

**DETERMINANTS OF MATERNAL CHILD HEALTH COMMODITIES  
MANAGEMENT IN PUBLIC HEALTH FACILITIES IN MERU COUNTY,  
KENYA**

**ELVIS MWANDAWIRO MBATIA**

**A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE  
REQUIREMENT OF THE DEGREE OF MASTERS OF SCIENCE IN HEALTH  
SYSTEMS MANAGEMENT, KENYA METHODIST UNIVERSITY**

**SEPTEMBER, 2021**

**DECLARATION AND RECOMMENDATION**

**Student**

*“I declare that this thesis is my original work and has not been presented for a degree or any award in any other University.”*

..... **Date**.....

**Elvis Mwandawiro Mbatia**

**HSM-3-0253-1/2015**

**Supervisors**

*“This research thesis has been submitted for examination with our approval as the University Supervisors.”*

..... **Date** .....

**Dr. Muthoni Mwangi**

Department of Health Systems Management  
Kenya Methodist University

..... **Date**.....

**Dr. Wanja Mwaura-Tenambergen**

Department of Health Systems Management  
Kenya Methodist University

## **COPY RIGHT**

©Elvis Mwandawiro Mbatia

*“All rights reserved. No part of this thesis may be reproduced, stored in any retrieval system or transmitted in any form or by any means, electronically, mechanically, by photocopying or otherwise, without prior written permission of the author or Kenya Methodist University, on that behalf”.*

## **ACKNOWLEDGEMENTS**

I would like to give thanks to the Almighty for the opportunity to advance my studies until this moment. I acknowledge and appreciate all my lecturers at Kenya Methodist University Nairobi Campus for their technical and guidance support during my study period. To my two supervisors, Dr. Muthoni Mwangi and Dr. Wanja Mwaura-Tenambergen, I value your constant insights, guidance and expertise a long this tedious journey of project development. I would like to appreciate my classmates and family kin for their education values, spiritual, moral and economic support they accorded me as I developed this thesis project. A wish to extend my special recognition for my dear wife, Selina Alucheri and our sons Fidel and Powel for braving with me during the late nights.

## ABSTRACT

The World Health Organization six pillars of the health are required to achieve desirable outcomes of any health system. Emergency Obstetric and Neonatal Care (EmONC) has become a priority especially in developing countries like Kenya. However, access to obstetric and neonatal care has been hindered by lack of medical commodity, equipment's and vaccines at Maternal Child Health (MCH) resulting to high maternal and neonatal mortality rates which has not been well addressed by free maternity services by the government in Kenya. The study is anchored on the pillar of health products, vaccines and technologies; the focus of the study is the Determinants of maternal child health commodities management in public health facilities. The broad objective of the study is to explore the determinants of maternal child health commodities management in public health facilities in Meru County. The specific objectives are to establish the influence of logistic management information system, medical staff competency, inventory management and supply chain management practices on maternal child health commodities in Meru County. The study adopted a cross sectional design with quantitative methods for data collection. The study sample was 116 health care workers involved in health commodity management of Obstetric and Neonatal Care. Data was collected using a structured questionnaire. The data was analyzed using SPSS version 24. Descriptive and inferential statistics are presented in frequencies, means and standard Deviation. The study significance level was set at  $p < 0.05$ . Results indicated that logistic management information system was positively and significantly associated with the health commodity management in MCH ( $\chi^2 = 4.450, P=0.035$ ). This implied that LMIS had a positive and significant association influence on the management of health commodity in MCH services. Medical staff competency was positively and significantly associated with the health commodity management of MCH ( $\chi^2 = 7.0489, P=0.008$ ). The study established that inventory management and supply chain management practices had no significance association to health commodity management in maternal child health. Recommendation of the study is the county government of Meru should invest in health information systems; ensure enough medical stocks and patients' needs are attended to within the shortest time. Invest in a system that is able to generate reports, forecast and quantify on maternal child health commodities; and ensure proper inventory and correct stock quantities status. Health Management Team and County government of Meru should invest in regular staff training and development in order to improve capacity of Human resource for Health on health commodity management. Lastly, Meru County Government should ensure that they formulate County specific policies, guidelines, and work plans to ensure all the facilities have enough allocation of funds for training health care workers and installing functional logistic information systems

## TABLE OF CONTENTS

|  |            |
|--|------------|
| <b>DECLARATION AND RECOMMENDATION .....</b>  | <b>ii</b>  |
| <b>COPY RIGHT .....</b>                      | <b>iii</b> |
| <b>ACKNOWLEDGEMENTS .....</b>                | <b>iv</b>  |
| <b>ABSTRACT.....</b>                         | <b>v</b>   |
| <b>TABLE OF CONTENTS .....</b>               | <b>vi</b>  |
| <b>LIST OF TABLES .....</b>                  | <b>ix</b>  |
| <b>LIST OF FIGURES .....</b>                 | <b>x</b>   |
| <b>ABBREVIATIONS AND ACRONYMS.....</b>       | <b>xi</b>  |
| <b>CHAPTER ONE: INTRODUCTION: .....</b>      | <b>1</b>   |
| 1.1 Background to the Study.....             | 1          |
| 1.2 Problem Statement .....                  | 4          |
| 1.3 Purpose of the study .....               | 6          |
| 1.4. Research Objectives.....                | 6          |
| 1.5 Research Questions .....                 | 7          |
| 1.6 Justification of the Study .....         | 7          |
| 1.7 Limitations of the Study.....            | 8          |
| 1.8 Delimitations of the Study .....         | 9          |
| 1.9 Significance of the Study .....          | 9          |
| 1.10 Assumptions of the Study .....          | 10         |
| <b>OPERATIONAL DEFINITION OF TERMS.....</b>  | <b>11</b>  |
| <b>CHAPTER TWO : LITERATURE REVIEW .....</b> | <b>13</b>  |
| 2.1 Introduction.....                        | 13         |
| 2.2 Free Maternity Services In Kenya .....   | 14         |

|   |           |
|---|-----------|
| 2.3 Emergency Obstetric/Gynecological and Neonatal Care Services (EMONC)..... | 15        |
| 2.4 Logistic Management Information System.....                               | 19        |
| 2.5 Medical Staff’s Competency.....   | 21        |
| 2.6 Inventory Management .....  | 22        |
| 2.7 Supply Chain Practices .....  | 24        |
| 2.8 Theoretical Framework.....  | 25        |
| 2.9 Conceptual Framework.....   | 31        |
| <b>CHAPTER THREE: RESEARCH METHODOLOGY .....</b>                              | <b>33</b> |
| 3.1 Introduction.....   | 33        |
| 3.2 Research Design.....  | 33        |
| 3.3 Target Population.....  | 33        |
| 3.4 Study Location .....  | 34        |
| 3.5 Sampling and Sampling Techniques.....                                     | 34        |
| 3.6 Sample Size.....  | 35        |
| 3.7 Data Collection Tools .....   | 36        |
| 3.8 Pre-Testing .....   | 37        |
| 3.9 Methods of Data Analysis.....   | 38        |
| <b>CHAPTER 4: RESULTS AND DISCUSSION .....</b>                                | <b>40</b> |
| 4.1 Introduction.....   | 40        |
| 4.2 Response Rate.....  | 40        |
| 4.3 Reliability Analysis.....   | 41        |
| 4.4 Demographic Information.....  | 43        |
| 4.5 Logistic Management Information Systems (LMIS).....                       | 45        |
| 4.6. Medical Staff Competency .....   | 50        |

|  |           |
|--|-----------|
| 4.7 Inventory Management .....                                   | 53        |
| 4.8 Supply Chain Practices .....                                 | 58        |
| 4.9 Health Commodity Management .....                            | 61        |
| 4.10 Inferential Statistics .....                                | 65        |
| 4.11 Multivariate Analysis.....                                  | 66        |
| <b>CHAPTER 5: SUMMARY AND CONCLUSIONS .....</b>                  | <b>71</b> |
| 5.1 Introduction.....  | 71        |
| 5.2 Summary of Research Findings .....                           | 71        |
| 5.3 Conclusions.....   | 74        |
| 5.4 Recommendations.....   | 76        |
| 5.5 Suggestions for further research .....                       | 76        |
| <b>REFERENCES.....</b>   | <b>78</b> |
| <b>APPENDICES .....</b>  | <b>83</b> |
| <b>APPENDIX 1: INTRODUCTORY LETTER .....</b>                     | <b>83</b> |
| <b>APPENDIX 2: CONSENT TO PARTICIPATE IN THE INTERVIEW .....</b> | <b>84</b> |
| <b>APPENDIX 3: QUESTIONNAIRE FOR HEALTH CARE WORKERS.....</b>    | <b>88</b> |
| <b>APPENDIX 4: KEMU ETHICAL APPROVAL LETTER .....</b>            | <b>94</b> |
| <b>APPENDIX 5: MERU COUNTY APPROVAL LETTER.....</b>              | <b>96</b> |
| <b>APPENDIX 6: NACOSTI STUDY APPROVAL LETTER .....</b>           | <b>97</b> |



## LIST OF TABLES

|  |                                     |
|--|-------------------------------------|
| Table 3.1: Target Population.....  | <b>Error! Bookmark not defined.</b> |
| Table 4.1 : Response Rate.....   | <b>Error! Bookmark not defined.</b> |
| Table 4.2 : Reliability co-efficient of the study variables..  | <b>Error! Bookmark not defined.</b> |
| Table 4.3: Demographic Information .....   | <b>Error! Bookmark not defined.</b> |
| Table 4.4: Respondents view on Logistic Management Information Systems on Child Health Commodities Management .....                            | <b>Error! Bookmark not defined.</b> |
| Table 4.5: Influence of Medical Staff Competency on Child Health Commodities Management.....   | <b>Error! Bookmark not defined.</b> |
| Table 4.6 Respondents view on the following statements in relationship to inventory management on Child Health Commodities Management          | <b>Error! Bookmark not defined.</b> |
| Table 4.7: Respondents view on the following statements in relationship to supply chain practices on Child Health Commodities Management ..... | <b>Error! Bookmark not defined.</b> |
| Table 4.8: Findings on Child Health Commodities Management   | <b>Error! Bookmark not defined.</b> |
| Table 4.9: Bivariate Linear Correlation: Child Health Commodities Management..   | <b>Error! Bookmark not defined.</b> |
| Table 4.10: Model Summary Multivariate Analysis.....   | <b>Error! Bookmark not defined.</b> |
| Table 4.11: The Nagelkerke R square Model Summary.....   | 66                                  |

## **LIST OF FIGURES**

Figure 2.1: Relevant factors affecting access of health commoditiesError! Bookmark not defined.

Figure 2.2: Conceptual Framework for Pharmaceutical Commodity Management ....Error! Bookmark not defined.

## ABBREVIATIONS AND ACRONYMS

|                |  |
|----------------|--|
| <b>AMSTIL:</b> | Active Management of Third Stage of Labour           |
| <b>BEmONC:</b> | Basic Emergency Obstetrics and Neonatal Care         |
| <b>CEmONC:</b> | Comprehensive Emergency Obstetrics and Neonatal Care |
| <b>EmONC:</b>  | Emergency Obstetrics and Neonatal Care               |
| <b>HCW's:</b>  | Health Care Worker's                                 |
| <b>KDHS:</b>   | Kenya Demographic Health Survey                      |
| <b>KEML:</b>   | Kenya Essential Medicines List                       |
| <b>KEMSA:</b>  | Kenya Medical Supply Agency                          |
| <b>LMIS:</b>   | Logistical Management Information System             |
| <b>MCH:</b>    | Maternal Child Health                                |
| <b>MMR:</b>    | Maternal Mortality Rate                              |
| <b>MOH:</b>    | Ministry of Health                                   |
| <b>NMR:</b>    | Neonatal Mortality Rate                              |
| <b>RMNCH:</b>  | Reproductive Maternal Neonatal Child Health          |
| <b>SBA:</b>    | Skilled Birth Attendance                             |
| <b>SCM:</b>    | Supply Chain Management                              |
| <b>SCMP:</b>   | Supply Chain Master Plan                             |
| <b>SCMU:</b>   | Supply Chain Management Unit                         |
| <b>SDGs:</b>   | Sustainable Development Goals                        |
| <b>STGs:</b>   | Standard Treatment Guidelines                        |
| <b>UNC:</b>    | United Nation Commission                             |
| <b>WHO:</b>    | World Health Organization                            |

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Background to the Study**

The County Government is mandated by the constitution to offer and improve the health status of people by provision of universal health access and should have the characteristics of being easy to buy and of quality health care and services. The World Health Organization (WHO) Framework for Action defines six pillars of a health system– Health Service Delivery, Health Financing, Stewardship. Health Workforce; Health Information system or strategic information; Health Medical Products and its Technologies. All the pillars are needed for a health system to achieve desirable outcomes. This study was anchored on the medical products and technologies health systems pillar, and focus was on the determinants of maternal child health commodities management in public health facilities in maternal child health with a major focus on Emergency Obstetric and Neonatal Care (EmONC) at Meru County health facilities. “Medical Supplies is a pillar that is really essential and it necessary means and includes medical equipment’s, appliances, consumables, reagents, medical lab supplies, medical antisera’s, non-pharmaceuticals and pharmaceuticals products or materials used in the offering health service delivery or care. In Kenya, some of the Medical products have been listed as essential drugs that can be used in the lowest level of health care service delivery to ensure both access of the drugs reaches the populace at the lowest cost and best standards and quality for consumption” (Kenya Medical Supplies Authority [KEMSA],2013)

The populace should get the right medicines, supplies, vaccines, non-pharmaceuticals and pharmaceuticals at the right place, right time and right quality when needed. “The World

Health Organization (WHO) has reported that ten to twenty million of the populace are really suffering without proper, quality care and treatment. It is estimated that around 5.5 billion people of the world population that make 83% live in states and countries that have low to non-existent reach or access to required drugs and medicines for treatment of mild, moderate and severe pains.” (World Health organization [WHO], 2012).

Supply Chain Management entails a web of management activities that core value is to ensure value for the beneficiary under competitive advantage. It needs efficient and effective quantification, how you source, produce, the Logistics involved and use of the information system to make informed decisions. It involves two approaches such as use of organization for the product to reach the beneficiary and two is the linkages that entails flow of physical goods and also information flow. In summary, Supply Chain Management is the process with tasks of managing and controlling commodity related activities that cuts across facilities, organizations and systems with bigger picture and objective of ensuring that the commodities are universally accessible and available to all

WHO (2014) reports infer that “Medicines as a pillar of health must have certain characteristics that include appropriate use, universal access to all, affordable cost and should always focus on strengthening health system strengthening across facilities, organizations and systems. Each population in the world has its own specific needs and the essential drugs given should fit the priority needs of the group concerned. For any long-standing outcome in the health system the essential drugs must be affordable, efficacious, have quality and safety to the population and must always be adequate when needed for

care and treatment. This will not only strengthen the health care systems but also ensure that universal health care is achieved across board”

EmONC refers to care given to the mother and her child and with major focus on emergency delivery services that are given two categories namely the Basic and Comprehensive namely CEmONC and BEmONC. It entails care given to the mother and the child before pregnancy and after pregnancy. For BEmONC, it has seven signal functions namely; removal of the placenta manually, administration of intravenous antibiotics, administering of uterus tonic drugs, administration of intravenous convulsions drugs, and conception products removal-manually through aspiration (MVA), vaginal delivery assistance for safe delivery (AVD) and conducting both basic and complex neonatal resuscitation maneuvers. For CEmONC it entails the seven BEmONC signal function and inclusive of two more signal functions namely administration of blood and performing caesarean section thus making nine signal functions.

The stillbirth rate in as per the Lancet report for 2016; provides that Kenya is at three per 1000 stillbirth rate which is actually more than eight times of developed world countries. In the world we have countries with lowest stillbirths such as Croatia with two stillbirths per 1,000 births, Netherlands average of 1.8 stillbirths per 1,000 births; Finland 1.8 stillbirths per 1,000 births just as Netherlands; Iceland with 1.3 per 1,000 births and last but not least Denmark with 1.7 stillbirths per 1,000 births, (The Lancet , 2016)

Without neglecting targeted interventions, the study sought to find out and make more investments in areas such as Supply Chain Management of commodities, equipment and drugs in Maternal Child Health in Meru County, which gives advantages over the long-term interventions in reducing the under-five children and maternal mortality and morbidity cases.

## **1.2 Problem Statement**

Maternal child health remains to be a public health issue with impact on society. United Nation report September 2013; states that the world has increasingly improved on its interventions to reduce children deaths both prenatal and postnatal but evidence has shown that Sub-Saharan Africa leads with one child in ten dying before reaching five years of age, while South Asia sixteen children die before the age of five

Meru County in Kenya has a gap of skilled birth attendance (SBA) which stands at 46% and with 216 facilities; in which 51 (26.5%) facilities partially offer Emergency

Obstetrics and Neonatal Care (EmONC) to both the mothers and children. This has contributed to lack of pharmaceutical commodities and equipment; lack of knowledge and skills among other reasons. The effects have been increased Maternal Morbidity and Mortality cases with Neonatal Mortality cases experienced in high volume facilities in Nyambene District Hospital and Meru Referral and Teaching Hospital (MTRH) with more than five Maternal Mortality cases reported in each month per facility in 2019.

