



UNIVERSITY of
RWANDA

EAC Regional Centre of Excellence for
Vaccines, Immunization and Health Supply
Chain Management (EAC RCE-VIHSCM)

***EVALUATING IMPACT OF ELECTRONIC LOGISTIC
MANAGEMENT INFORMATION SYSTEM IN
RWANDA HEALTH SUPPLY CHAIN***

*Thesis submitted to the University of Rwanda, in partial fulfilment of the
requirements for the degree of Masters in Health Supply Chain Management (MSc
HSCM)*

By

SINDAMBIWE JEAN PIERRE (B. Pharm.)*

Reg Nr: 218014635

GICUMBI DISTRICT PHARMACY - NORTH.RWANDA

Supervisors:

ASS.PROF KAYUMBA PIERRE CLAVER

Mr MAX KABALISA

Academic year 2018-2019

DEDICATION

I sincerely dedicate my work to Eugenie NYIRABAZUNG, my wife whose special love shown in my life.

To all my relatives for invaluable contribution throughout my whole life and this work.

To all my classmates especially Mr ANYONA for the valuable study period shared together

Finally, to all who contributed to this work but not mentioned here.

May the Almighty God bless you.

ACKNOWLEDGEMENT

All praises to the Almighty God who enables me to conduct this research. My sincere thanks to my main supervisor Ass. Prof KAYUMBA Pierre Claver and Co-supervisor Max KABALISA for their support, guidance, valuable suggestions, positive feedback and encouragement given throughout the work process. They have been very patient during the whole process discussing and refining this thesis.

I am amazingly thankful to the Government of Rwanda especially MOH, National Health Research Committee and Partners especially KFW for granting me scholarship through Ministry of Health. I also thank Gicumbi District authorities for the favor provided to me and help related to the work arrangement concomitantly with studying program.

I wish to precise my most profound sense of appreciation to my wife NYIRABAZUNGU Eugenie for her moral, economic and prayerful support, being patient in my absent and her constant encouragements.

I am also expressing my appreciation to my son Savior Pierrot Obed HIMBAZWA and my daughter Mercy KUZWA Kevine for their kindness during my absence. I express my thanks to my relatives and friends for their encouragement during this research.

DECLARATION

I do hereby declare that this *thesis* submitted in partial fulfillment of the requirements for the degree of **MASTER OF HEALTH SUPPLY CHAIN MANAGEMENT**, at the Regional Center of Excellence-University of Rwanda / College of Medicine and Health Sciences, is my original work and has not previously been submitted elsewhere.

Also, I do declare that a complete list of references is provided indicating all the sources of information quoted or cited.

SINDAMBIWE Jean Pierre

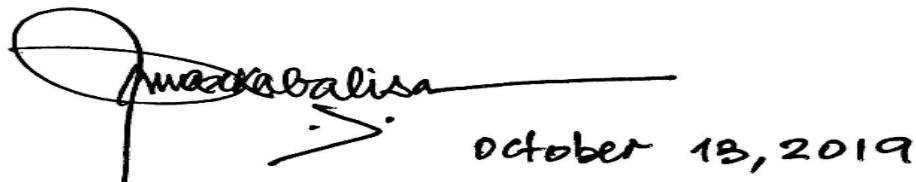


, 11/10/2019

Authority to Submit the dissertation

MAX KABALISA

In my capacity as a Co-Supervisor, I do hereby authorize the student to submit his dissertation.



Ass. Prof KAYUMBA Pierre Claver

In my capacity as a Supervisor, I do hereby authorize the student to submit his
dissertation. 

