supportive supervision and performance review is associated with a significant improvement in healthcare performance. This is in concurrence to a study by Huo, Han, Chen and Zhao (2015) similarly demonstrated that there was a connection between a group of high-engagement HRM processes that focus on enhancing staff conducts, achievement and supply chain integration.

Moreover, integration of HRM systems had a positive and significant effect on healthcare performance of the healthcare facilities in Migori County ($\beta = 0.321$; P-value < 0.05). This implies that a unit increase in integration of HRM systems leads to a significant improvement in healthcare performance of the healthcare facilities in Migori County by up to 0.321 units. These results agree with that of a study by Magova and Kessy (2020) who indicated that adoption of HRM systems such as competitive hiring process, job assurance procedures and a culture of team building had a beneficial effect on supply chain flexibility

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter is comprised of the key points in Chapter Four. It gives the main findings, descriptive and inferential. The summary guides presentation of conclusions and delivering of recommendations. Another crucial section in this chapter is the areas for further study.

5.2 Summary of Findings

The descriptive findings indicated that public hospitals in Migori County, regardless of the level, had integrated their supply chain systems, namely, inventory management systems, quantification systems, logistics management information systems and human resource management systems in supply chain to a high extent with an aim of enhancing healthcare performance. As a result, it has largely benefitted their supply chain operations and ultimately healthcare performance in terms of ensuring quality of care, safety of care and affordability of care.

The inferential findings indicated that integration of all the four health supply chain systems have a positive effect on healthcare performance. However, only integration of logistics management information systems as well as human resource management systems in supply chain has a significant effect on healthcare performance. On the contrary, integration of inventory management systems and quantification systems have an insignificant effect on healthcare performance. In order of strengths, correlation results indicated that integration of HRM systems had the strongest effect on healthcare performance followed by integration of logistics management systems, then integration of quantification systems and lastly integration of inventory management systems.

5.3 Conclusions

Based on results from the study, it can be concluded that enhancing integration of HRM systems through practices such as skills development, supportive supervision and performance review can significantly improve healthcare performance in Migori County. The study also concludes that strengthening logistics management information systems by putting in place practices aimed at ensuring availability of data, timeliness and data completeness can significantly improve healthcare performance in Migori County.

It can also be concluded that the current inventory management systems have not strongly been implemented to significantly improve healthcare performance in Migori County, which calls for an improvement in its adoption. However, were they to be improved by putting in place practices that ensure there is good inventory management systems by stocking according to plan, accuracy in stock transactions and having systems to detect early stockout rates, it would improve healthcare performance.

The study also concludes that the current quantification systems have not strongly been implemented to significantly improve healthcare performance in Migori County, which calls for an improvement in its adoption. However, were they to be improved through practices such as using forecasting tools, resource mobilization and minimization of forecasting error by improving the quality of data used for quantification, it would improve healthcare performance.

5.4 Recommendations

Given that integration of HRM systems has been established to have a positive and significant influence on healthcare performance, the research recommends the management of the public hospitals in Migori County and Kenya at large, to enhance its implementation so as to realize its impact at higher levels. Among the practices to put more emphasis on are skills development, supportive supervision and performance review.

Since it was established that integration of logistics management information systems has been established to have a significant effect on healthcare performance, the study recommends the management of the public hospitals in Migori County and Kenya at large, to enhance its implementation so as to further realize its impact at higher levels. Among the practices to put more emphasis on are putting in place practices aimed at ensuring availability of data, timeliness and data completeness can significantly improve healthcare performance.

The study recommends a keen and dedicated focus towards enhanced implementation of inventory management systems through investment since it was determined that the current inventory management systems have not strongly been implemented to significantly improve healthcare performance in Migori County. Specifically, there is a need to invest in practices that ensure there is inventory accuracy rate, stocking according to plan and having systems to detect early stockout rates.

Based on the findings that the current quantification systems have not strongly been implemented to significantly improve healthcare performance in Migori County, the study recommends a keen and dedicated focus towards its enhanced implementation through investment in quantification systems. Specifically, there is a need to invest in practices such as using forecasting tools, resource mobilization and minimization of forecasting error.

5.5 Areas for Further Study

Contextually, the study focused on public hospitals based in Migori County Kenya which delimits the contextual scope and presents a contextual research gap for other studies. Therefore, there is a need for future studies to widen the scope to other counties other than Migori so as to have in-depth empirical evidence regarding integration of supply chain management systems and healthcare performance. Furthermore, the research focused on heterogenous set of units of analysis, that is to say, all the hospital's levels and hence, this is hard to individualize the issues per level. Therefore, there is a need for future studies to homogeneously focus on various levels so as to establish the unique issues per level.