(District Health Information System 2 [DHIS-2], 2019)

Most Comprehensive and bare minimum Emergency Obstetrics and child health Care services are majorly performed by few facilities namely Meru Referral and Teaching Hospital, St Theresa Kiirua, Consolata Hospital Nkubu and Nyambene District Hospital (DHIS-2, 2019)

The Kenya Health Sector Budget for the fiscal year 2018/2019, which accounts for National and County budget analysis shows that Meru County had allocated 34% of its Annual budget to Health system strengthening. It is worth noting that different counties allocated health system differently of the total budget allocated to them to support Commodity management, Human Resource for Health, Logistic information systems among other pillars of health

The Targets allocation are way below the funding of 216 facilities for Meru health system thus justifies the need to access thematic areas such as Human resource trainings, commodity procurement, distribution and inventory management, logistic information systems, forecasting, quantification and product selection.

In addition, universal Commodity access by the clients to quality and safe pharmaceutical commodities and equipment in maternal and neonatal care in Meru County facilities; justify the need of the study. The ideal Maternal Child Health care in dispensary and health centers should offer the BEmONC, while the Sub-County and County referral facilities should offer CEmONC. The expected outcome of Health Commodity Management is improved Service Delivery.



### **1.3 Purpose of the study**

The purpose of this paper is to explore opinions, knowledge and practices of health care workers on logistic information management systems, staff competency, inventory management and procurement practices on Maternal Health commodities management in Meru County, Kenya. The results from this research are to inform future policy making and implementation, training and guidelines on the management of health commodity management, in order to inform the best commodity management approach.

### **1.4. Research Objectives**

#### **1.4.1 Broad objective**

The broad objective of the study was to explore the determinants of Maternal Child Health Commodities Management in Public Health Facilities in Government health facilities of Meru County.

#### **1.4.2 Specific objectives**

The specific objectives were:

- i. To assess Logistic Management Information System influences on Maternal Child Health Commodities Management in Public Health Facilities of Meru County.
- ii. To establish medical staff competency effects on Maternal Child Health Commodities Management in Public Health Facilities of Meru County.
- iii. To determine Inventory management effects on Maternal Child Health Commodities Management in Public Health Facilities of Meru County.

- iv. To determine Supply Chain Management practices influences on Maternal Child Health Commodities Management in Public Health Facilities of Meru County.

### **1.5 Research Questions**

- i. The extent at which Logistic Management Information System influence Maternal Child Health Commodities Management in Public Health Facilities of Meru County?
- ii. To what extent does Medical Staff competency affect Maternal Child Health Commodities Management in Public Health Facilities of Meru County?
- iii. How does Inventory management affect Health Commodity Management in Child Health in Meru County?
- iv. How does Supply Chain Management practices influence Maternal Child Health Commodities Management in Public Health Facilities of Meru County?

### **1.6 Justification of the Study**

Obstetric and neonatal care has become a global concern and more so due to the increasing incidence of maternal and infant mortality rate and morbidity rates especially in developing countries, like Kenya. Furthermore, EmONC need to be available for use in all public, private and faith based organization facilities offering care for the mothers and their children.

The realization of the *2030 Sustainable Development Goal 3.8* infers that “To all the population in the world should have access to affordable and essential health service delivery. Care should be universal, safe, have quality & standards and at least the populace should be socially protected from financial risks” is likely to be further away if Supply

Chain Management of medical commodity and equipment is not considered as a pillar of health.

The study is also justified by Health related SDGs namely SDG 3.1 and SDG 3.2. “The two objectives aim to actively down scale the world maternal deaths to less than 70/100,000 live births by the year 2030. Stop any preventable mortality of both children under five and newborns with both developing and under developed countries to be below 12/1,000 live births and under five years of age to below 25/1,000 live births by the year 2030 respectively”

### **1.7 Limitations of the Study**

The participants in the study were hesitant to reveal information the study sought, especially concerning their facility. Privacy and security of the data that they provided was major challenge since the researcher had to seek permission from the facility in-charges to access Logistic management tools and primary source documents for verification that affected the turnaround time from one facility to another. It was not easy to access the respondents physically due to the Covid-19 pandemic due to the Covid 19 ministry of Health protocols; however, the use of emailed questionnaires to the respondents came in handy. Targeted respondents were not comfortable sharing information about their organization management weakness because of the communication and information sharing policy that is in place to share information to external entities and research organizations for fear of victimization. The researcher was, however, able to convince the respondents by sharing the letter from the County Director Health Services and from the

university assuring them the information was purely for learning purpose and the data provided as protected by data privacy laws shall not be shared with any unauthorized party.

### **1.8 Delimitations of the Study**

Factors affecting access of these medicines and interventions are required to ensure we achieve the goal of availability, accessibility and appropriate use of EMONC commodities in Kenya. The study narrowed to Emergency Maternal Obstetric and Neonatal Commodities, which has more clients compared to other essential services. It also narrowed on services offered in public health hospitals other than private and faith based facilities because of larger presentations in patient attendance. The study is restricted to health care providers offering commodity management and maternal child health services. While it would have been desirable to include these private and faith based facilities, focus on all essential commodities, Public health administrators and finance department in the study, time and resources will not allow.

### **1.9 Significance of the Study**

With the increasing incidence of both Maternal Child mortality and morbidity cases in Kenya, mostly that require EmONC, there is need to put policy and interventions to increased universal access of medicine, commodity and equipment for use in Maternal Child Health.

The body of knowledge will ultimately expose gaps and suggest interventions in the health system that need to be put in place to benefit maternal child health and help in improving service delivery and patient satisfaction in Kenya.

In an attempt to answer the policy question, this study will provide the policy makers in both Ministry of Health and Stakeholders with the situational analysis as regards to determinants of health commodities management in maternal child health. This is in relation to EmONC in public sector hospitals and subsequently the interventions will be used to improve safety, quality and access of these medicines and equipment to the clients.

### **1.10 Assumptions of the Study**

The analysis made the following study assumptions; the samples selected are true representation of the targeted population, the content and context of the information obtained can be generalized to the whole populace.

The study also assumed the respondents were honest and unbiased in their answering of questions and information they will share. “Assumptions have some basic characteristics, that is the study respondents will give information that is logical, true, reasonable, and does not need to be proofed or validated” (Polit & Beck 2012).

## OPERATIONAL DEFINITION OF TERMS

|   |   |
|---|---|
| <b>Access</b>                             | : ensure that medicine and equipment's are available, affordable and rationally used.                       |
| <b>Efficient Supply Chain Management</b>  | : When the right product are delivered at right time, right quantity, and right quality to the right groups |
| <b>Emergency Obstetrics Neonatal Care</b> | : care given to the mother and the child before pregnancy and after pregnancy.                              |
| <b>LMIS</b>                               | : a system that collects and analyze data in relation to goods and services supplied                        |
| <b>Logistics</b>                          | : Thee flow of goods and its related information  |
| <b>Staff Competency</b>                   | : Skills, Techniques and Knowledge on handling Health commodities   |
| <b>Supply Chain Management</b>            | : steps and processes that produces and delivers products and services to the final customer                |
| <b>Supply Chain</b>                       | : web and Referrals of goods from supplier to the beneficiary   |
| <b>Tier</b>                               | : Government hospitals classification from tier one which entail Dispensary, tier two which entails         |

Health center, tier three entails Sub County facilities  
and tier four which entails County Referral facilities  
such as Meru County Referral Hospital

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

Maternal and Child health is a big global health related problem. Currently, death among mothers and Children are major topics in the world and development sector discussions. While few countries in the world have made major steps to reduce the deaths, half of the deaths among mothers and children are still being reported in Sub Saharan Africa with no or little intervention being achieved. The next generation is determined by the health of the mother and the infants and this really forecasts the future health challenges and opportunities for the communities, families and individuals and largely the health systems. Children will reach their full growth and potentials if deaths and morbidity are prevented, (Healthy People, 2020)

“The Persistent failure seen in the Public health system, has been proved by the governments not appropriating sufficient funds thus attaining less than 15% health financing as per the Abuja 2000 declaration. The estimates done by various partners put it at 34 US dollars per person per year. Also beside the laid down policies the Holistic national health policy framework for 2011 to 2030, do acknowledge that essential commodity lists are available but due to many systems of forecasting and procurement, distribution of commodities still the standards and quality are below the belt” (WHO ,2014)

This chapter describes determinants that affect supply of commodities and equipment in a maternal-child clinic to improve on maternal and child health care services and act to



scale down the high levels of maternal and neonatal mortality and morbidity rates. These factors include - Commodity Management Practices, staff competency, Commodity access, and logistical Commodity cycle. “New-born deaths account for approximately 42% of all deaths of children under five years of age in Kenya. Neonatal Mortality Rate (NMR) stands at 22/1000 live births while prematurity accounts for 35% of all new-born deaths” (Kenya Demographic and Health Survey [KDHS], 2014).

The Kenya Demographic and Health Survey (2014) reports that the increased Kenya mother and Child mortality rates which stands at 362/ 100,000 live births its major contributing factors lie to poorly managed commodities and health care delivery and little access to Reproductive maternal child health care services. The theoretical framework for the study was based on Theory of Constraints on Supply Chain.

## **2.2 Free Maternity Services In Kenya**

According to Wamalwa et al. (2015), “The Government of Kenya rolled out maternity service to the populace which was made to be free in 2013 in the month of June. This was done through the declaration by the President to encourage all mothers to access skilled birth attendance at facility level under qualified health care workers. This was in tandem with the African union resolution that all pregnant mother and under five years of age should be exempted from financial cost incurred”

Wamalwa et al, (2015) further stated, “the offering of the maternal and child health services has many hurdles that are policy based such as supplies that are not enough for all at (86%), poor health funding at (38%). For the Human resource for Health shortages and attrition at

(92%), demotivation among health care workers at (62%), increasing workload at (89%) and abuse of health care services by the beneficiary who are the clients at (32%). For implementation of the free maternity services, one major facet cited was putting strategies to ensure the Health product pillar for health is supported and sustained to help address these challenges.”

### **2.3 Emergency Obstetric/Gynecological and Neonatal Care Services (EMONC)**

Obstetric/Gynecological and childcare services have become a public concern due to the increasing incidence of maternal and infant mortality rate and morbidity rates especially in developing countries, like Kenya.

“Neonatal mortality is when a baby dies in the first 28 days of life while maternal mortality is death related to mothers before and after birth and it's caused by some factors and environment. Major cases of death occur during pre-labor, during labor and after delivery within twenty-four hours of delivery” (Makuei et al., 2018)

According to (United Nations International Children's Emergency Fund [UNICEF], 2015) the good reports is that between 1990 and 2015 neonate death declined. The neonate deaths are declining worldwide. Death rate has fallen from 36 to 19 deaths per 1,000 live births; this is a 47% decrease rate, which is a good neonatal indicator. On the same breath, new-born deaths that were reported declined also from five million to two million.

“In Kenya, three top causes of neonatal death include prematurity, neonatal sepsis and birth asphyxia” (KDHS 2014). “Globally, from the year 1990 to 2013, the maternal death ratio

went down by 45 per cent. In Kenya, the Maternal Mortality Rate (MMR) has declined slowly by 17% from 590 in 1998, to 488 per 100,000 live births in 2008. The dangers of a woman dying from pregnancy related complications in Kenya is 1 in 38 while in developed nations the risk is 1 in 3500”, United Nations Population Fund (UNFPA,2014)

Maternal mortality has causes that can be into two groups namely as direct and the others as indirect. The most probable factors and conditions in Africa at large are maternal bleeding at 34%, Sepsis at 10%, high blood pressures at 9%, obstructed labor at 5%. It is reported that between 11% to 17% mothers die during childbirth and 50% to 71% of the deaths occurs after birth

“The report also found that generally logistical record keeping was in bad state, drugs were stored in poorly maintained storages, and logistical management information systems did not provide information on supplies and procurement by the ministry of Health. Some drugs and medical equipment have had short expiry. To an extent, some drugs were illegally being sold to the beneficiary”

Many Sub Saharan Africa Countries still have significant problem proving very slow will and progression in fight to improve both child and Maternal health (The Partnership for Maternal, Newborn and Child Health 2013) Maternal and Child mortality is quite tragic and worrying; in that, 97% of mothers with pregnancy associate deaths and diseases can be prevented. Chronic shortages of Blood and Blood products, health commodities and supplies including medical equipment and facility not having blood bank that are functioning resulted to more deaths since blood is a key component for maternal resuscitation

The Partnership advocacy also had Objective of making the SDG have a framework for Monitoring and evaluation on areas that have lagged behind like reproductive and sexual rights, childbirth, young and adolescent women and patients' rights. The implementing partners should establish road maps to control, guide, and ensure health financing of the Sexual Reproductive Maternal Neonatal Child and Adolescent Health investments. The investments should have a conducive environment for sustainable health financing for Sexual Reproductive Maternal Neonatal Child and Adolescent Health programmes, and to mobilize resources from the domestic and international implementing partners, investors, and they should include both public and private sectors thus having effective and efficient health financing investment. Lastly, the investment should put a monitoring framework to track activities, tasks and the performance thus improve on learning to the partners and donors based on experiences from different countries.

“EmONC focuses on nine signal functions namely; administration of parenteral antibiotics, administering of utero-tonic drugs, administration of parenteral convulsions drugs. Removal of the placenta manually, the womb products (conception) removal, conducting assisted birth delivery, conducting basic resuscitation of the neonates, Blood and Blood products administration and conducting cesarean section and in which calls for proper sustainable commodity and equipment management in MCH” (Mauti et al., 2019)

Thus in the study, it shall strive to identify the availability of following equipment and commodity to ascertain if they are compliant with EmONC namely availability of EmONC Guidelines, antibiotics such as ampicillin, flagyl and gentamicin. Uterotonics such as Oxytocin, MgSO<sub>4</sub> to control convulsion in hypertensive mothers, Long gloves to do manual

removal of placenta. Misoprostol for ripening of cervix for AMSTIL (Active management of third stage of labor), manual vacuum extractors' kit for removal of products of conception, KIWI Vacuum kit or forceps for assisted vaginal delivery. Neonatal and pediatrics ambu bags for resuscitations, cesarean section set and blood transfusion set for high volume facilities practicing CEmONC services.

Other commodities include; blood pressure machine for blood pressure monitoring, chlorhexidine solutions for umbilical cord care of the child, hand sanitizer for infection control and child incubators. Meru County women of reproductive age are 399,140 with estimated number of pregnancies of 93,716. It has Maternal Mortality Rate (MMR) of 77.1/100,000 live births in health facility and Neonatal Mortality Rate (NMR) of 5.3/1000 live births in health facilities. HIV prevalence of 3.0% and number of facilities offering BEmONC are 51 in total. Total fertility rate stands at 3.1 while the skilled birth attendance for the 51 EmONC facilities stands at 83 %. (Data source: DHIS 2019)

In line with this, Ibegbunam and McGill (2012) reported that partner involvement that entails planning, integration, monitoring and coordination of commodity management efforts reduces work duplication and resources. Besides, having a dedicated team makes it easy to ensure that pertinent needs such as the issue to empower the workforce through supervisions, mentorships and on job trainings are achieved accordingly.

The facility performs Inventory Internal Control of Health Commodity i.e. (use of Purchase order for tracking, Inventory ledger or physical Inventory Counts verses recorded amounts this may be a reflection of respondents' experiences with poorly designed and poorly implemented internal controls. Inefficiencies in internal controls systems have been

implicated as reasons for causing unnecessary delays in forecasting and quantification and buying of medical equipment's and commodities thus causing shortages in the targeted facilities (Tsofa et al., 2017).

Commodity financing had a positive impact on Health care management; Okello et al. (2015) has proved that inadequate Health financing was associated with availability of important drugs in facilities.

Similarly, a study done in Nakuru County, Kenya, revealed that budget inadequacy was caused by misappropriation of funds thus negating the importance of having availability of maternal and child health commodities to save life (Wangu & Osuga, 2014). A study done in Ethiopia also demonstrated that adequacy of budget was a significant predictor of the availability of the health commodities and hence an enhancement of efficiency in Health care management (Damtew et al., 2019).

#### **2.4 Logistic Management Information System**

“Commodity availability occurs when the community is able to request, get, and use the supplies they want. Access to stock information at all levels is important to ensure there is reduction in the incidence and severity of drug shortages at national and service delivery points” (Health Care Sharing Ministries [HCSM], 2013). In Kenya, PPB (Pharmacy and Poison Board) promote appropriate medicine use and enhance patient safety through improved detection, management, monitoring and reporting of suspected adverse drug reactions and poor quality medicinal products, then using this data for improved decision-making such as drug safety, drug security, financing and Pharmacovigilance.

Meru County has logistic management information challenges resonating from poor drug forecasting and quantification, lack of stock cards, formation of commodity technical working groups. Commodity and equipment supply and distribution is mostly donor dependent (DHIS, 2019)

Soyemi (2014) supply chain managers should employ use of monitoring risk activities such ensuring that the system have internal controls, proper reporting and exigency planning. The managers should purpose to monitor organizational information to help monitor and evaluate stages and levels and mitigating risks. The capacity to adopt monitoring systems depends on the size and nature of the organization.