13/10/2019

TABLE OF CONTENTS

DEDICATION	ii
ACKNOWLEDGEMENT	iii
DECLARATION	iv
TABLE OF CONTENTS.....	v
LIST OF TABLE	vii
LIST OF FIGURES	viii
ABBREVIATION AND ACCRONIMS	ix
ABSTRACT.....	x
CHAPTER I: INTRODUCTION.....	1
1.1. BACKGROUND OF THE STUDY	1
1.2. EVALUATION STATMENT	2
1.3. PURPOSE OF THE STUDY	3
1.4. OBJECTIVES OF THE STUDY	3
1.5. EVALUATION QUESTION.....	3
1.6. SIGNIFICANCE OF THE STUDY	4
1.7. LIMITATION	4
1.8. KEY TERMS DEFINITIONS	5
CHAPTER II: LITERATURE REVIEW	6
2.0. OVERVIEW OF THE TOPIC	6
2.1. e-LMIS USE IN RWANDA	6
2.2. DETERMINANTS.....	8
2.3. SUMMARY OF LITERATURE REVIEW.....	10
2.4. CONCEPTUAL FRAMEWORK	11
CHAPTER III: RESEARCH METHODS	13
3.1. RESEARCH DESIGN	13
3.2. STUDY LOCATION	13
3.3. TARGET AND STUDY POPULATION	15
3.4. SAMPLE	15

3.5. DATA COLLECTION TOOL	16
3.6 PRE-TESTING.....	16
3.7. VALIDITY	17
3.8. RELIABILITY	17
3.9. DATA COLLECTION PROCEDURE	17
3.10. DATA ANALYSIS	18
3.11. LOGICAL & ETHICAL CONSIDERATION.....	18
CHAPTER IV: RESULTS PRESENTATION AND INTERPRETATION	19
4.0. INTRODUCTION.....	19
4.1 RESPONDENT'S DEMOGRAPHIC CHARACTERISTICS	19
4.2. E-LMIS UTILIZATION LEVEL.....	22
4.3. IMPACT OF E-LMIS USE IN HEALTH SUPPLY CHAIN MANAGEMENT	28
4.4. CHALLENGES AND LIMITATION WITH E-LMIS UTILIZATION IN HEALTH SUPPLY CHAIN	39
CHAPTER V: RESULTS DISCUSSION	41
5.1. INTRODUCTION.....	41
5.2. DEMOGRAPHIC CHARACTERISTICS	41
5.3. E-LMIS LEVEL OF USE	42
5.4. IMPACT OF E-LMIS USE IN HEALTH SUPPLY CHAIN MANAGEMENT	44
5.5. CHALLENGES, SUGGESTIONS RELATED TO e-LMIS USE.....	46
CHAPTER SIX: CONCLUSION, RECOMMENDATIONS AND LIMITATIONS.....	48
REFERENCES	51
CONSENT FORM	a
ETHICAL CLEARANCE FOR STUDY	b
FORMULAIRE DE CONSENTEMENT	d
DATA COLLECTION TOOL.....	e
QUESTIONNAIRE (Version Francais)	r

LIST OF TABLE

Table 1: Studied e-LMIS users regarding their socio- demographic characteristics	20
Table 2. Stock level control	31

LIST OF FIGURES

Figure 1. Effects of Improved Supply Chain Management	12
Figure 2. Rwanda Profile	14
Figure 3. Frequency of e-LMIS use	23
Figure 4. Inventory adjustment through e-LMIS	23
Figure 5. e-LMIS functions use in health supply chain	24
Figure 6. Quality of information from e_LMIS to be used indecision making	25
Figure 7. Generated information in reporting or for decision making.....	26
Figure 8. Activities that takes more time in e-LMIS	27
Figure 9. Data Accessibility.....	28
Figure 10. Data Availability for decision making	29
Figure 11. Reduction of quantification challenges	30
Figure 12. Data accuracy	32
Figure 13. Improvement of data quality	33
Figure 14. Impact of e-LMIS on Supervision.....	34
Figure 15. Contribution of e-LMIS on Workload reduction.....	35
Figure 16. Duration of ordering processes through e-LMIS.....	36
Figure 17. e-LMIS contribution on health supply chain cost -effectiveness	36
Figure 18. Number of items expired	37
Figure 19. Value of expired products in Rfws.....	37
Figure 20. Commitment of health facilities' manager.....	38

ABBREVIATION AND ACCRONIMS

AIDS	Acquired Immune Deficiency Syndrome
e-LMIS	Electronic Logistic Management Information System
DP	District Pharmacy
DH	District Hospital
EM	Essential Medicines
HC	Health Facility(ies)
LMIS	Logistic Management Information System
GHSC-PSM	Global Health Supply Chain Procurement Supply Management
IT	Information Technology
MOH	Ministry of Health
LMU	Logistic Management Unit
HSCM	Health Supply Chain Management
R&R	Report and Requisition
SCMgr	Supply Chain Manager
sDP	Service Delivery Point
USAID	United States for Agencies International Development
WHO	World Health Organization