The degree of supply chain systems integration varies significantly across different levels, and thus its effect on overall healthcare performance will vary. The regression results also showed that the four supply chain integration systems, that is inventory management systems, quantification systems, logistics management information systems as well as human resource management systems in supply chain accounted for 61.5% of the variation in healthcare performance meaning that the remaining percentage, that is, 38.5%, was accounted for by other factors which may necessitate other studies to find out which they are.

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APPENDICES

Appendix I: Appendix II: Cover Letter

FRANCIS MAINGI,

UNIVERSITY OF NAIROBI,

P. O. BOX 30192-00100,

Tel: 0740 021466,

NAIROBI.

Dear Sir/Madam,

RE: RESEARCH QUESTIONNAIRE

The questionnaire (enclosed) is intended to collect data on the Performance of Integrated Supply Chain Systems on Healthcare: A case of Afya Ugavi Project in Migori County, Kenya. The researcher is a student at the University of Nairobi and is carrying out a study for a research project paper in partial fulfillment of the Master of Arts in Project Planning and Management.

The aim of this exercise is to collect data for educational purpose only. Data collected will not be shared with any other person and or used maliciously and will exclude any personal identification information to guarantee confidentiality. Your willing participation and honest responses are of utmost importance.

Yours Sincerely,

Francis Maingi

Appendix II: Research Questionnaire

Section A: Demographic and Respondent's Profile

This questionnaire requires health supply chain managers to provide information on the topic: Integration of Supply Chain Systems and Healthcare Performance: A case of Afya Ugavi, Migori County, Kenya. The data will be confidential and used for educational purpose only. Please note that data is required from all the areas in order to get the desired information.

1. State your gender:

   Male ( ) Female ( )

2. Indicate the level of hospital where you are working:

   County Referral Hospital ( ) Sub County Hospital ( )

   Health Centre ( ) Dispensary ( )

3. How long has this hospital been operational? (In years) (More than 5 years)

4. How many staff are working in the supply chain department in the hospital?

5. Indicate your highest level of education:

   Diploma ( ) Undergraduate Degree ( )

   Master Degree ( ) Doctoral Degree ( )

Other Qualifications ( ) (Please specify)

6. What is your present position at the hospital?

CHMT Member ( ) SCHMT Member ( )

Facility in Charge ( ) Facility Staff ( )

Other (Specify)……..

7. What is the duration of your current position? (In years)

8. Indicate your cadre:

Pharmacist ( ) Pharmaceutical Technologist ( )

Health Records & Information Officer ( ) Nurse ( )

Nutritionist ( ) Laboratory Technologist ()

Section B: Integration of Inventory Management Systems

9. Please state your level of agreement to the following statements in your organization by marking (X) inside the relevant box. Refer to the key below:
   1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Statement	**1**	**2**	**3**	**4**	**5**
Integration of Inventory Management Systems improves the number of products with updated bin cards.					
Integration of Inventory Management Systems improves receiving of health products.					
Integration of Inventory Management Systems improves issuing of health products.					
Integration of Inventory Management Systems has led to introduction of order rationalization.					
Integration of Inventory Management Systems increases order accuracy rate.					
Integration of Inventory Management Systems influences availability of quality health products.					
Integration of Inventory Management Systems reduces overstocking of health products in the hospital.					
Integration of Inventory Management Systems leads to good storage conditions.					

Integration of Inventory Management Systems improves on frequency of delivery of health products.					
Order accuracy rate ensures hospitals are stocked according to plan.					
Integration of Inventory Management Systems leads to fewer number of health products stocked out.					
Integration of Inventory Management Systems reduces the number days health products are stocked out.					
Integration of Inventory Management Systems reduces the number hospitals stocked out health products.					
Integration of Inventory Management Systems reduces wastage due to expiries of health products at the hospital.					
Integration of Inventory Management Systems reduces wastage due to pilferage of health products at the hospital.					

10. Explain how else Integration of Inventory Management Systems has influenced Healthcare Performance in your hospital?.....

Section C: Integration of Quantification Systems

11. Please state your level of agreement to the following statements in your organization by marking (X) inside the relevant box. Refer to the key below:
    1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Statement	**1**	**2**	**3**	**4**	**5**
Integration of Quantification Systems leads to availability of bin cards.					
Integration of Quantification Systems leads to availability of delivery notes.					
Integration of Quantification Systems leads to availability of DARs.					
Integration of Quantification Systems leads to availability of CDRRs.					
Availability of forecasting tools reduces the time needed when forecasting for health products.					
Integration of Quantification Systems leads to decrease in forecasting errors.					
Proper forecasting and supply planning leads to availability of right health products for health care.					
Integration of Quantification Systems ensures availability of health products in all levels of healthcare.					