Tola et al., (2020) showed that a well-functioning LMIS provided succinct information for the managers to make decisions based on evidence thus mitigating drug shortages due to drug losses and expiry. Shewarega et al. (2015) found that availability of LMIS had a very important role in operating a Health commodity system that is effective and efficient at times. Previous studies done in Kenya have shown that the utilization of healthcare information, including the one generated from LMIS, is poor and most health facilities depend on paper based tools and automated information systems that are not well maintained (Mochache et al., 2011; Obwocha et al., 2016). Bekele and Anbessa (2021) indicated that the availability of drug products relies upon how the LMIS is performing. Another research conducted in Uganda revealed that wrong decision was made and that was highly contributed by collecting tools that were not updated in the facilities (Maul, 2013)

## **2.5 Medical Staff's Competency**

“Experience has that procurement process requires a work force that is adequately trained and with managerial skills and proper health financing support put in place. However as much the health planning was decentralized and it's still doable and get results, some commodity management process should also be left at high level to maintain quality such as quality assurance” (KEMSA, 2013)

The KEMSA Report, 2013 also reports that “Health workforce Management integral part for administrative and management systems. Most important facet to building in the human resource for health is to capacity build them to ensure they have skills and techniques to operate the supply chain management to ensure commodities are in good quality and that they reach the beneficiary at low cost and soonest time possible. The training approaches are support supervision, on job training, mentorship on medical related activities with procurement of health commodities in mind. The capacity building should focus on procurement policy, commodity forecasting and quantification, medical guidelines and diagnosis criteria.

“Important factor to consider is monitoring of the health care worker's skills and techniques since the corporate world is increasingly expanding with new interventions and processes. For expansion, the health care systems should request for technical assistance to improve on extremely difficult domains such as forecasting, quantifications, storage, pharmaco-vigilance, market survey among other complex processes during planning phases” .



Pastakia et al. (2018) stated, “A reliable and efficient health care management system is dependent on having work force that has technical and administrative skills and experience and capacity to man it effectively. In fact, work force problems stretch already overworked health and its pillars, it reduces the strength, and opportunities to improve on different interventions that are needed to develop efficient health care logistic management

Desale et al. (2013) also “recommended capacity building of laboratory work force to manage laboratory health commodities as a solution for the frequent shortages of laboratory commodities in health facilities in Ethiopia”. A study done in Zimbabwe where information generated from HCM systems “improved accuracy and reliability owing well managed Programmes for supervisions, on job training for the staffs (Nyenwa et al., 2015).

## **2.6 Inventory Management**

“An Essential Medicines List (EML) follow up has been poor in terms of adherence but efforts have put in place to ensure that procurement systems have been put in place with good evidence that the required medical equipment and drugs are available in the community health facilities.”

The policy also states, “Inventory management and distribution system entails storage amenities and transport referrals and links and bookkeeping at different levels in an organization. Inventory control and enough storage facilities is a major problem because health commodities do expire before they reach the beneficiary or irrationally used by the clients. Where the essential list of medicine exists, it has been proved that irrational prescription and drug use has been a big and major problem”

In 2012, the Commodities Commission found the 13 essential drugs for the maternal child health Programmes were out of stock and that contributed largely to the high number of deaths among the mothers and children especially the critical medicines and health care commodities. Most affected were the under five year of age children but evidence has shown that areas with good supplies of the 13 essential drugs had significant low mortality rates among the mothers and their children during, before and after partum period” (Partnership for Maternal, Newborn & Child Health, 2013)

Expanding to universal health commodities and other related supplies in any country would eventually save approximately 6 million children and women by the year 2017

High numbers of children and women's deaths can be prevented and it has been shown that most cost effective health commodities and quality drug supplies do not benefit the mothers and their children. And the challenge for not reaching the intended beneficiary are the common barriers such as poor supplies of high end standards and quality health products and supplies, poor universal access and knowledge of why and when to correctly use the commodities (United Nations [UN], 2012).

The reports also show that any mismanagement of capital shall lead to high expense. They highlighted that organizations should keep proper inventory to ensure optimal levels by doing information analysis between the capital management and the organizational profits. A study by Bray and Awuah (2019), showed that Inventory management is an important facet to commodity management, since systems of the inventory that are poorly maintained will lead to a negative impact that will severely affect the optimal delivery of service. Bray

and Awuah (2019), also observed that it's critical to maintain and keep inventory for efficient and optimal commodity management system

## **2.7 Supply Chain Practices**

Supply Chain Management entails integration and coordination of various activities such planning, procurement, sourcing and involves the organization's efforts to collaborate and coordinate with other stakeholders who can be the supplier, beneficiary, service providers. The principles of supply and demand must be integrated in the intermediary parties across the supply chain management, (HCSM, 2013)

In November 2013, HCSM did a study among 13 counties in the following areas, Coast, Nyanza and western Regions. It found that eighty percent of the facilities had very little health commodities and supplies in storage on the day they were visited. For the month of January to March 2014, many counties' forecasting, quantification and distribution plans were not clear. This proved that counties had challenges and responsibility that was passed from the National to County governments.

“It's worth noting that great achievements and milestones such as efficient management of commodities and procurement harmonization of storage facilities and distribution of health products through KEMSA was well achieved, but some processes and steps were not achieved beside having the Drug policies from the National level” (KEMSA ,2013). Currently KEMSA has no essential list focusing on important drugs for management of maternal and neonatal cases in the country. Maternal and child health supply of commodity and equipment and distribution is donor dependent like the USAID funded projects.

Li (2011) established that three essential facets need to be factored and that is pegged on organizational documentation to optimize, access to organization service strength and the beneficiary management and strategies' alignment

“Strengthening procurement processes including having customized procurement approaches enhanced the efficiency of HEALTH CARE MANAGEMENT” (Pastakia et al., 2018). Ethiopian study showed that most of the inventory bookkeeping did not match with the information and the real commodity county leading to poor decision making” (Desale et al., 2013). Desale et al. (2013) also noted that, in spite of the existence of a well-designed laboratory LMIS, the quality of reports generated from DAR and stock cards was very low. As a consequence of this there were regular stock outs of key commodities in many health facilities" Bray and Awuah (2019) observed that, for a high officious system the book keeping should be properly kept and maintained

## **2.8 Theoretical Framework**

“The study opted for the Theory of Constraints on Supply Chain (TOC). The common theory for supply chain management is Goldratts Theory of Constraint (TOC) as explained by (Trietsch, 2005). The theory of constraints is pegged on the assumption that the goal achievement by a goal oriented organizational system is limited by at least one constraint. The theory of constraints is a management paradigm that views any management system as being limited on getting more of its goals by very petite constraints and thus Theory of

constraints uses forecasting steps to identify the constraints and re-organize it to achieve great impact in the organization (Triestch, 2005).

“It is in concurrence with the ideas of early fathers of theory of constraint, Simatupang (2004), who found challenges as causes of process not yielding results. By flow increase through constrain can over achieve output and objective of an organization or system (Goldratts, 2004).

The organizational objective assumes the need to identify constraints and decide how to explore constraints. The subordination of activities and process also aligns with the organization to make the desired changes (Goldratts 2004).

Constraints according to Noreen et al. (1995) systems and organizations can have external or internal constraints that may include equipment constraint, policy constraints, regulation constraints, human resource capacity constraints among others factors.

“The theory of constraint can be applied to solve the supply chain management efficiency by providing decisions to inventory availability and flow through monitoring and evaluating the techniques in managerial process to down scale and replenishment lead time and delayed delivery” (Herman, 2000). “Such improvements will highly increase commodity and service availability to the beneficiary. It qualifies for a comprehensive mapping of important stakeholders and their influences and veto power on health commodity access, safety quality, and its use. The stakeholders can be already active part of the organizational pillars such as the Human resource for health care giving health care services and government officers implementing health product regulations and drug policies, and few may play and actualize

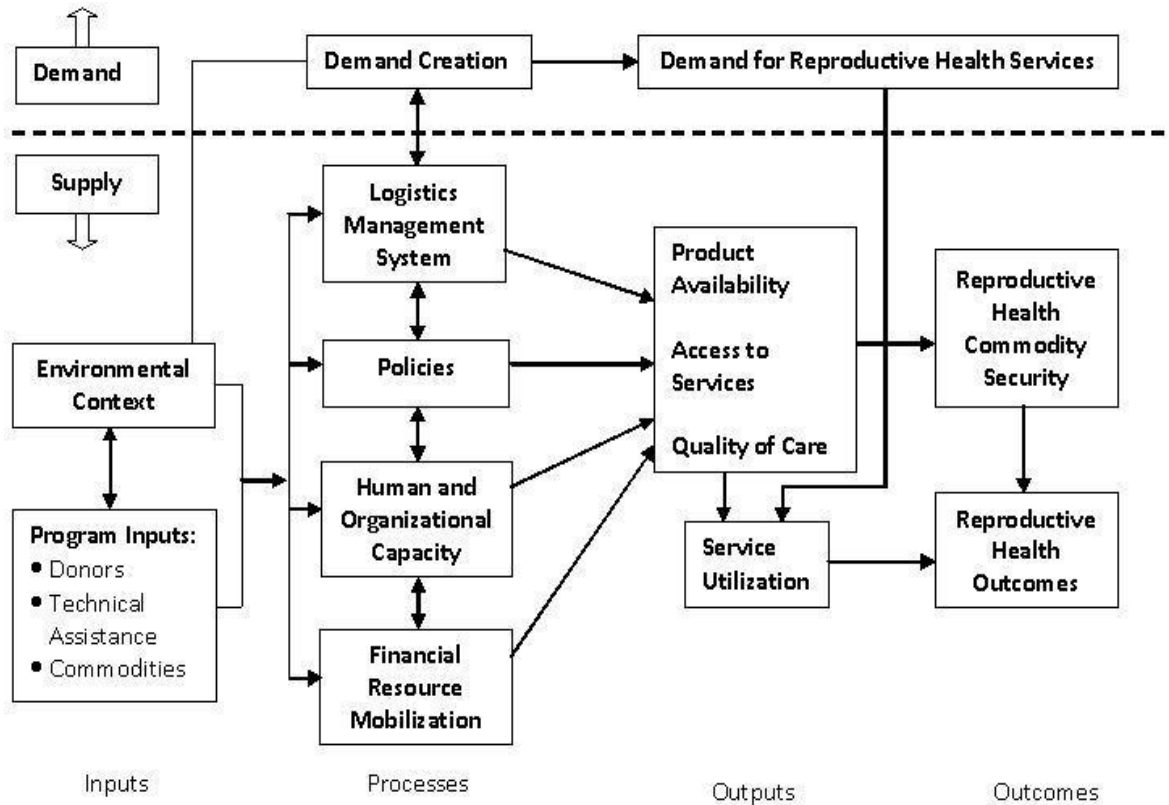
the exact service delivery like having implementing partners and stakeholders financing key activities and supply chain practices" (WHO, 2014)

“Delivering health products and supplies that are enough and of quality standards to the point of care entails very important factors of logistical operations in a system. The quality of care to the mother and children we serve can only improve if the products and supply chain systems focus on the needs of the program. Health products and Technologies are a very important facet to enable the program to give great impact (WHO, 2014).

The figure here below clearly shows the important facets, mechanisms, logistical processes and management including guidelines, frameworks and system capacity and its monetary resource mobilization for effective systems. It also shows how logistical steps and process and real results relate to the general health products management conceptual framework.

**Figure 2.1:**

*Relevant factors affecting access of health commodities*



To improve on access to health products and good impact on health, organizations should be able to predict behavior patterns, based on sources and plans and also the implementation and activity access in the system (WHO, 2014).

“The commodity security and client needs should be ideal to monitor through processes to ensure the end products are available to the beneficiary through efficient logistical systems.

The system should be able to mobilize for financial resources, Human resource and technical resources with little external help so that the program is sustainable and can consistently offer quality care.” (WHO, 2014).

The supply chain management is always shown to be as a cycle with components of selection (the right goods), forecast and procurement of the right quantities at right cost, including bookkeeping management, distribution, and provision to the beneficiary.

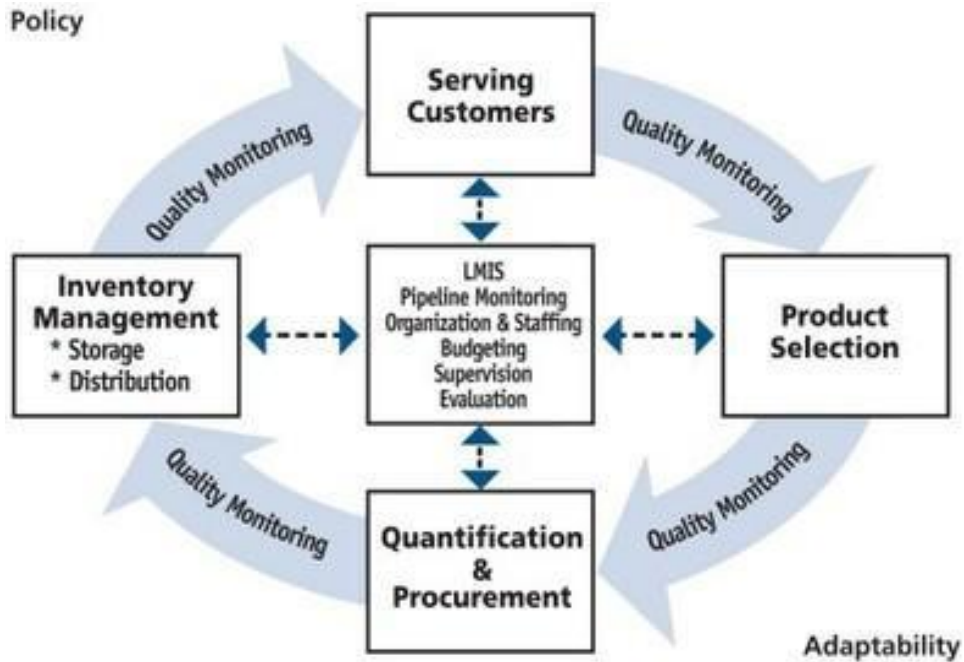
To Maintain Health product access and its availability requires attention to six rights: products to be in the right condition, delivered to the right place, at the right time, for the right cost, the right goods, in the right quantities. Information is central to the cycle, and quality improvement and assurance of the commodity standards and evaluation take place always. “Attention to the six rights should be observed to ensure the needs of the beneficiary are achieved”. (WHO, 2014).

To improve on the essential program Components and systems the National and county governments, donors and the implementing partners should evaluate logistics system performance at policy level.



**Figure 2.2:**

*Policy Level: Role of Leadership and Governance (Measure Evaluation report, 2014)*



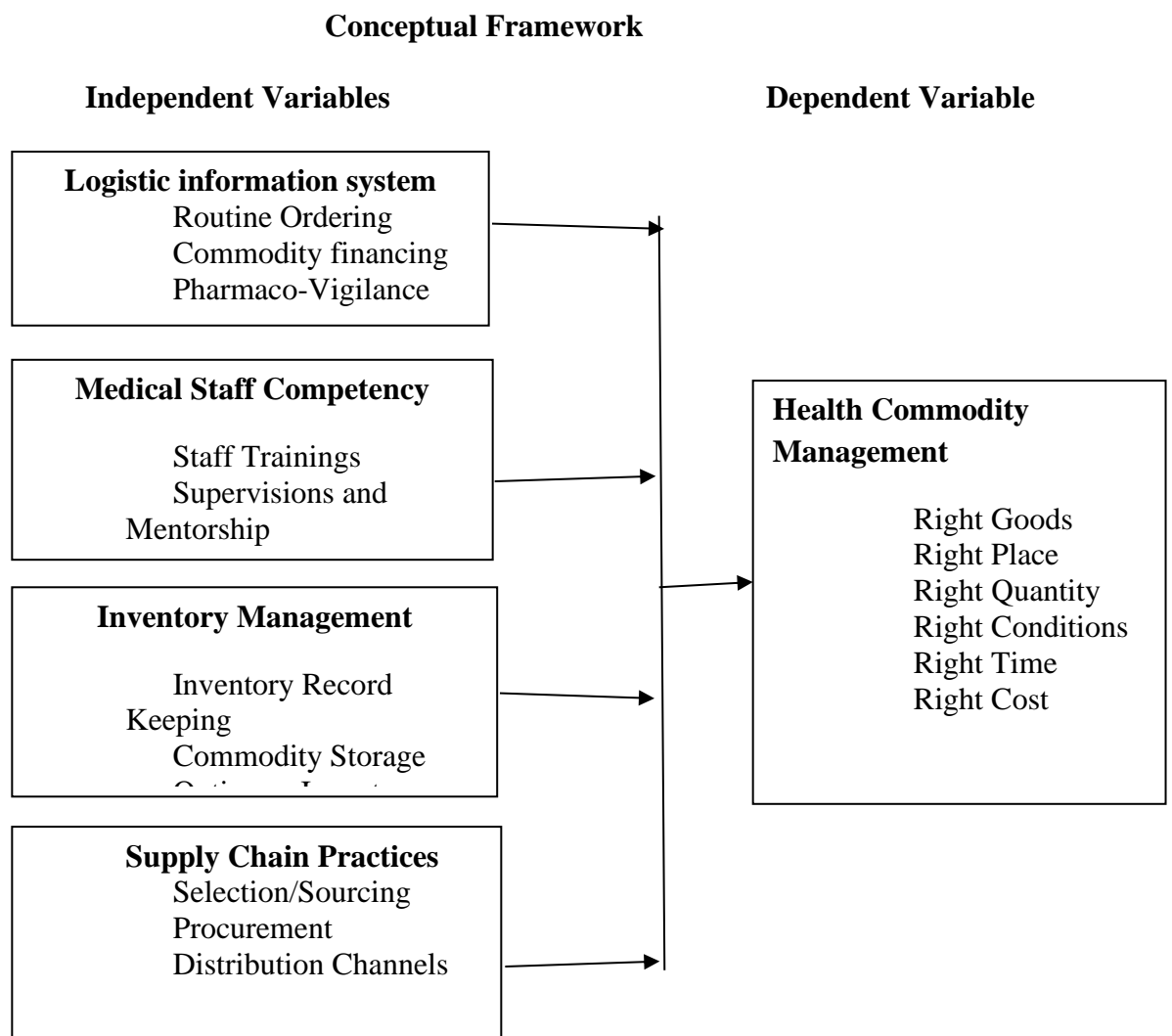
“With the changing health service delivery and its dynamism, any manager should be always factor in logistical challenges and consider their environment since some issues apply differently in a general or integrated system in the current world of technology”  
(Measure Evaluation report, 2014)

## 2.9 Conceptual Framework

It is represented in a diagrammatic format of the study showing the association between the dependent and the predictor variables. The predictor or independent variable is presumed to cause changes in the dependent variable (Mugenda & Mugenda, 2003).