ABSTRACT

Background: Appropriate logistics management information system in the supply chain enhances health outcomes by maintaining accurate and timely data. Although e-LMIS is being used as the sole source of collecting logistics data for supply chain in Rwanda, reports are still showing that most of health facilities have inaccurate data with irregular recording, pharmaceutical products expiration and stock outs in the health system. Looks like e-LMIS doesn't improve stock monitoring and inventory management which leads to interrupted supply chain and hence ineffective services to customers. Therefore, the study was conducted to evaluate the effectiveness of e-LMIS utilization in Rwanda health supply chain improvement at district pharmacies in Rwanda.

Methodology: A descriptive cross-sectional study design with a qualitative method was conducted from 08 July to 26 July 2019. Participants were recruited by census convenience sampling method to participate in the study. The questionnaire was used as tool for data collection. The tool was piloted and tested for validity and reliability. During data analysis, demographic characteristics of respondents, e-LMIS utilization level, impact of e-LMIS use in health supply chain management were described and analyzed using descriptive statistical package for the social sciences version 21, limitations and suggestions also were presented.

Results: 59 out 60 users from 30 districts pharmacies participated in the study. This study showed that two third of respondents do always use e-LMIS as part of their job and at least half of respondents (57%) use all e-LMIS function, 72.9% use e-LMIS information to report . The study revealed that e-LMIS contribute to data accessibility at 94.9 % and contributes in reduction of quantification challenges at 57.6%. And, the use of e-LMIS has improved the quality of data 77.9% and inventory management of health products at optimum with reduction of losses due to expiries. The highlighted limitations were system complexities, lack of sufficient staff and accountabilities for both users and authorities.

Conclusion: The findings showed that most of users partially use e-LMIS functions and agreed on improvement in health supply chain management through e-LMIS use . There is a need of resolving system complexities, user commitment and involvement of authorities both local and national for better use of e-LMIS.

CHAPTER I: INTRODUCTION

In this chapter, background, statement evaluation, objectives and significance of the study, and the scope of this study are discussed.

1.1. BACKGROUND OF THE STUDY

To ensure uninterrupted flow of health commodities to the right clients in time of need, visibility into all functions of the supply chain including selection, quantification, procurement, warehousing, inventory, distribution and funding to the concerned managers is key need. This requires a strong logistics system to ensure data visibility throughout each function as base in decision-making.

As technology continues to evolve, In management of public health supply chains, many countries have adopted an electronic system which quickly collects, organizes, and presents logistics data that have been gathered across all levels of the supply chain system to make informed decisions. This ultimately improves customer service by minimizing losses and stock imbalances while moving public health commodities more efficiently according to the need.

Since 21 March 2014, Rwanda launched the use of e-LMIS system where users and managers had quicker access on specific data at simple click. With the use of the said system, electronic reports have simplified approval workflows and processing time for requisitions. In additional, e-LMIS enables district health management teams to easily spot overstock and under stock situations and then propose redistribution to meet patient needs also by reducing losses through commodity expiry. Furthermore, data are visible to authorized users throughout the order process, allowing managers to isolate where support through supervision may be required to assist users. For other stakeholders such as program managers, policymakers, donors, and implementing partners, dashboards and detailed management reports streamline the summative nationwide raw data which simplify the process for decision-making. Financial and human resources to carry hard

copy of orders to the national health supply level has been suppressed. Now only cost is spent while shipping products to health facilities with trucks.

Since 21 March 2014, up to date, this system is being used across the country, at all level of health supply chain. Some issues and challenges to its effective utilization are raised by users accompanied by inaccuracy of data and stock level imbalances at some level of the health system. With that, curiosity is there to know if the system is serving effectively as it is intended. And from there, action and measure were taken in accordance.

1.2. EVALUATION STATMENT

With electronic information systems, data visibility that was generated through logistics of supply chain permit key stakeholders to decide accordingly. Recent studies have articulated that e-LMIS also contribute to the quality of data, availability of commodity and supply chain performance at health facilities, which impact service delivery and client health outcome (Kabalisa et al. 2016; Rosen et al. 2014).