Integration of Quantification Systems reduces the number of counterfeit products in hospitals.					
Proper forecasting and supply planning reduces the number of emergency orders.					
Integration of Quantification Systems streamlines procurement of commodities from qualified suppliers					
Integration of Quantification Systems provides data useful in planning, mobilizing and securing financial resources.					
Integration of Quantification Systems leads to prioritization of the most critical requirements.					
Integration of Quantification Systems reduces the cost of carrying out quantification process					
Increased funding for health products ensures availability of the commodities.					

12. Explain how else Integration of Quantification Systems has influenced Healthcare Performance in your hospital?.....

Section D: Integration of Logistics Management Information Systems

13. Please state your level of agreement to the following statements in your organization by marking (X) inside the relevant box. Refer to the key below:
    1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Statement	**1**	**2**	**3**	**4**	**5**
Integration of LMIS improves health commodity reporting rate.					
Availability of data provides information for decision making.					
Integration of LMIS makes it easier to access commodity data at all levels.					
Availability of data helps in development of dashboards for commodity data visibility.					
Data visibility helps in targeted commodity redistribution.					
Integration of LMIS improves health commodity on time reporting.					
Integration of LMIS has led to improved timely exchange of data between supplier and hospital.					
Timelines of reporting influences resupply of health products.					
Timely resupply of health products improves efficiency of health care.					

Constant sharing of logistics data among partners improves on targeted support.					
Integration of LMIS improves data completeness.					
Integration of LMIS improves data collection/documentation.					
Complete data ensures availability of the right medicine in the correct dosage for health care.					
Integration of LMIS improves data accuracy					
Data accuracy improves on the right medication.					

14. Explain how else Integration of Logistics management Information Systems has influenced Healthcare Performance in your hospital?.....

Section E: Integration of Human Resource Management Systems

15. Please state your level of agreement to the following statements in your organization by marking (X) inside the relevant box. Refer to the key below:
    1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Statement	**1**	**2**	**3**	**4**	**5**
Integration of HRM Systems improves availability of supply chain staffs.					
Integration of HRM Systems helps in providing training courses for workers in the hospitals.					

Integration of HRM Systems empowers staff to provide comprehensive health care.					
Integration of HRM Systems leads to reduced medical errors.					
Integration of HRM Systems improves adherence to standard treatment guidelines (STGs).					
Integration of HRM Systems leads to establishment of staff performance review plan.					
Integration of HRM Systems improves management support to healthcare workers.					
Integration of HRM Systems improves working conditions to hospital's staff.					
Integration of HRM Systems provides material and moral incentives for employees working in government hospitals.					
Availability of health products boosts the morale of healthcare workers.					
Integration of HRM Systems increases the rate of integrated Supportive Supervision Visits (iSSVs).					
On job trainings are carried out during supportive supervision visits.					
ISSVs help in boosting confidence of health care workers.					

Integration of SSV reduces the time-of-service interruption by the supervision team.					
Integration of SSV provides a platform for recognition and reward for good performance.					

16. Explain how else Integration of Human Resource Management Systems has influenced Healthcare Performance in your hospital?.....

Section F: Healthcare Performance

17. Please state your level of agreement to the following statements in your organization by marking (X) inside the relevant box. Refer to the key below:
    1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Statement	**1**	**2**	**3**	**4**	**5**
Availability of enough supply chain staff leads to improved healthcare.					
Availability of specialized personnel help to deliver efficient and timely services to customers.					
Availability of health products leads to efficiency in provision of health services.					
Availability of medicines ensures that patients can be given full dosage improving health care effectiveness.					
Motivated healthcare workers provide quality health services.					

Availability of high-quality commodities ensures safety of care.					
Availability of health products increases adherence to medication hence reduced drug resistance.					
Availability of health products ensures that patients/clients can access healthcare services whenever needed.					
Reduced medical errors guarantees safety of health care.					
Adherence to standard treatment guidelines leads to quality health care.					
Comprehensive health care reduces the time needed for hospital visits.					
Availability of health products in all levels reduces the amount of money used in search of care.					
Availability of health products in lower levels reduces the cost of treatment.					
Reduced cost of inventory management frees up funds for other health services.					
Procurement of health products from conventional suppliers reduces the cost of commodities.					