**Figure 2.3:**

*Conceptual Framework for Pharmaceutical Commodity Management*



## The **Dependent Variable**

**Health Commodity Management** - which looked into six rights of Health product such the right goods, quantities, condition and delivered to the right place, time, and at the right cost to the beneficiary

The **Independent Variables** include:

- a) **Logistic Management Information System**; which looked into Routine ordering and Commodity financing
- b) **Medical Staff Competency**; which looked into Training and Support supervisions
- c) **Inventory Management**; which looked into Inventory Record keeping, Commodity storage and Optimum inventory levels
- d) **Supply Chain Practices** - Selection, Procurement, Distribution

The expected outcome from interaction of the variables was Health commodity management.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This section covered research design, target population, study location, sampling and sampling techniques, instrumentation and data collection procedure, pre-testing, study validity and study reliability, methods of data analysis and study ethical approvals.

#### **3.2 Research Design**

The study using mixed methods approaches by cross sectional study design to correlate the independent variables and the dependent variables. The study was cross sectional, since data was collected for a specific population and at a specific point in time. Both qualitative and quantitative data collection methods were adopted and the results will be used for public health planning.

#### **3.3 Target Population**

The study targeted the facility health care workers involved in commodity management processes in a maternal neonatal child health clinic. The population targeted for this study was 116 employees working in EMONC facilities in Meru County.

The composition of this target population was structured in terms of cadres as follows, General Clinical Officers, Nurses, Pharmaceutical Technologists or Pharmacists.

The Composition entailed 38 General Clinical Officers, 63 Nurses and 15 pharmaceutical technologist and pharmacist (CHRIO 2019 Report). The County Referral Hospital, Sub-

County Hospital, Health Centers and Dispensaries were selected because they are the major providers of EMONC services.

Meru County has 216 health facilities with only 51 government facilities offering EMONC services; 1 County referral facility, 8 Sub-County facilities, 32 Health centers and 10 dispensaries distributed across the County (Ministry of Health,[MOH] 2015).

**Table 3.1:**

*Target Population*

| <b>Health Care Cadre</b>                     | <b>Respondents</b> | <b>Percentages</b> |
|--|--------------------|--------------------|
| General Clinical Officers                    | 38                 | 33%                |
| Nurses                                       | 63                 | 54%                |
| Pharmaceutical Technologists and Pharmacists | 15                 | 13%                |
| <b>Total</b>                                 | <b>116</b>         | <b>100</b>         |

**Source:** County Health Record Officer Report (2019)

### **3.4 Study Location**

The study was conducted in Government health facilities. The rationale for targeting the Public health facilities was because they offer the bulk of obstetric and neonatal care services and most of the patient’s first contact from the community is in these public facilities.

### **3.5 Sampling and Sampling Techniques**

Stratified sampling of the facilities was used to identify the number of the respondents involved in supply chain management of health commodities of EMONC services in Meru County. This was followed up with Purposive sampling of respondents from the identified

strata. Yamane, (1967) advocates for a minimum requirement from the target population as representative. The study targeted 90 respondents, a number that allowed fairly accurate representation of all facilities and it was manageable for the researcher in terms of limited resources. Table distribution below shows how the respondents were identified as the study sample size.

### 3.6 Sample Size

The minimum required sample size for the proposed study was determined using the following formulae:

$$n = \frac{N}{1 + Ne^2} \dots\dots\dots (Yamane, 1967)$$

Where *n* is the sample size

*N* is the total population

*d* is the desired level of precision (0.05)

$$n = \frac{116}{1 + 116 * 0.05^2} = 89.9$$

The minimum required sample size for the study was 90 participants. The sample size for each cadre of staff was determined using probability proportionate to population size approach (Peters & Eachus, 1995). Table 3.1 shows the Population distribution of the sample among the various cadres of healthcare providers.

**Table 3.1***Distribution of the sample among the different cadres of staff*

| <b>Cadre</b>                                 | <b>N</b>   | <b>n</b>  |
|--|------------|-----------|
| General Clinical Officers                    | 38         | 30        |
| Nurses                                       | 63         | 48        |
| Pharmaceutical Technologists and Pharmacists | 15         | 12        |
| <b>Total</b>                                 | <b>116</b> | <b>90</b> |

### **3.7 Data Collection Tools**

Tools used in the study were a structured questionnaire (See appendix 3) for the facility staff and observation by the research assistants on availability of pharmaceutical commodities, best practices and the inventory tools. A five Point Likert's Scale Likert's analysis using the following Keys were used, SA denoting Strongly agreed, A denoting Agreed, N denoting Neutral, D denoting Disagreed and SD denoting Strongly Disagreed. The questionnaires were distributed to the respondents with a brief introduction of the scope of the research. This introduction established useful rapport with the respondents to allow for any clarification.

This tool was used to access the commodity management practices such as commodity safety, Logistical information management systems and inventory management processes that included record keeping, storage, and consumption. It also accessed Staff competency such as skills and knowledge on commodity management practices, guidelines and policy

that deal with MCH care, Commodity access in terms of adequacy and availability; and factors that affect logistical cycle during selection, procurement, distribution channels and storage. It collected both quantitative and qualitative data.

### **3.8 Pre-Testing**

The research pre-testing instruments were tested at Embu County Referral and Teaching Hospital which is a facility hospital bordering Meru County. The pretesting was to reveal efficiency, appropriateness, completeness, clarity and quality of the tools.

#### **3.8.1 Validity**

Mugenda and Mugenda (2003); validity is the meaningfulness and the accuracy of inferences based on the research results. The test must produce information that must be free from systematic and relevant information. Validity was confirmed by the pretest study, three rater reviews and checking for completeness and internal consistencies. In order to ensure validity, the study was subjected to expert opinion and cross checking with existing literature ``High validity and reliability of the tool was maintained" (Alay, 2009).

#### **3.8.2 Reliability**

“Reliability is the degree to which an assessment tool produces not only consistent results but stable results" (Phelan & Wren, 2006). A high coefficient of the internal consistency reliability was to indicate the extent to which an item on a test measured the same thing in



content. The study adopted the Cronbach Alpha to test reliability that will be pegged at the coefficient of 0.6; research instruments are expected to yield the same results if they are reliable and should provide the same results like the ones for pretest study when it is administered to the actual sample size.

### **3.9 Methods of Data Analysis**

The data analysis, guided by the objectives of the study was outlined and was to ensure that relationships between both dependent and independent variables of the study are attained. Both descriptive analysis and inferential analysis were employed in the study. Descriptive statistics like Frequency, mean and standard deviations were computed and represented graphically using Tables. Inferential statistics analysis was done. Quantitative data responses were analyzed five Point Likert's Scale and Regression analysis

### **3.10 Ethical Considerations**

Kenya Methodist University (KEMU) Scientific and Ethical Review Committee approval and NACOSTI Research Permit Reference number 513293 (See Appendix 6) were sought. The County study approval was obtained from Meru County Health Management Team (CHMT) through the County Director of Medical Services. This research involved human subjects and thus consents from the participants and local administration was necessary for the study.

Participant's Informed consent was obtained before any engagements. The respondent had the right in determining whether to be interviewed or not. The researcher made it clear to

them that they had the right to accept or decline the study. An assurance to the healthcare workers who provided the responses was that they would not be identifiable in the questionnaires or exit interview. The information provided was only for finding a solution to the problem and not for any other purposes.

## CHAPTER 4

### RESULTS AND DISCUSSION

#### 4.1 Introduction

This chapter discusses the interpretation and presentation of the findings. The purpose of the study was to establish the determinants of maternal child health commodities management in public health facilities in maternal child health, a case of Meru County, Kenya. The investigator made use of frequency tables to present analyzed data. The study findings were intended to answer the study's research questions. Data was collated and reports produced in form of tables and qualitative analysis performed in prose. The data collected for this study was analyzed and the findings are presented here below. The key features of the research findings are descriptive and inferential statistics and discussion of the study findings. The analytical techniques used were Pearson's Product Moment and regression analysis.

#### 4.2 Response Rate

**Table 4.1 :**

*Response Rate*

| <b>Category</b>           | <b>n</b>  | <b>%</b>    |
|---------------------------|-----------|-------------|
| Filled questionnaires     | 90        | 100%        |
| Incomplete questionnaires | 0         | 0%          |
| <b>Total</b>              | <b>90</b> | <b>100%</b> |

Shown in above Table 4.1 is the response rate of 90(100%) achieved from the distributed questionnaires and 0% of the questionnaires were not filled or were incomplete. For generalization, a study response rate of 50% is enough for analysis and reporting, 60% is good and a response rate of 70% and over is excellent (Mugenda & Mugenda, 2003). Therefore, a response rate of above 85% is within the recommended response rate.

### 4.3 Reliability Analysis

Reliability test was performed to evaluating the questionnaires, this was necessary to analyse the degree to which construct are consistent and with their measure in individual study variables. The internal consistency was assessed using the Cronbach's coefficient alpha (Zikmund, 2010). He also proved that a Cronbach alpha value of 0.6 as a minimum is acceptable. Results exceeded the 0.7 level of acceptability thus proving that degree of reliability was very high (Thornhill, & Lewis, 2007). Shown in Table 4.2, all the alpha coefficient ranged between 0.7 and 0.9. Coefficient values for the tested study items were deemed reliable for analysis.

**Table 4.2 :**

***Reliability co-efficient of the study variables***

| Variable                                | Number of Items | Cronbach's Alpha Co-efficient ( $\alpha$ ) | Comments |
|---|-----------------|--|----------|
| Logistic Management Information Systems | 5               | 0.839                                      | Accepted |
| Medical Staff Competency                | 3               | 0.850                                      | Accepted |
| Inventory Management                    | 5               | 0.719                                      | Accepted |
| Supply Chain Practices                  | 5               | 0.925                                      | Accepted |

Table 4.2 shows that Logistic Management Information Systems had a Cronbach's Alpha Co-efficient ( $\alpha$ ) of 0.839; Medical Staff Competency had Cronbach's Alpha Co-efficient ( $\alpha$ ) of 0.850; while Inventory Management scored 0.719 and Supply Chain Practices had the highest Cronbach's Alpha Co-efficient ( $\alpha$ ) at 0.925. The reliability results exceed 0.6 lower level of acceptability, consistency reliability that was internal was used and were considered high and to have adequately measured the study's variables and were therefore considered for further analysis. Validity was tested through carrying out a pretest. A sample of 30 was selected for the pretest using the Machin (2018) rule of thumb where 80 to 250 respondents are to be used. The instruments were then modified in the form of structure and results incorporated in the final instrument. The questionnaire was interrogated by verification and validation with the supervisor during the questionnaire formulation stage to ensure that the measure included an adequate representative set of items that tapped the content. Construct validity was also ensured by anchoring the constructs to the theory and empirical review of data from which they were derived.

#### 4.4 Demographic Information

**Table 4.3:**

*Demographic Information*

| <b>Gender</b>                      | <b>Frequency</b> | <b>%</b> |
|------------------------------------|------------------|----------|
| Male                               | 52               | 57.8     |
| Female                             | 38               | 42.2     |
| <b>Age</b>                         |                  |          |
| 30 years and below                 | 19               | 21.1     |
| 31-45 years                        | 55               | 61.1     |
| Above 45 years                     | 16               | 17.8     |
| <b>Tier of the health facility</b> |                  |          |
| Tier 1                             | 17               | 18.9     |
| Tier 2                             | 38               | 42.2     |
| Tier 3                             | 23               | 25.6     |
| Tier 4                             | 12               | 13.3     |
| <b>Working Experience</b>          |                  |          |
| Less than 5 years                  | 12               | 13.3     |
| 5 -10 years                        | 54               | 60       |
| 10 -15 years                       | 24               | 26.7     |
| <b>Cadre of Staff</b>              |                  |          |
| General Clinical Officer           | 30               | 33.3     |
| Nurse                              | 48               | 53.3     |
| Pharmacist                         | 3                | 3.3      |
| Pharmaceutical Technologist        | 9                | 10       |

Table 4.3 presents the information on demographic character of the participants that provides data regarding research participants and is necessary for the determination of

whether the individuals in particular studies are a true representative sample of the population target for generalization reasons, and this is key as it allows us to investigate the changes to the population. The results on the gender of the study participants are outlined in Table 4.3. Most of the respondents were male 52 (57.8%). Females who took part in the study constituted the minority of the study participants 38 (42.2%).

Majority of the respondents were aged between 31 and 45 years 55, (61.1%). Respondents who were aged above 45 years were 16 (17.8%) while those who were aged not more than 30 years were 19 (21.1%). The tier of the health facilities from where the present research enrolled the participants are and from Tier 1 and Tier 2 health facilities, respectively, 17(18.9%) and 38 (42.2%) respondents were recruited in the study. In addition, 23 (25.6%) and 12 (13.3%) respondents were enrolled from Tier 3 and Tier 4 health facilities respectively.

The findings from the enquiries of the working experience of the study participants shows that respondents who reported that they had been employed for a period of less than five years were 12 (13.3%) while those who had been employed for a period of between five and ten years were 54 (60%). The other lot had a working experience that exceeded ten years 24, (26.7%). The distribution of the study participants based on their staff cadre. Most of the study participants were nurses 48, (53.3%). The total number of general clinical officers who took part in the study were thirty 30, (33.3%). The number of respondents who worked in the health facility's pharmacy were pharmacist and Pharmaceutical Technologist and were three and nine respectively 3, (3.3%) and 9, (10%). The study asked

data on demographic characteristics because it determines one view and perception as well as an understanding of issues within the facility in terms of technical experience on commodity management, facility level with proper logistical support and management and adherence to laid down procedures, guidelines and policies. 4.3 Present the dependent variable results here first followed by the four specific objectives

#### 4.5 Logistic Management Information Systems (LMIS)

**Table 4.4:**

*Influence of Logistic Management Information Systems on Child Health Commodities*

*Management*

| Item   | Response    |            |            |            |             | Mean | Std Dev |
|--|-------------|------------|------------|------------|-------------|------|---------|
|  | SA<br>N (%) | A<br>N (%) | N<br>N (%) | D<br>N (%) | SD<br>N (%) |      |         |
| The facility has logistic management and information system to report on health commodities in maternal child health   | 11(12.2)    | 17(18.9)   | 5(5.6)     | 31(34.4)   | 26(28.9)    | 2.51 | 2.39    |
| Logistic Management and Information System (LMIS) affects availability of EMONC commodity in this facility   | 6(6.7)      | 12(13.3)   | 7(7.8)     | 30(33.3)   | 35(38.9)    | 2.16 | 2.02    |
| Commodity financing affect commodity management and service delivery sustainability in maternal child health clinic in this facility   | 28(31.1)    | 39(43.3)   | 6(6.7)     | 12(13.3)   | 5(5.6)      | 3.81 | 3.48    |
| Facility Health management team have Quality Assurance Quality Improvement (QAQI) team to check on drug quality, safety, and pharmacovigilance for Health Commodities in maternal child health | 49(54.4)    | 28(31.1)   | 6(6.7)     | 0(0.0)     | 7(7.8)      | 4.24 | 3.88    |



|  |          |          |          |          |          |      |      |
|--|----------|----------|----------|----------|----------|------|------|
| Facility use Logistic management Information System for routine ordering of drugs for health commodities for maternal child health | 27(30.0) | 27(30.0) | 10(11.1) | 15(16.7) | 11(12.2) | 3.49 | 3.26 |
|--|----------|----------|----------|----------|----------|------|------|

As tabulated in table 4.4, participants were asked if the facility has a functional logistic management and information system to report on health commodities in maternal child health, 26 (28.9%) of the respondents strongly disagreed, 31(34.4%) disagreed, 5(5.6%) were undecided, 17(18.9%) agreed while 11(12.2%) agreed strongly with a mean of 2.51 and SD of 2.39. The study also sought to find out if LMIS affects availability of EMONC commodity in the facility. The responses of the study participants were as follows; 35(38.9%) strongly disagreed, 30(33.3%) disagreed, 7(7.8%) were undecided while 12(13.3%) and 6(6.7%) agreed and strongly agreed, respectively, with a mean of 2.16 and SD of 2.02. On being asked if commodity financing affects commodity management and service delivery sustainability in maternal child health clinic, of the 90 participants engaged in the study, 5(5.6%) strongly disagreed, 12(13.3%) disagreed, 6(6.7%) were neutral, 39(43.3%) agreed and 28(31.1%) strongly agreed. The item mean score was 3.81 with a standard deviation of 3.48.