Since 21 March 2014, the Government of Rwanda launched the Electronic Logistic Management Information System intended to solve reporting related problems, data quality, visibility and accessibility to needed data issues. In additional, the system would mitigate the issue of interrupted supply of commodities across the entire supply chain levels. Although e-LMIS is being used in Rwanda health supply chain, in collaboration with Global fund, Auditor general health supply chain audit 2018 reports showed that health products expiration, stock outs and data discrepancies still being a dilemma in the health system.

Also, based on monthly report extracted from e-LMIS by MOH through the logistics management office for decision making especially in quantification exercise, most of health facilities have inaccurate data with irregular recording. In addition, one third of health facilities do frequently get into stock out of essential drugs concomitantly with expiries at the same health facility or in neighboring one. It seems that e-LMIS doesn't improve stock monitoring and inventory management which leads to interrupted supply chain of health commodities and hence ineffective services to customers. The study to

evaluate outcomes of e-LMIS utilization throughout Rwanda health supply chain is yet to be identified. Therefore, the study is designed to evaluate the effectiveness of e-LMIS utilization in medical products supply chain to improve quality of services delivery through supply chain management in Rwanda.

1.3. PURPOSE OF THE STUDY

This study is focusing on the functionality and impact of web-based System on health supply chain in Rwanda. This intended also to discover the strengths and weaknesses regarding the use of e-LMIS that can be used to improve its functionality.

1.4. OBJECTIVES OF THE STUDY

Objectives of this study are the following:

1. To conduct assessment of key reporting improvement of e-LMIS utilization in Rwanda health supply chain.
2. To identify the role of e-LMIS utilization on accessibility of data , visibility, quality as well as transparency
3. To assess e-LMIS utilization level in decision making regarding procurement, quantification and inventory management
4. To investigate challenges of e-LMIS implementation and their mitigation

1.5. EVALUATION QUESTION

To respond to the above objective, the following questions were answered:

1. At which level has e-LMIS improved reporting indicators such as frequency, timeliness and accuracy.
2. How can e-LMIS utilization contribute to data accessibility, visibility, transparency and quality

3. At which extent has e-LMIS contributed to the health supply chain performance (acquisition processes, quantification, inventory management?)
4. What are challenges encountered in e-LMIS utilization and its mitigation strategies

1.6. SIGNIFICANCE OF THE STUDY

Importance of this study is to reveal information about the impact of e-LMIS use toward quality of service delivery in health commodities management. The results from this research may contribute on better e-LMIS use and implementation, e-LMIS optimization and monitoring, and further research in e-LMIS utilization as follow: 1) For e-LMIS better use and implementation, the study findings help to discover weakness of e-LMIS, develop and organize training plans to increase usability and enhance the user's level of awareness in implementation. 2) For optimization and monitoring, the study findings give information to guide for setting monitoring and evaluation indicators, measures and make it easier so that it can facilitate the work. It was used as basis to improve health supply chain practices with e-LMIS use in our country. 3) For further research in e-LMIS utilization, this research therefore contributes to the present literature on health commodities management for further reference and will enable other investigator in developing their conceptual framework.

1.7. LIMITATION

The scope of study tends to focus on impact on logistic process through health products supply chain management in Rwanda using e-LMIS. We limited our study to a one-tire bond to make easier our research,. The study was carried out at middle level of health supply chain in Rwanda: 30 District pharmacies.

1.8. KEY TERMS DEFINITIONS

(e-LMIS) Electronic Logistics Management Information System: is a web-based system that records and reports, aggregates, analyzes, validates and displays data from all levels of the logistics system that can be used to make logistics decisions and manage the health supply chain.(Hare and Snow, 2012)

Effectiveness: a measure of the success in achieving a clearly stated objective(Harcourt, 1992).

Impact: In this study, the impact is defined as a sudden and powerful effect that something has on a situation, process, or person.

Health supply chain: In his study, Health supply chain refers to the process of obtain medical products to be used in human medicine.

Health commodities: in this study, health commodities refer to any medical products including essential medicines, medical consumables, laboratory related health products and medical equipments.