18. Explain how else Integration of Supply Chain Systems has influenced Healthcare Performance in your hospital?.....

Appendix III: Key Informants Interview Schedule

Name of Hospital _____ Date___

I am carrying out academic research and would like to get an opinion of the service delivery received at the hospital. Please give me your anonymous opinion (*Nafanya upelelezi wa masomo nanuia kupata maelezo yako kuhusu huduma ya matibabu uliyopokea kwa hospitali hii. Tafadhali nipatie maoni yako bila kujijulisha).*

1. What is the influence of Integration of Inventory Management Systems on Healthcare Performance in Migori County in terms of accessibility of medicine, comprehensive care & full dosages?

   (Je, kuna athari gani ya Ujumuishaji wa Mifumo ya Kudhibiti Mali kwenye Utendakazi wa Huduma ya Afya katika Kaunti ya Migori ukiangalia suala la upatikanaji wa dawa, utunzaji wa kina na vipimo kamili?)

2. How does Integration of Quantification Systems influence Healthcare Performance in Migori County in terms of drug availability, type, and formulation in public hospitals?

   (*Je, Ujumuishaji wa Mifumo ya Kukadiria unaathiri vipi Utendaji wa Huduma ya Afya katika Kaunti ya Migori ukizingatia suala la upatikanaji wa dawa na aina za dawa katika hospitali za umma?)*

3. What is the influence of Integration of Logistics Management Information Systems on Healthcare Performance in Migori County in terms of accuracy, and timeliness of care?
   (Je, kuna athari gani ya Ujumuishaji wa Mifumo ya Usimamizi wa Taarifa kuhusu Utendakazi wa Huduma ya Afya katika Kaunti ya Migori kuhusiana na usahihi, na kufaa kwa utunzaji??)

4. How does Integration of Human Resource Management Systems influence Healthcare Performance in Migori County in terms of staff availability, attitude, feedback, expertise, and customer care?

   (Je, Ujumuishaji wa Mifumo ya Usimamizi wa Rasilimali Watu unaathiri vipi Utendaji wa Huduma ya Afya katika Kaunti ya Migori katika suala la upatikanaji wa wafanyikazi, mtazamo, maoni, utaalam, na utunzaji wa wateja)

5. How can you describe Healthcare Performance received from Migori County public hospitals in terms of quality, safety, and affordability of care?
   (Unawezaje kuelezea Utendaji wa Huduma ya Afya uliopokewa kutoka kwa hospitali za umma za Kaunti ya Migori kulingana na ubora, usalama, na gharama ya huduma?)

Thank You| Asante sana

Appendix IV: Research Permit (NACOSTI)

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **912192**

Date of Issue: **25/June/2022**

RESEARCH LICENSE

This is to Certify that Mr.. Francis Nzioki Maingi of University of Nairobi, has been licensed to conduct research in Migori on the topic: INTEGRATION OF SUPPLY CHAIN SYSTEMS AND HEALTHCARE PERFORMANCE: A CASE OF AFYA UGAVI PROJECT, MIGORI COUNTY, KENYA for the period ending : 25/June/2023.

License No: **NACOSTI/P/22/18490**

912192

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

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Appendix V: Authorization Letter (Migori County)

MIGORI COUNTY

DEPARTMENT OF HEALTH SERVICES

Telegrams: "MOH", Migori
Telephone: Suna (059) 20058
Email:migoricountyHMT@gmail.com

COUNTYDIRECTOR OF MEDICAL SERVICES
MIGORI COUNTY
P O BOX 202-40400
SUNA - MIGORI

When replying please quote
MIG/CDH/TRAIN/VOL II

20th June, 2022

To,
Francis Maingi,
Faculty of Business and Management Sciences,
The University of Nairobi.

Dear Sir,

RE: AUTHORIZATION TO COLLECT STUDY DATA IN SELECT HEALTH FACILITIES IN MIGORI COUNTY

We, hereby, grant you the permission to undertake your study research titled ***"Integration of Supply Chain Systems and Healthcare Performance: A Case of Afya Ugavi, Migori County – Kenya"*** at the identified project sites in Migori County.

We look forward to a fruitful study and we kindly request that you share the study findings with the county at the end of the study.

Kind regards,

OFFICE OF THE COUNTY DIRECTOR
20 JUN 2022
P.O. Box 202-40400 SUNA-MIGORI
HEALTH SERVICES, MIGORI

Dr. Nyachae Michael
Head Planning M&E
For County Director of Medical Services