On item ‘Facility health management team have quality assurance quality improvement (QAQI) team to check on drug quality, safety, and pharmacovigilance for health commodities in maternal child health’ respondents who strongly agreed, agreed, were neutral, and strongly disagreed were 49(54.4%), 28(31.1%), 6(6.7%) and 7(7.8%) respectively. The item mean score was 4.24 with a SD of 3.88. The respondents who were

in agreement and in strong agreement with the item 'Facility use logistic management information system for routine ordering of drugs for health commodities for maternal child health' were 27 (30.0%) in each case. The rest either were undecided (10, 11.1%), disagreed (15, 16.7%) or strongly disagreed (11, 12.2%). The mean and SD scores for the item were 3.49 and 3.26 respectively. The findings are agreement with other scholars such as Soyemi (2014) that supply chain managers should employ use of monitoring risk activities such ensuring that the system have internal controls, proper reporting and exigency planning. The managers should purpose to monitor organizational information to help monitor and evaluate stages and levels and mitigating risks. The capacity to adopt monitoring systems depends on size and nature of the organization

Most respondents disagreed that availability of LMIS affects maternal Child health commodities management in public health facilities. In contradiction to our results, Shewarega et al. (2015) found that "availability of LMIS had a great facet in the actualization of cost-effective and reliable health product management" The most probable explanation for the discrepancy of the findings in the two studies could be on how the utilization of the LMIS tool are used between the two study sites. Noteworthy is the fact that availability of a tool does not always translate to its proper use. For instance, health care capacity to use the Logistic information systems that are electronic may be as a result of several factors including infrequent power supply, low capacity of the work force and the topographical features and location of the facilities where electricity is not available at all. Further, the type of LMIS available may influence the maternal child health commodities in public health facilities. Compared to paper-based LMIS, electronic LMIS

may enhance the efficiency of health care management through division of labor among health care workers, task shifting and timely reporting. This is a very important consideration when interpreting the findings of the present study, since previous studies done in Kenya have shown that the use of health care and service data and information generated from the Logistic management information system is not reliable. Many Public health facilities depend on a reporting system that is paper based and an automatic system, which are poorly maintained and supported (Obwocha et al., 2016). The study also revealed that the non-professionals who are not experts in health strategic information systems did utilize health information at the health facilities. The Clinicians, nurses, pharmaceutical technologists and pharmacists entered and utilized the data instead of the health records. Health records are inadequately staffed thus not enough focus on Logistic management information systems in most countries.

LMIS affects availability of EMONC commodity in maternal child health in public health facilities. This finding may be a reflection of the inefficiencies in the use of the LMIS. This result is in line with those of studies done elsewhere. Bekele and Anbessa (2021) indicated that the “availability of drug products relies upon how the LMIS is performing” In a Tanzania study revealed that important consumption data that is logistical was not available and many health facilities did not submit their monthly and quarterly reports to the next level while other submitted their data out of the time frame set. The operating systems and communication challenges were noted as a barrier (Chimnani et al., 2011). Another research done in Uganda revealed that many inventory books were not updated, thus causing the manager to make uninformed decision-making during the logistic process

(Maul, 2013). The findings highlight the fact that availability of health medicines depends on health commodity management processes that entails, procurement, distribution, selection, and weakness of any of the four shall eventually lead to logistic system failure. Most respondents agreed that Commodity financing affected the Child Health commodities management. This was proved by a study done in Uganda by Okello et al., (2015) which showed that insufficient funding was found to affect the access of basic medicines, Similarly, a study done in Nakuru County, Kenya, revealed that poor health financing affected, negatively, the availability of the essential mother child health commodities (Wangu & Osuga, 2014).

Presence of Quality Assurance Quality Improvement (QAQI) team) affected Maternal Child Health commodities management. The most likely explanation for this observation is that the Quality Assurance Quality Improvement team enhances coordination and integration of health commodity management systems. In line with this, Ibegunam and McGill (2012) reported that to reduce effort duplication the managers should think of partnership and coordination. Besides, having a dedicated team makes it easy to ensure that pertinent needs such as improving the health worker capacity through On Job training and mentorship.

Use of LMIS for routine ordering affected Child health commodities management. In agreement with this finding, Tola et al. (2020) showed that a well-functioning LMIS provided important data. This data was used by managers for decision making to avoid drug shortages and expires in the facilities

#### 4.6. Medical Staff Competency

**Table 4.5:**

*Influence of Medical Staff Competency on Child Health Commodities Management*

| Statement   | Response N (%) |              |            |              |             | Mean | Std Dev |
|---|----------------|--------------|------------|--------------|-------------|------|---------|
|   | SA<br>N (%)    | A<br>N (%)   | N<br>N (%) | D<br>N (%)   | SD<br>N (%) |      |         |
| Trainings and Mentorship on Commodity management affect EMONC Commodity and supplies in this facility       | 44(48.9<br>)   | 23(25.6<br>) | 5(5.6<br>) | 13(14.4<br>) | 5(5.6)      | 3.98 | 3.67    |
| Staff working in MCH/ Pharmacy have been trained on Commodity management in relation to EMONC Services      | 25(27.8<br>)   | 40(44.4<br>) | 6(6.7<br>) | 12(13.3<br>) | 7(7.8)      | 3.71 | 3.40    |
| Supportive supervision or Mentorship on Commodity Management in relation to EMONC services in this facility | 47(52.2<br>)   | 27(30.0<br>) | 6(6.7<br>) | 6(6.7)       | 4(4.4)      | 4.19 | 3.82    |

The results are outlined in the Table 4.5. Shows the responses on the statement that trainings and mentorship on commodity management affect EMONC commodity and supplies in the facility were follows; 44(48.9%) and 23(25.6%) participants strongly agreed and agreed respectively while 5(5.6%) participants were undecided. Those who disagreed and strongly disagreed were 13(14.4%) and 5(5.6%) respectively. The mean score for the item was 3.98 with a SD score of 3.67.

The mean and SD scores for the staffs on Commodity management training and mentorship on commodity management effect EMONC commodity and supplies in this facility were

3.71 and 3.40 respectively. Responses were as follows; 25(27.8%) strongly agreed, 40(44.4%) agreed, 6(6.7%) were neutral, 12(13.3%) disagreed and 7(7.8%) strongly disagreed. Supportive supervision or mentorship on commodity management in relation to EMONC services in this facility had a mean score of 4.91 and a SD score of 3.82. Majority of the respondents strongly agreed with the statement 47, (52.2%). Those who agreed were 27 (30.0%) while those who were undecided were 6(6.7%). The rest disagreed 6 (6.7%) and strongly disagreed 4 (4.4%).

Trainings and mentorship on commodity management affected the Child Health commodities management. This is in concordance with the observations made by Pastakia et al. (2018) who stated, “A reliable and Health care system is dependent on having a workforce with the knowledge and skills to operate it properly. In fact, knowledge and skill problem overworks a feeble health structure and impedes the ability to integrate with other tasks are required in order to develop reliable and Health Commodity Management systems”

Supportive supervision or mentorship on commodity management in relation to EMONC services in the facility affected on Child Health commodities management. Similar findings were reported in a study done in Zimbabwe where information generated from Health Commodity Management systems improved accuracy and reliability owing to the presence of staff in capacity building” (Nyenwa et al., 2015). In Ethiopia, “Absence of coordinated mentorship and more patients in the facility were confirmed as the reasons for poor and incomplete inventory books and hence poor decision-making in commodity management in health facilities” (Desale et al., 2013). Training and mentorship on commodity

management affected Child Health commodities management in the facilities. Tandem to this finding, Desale et al. (2013) recommended “capacity building of laboratory staff manning laboratory health commodities as a cure for the frequent shortages of laboratory supplies. The differences could be due to the cadre of staff that each study recruited”

The study by Obwocha et al., (2016) shows that 60% of facilities with health staff have not acquired computer skills and the same facilities do not have adequate computers or have computers but lack the soft wares. The investigator noted that a health professional without computer technology or skills will not really go far; and that health care systems require information technology because health care is information intensive in collating data, analysis, storage and dissemination an act that is not done as a practice. He explains that e-health and health Information system should considered a top priority in health system strengthening

## 4.7 Inventory Management

**Table 4.6**

*Influence of inventory management on Child Health Commodities Management*

| Item  | Response n (%) |          |         |          |        | Mean | Std Dev |
|---|----------------|----------|---------|----------|--------|------|---------|
|   | SA             | A        | N       | D        | SD     |      |         |
| Inventory management affects Health Commodity Management in Child Health in Meru County   | 38(42.2)       | 38(42.2) | 7(7.8)  | 5(5.6)   | 2(2.2) | 4.17 | 3.75    |
| The facility have a proper inventory, storage and distribution system in place for Health Commodity in Child health services  | 32(35.6)       | 42(46.7) | 5(5.6)  | 6(6.7)   | 5(5.6) | 4.00 | 3.63    |
| The Facility have properly filled Daily activity registers (DAR) and Bin cards available in the facility for Inventory management for EMONC Drugs and Commodity                       | 29(32.2)       | 38(42.2) | 8(8.9)  | 10(11.1) | 5(5.6) | 3.84 | 3.50    |
| The facility performs Inventory internal Control of Health Commodity i.e. (use of Purchase order for tracking, Inventory ledger or physical Inventory Counts verses recorded amounts) | 39(43.3)       | 26(28.9) | 9(10.0) | 11(12.2) | 5(5.6) | 3.92 | 3.60    |
| The stock status level available for the following EMONC Commodity and Equipments in the MCH are readily available  | 27(30.0)       | 38(42.2) | 9(10.0) | 12(13.3) | 4(4.4) | 3.80 | 3.45    |

Table 4.6 shows the responses from the study participants on the between inventory management and health commodity management in maternal child health. Analysis of



Inventory management affects health commodity management in child health in Meru County revealed that an equal proportion of respondents 38 (42.2%) agreed and strongly agreed, while 7 (7.8%) participants were undecided. 5 (5.6%) and 2 (2.2%) respondents were in disagreement and strong disagreement with the statements respectively

Respondents who were in agreement and strong agreement with the facility have a proper inventory, storage and distribution system in place for health commodity in child health services were 42(46.7%) and 32 (35.6%) respectively; 5 (5.6%) were undecided, 6(6.7) disagreed and 5(5.6) strongly disagreed. A total of 29(32.2%) and 38(42.2%) respondents strongly agreed and agreed respectively that the facility has properly filled daily activity registers (DAR) and bin cards available in the facility for inventory management for EMONC drugs and commodities. Those who were undecided were 8 (8.9%); 10 (11.1%) respondents disagreed while the rest 5, (5.6%) were in strong disagreement with the item.

The mean and SD scores for the facility have properly filled Daily activity registers (DAR) and Bin cards available in the facility for Inventory management for EMONC Drugs and Commodity were 3.84 and 3.50 respectively. Results from the facility performs inventory internal control of health commodity showed that 39(43.3%) participants strongly agreed; 26(28.9%) agreed; 9(10.0%) were undecided; 11(12.2%) participants disagreed and 5(5.6%) strongly disagreed. The mean score for the item was 3.92 and SD of 3.60. The findings from analysis of the stock status level available for the following EMONC Commodity and Equipments in the MCH are readily available were as follows;27(30.0%)

strongly agreed; 38(42.2%) agreed; 9(10.0%) were undecided; 12(13.3%) disagreed and 5(5.6%) strongly disagreed. The mean and SD scores for the stock status level available for the following EMONC Commodity and Equipments in the MCH are readily available were 3.80 and 3.45 respectively. The overall mean and SD scores for inventory management 3.92 and 3.60 respectively.

The overall mean score indicates that inventory management plays an important role on Health Commodity Management in Maternal Child Health. The findings concur with those of Lazaridis and Dimitrios (2015); the duo noted that any mismanagement of capital shall lead to high expense. They highlighted that organizations should keep proper inventory to ensure optimal levels by doing information analysis between the capital management and the organizational profits.

A study by Bray and Awuah (2019), showed that Inventory management is an important facet to commodity management, since systems of the inventory that are poorly maintained will lead to a negative impact that will severely affect the optimal delivery of service. Bray and Awuah (2019), also observed that it's critical to maintain and keep inventory for efficient and optimal commodity management system

Inventory management affects Child Health commodities management in public health facilities in Meru County. Patakia et al. (2018), who demonstrated that inefficiencies in inventory management could lead to life threatening consequences, made similar observations. Inventory management and health supplies exist in the supply chain because of a mismatch between supply and demand. A function that inventory management gives in commodity management, in general, is to improve the quantification to satisfy needs of the populace by having the health commodities accessible when the beneficiary wants it.

The facility has a proper inventory, storage and distribution system in place for Child Health commodities management in public health facilities in Meru County. In agreement with our finding, Bray and Awuah (2019) observed that, for a working LMIS, it is important that an inventory is well maintained” The most probable explanation for the concordance in the two study findings is similarity in the ordering and procurement processes in the two study settings. “In our study setting the processes are often protracted, expensive and unreliable” (Tsofa et al 2017).

The Facility has properly filled Daily activity registers (DAR) and Bin cards available in the facility for Inventory management for EMONC Drugs and Commodity. In discordance with this, is a study conducted in Ethiopia, Desale et al (2013) who noted that, “in spite of the existence of a well-designed laboratory LMIS, the quality of reports generated from DAR and stock bin cards was very low. As a consequence of this there were regular stock outs of key commodities in many health facilities”

The study is agrees with Obwocha et al. (2016) many health care workers are not well capacity build on information technology and communication and thus are not ICT privy; most of health care workers are trained and mentored on paper based tools and registers. The investigator also noted that none of the facilities used a pure electronic information system thus resulting to poor quality of data collected thus affecting decision making in health commodity management. He noted that use of technology was mostly developed for use in other industries but not in the health strategic information

The facility performs Inventory Internal Control of Health Commodity i.e. (use of Purchase order for tracking, Inventory ledger or physical Inventory Counts versus recorded amounts

this may be a reflection of respondents' experiences with poorly designed and poorly implemented internal controls. "Inefficiencies in internal controls systems have been implicated as reasons for causing late quantification and supply of important drugs and thus drug shortages in intended facilities" (Tsofa et al., 2017).

The stock status level available for the following EMONC Commodity and Equipments in the MCH are readily available this is in agreement with the findings of a result conducted in Uganda by Okello et al. (2015) which indicated that quantification improves the availability of essential medicines. The similarities in the findings from the two studies may be attributed to the accuracies of records on stock levels in the two study areas. In addition, an Ethiopian study showed that, "a lot of inventory books did not capture the succinct data to match with the actual stocks at hand thus making skewed decision making" (Desale et al., 2013).

## 4.8 Supply Chain Practices

**Table 4.7:**

### *Influence of Supply Chain Practices' on Child Health Commodities Management*

| Item   | Response n (%) |          |          |          |        | Mean | Std Dev |
|--|----------------|----------|----------|----------|--------|------|---------|
|  | SA             | A        | N        | D        | SD     |      |         |
| The following factors affecting Supply Chain Practices (Selection, procurement, distribution) of EMONC commodity in MCH in this facility   | 27(30.0)       | 37(41.1) | 19(21.1) | 2(2.2)   | 5(5.6) | 3.88 | 3.50    |
| MCH Staff get involved in selection, Procurement, storage and Reporting of Health commodities related with EMONC services in this facility | 10(11.1)       | 49(54.4) | 20(22.2) | 9(10.0)  | 2(2.2) | 3.66 | 3.21    |
| The procurement Method of Health commodity related to EMONC services in this facility  | 22(24.4)       | 43(47.8) | 13(14.4) | 7(7.8)   | 5(5.6) | 3.78 | 3.41    |
| Health financing on procurement and distribution of EMONC commodity to Health facilities is effective                                      | 20(22.2)       | 31(34.4) | 21(23.3) | 16(17.8) | 2(2.2) | 3.57 | 3.21    |
| Facility have Policy, guideline and Job aids on Procurement, storage, pharmaco-vigilance and disposal of drugs at MCH                      | 25(27.8)       | 39(43.3) | 10(11.1) | 9(10.0)  | 7(7.8) | 3.73 | 3.41    |

The results of the analysis of the responses to the inquiries on supply chain practices in relation to health commodity management in maternal child health are displayed in Table 4.7. The following factors affecting supply chain practices (selection, procurement, distribution) of EMONC commodity in MCH in this facility 27(30.0%) strongly agreed; 37(41.1%) agreed; 19(21.1%) were undecided; 2(2.2%) disagreed and 5(5.6%) strongly disagreed. The mean score was 3.88 while the SD score was 3.50. MCH Staff get involved

in selection, Procurement, storage and Reporting of Health commodities related with EMONC services in this facility responses were as follows; the mean and SD scores were 3.62 and 3.21 respectively; 10 (11.1%); strongly agreed; 49(54.4%) agreed; 20(22.2%) were undecided; 9(10.0%) disagreed and 2(2.2%) strongly disagreed.

Respondents who were in agreement and strong agreement with that the procurement Method of Health commodity related to EMONC services in this facility were 43(47.8%) and 22(24.4%) respectively. The rest responded as follows; 13(14.4%) were undecided; 7(7.8%) disagreed and 5(5.6%) strongly disagreed. The mean score was 3.78 while the SD score was 3.41.