Evaluation: The process of assessing the overall efficiency, effectiveness and success of an ongoing project in achieving its goal, concentrates on the standards of project design to differentiate a program's effects from other, through a modification of existing operations.

CHAPTER II: LITERATURE REVIEW

This chapter discusses theoretical information such as overview of the topic, determinants, summary of the literature and conceptual framework through investigations and evaluating effectiveness of e-LMIS utilization to the quality of health service improvement through health products management.

2.0. OVERVIEW OF THE TOPIC

Electronic Logistics Management Information System: is a web-based system that records and reports, aggregates, analyzes, validates and displays data from all levels of the logistics system that can be used to make logistics decisions and manage the health supply chain.(Hare and Snow, 2012).(Hare and Snow, 2012) Author continued enumerating data elements of e-LMIS. And among them there are stock on hand, losses and adjustments, consumption and issues, demand and distribution status, then information about managed commodities cost.

Health Supply chain management (HSCM) is the 21st century global operations approach for attaining health organizational competitiveness. Organizations are trying to find ways to improve their liveness and sensitivity and in turn competitiveness by varying their operations strategy, methods and technologies that comprise the implementation of HSCM model and information technology (IT). (Tiye and Gudeta, 2018)

Nevertheless, a comprehensive and critical review of literature is yet to be passed out with the objective of bringing out significant factors and useful insights the role and involvements of IT in HSCM.(Ziken International (Consultants) Ltd, 2005)

2.1. e-LMIS USE IN RWANDA

The management of information system support

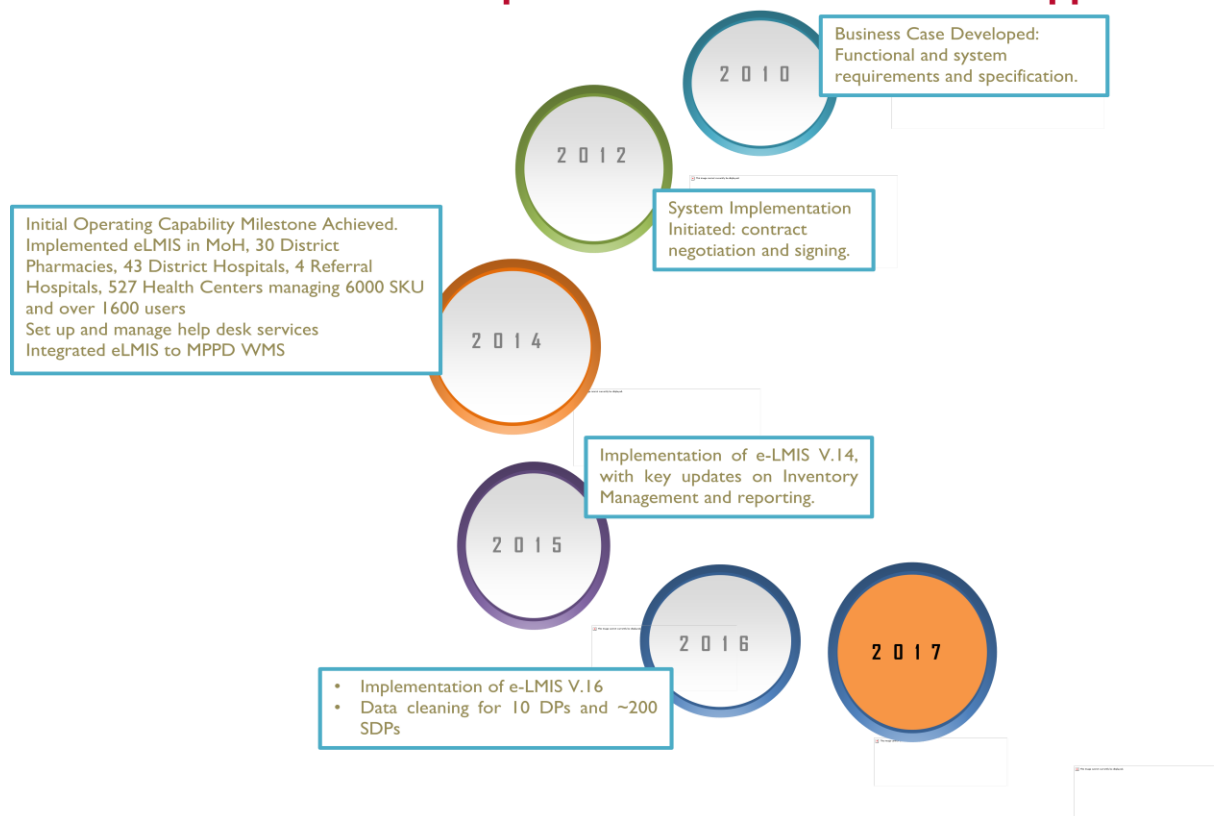
Rwanda Ministry of Health has empowered national supply chain (SC) management by initiating and implementing an e-LMIS. The goal is to improve supply chain processes and best standard practices and ensure timely availability of accurate logistics data for