Health financing on procurement and distribution of EMONC commodity to Health facilities is effective statement had the following responses 20(22.2%) strongly agreed while 31(34.4%) agreed). Those who were undecided were 21(23.3%). The rest disagreed and strongly disagreed 16(17.8%) and 2(2.2%) respectively. For Item Facility have Policy, guideline and Job aids on Procurement, storage, pharmaco-vigilance and disposal of drugs at MCH had the mean score was 3.73with a SD score of 3.41 Further analysis of statement showed the following results; 25(27.8%) strongly agreed; 39(43.3%) agreed; 10(11.1%) were undecided; 9(10.0%) disagreed and 7(7.8%) strongly disagreed.

The findings indicate that most respondents agreed that supply chain practices affect maternal child health commodity management. Li (2011) established that three essential facets need to be factored and that is pegged on organizational documentation to optimize,

access to organization service strength and the beneficiary management and strategies' alignment

The following factors affecting Supply Chain Practices (Selection, procurement, distribution) of EMONC commodity in MCH in this facility. This finding is not surprising considering that, “in a health system strengthening commodity management should consider constant access and availability of health products and not be limited to important Maternal Child health supplies” (UNICEF,2015). Research by Damtew et al. (2019) reported similar findings in a study conducted in Ethiopia. Similarly, a study done in Nakuru County, Kenya, revealed that budget inadequacy was cause by misappropriation of funds thus negating the importance of having availability of maternal and child health commodities to safe life (Wangu & Osuga, 2014). MCH Staff get involved in selection, Procurement, storage and Reporting of Health commodities related with EMONC services in this facility has positive effect on HCM. The reported positive effect may be attributed to several factors such trainings, mentorship and commitment in commodity management among the staff. In addition, the observed effect may arise from strengths in leadership, knowledge and skills and good integration of different cadres of staff.

The procurement Method of Health commodity related to EMONC services in this facility affected Child Health commodities management. This is in agreement with who showed that “strengthening procurement processes including having customized procurement approaches enhanced the efficiency of HCM” (Pastakia et al., 2018). Health financing on buying of EMONC commodity to the beneficiary is effective had effect on Child Health commodities management in Public health facilities in Meru County. In concordance with this finding is a study done in Ethiopia which demonstrated that “adequacy of budget was

a significant predictor of the availability of the health commodities and hence an enhancement of efficiency in HCM” (Damtew et al., 2019).

Facilities have Policy, guideline and Job aids on Procurement, storage, pharmaco-vigilance and disposal of drugs at MCH had effect on HCM. Most probably, this is an indication of the interplay of several factors that influence health commodity management. Besides, the existence of these documents may not necessarily imply that they are implemented as envisioned by the management.

#### 4.9 Health Commodity Management

**Table 4.8:**

***Findings on health commodity management in maternal child health***

| Statement  | Response N (%) |            |            |            |             | Mean | Std Dev |
|--|----------------|------------|------------|------------|-------------|------|---------|
|  | SA<br>N (%)    | A<br>N (%) | N<br>N (%) | D<br>N (%) | SD<br>N (%) |      |         |
| We are very particular about the product selection process in this hospital                      | 29(32.2)       | 46(51.1)   | 9(10.0)    | 2(2.2)     | 4(4.4)      | 4.04 | 3.64    |
| There is a proper inventory, storage and distribution system in place                            | 20(22.2)       | 42(46.7)   | 14(15.6)   | 8(8.9)     | 6(6.7)      | 3.69 | 3.34    |
| We obtain services, supplies, and equipment in conformance with applicable laws and regulations. | 38(42.2)       | 33(36.7)   | 9(10.0)    | 6(6.7)     | 4(4.4)      | 4.06 | 3.68    |
| Healthcare providers get sufficient health commodities of assured                                | 26(28.9)       | 36(40.0)   | 13(14.4)   | 15(16.7)   | 0(0.0)      | 3.81 | 3.43    |



|  |           |           |           |        |        |      |      |  |
|--|-----------|-----------|-----------|--------|--------|------|------|--|
| quality at competitive prices in accordance with national and international laws                   |           |           |           |        |        |      |      |  |
| We prevent irrational/incorrect use of supplies by showing users the right way to use the supplies | 25(27.8 ) | 43(47.8 ) | 13(14.4 ) | 5(5.6) | 4(4.4) | 3.89 | 3.50 |  |

Table 4.8 displays the findings on health commodity management in maternal child health. The responses on Item we are very particular about the product selection process in this hospital were as follows; 29(32.2%) strongly agreed; 46(51.1%) agreed; 9(10.0%) were neutral; 2(2.2%) disagreed and 4(4.4%) strongly disagreed. The mean and SD scores were 4.04 and 3.64 respectively. Analysis of if there is a proper inventory, storage and distribution system in place yielded the following results; 20(22.2%) strongly agreed; 42(46.7%) agreed; 14(15.6%) were neutral; 8(8.9%) disagreed and 6(6.7%) strongly disagreed. The mean score was 3.69 with a SD score of 3.34. The mean and SD score for the responses on if healthcare providers get sufficient health commodities of assured quality at competitive prices in accordance with national and international laws were 3.81 and 3.43 respectively. Further analysis revealed that 26(28.9%) strongly agreed; 36(40.0%) agreed; 13(14.4%) were neutral and 15(16.7%) disagreed. No respondent strongly disagreed with healthcare providers get sufficient health commodities of assured quality at competitive prices in accordance with national and international laws. The responses on if we prevent irrational/incorrect use of supplies by showing users the right way to use the supplies were as follows; The mean and SD scores were 3.89 and 3.50 respectively; 25(27.8%) strongly agreed; 43(47.8%) agreed; 13(14.4%) were neutral; 5(5.6%) disagreed

and 4(4.4%) strongly disagreed. The overall mean and SD score for Items on health commodity management in maternal child health were, respectively, 3.99 and 3.52.

The study findings indicate that product selection, which is a procurement process, informs on the Child Health commodities management. This finding is tandem with study done by Pastakia et al. (2018), whose study inferred that “strengthening procurement processes should have a comprehensive procurement approaches that should strengthen efficiency of Health commodity management”

Inventory management, Storage and distribution of commodity affected Child Health commodities management. Bray and Awuah (2019) proved that inventory management is an important facet to the implementation of commodity management. It supported this because without well-kept inventory systems, undesired impact will lead to customer in-satisfaction. The study also proved that for effective procurement activities to trade well for commodity management and for optimum results, the inventory theories for commodities should randomly evolve and correlate with the price and demand processes. This implied that the standard health management tools and techniques tandem with health financing models and application of guidelines for ordering commodity would benefit the suggested approach

The study showed that the quality of health commodities should be in standard with the national, international laws and standards as supported by (Tsofa et al., 2017). “Any facility that performs Inventory Internal Control of Health Commodity by use of requisition orders for tracking, Inventory physical Counts and compared with recorded amounts this may be an evidence of respondents’ experiences for internal controls. Inefficiencies in

internal controls systems have been cited as reasons for causing major and late request for commodities thus leading to shortage of important health products in health facilities”

The study supported rational use of commodities to prevent incorrect use. (WHO, 2014) cites that “Health commodities and Medicines should be accessible, affordable and that appropriate use should be a focus for strengthening health systems and to advance universal health coverage. Essential equipment’s and medicines respond to the priority health needs for specific population as beneficiary. At all time’s essential medicine should be in right place, have quality, for right person and cost effective”

#### 4.10 Inferential Statistics

##### **Bivariate Linear Correlation on Child Health Commodities Management in Meru County**

The researcher conducted a bivariate linear correlation analysis to show and determine the relationship between each structural factor and its influence on Health Commodity Management in Maternal Child Health as shown in table 4.9

**Table 4.9:**

##### *Bivariate Linear Correlation: Child Health Commodities Management*

|                            | Pearson Chi-Square Tests |    |         |
|----------------------------|--------------------------|----|---------|
|                            | Value                    | df | P-Value |
| LMIS                       | 4.450 <sup>a</sup>       | 1  | 0.035   |
| Staff Competency           | 7.048 <sup>a</sup>       | 1  | 0.008   |
| Inventory Management       | .000 <sup>a</sup>        | 1  | 0.989   |
| Supply Chain management    | .029 <sup>a</sup>        | 1  | 0.865   |
| Number of Valid Cases = 90 |                          |    |         |

To analyze and inform each of the independent variable in this study (X) that is logistic management information system, medical staff competency, inventory management, and supply chain management practices influences the Health Commodity Management in Maternal Child Health (Y), a bivariate linear analysis was performed between structural arrangements and the Health Commodity Management in Maternal Child Health.

The results in Table 4.9 indicated that the logistic management information system was positively and significantly associated with the Health Commodity Management in Maternal Child Health (Pearson Chi-Square = 4.450, P-Value=0.035). This implied that

the Logistic Management Information System had a positive and significant association thus an improvement will lead to an improvement in the Health Commodity Management in Maternal Child Health. Medical staff competency was positively and significantly associated with the Health Commodity Management in Maternal Child Health (Pearson Chi-Square = 7.0489, P-Value=0.008). This also implied that medical staff competency had a positive and significant association thus its improvement will lead to an improvement in the Health Commodity Management in Maternal Child Health.

On Cross tabulation of Inventory management and Health Commodity Management, there was no significant association (Pearson Chi-Square = 0.000, P-Value=0.989). This implied that Inventory management had no significant effect on Health Commodity Management in Maternal Child Health. Lastly, Supply Chain Management practices was not significantly associated with the Health Commodity Management in Maternal Child Health (Pearson Chi-Square = 0.029, P-Value=0.865). This also implied that Supply Chain Management practices were not significantly associated with Health Commodity Management in Maternal Child Health. This was an indication that Logistic Management Information System and medical staff competency have a strong association while Inventory management and Supply Chain Management practices portrayed a weak association with Health Commodity Management in Maternal Child Health.

#### **4.11 Multivariate Analysis**

##### **Table 4.10:**

##### ***Model Summary Multivariate Analysis***

|                     |  | B     | S.E. | Wald  | df | Sig. | Exp (B) | 95% C.I. for EXP(B) |       |
|---------------------|--|-------|------|-------|----|------|---------|---------------------|-------|
|                     |  |       |      |       |    |      |         | Lower               | Upper |
| Step 1 <sup>a</sup> | Logistic management information system (1) | 1.201 | .535 | 5.044 | 1  | .025 | 3.322   | 1.165               | 9.474 |
|                     | Staff competency (1)                       | 1.602 | .569 | 7.917 | 1  | .005 | .202    | .066                | .615  |
|                     | Inventory management (1)                   | -.533 | .668 | .638  | 1  | .425 | .587    | .159                | 2.171 |
|                     | Supply chain practices (1)                 | -.290 | .541 | .287  | 1  | .592 | .748    | .259                | 2.160 |
|                     | Constant                                   | .499  | .867 | .331  | 1  | .565 | 1.647   |                     |       |

a. Variable(s) entered on step 1: logistic management information system, staff competency, inventory management, Supply chain practices.

The study applied regression with health commodity management as the dependent variable and Logistic management information system, Staff Competency, Inventory management, supply chain practices as the predictor factors. Data from 90 respondents was tested.

The regression analysis shows that the Logistic management information system (P-Value=0.025) thus it is a significance determinant of health commodity management; where Logistic management information system is present, the health commodity management is 3.322 times more likely to be available than in case where there is no Logistic management information system.

The regression analysis also shows that staff competency (P-value =0.005) thus it is a significant determinant of Health commodity management. Where there are not

competent staff, the health commodity management is 0.202 times less likely to be available when compared to facilities with competently trained staff. The results were significant at 0.005

The regression analysis also shows that Inventory management (P-value =0.425) and Supply chain practices (P-Value=0.592) respectively are not significant determinants of maternal child health commodities management in public health facilities.

**Table 4.11:**  
*The Nagelkerke R square Model Summary*

| <b>Model Summary</b> |                     |                      |                     |
|----------------------|---------------------|----------------------|---------------------|
| Step                 | -2 Log likelihood   | Cox & Snell R Square | Nagelkerke R Square |
| 1                    | 98.654 <sup>a</sup> | .134                 | .189                |

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than ,001.

The analysis Nagelkerke R square =0.189; the study shows the four independent variables; Logistic management information system, staff competency, Inventory management and Supply chain practices contributes to 18.9% of the change on health commodity management and thus a need to conduct further studies.

The study found that Logistic Management and Information System affects availability of EMONC commodities. Where Logistic management information system is present, the health commodity management is times more likely to be available than in cases where there is no Logistic management information system. These results agree with previous study by Bekele and Anbessa (2021) which found that the availability of drug products

relies upon how the LMIS is performing. The results may not be consistent with a Kenyan study, which indicated that the use of healthcare service to generate data and information from logistic management information system is not reliable, and many public health facilities depend on a reporting system that is paper based (Obwocha et al., 2016).

Another study results done in Nakuru County, Kenya revealed that inadequate budget negatively affected the availability of the lifesaving MCH commodities (Wangu and Osuga, 2014). The study found that training and mentorship had an influence on availability of EMONC commodities. Where there are not competent staff, the health commodity management is less likely to be available when compared to facilities with competently trained staff. This concurred with Pastakia et al.(2018) findings that a reliable and efficient Health Commodity Management system is dependent on having a workforce that has technical and administrative skills, experience, and capacity to manage effectively. Desale et al. (2013) recommended capacity building for laboratory workforce as a solution for the frequent shortages of laboratory commodities in health facilities in Ethiopia.

In view of inventory management, it has no significance as a determinant of maternal child health commodities management in public health facilities. This finding is inconsistent with Bray and Awuah (2019) who found out that inventory management is critical to the function of commodity management, because without proper inventory systems, the bullwhip effect is likely to occur and impede health service delivery. The implication is that quality of health commodity should be in tandem with the national and international laws and standards as supported by (Tsofa et al. 2017), who said that any



facility that performs inventory internal control of health commodity by use of requisition orders for tracking, inventory physical counts is evidence of experiences for internal controls. Inefficiencies in internal controls systems have been cited as reasons for causing major and late requests for commodities thus leading to shortage of important health products in health facilities. The investigator also noted that many countries with decentralized health systems retained most commodities and he argues that the decentralized commodity systems had good ability to perform quality controls, quantifications thus obtaining the economy of scale when making bulky purchases, and can evaluate the commodity qualities supplied to the devolved units of health. Good documentation lead to better health financing allocation for commodities thus leading to optimal servicing of health commodities orders and request at health facility level.

The study found that Supply chain practices is not a significant determinant of maternal child health commodities management in public health facilities in Meru County.

The study is consistent with an Ethiopian study that showed, “a lot of inventory books did not capture the succinct data to match with the actual stocks at hand thus making skewed decision making” (Desale et al., 2013). Findings of a study conducted in Uganda by Okello et al. (2015) indicated that quantification improves the availability of essential medicines.

The investigator noted that Meru County health financing is at 34%, which is higher than Abuja recommended 15% yet no change in improvement of Health commodity predictors.

This implies that the interventions used are not of high impact thus the need for recommending a study in health financing on why such a huge percentage in investment does not correspond to improvement in health indices.

## CHAPTER 5

### SUMMARY AND CONCLUSIONS

#### 5.1 Introduction

This chapter consists of a summary of the findings of the research, conclusions relating to the research objectives, recommendations on the study, which was to establish the determinants of maternal child health commodities management in public health facilities in Meru County. Data relating to the objectives of study was collated, collected and analyzed and the findings are presented in the fourth chapter. The study sought to determine the internal factors that influence health commodity management and specifically the study sought to determine how Logistic Management Information Systems, Medical Staff Competency, Inventory Management and Supply Chain Practices determines how health commodity management influences maternal child health.

#### 5.2 Summary of Research Findings

In Summary the model of the bivariate was  $Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4$ .

The study shows Logistic information management system and Staff competency have significant relation with health commodity management with P-value of 0.025 and 0.005. Inventory management and Supply chain practices have no significant association with health commodity management and had P-value of 0.425 and 0.592 respectively.

### **5.2.1 Health Commodity Management**

The study findings indicated that the two predictor variables, Logistic management information system and Staff competency have a significant positive impact on health commodities management in Maternal Child Health in Meru County and while Inventory management and supply chain management practices have no significance to Child Health commodities management. Thus, the values of predictor variables of Logistic information management system and Staff competency have significant relation with Child Health commodities management with P-value of 0.025 and 0.005. Inventory management and Supply chain practices have no significant association with Child Health commodities management and had P-value of 0.425 and 0.592 respectively. This means an increase of predictor variables of Logistic information management system and Staff competency should increase health commodity management.

### **5.2.2 Logistic Management Information System**

The first objective of the study was to assess how the Logistic Management Information System Influences Health Commodity Management in Maternal Child Health in Meru County. The study established that the logistic management information system was positively and significantly associated with the Child Health commodities management in Public Health facilities in Meru County '(p=0.25 <0.05). This implied that since the Logistic Management Information System had a positive and significant effect thus an improvement would lead to an improvement in the Child Health commodities

management. Logistic management information system affects health commodity management to a great extent that explains variation in health commodity management in maternal-child health in Meru County. 0.025 significance level is less than 0.05 thus the regression model positively associates with the dependable variable. Where a Logistic management information system is present, the health commodity management is 3.322 times more likely to be available than in cases where there is no Logistic management information system.

### **5.2.3 Medical Staff Competency**

The second objective of the study was to establish how medical staff competency affects Child Health commodities management in Meru County, Health Commodity Management in Maternal Child Health. Medical staff competency was positively and significantly associated with the Health Commodity Management in Maternal Child Health ( $p=0.005<0.05$ ). This also implied that since medical staff competency had a positive and significant effect thus its improvement will lead to an improvement in the Health Commodity Management in Maternal Child Health. The medical staff competency determines health commodity management in maternal-child health in Meru County to a great extent. Where there are not competent staff, the health commodity management is 0.202 times less likely to be available when compared to facilities who are competently trained. The results were significant at 0.005

#### **5.2.4 Inventory Management**

The third objective of the study was to determine how inventory management affects Child Health commodities management in Meru County. Inventory management was not significantly associated with the Health Commodity Management in Maternal Child Health ( $p=0.425$ ) that more than 0.005 significance level. This implies that Inventory management had no significant effect thus its improvement will not lead to an improvement in the Health Commodity Management in Maternal Child Health. Inventory management has no significant influence on the health commodity management in maternal-child health in Meru County. 0.425 is more than 0.05 thus; the regression model does not predict the dependable variable

#### **5.2.5 Supply Chain Management Practices**

The fourth objective of the study was to determine factors how Supply Chain Management Practices affects Child Health commodities management in Public health facilities of Meru County. Lastly, Supply Chain Management practices had no significant association with the Health Commodity Management in Maternal Child Health ( $p=0.592$ ). This implied that Supply Chain Management practices would not lead to an improvement in the Health Commodity Management in Maternal Child Health

### **5.3 Conclusions**

The study established that there is a significant relationship between study predictor variables, namely Logistic management information system and Staff competency with Child Health commodities management. The study also concludes that medical staff

competency is the predictor variable that highly affected health commodity management in Meru County, followed by logistic management information system. Inventory management and supply chain management practices were not significantly associated with commodity management in Meru County.

This study concludes that staff competency and logistics management information system influences to a great extent on the Child Health commodities management in Public health facilities of Meru County, while inventory management and supply chain practices have no influence on Child Health commodities management in Meru County. First Objective was to establish how the logistic management information system affects Child Health commodities management. The second objective was to establish how medical staff competency affects Child Health commodities management in Meru County and the study concludes that medical staff competency affects Child Health commodities management to a great extent and it has a has sufficient influence in Child Health commodities management. Third objective was to determine how inventory management affects Child Health commodities management child health in Meru County. The study established that inventory management does not significantly affect Child Health commodities management and the study concludes that inventory management plays less role on health commodity management in maternal child health. Finally, the study concludes that supply chain management practices does not determine Child Health commodities management in Meru County and has no significant influence on health commodity management in maternal child health. The study analysis (Nagelkerke R square =0.189); shows the four independent variables; Logistic management information system, staff competency,

Inventory management and Supply chain practices contributes to 18.9% of the change on health commodity management and thus a need for further studies.

#### **5.4 Recommendations**

- i. The county government should invest on health information systems for Quantification, forecasting reporting and procurement of medical goods and equipment's to ensure enough medical stocks and that client' needs are attended to within the shortest time.
- ii. The County government should also invest in a system that is able to generate reports, forecast and quantify on maternal child health commodities and equipment to ensure proper inventory and correct stock quantities status.
- iii. The County Health Management Team and County government of Meru should invest in regular staff training and development in order to improve capacity of Human resource for Health on health commodity management.
- iv. The Meru County Government should ensure that they formulate County specific policies, guidelines, and work plans to ensure all the facilities have enough allocation of funds for training health care workers and installing functional logistic information systems.

#### **5.5 Suggestions for further research**

A study recommends that a similar study should be conducted in other counties to validate the findings of this study. The study having targeted the General Clinical Officers, Nurses, Pharmaceutical Technologists and Pharmacists, the investigator recommends a similar

study with the procurements, finance, administrative and facility management committees who could have influence on health commodity management. This could result in missing very important information that could be used to come up with the exact gaps thus informing on policymaking or changes.



## REFERENCES

- Bekele, A. & Anbessa, G.T. (2021). Logistics Management Information System Performance of Program Medicines in Public Health Facilities of East Gojjam Zone, Northwest Ethiopia: A Cross-Sectional Study. *Journal of Multidisciplinary Healthcare* 13(14), 81-89  
<https://doi.org/10.2147/JMDH.S286981>
- Bray, A. V., & Awuah, S. O. (2019, December 15-18). *Distribution Challenges of Health Commodities* [Conference Session]. 9th International Conference on Operations and Supply Chain Management, Vietnam. [https://journal.oscm-forum.org/journal/proceeding/show\\_all/oscm-2019-vietnam](https://journal.oscm-forum.org/journal/proceeding/show_all/oscm-2019-vietnam)
- Chimnani, A., Kamunyori, J., & Tuddenham, T.S.J. (2011). *Tanzania: TB and leprosy logistics system assessment quantitative and qualitative results from the LIAT and the LSAT*. [https://publications.jsi.com/JSIInternet/Inc/Common/\\_download\\_pub.cfm?id=12240&lid=3](https://publications.jsi.com/JSIInternet/Inc/Common/_download_pub.cfm?id=12240&lid=3)
- Damtew, D., Worku, F., Tesfaye, Y., & Jemal, A. (2019). Availability of Lifesaving Maternal and Child Health Commodities and Associated Factors in Public and Private Health Facilities of Addis Ababa, Ethiopia. *Health services research and managerial epidemiology*, 6, 1-9. <https://doi.org/10.1177/2333392819892350>
- Desale, A., Taye, B., Belay, G., & Nigatu, A. (2013). Assessment of laboratory logistics management information system practice for HIV/AIDS and tuberculosis laboratory commodities in selected public health facilities in Addis Ababa, Ethiopia. *The Pan African medical journal*, 15(1), 31-46. <https://doi.org/10.11604/pamj.2013.15.46.1969>
- District Health Information System 2 (2019). *Open Health News: The voice for the open Health Community*. <https://www.openhealthnews.com/resources/district-health-information-system-2-dhis2>
- Goldratts, K. (2004) Theory of Constraints. In Gass S.I., & Fu M.C. (eds) *Encyclopedia of Operations Research and Management Science*. Springer.  
[https://doi.org/10.1007/978-1-4419-1153-7\\_200848](https://doi.org/10.1007/978-1-4419-1153-7_200848)
- Health Care Sharing Ministries (2013). *Health commodity and services management program*. [https://www.google.com/?gws\\_rd=ssl#q=commodity+security%2Ccommodity+safety%2C+commodity+reporting+in+kenya+health+sector](https://www.google.com/?gws_rd=ssl#q=commodity+security%2Ccommodity+safety%2C+commodity+reporting+in+kenya+health+sector); [retrieved on 11/1/2016]
- Healthy People (2020). *Maternal, Infant and Child Health*. <https://www.healthypeople.gov/2020/topics-objectives/topic/maternal-infant-and-child-health>

- Herman, D. (2000.) Introducing short-term brands: A new branding tool for a new consumer reality. *Journal of Brand Management*, 7(15), 330–340 (2000).  
<https://doi.org/10.1057/bm.2000.23>
- Ibegbunam, I., & McGill, D. (2012). Health commodities management system: Priorities and challenges. *Journal of Humanitarian Logistics and Supply Chain Management; Bingley*, 2(2), 161-182. DOI: 10.1108/20426741211260741
- Kenya Demographic and Health Survey (2014). *Kenya Demographic and Health Survey 2014*  
<https://dhsprogram.com/pubs/pdf/fr308/fr308.pdf>.
- Kenya Medical and Supply Agency (2013). *Kenya Medical and Supply Agency Authority Act*.  
<http://kenyalaw.org/kl/fileadmin/pdfdownloads/Acts/KenyaMedicalSuppliesAuthorityActNo20of2013.pdf>
- Lazaridis, I. & Dimitrios, T. (2015). Improved bowel preparation increases polyp detection and unmasks significant polyp miss rate. *World journal of clinical cases*, 3(10), 880–886.  
<https://doi.org/10.12998/wjcc.v3.i10.880>
- Machin, D, Campbell, M.J., Tan, S.B,& Tan, S.H. (2018). *Sample Sizes for Clinical, Laboratory and Epidemiology Studies*. John Wiley and Sons
- Makuei, G., Abdollahian, M. & Marion, K. (2018). Optimal profile limits for maternal mortality rate (MMR) in South Sudan. *BMC Pregnancy Childbirth*, 18(4) 246- 278  
<https://doi.org/10.1186/s12884-018-1892-0>
- Management Sciences for Health (2012). *MDS-3: Managing Access to Medicines and Health Technologies* (3<sup>rd</sup> ed.) Kumarian Press.
- Maul, T. (2013). Simulation Modelling Study of Self-Assembled Nanoparticle Coatings for Retinal Implants. *Journal of Bionic Engineering*, 10(1), 65–76.  
<http://www.bargiela.com/papers/a49.pdf>
- Mauti, J., Gautier, L. & De Neve, J. (2019). Kenya’s Health in All Policies strategy: a policy analysis using Kingdon’s multiple streams. *Health Research Policy System*. 17(3,) 15 - 20. <https://doi.org/10.1186/s12961-019-0416-3>.
- Measure Evaluation (2014). *Measure Evaluation–Tanzania Final Project Report* (2014–2019).  
<https://www.measureevaluation.org/resources/publications/tr-19-324.html>.
- Ministry of Health. (2014). *The Kenya Health Policy 2014 - 2030; Towards attaining the highest standard of health*. <https://www.ncikenya.or.ke/documents/kenya-health-policy.pdf>
- Ministry of Health. (2015). *The Kenya Health Facilities Distribution Data Sheets*.  
<https://www.health.go.ke/wp-content/uploads/2016/04/Kenya-HRH-Strategy-2014-2018.pdf>

- Ministry of Medical Services & Ministry of Public Health & Sanitation (2012). *Sessional Paper No. 4 of 2012 on National Pharmaceutical Policy*.  
<http://repository.kippira.or.ke:8080/handle/123456789/1165>
- Mochache, D., Chinyanganya, F., & Ngidari, J. (2011). Inventory management performance for family planning, maternal and child health medicines in public health facilities of West Wollega zone, Ethiopia. *Journal of pharmaceutical policy and practice*, 14(1), 2-20.  
<https://doi.org/10.1186/s40545-021-00304-Z>.
- Mugenda, O. M. & Mugenda, A. G. (2003). *Research methods: Quantitative and qualitative Approaches*. African Centre for Technology Studies.
- Noreen, E., Smith, D.A., Mackey, J.T., & Goldratt, E. (1995). *The theory of constraints and its implications for management accounting*. North River Press
- Nyenwa, J., Yusuf, F., Sulaiman Dauda, D., Salihu, A., & Sinai, I. (2015). Factors associated with the knowledge of obstetric danger signs, and perceptions of the need for obstetric care amongst married young women in northern Nigeria. *African journal of primary health care & family medicine*, 13(1), e1–e9. <https://doi.org/10.4102/phcfm.v13i1.2557>
- Obwocha W, Ayodo G, Nyangura A,& Thomas O. (2016). Utilization of healthcare information among health Care Workers in Gucha Subcounty, Kisii County, Kenya. *Journal of Health Education Research and Development*, 4(4), 1-10. DOI: 10.4172/2380-5439.1000192
- Okello, T. R., Olido, K., & Mshilla, M. M. (2015). *Determinant of essential medicines availability in the public health facilities in Uganda*.  
<https://www.pharmascholars.com/abstract/determinant-of-essential-medicines-availability-in-the-public-health-facilities-in-uganda-51485.html>
- Partnership for Maternal, Newborn & Child Health (2013). *The Partnership for Maternal, Newborn & Child Health 2013 Work plan*. WHO.  
<https://www.healthynewbornnetwork.org/resource/the-partnership-for-maternalnewborn-child-health-2013-workplan/>
- Pastakia, S. D., Tran, D. N., Manji, I., Wells, C., Kinderknecht, K., & Ferris, R. (2018). Building reliable supply chains for noncommunicable disease commodities: lessons learned from HIV and evidence needs. *AIDS*, 32(1), 55–61.  
<https://doi.org/10.1097/QAD.0000000000001878>
- Peters, T.J. & Eachus, J.I., 1995. Achieving equal probability of selection under various random sampling strategies. *Pediatric and Perinatal Epidemiology*, 189 9(2), 219–224.  
<http://dx.doi.org/10.1111/j.1365-3016.1995.tb00135.x>.
- Phelan, C., & Wren, J. (2007). *Exploring Reliability in Academic Assessment*.  
<https://www.uni.edu/chfasoa/reliabilityandvalidity.htm>

- Polit, D. F. & Beck, C. T. (2012). *Nursing research: Generating and assessing evidence for nursing practice* (9th ed.). Lippincott Williams & Wilkins.
- Shewarega, A., Dowling, P., Necho, W., Tewfik, S., & Yiegezu, Y. (2015). *Ethiopia: National survey of the integrated pharmaceutical logistics system*.  
<https://www.semanticscholar.org/paper/Ethiopia%3A-National-Survey-of-the-Integrated-System.-Shewarega-Dowling/c4b8968c274cd83065eb372674d0702c0c5c3964>
- Soyemi, K.A. (2014). *Risk management practices and financial performance: evidence from the Nigerian deposit money banks (DMBs)*. <https://www.arcjournals.org/pdfs/ijmsr/v2-i5/5.pdf>
- Simatupang, T. M., Wright, C. & Sridharan, R. (2004). Applying the theory of constraints to supply chain collaboration. *Supply Chain Management*, 9(1), 57-70. DOI: 10.1108/13598540410517584
- Tefera, B. B., Yihunie, W., & Bekele, A. (2021). Integrated Pharmaceutical Logistics System Implementation in Chagni Primary Hospital and Injibara General Hospital, Awi Zone, Ethiopia. *Journal of multidisciplinary healthcare*, 14 (6), 1673–1682. DOI <https://doi.org/10.2147/JMDH.S316595>
- The Lancet (2016). *Ending Still Births*. <https://www.stillbirthalliance.org/wp-content/uploads/2019/10/stillbirths2016-exec-summm.pdf>
- Tola FB, Anbessa GT, Yikna BB. Anti-Tuberculosis Commodities Management Performance and Factors Affecting It at Public Health Facilities in Dire Dawa City Administration, Ethiopia. *Journal of multidisciplinary healthcare* 13(7), 1677-1691 <https://doi.org/10.2147/JMDH.S280253>
- Trietsch, D. (2005). Why a Critical Path by Any Other Name Would Smell Less Sweet? Towards a Holistic Approach to PERT/CPM. *Project Management Journal*, 36(1),27-36. doi:10.1177/875697280503600104
- Tsofa, B., Goodman, C., Gilson, L., & Molyneux, S. (2017). Devolution and its effects on health workforce and commodities management - early implementation experiences in Kilifi County, Kenya. *International journal for equity in health*, 16(1), 169. <https://doi.org/10.1186/s12939-017-0663-2>.
- United Nations (2012). *United Nations Commission on Life-Saving Commodities for Women and Children's Advocacy Working Group*. <http://www.lifesavingcommodities.org/about/>;
- United Nations International Children's Emergency Fund (2015). “*UNICEF data on Child and Neonatal Survival*”. <https://data.unicef.org/topic/child-survival/neonatal-mortality/>
- United Nations Population Fund. (2014). *Trends in Maternal Mortality: 1990 to 2013*. [https://www.unfpa.org/sites/default/files/pub-pdf/UNFPA\\_annual\\_report\\_2014\\_en.pdf](https://www.unfpa.org/sites/default/files/pub-pdf/UNFPA_annual_report_2014_en.pdf)

- United Nations Population Fund (2014). *Delivering a world where every pregnancy is wanted every childbirth is safe and every young person's potential is fulfilled*.  
[https://www.unfpa.org/sites/default/files/pubpdf/UNFPA\\_annual\\_report\\_2014\\_en.pdf](https://www.unfpa.org/sites/default/files/pubpdf/UNFPA_annual_report_2014_en.pdf).
- Wamalwa, E., Edward, N., Moses, P., William, R., Geoffrey, O., Monicah, B., & Rosemary, M. (2015). Condom Use Determinants and Practices among People Living with HIV in Kisii County, Kenya. *The open AIDS journal*, 9, 104–111.  
<https://doi.org/10.2174/1874613601509010104>
- Wangu, M. M., & Osuga, B. O. (2014). Availability of essential medicines in public hospitals: A study of selected public hospitals in Nakuru County, Kenya. *African Journal of Pharmacy and Pharmacology*, 8(17), 438-442.  
<https://doi.org/10.5897/AJPP2014.4000>
- Wekesa, E., Osuga, B. & Adoyo, M. (2015). Implementation challenges of free maternity services policy in Kenya: the health workers' perspective, *The Pan African Medical Journal* , 22(375), 67-54DOI:10.11604/pamj.2015.22.375.6708
- World Health Organization. (2004). *WHO Policy perspectives on medicines*. Geneva, Switzerland: WHO. <http://digicollection.org/hss/en/cl/CL7.16/clmd,50.html>
- World Health Organization. (2010). *Health Systems Financing, The Path to Universal Coverage*. WHO. [https://www.paho.org/en/documents/world-health-report-2010-health-systems-financing-path-universal-coverage#:~:text=health%20report%202010\)-,Health%20report%202010\)-,Health%20report%202010\)-,Health%20report%202010\)-](https://www.paho.org/en/documents/world-health-report-2010-health-systems-financing-path-universal-coverage#:~:text=health%20report%202010)-,Health%20report%202010)-,Health%20report%202010)-,Health%20report%202010)-)
- World Health Organization. (2011). *The Abuja declaration; Ten Years on*. <https://www.who.int/healthsystems/publications/Abuja10.pdf>
- World Health Organization (2012). *Country Health Profile; Kenya*. WHO. <https://www.oecd.org/health/country-health-profiles-eu.htm>
- World Health Organization (2014). *Medicines in Health Systems – Advancing access, affordability and appropriate use*. <https://www.who.int/alliance-hpsr/resources/publications/9789241507622/en/>
- Yamane, T. (1967). *Statistics: an introductory analysis*, (2nd ed), Harper and Row.
- Zikmund, W. G. (2010). *Business research methods*. Southwestern Cengage Learning.

## APPENDICES

### APPENDIX 1

#### INTRODUCTORY LETTER

Dear Respondent,

I am Elvis Mwandawiro Mbatia, a student at Kenya Methodist University, Meru campus where I am pursuing a Master of Science Degree in Health Systems Management. As part of the course requirement, I am conducting a research on *“Determinants of maternal child health commodities management in public health facilities at Maternal Child health, in Meru County”*

The findings of this research will assist in identifying determinants affecting maternal child health care in relation to availability of medical commodity and equipment's in Meru County. I kindly request for your participation and cooperation in providing responses to the data collection instruments.

The data gathered was treated with utmost confidentiality. Thank you very much for your time.

Sincerely,

**Elvis M. Mwandawiro**

## **APPENDIX 2**

### **CONSENT TO PARTICIPATE IN THE INTERVIEW**

Kenya Methodist University

P. O Box 267-60200

MERU, Kenya

#### **SUBJECT: INFORMED CONSENT**

#### **Dear Respondent,**

My name is Elvis Mwandawiro Mbatia. I am a M.Sc. student from Kenya Methodist University. I am conducting a study titled: “*Determinants of maternal child health commodities management in public health facilities at Maternal Child Health in Meru County*”. The findings will be utilized to strengthen the health systems in Kenya and other Low-in- come countries in Africa. As a result, countries, communities and individuals will benefit from improved quality of healthcare services. This research proposal is critical to strengthening health systems, as it will generate new knowledge in this area that will inform decision makers to make decisions that are research based.

#### **Procedure to be followed**

Participation in this study will require that I ask you some questions and access all the hospital's departments to address the six pillars of the health system. I will record the information from you in a questionnaire checklist.

You have the right to refuse participation in this study. You will not be penalized nor victimized for not joining the study and your decision will not be used against you nor affect you at your place of employment.

Please remember that participation in the study is voluntary. You may ask questions related to the study at any time. You may refuse to respond to any questions and you may stop an interview at any time. You may also stop being in the study at any time without any consequences to the services you are rendering.

**Discomforts and risks.**

Some of the questions you will be asked are on intimate subjects and may be embarrassing or make you uncomfortable. If this happens, you may refuse to answer if you choose. You may also stop the interview at any time. The interview may take about 40 minutes to complete.

**Benefits**

If you participate in this study, you will help us to strengthen the health systems in Kenya and other Low-income countries in Africa. As a result, countries, communities and individuals will benefit from improved quality of healthcare services. This field attachment is critical to strengthening the health systems, as it will generate new knowledge in this area that will inform decision makers to make decisions that are research based.



## **Rewards**

There is no reward for anyone who chooses to participate in the study.

## **Confidentiality**

The interviews will be conducted in a private setting within the hospital. Your name will not be recorded on the questionnaire and the questionnaires will be kept in a safe place at the University.

## **Contact Information**

If you have any questions, you may contact the following supervisors:

### **1. Dr. Muthoni Mwangi**

Department of Health Systems Management

Kenya Methodist University

### **2. Dr. Wanja Mwaura-Tenambergen**

Department of Health Systems Management

Kenya Methodist University

## **Participant's Statement**

The above statement regarding my participation in the study is clear to me. I have been given a chance to ask questions and my questions have been answered to my satisfaction. My participation in this study is entirely voluntary. I understand that my records will be kept private and that I can leave the study at any time. I understand that I will not be victimized at my place of work whether I decide to leave the study or not and my decision will not affect the way I am treated at my

work place.

Name of Participant.....

Date.....

Signature.....

**Investigator's Statement**

I, the undersigned, have explained to the volunteer in a language s/he understands the procedures to be followed in the study and the risks and the benefits involved.

Name of

Interviewer.....Date.....

Interviewer Signature.....

### APPENDIX 3

#### QUESTIONNAIRE FOR HEALTH CARE WORKERS

The purpose of this interview is to get responses on the Logistic management information system, Medical staff Competency, Inventory management and supply chain practises in relation to a health Commodity Management at maternal child health in Meru County.

Your participation and assistance in completing this study is highly appreciated.

#### SECTION A: GENERAL INFORMATION

1. Facility Name \_\_\_\_\_

2. Date of Assessments \_\_\_\_\_

3. Sub County \_\_\_\_\_

4. Gender

Male

Female

5. Age Bracket

30 years and below

30-45 year

Above 45 years

6. Facility Tier

Tier 1

Tier 2

Tier 3

Tier 4

**7. Working Experience in this Facility**

- Less than 5 years
- 5 -10 years
- 10 -15 years
- Above 15 years

**8. Cadre of Staff**

- General Clinical Officer
- Nurse
- Pharmacist
- Pharmaceutical Technologist

**SECTION B: LOGISTIC MANAGEMENT INFORMATION SYSTEMS (LMIS)**

**PART B: MAIN AREA UNDER STUDY**

**Logistic Management Information Systems (LMIS) (Tick one option)**

Kindly indicate your view on the following statements in relationship to Logistic Management Information Systems (LMIS) and use the scale provided for the best answer possible

|    |  | <b>St<br/>ro<br/>ng<br/>ly<br/>ag<br/>ree</b> | <b>A<br/>gr<br/>ee</b> | <b>U<br/>nd<br/>eci<br/>ded</b> | <b>D<br/>is<br/>sa<br/>gr<br/>ee</b> | <b>Str<br/>on<br/>gly<br/>Dis<br/>agr<br/>ee</b> |
|----|--|---|------------------------|---------------------------------|--------------------------------------|--|
| 1) | Does the facility have logistic management and information system to report on health commodities in maternal child health |   |                        |                                 |                                      |  |
| 2) | Logistic Management and Information System (LMIS) affect availability of EMONC Commodity in this facility                  |   |                        |                                 |                                      |  |
| 3) | Commodity Financing affect Commodity management and  |   |                        |                                 |                                      |  |

|    |   |  |  |  |  |  |
|----|---|--|--|--|--|--|
|    | Service delivery sustainability in maternal child health Clinic in this facility  |  |  |  |  |  |
| 4) | Facility Health management team have Quality Assurance Quality Improvement (QAQI) team to check on drug quality, safety, and Pharmaco-Vigilance for Health Commodities in maternal child health |  |  |  |  |  |
| 5) | Facility use Logistic management Information System for routine ordering of drugs for health commodities for maternal child health  |  |  |  |  |  |

**SECTION C: MEDICAL STAFF COMPETENCY**

**SECTION C: Medical Staff Competency**

Kindly indicate your view on the following statements in relationship to Medical Staff Competency on Health Commodity Management in Maternal Child Health and use the scale provided for the best answer possible

|    |   | <b>St<br/>ro<br/>ng<br/>ly<br/>ag<br/>re<br/>e</b> | <b>A<br/>gr<br/>ee</b> | <b>U<br/>nd<br/>eci<br/>de<br/>d</b> | <b>D<br/>i<br/>s<br/>a<br/>g<br/>r<br/>ee</b> | <b>Stro<br/>ngly<br/>Disa<br/>gree</b> |
|----|---|--|------------------------|--------------------------------------|---|--|
| 1) | Trainings and Mentorship on Commodity management affect EMONC Commodity and supplies in this facility       |  |                        |                                      |   |  |
| 2) | Staff working in MCH/Pharmacy have been trained on Commodity management in relation to EMONC Services       |  |                        |                                      |   |  |
| 3) | Supportive supervision or Mentorship on Commodity Management in relation to EMONC services in this facility |  |                        |                                      |   |  |

### SECTION D: INVENTORY MANAGEMENT

Kindly indicate your view on the following statements in relationship to inventory management on Health Commodity Management in Maternal Child Health and use the scale provided for the best answer possible

|    |  | <b>St<br/>ro<br/>ng<br/>ly<br/>ag<br/>re<br/>e</b> | <b>A<br/>gr<br/>ee</b> | <b>U<br/>nd<br/>eci<br/>de<br/>d</b> | <b>Di<br/>sa<br/>gr<br/>ee</b> | <b>Stro<br/>ngly<br/>Disa<br/>gree</b> |
|----|--|--|------------------------|--------------------------------------|--------------------------------|--|
| 1) | Inventory management affects Health Commodity Management in Child Health in Meru County  |  |                        |                                      |                                |  |
| 2) | The facility have a proper inventory, storage and distribution system in place for Health Commodity in Child health services   |  |                        |                                      |                                |  |
| 3) | The Facility have properly filled Daily activity registers (DAR) and Bin cards for Inventory management for EMONC Drugs and Commodity available in the facility                        |  |                        |                                      |                                |  |
| 4) | The facility performs Inventory internal Control of Health Commodity? i.e. (use of Purchase order for tracking, Inventory ledger or physical Inventory Counts verses recorded amounts) |  |                        |                                      |                                |  |

|    |   |  |  |  |  |  |
|----|---|--|--|--|--|--|
| 5) | The stock status level available for the following EMONC Commodity and Equipment's in the MCH are readily available |  |  |  |  |  |
|----|---|--|--|--|--|--|

**SECTION E: Supply Chain Practices**

Kindly indicate your view on the following statements in relationship to Supply Chain Practices on Health Commodity Management in Maternal Child Health and use the scale provided for the best answer possible

|    |  | <b>St<br/>ro<br/>ng<br/>ly<br/>ag<br/>re<br/>e</b> | <b>A<br/>gr<br/>ee</b> | <b>U<br/>nd<br/>eci<br/>ded</b> | <b>Disa<br/>gree</b> | <b>Stro<br/>ngly<br/>Disa<br/>gree</b> |
|----|--|--|------------------------|---------------------------------|----------------------|--|
| 1) | The following factors affecting Supply Chain Practices (Selection, procurement, distribution) of EMONC commodity in MCH in this facility   |  |                        |                                 |                      |  |
| 2) | MCH Staff get involved in selection, Procurement, storage and Reporting of Health commodities related with EMONC services in this facility |  |                        |                                 |                      |  |
| 3) | The procurement Method of Health commodity related to EMONC services in this facility?   |  |                        |                                 |                      |  |
| 4) | Health financing on procurement and distribution of EMONC commodity to Health facilities is effective                                      |  |                        |                                 |                      |  |

|    |   |  |  |  |  |  |
|----|---|--|--|--|--|--|
| 5) | Facility have Policy, guideline and Job aids on Procurement, storage, pharmaco-vigilance and disposal of drugs at MCH |  |  |  |  |  |
|----|---|--|--|--|--|--|

**SECTION G: HEALTH COMMODITY MANAGEMENT**

Kindly indicate your view on the following statements in relationship on Health Commodity Management in Maternal Child Health and use the scale provided for the best answer possible


|    |  | <b>St<br/>ro<br/>ng<br/>ly<br/>ag<br/>re<br/>e</b> | <b>A<br/>gr<br/>ee</b> | <b>U<br/>nd<br/>eci<br/>de<br/>d</b> | <b>Disa<br/>gree</b> | <b>Stro<br/>ngly<br/>Disa<br/>gree</b> |
|----|--|--|------------------------|--------------------------------------|----------------------|--|
| 1) | We are very particular about the product selection process in this hospital  |  |                        |                                      |                      |  |
| 2) | There is a proper inventory, storage and distribution system in place  |  |                        |                                      |                      |  |
| 3) | We obtain services, supplies, and equipment in conformance with applicable laws and regulations.   |  |                        |                                      |                      |  |
| 4) | Healthcare providers get sufficient health commodities of assured quality at competitive prices in accordance with national and international laws |  |                        |                                      |                      |  |
| 5) | We prevent irrational/incorrect use of supplies by showing users the right way to use the supplies   |  |                        |                                      |                      |  |

**Thank you for your cooperation.**



## APPENDIX 4

### KEMU ETHICAL APPROVAL LETTER

  
**KENYA METHODIST UNIVERSITY**  
P. O. BOX 267 MERU - 60200, KENYA      FAX: 254-64-30162  
TEL: 254-064-30301/31229/30367/31171      EMAIL: [INFO@KEMU.AC.KE](mailto:INFO@KEMU.AC.KE)


---

24<sup>TH</sup> JANUARY, 2017

Elvis Mwandawiro Mbatia  
HSM-3-0253-1/2015  
Kenya Methodist University

Dear Elvis,

*Approved*  
*[Signature]*  
2017

  
CHIEF EXECUTIVE OFFICER  
HEALTH SERVICES COMMISSION  
P. O. BOX 267 MERU

**SUBJECT: ETHICAL CLEARANCE OF A MASTERS' RESEARCH PROJECT**

Your request for ethical clearance for your Masters Research project titled "Determinants of Efficient Health Commodity Management in Maternal Child Health: A Case of Meru County, Kenya" has been provisionally granted to you in accordance with the content of your project proposal subject to tabling it in the full Board of Scientific and Ethics Review Committee (SERC) for ratification.


As Principal Investigator, you are responsible for fulfilling the following requirements of approval:

1. All co-investigators must be kept informed of the status of the project.
2. Changes, amendments, and addenda to the protocol or the consent form must be submitted to the SERC for re-review and approval prior to the activation of the changes. The Proposal number assigned to the project should be cited in any correspondence.
3. Adverse events should be reported to the SERC. New information that becomes available which could change the risk: benefit ratio must be submitted promptly for SERC review. The SERC and outside agencies must review the information to determine if the protocol should be modified, discontinued, or continued as originally approved.
4. Only approved consent forms are to be used in the enrollment of participants. All consent forms signed by subjects and/or witnesses should be retained on file. The SERC may conduct audits of all study records, and consent documentation may be part of such audits.

5. SERC regulations require review of an approved study not less than once per 12-month period. Therefore, a continuing review application must be submitted to the SERC in order to continue the study beyond the approved period. Failure to submit a continuing review application in a timely fashion will result in termination of the study, at which point new participants may not be enrolled and currently enrolled participants must be taken off the study.

Please note that any substantial changes on the scope of your research will require an approval.

Thank You.

  
Dr. Wamachi  
Chair, SERC  
Cc: Dean, RD&PGS



APPENDIX 5

MERU COUNTY APPROVAL LETTER

COUNTY GOVERNMENT OF MERU  
DEPARTMENT OF HEALTH

Telegrams: "HEALTH" Meru  
Telephone: Meru 064-32370/1  
Fax: 31242  
Email: [countyhealthdirector@yahoo.com](mailto:countyhealthdirector@yahoo.com)  
When replying should be to:  
County Health Director



COUNTY HEALTH DIRECTOR  
MERU COUNTY  
P.O. BOX 8 – 60200  
MERU

Ref: MRU/MED/GEN/C.50

Date: 23<sup>rd</sup> March , 201

Elvis Mwandawiro Mbatia  
SHM – 3-0253-1/2015  
**Kenya Methodist University**

**RE:RESEARCH AUTHORIZATION**

Reference is hereby made to your letter dated 24<sup>th</sup> January 2017.

Your request to be allowed to collect data in Meru County on "**Determinants of Efficient Health Commodity Management in Maternal Child Health: A case of Meru County Kenya**" has been approved.

Note that on completion of the research, you are expected to submit two hard copies and a soft copy of the report research to this office.

A handwritten signature in blue ink, appearing to read 'Kanana Kimonye'.

Dr Kanana Kimonye  
For: County Director Medical Services  
**County Government of Meru**





APPENDIX 6

NACOSTI STUDY APPROVAL LETTER



REPUBLIC OF KENYA

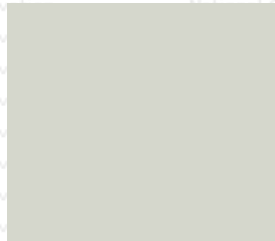


NATIONAL COMMISSION FOR  
SCIENCE, TECHNOLOGY & INNOVATION

Ref No: 513293

Date of Issue 21/July 2021

RESEARCH LICENSE



This is to Certify that Mr.. Elvis Mwandawiro Mbatia of Kenya Methodist University, has been licensed to conduct Meru on the topic: DETERMINANTS OF MATERNAL CHILD HEALTH COMMODITIES MANAGEMENT IN PUBLIC HEALTH FACILITIES IN MATERNAL CHILD HEALTH: A CASE OF MERU COUNTY. KENYA for the period ending : 21/July/2022.

License No: NACOSTI/P/21/11689

513293

Applicant Identification Number

Director General  
NATIONAL COMMISSION FOR  
SCIENCE, TECHNOLOGY &  
INNOVATION

Verification QR Code



NOTE: This is a computer generated License. To verify the authenticity of this document.  
Scan the QR Code using QR scanner application.