informed decision-making. The Ministry of Health has undertaken the effort to design, build, and effectively manage e-LMIS implementation and integration while ensuring that all user requirements are accommodated and validated and users are trained in effective and sustainable supply chain management. (GHSC-PSM, 2018)

The system has been rolled out to all supply chain levels in the country, including the central level, all hospitals, district pharmacies, and health centers. To ensure that e-LMIS is fully used and implementation of its objectives are met, users were trained, and a help desk established to troubleshoot any emerging issues.

The objective was to improve Supply chain systems performance in Reporting, data Analysis, decision Making, Monitoring and Evaluation, Quantification, drug Codes Standardization

Rwanda e-LMIS implementation timelines and support.



Rwanda e-LMIS operational impact

E-LMIS has had a major positive effect on reporting rates, system efficiencies, and supply chain fulfillment.(USAID, 2016). Author continue continued highlighting that customers have increased access to a enormous list of essential medicines.

Also, After strengthening health supply chain through e-LMIS, district pharmacies are now more effective in management of inventory, accurately reporting, efficiently use of allocated funds at optimum level, and are more effective in management of human resources and material.(USAID,2016). Facility staff utilize the e-LMIS to give physical count information, distribution to the district pharmacies, and generate reports for decision-making.

Data is available real time and facilities can generate reports from the system at any time including indicators such as stock on hand, consumption and expiries. These data are utilized to provide improved transparency into commodity consumption.(USAID, 2015). Author highlighted stakeholder coordination, improved data availability, flexibility and planning is contributing to the availability of lifesaving drugs at health facilities level, avoiding urgent situation orders at central medical store house and disease incidence.

2.2. DETERMINANTS

The growth of the supply chain concept requires logistics organizations to enhance both internally and externally flow of information. Existing developments in ICT have pointed the need for the development of different systems to smooth the progress of the flow and logistics management in various organizations. Such program of ICT in health logistics management is called e-LMIS. (Omary, 2017)

Different investigators came up with various models to explain different factors to evaluate how effectively e-LMIS improve the quality of service and service delivery in health system. Tools about information quality, system performance, customization, implementation at different level of the system, relationship with staff and top management involvement were main factors to measure users' satisfaction (JSI, 2019)

There are factors that contribute to the effectiveness of the electronic logistic information management use specifically system quality, information quality, and system use (Omary, 2017). According to authors, the effectiveness of the system use rely on the intention of the users, the quality of the used system, the quality of the obtained information from the system, and the service provided to users (Hockings, 2000).

E-LMIS quality performance has three principal dimensions: Information, system and service quality; and each should be controlled to identify how they will promote to the effectiveness and progress of service delivery (Waseem, 2019).

Rationale of e-LMIS

To ensure that health products are ready to the right customers in need, managers need to have visibility to the health supply functions flow, specifically in procurement, warehousing , inventory management, distribution, funding. With this a strong logistic information is needed.(Usaid, 2014)

According to USAID (2017) e-LMIS is designed to facilitate commodity ordering at all levels; capture consumption data from health facilities and distribution data from MPPD, district pharmacies, and other distribution systems; and support effective management and planning of all tasks involved in logistics management.

And, Its introduction sought to address shortfalls in Rwanda's supply chain system (e.g., the enormous costs spent in inventory management associated with expiries losses, stock outs and emergency orders treatment) and data availability and quality challenges (e.g., unreal time data, data invisibility through the value chain, data with poor quality, and deficiency in data validation and integrity checks) (USAID, 2017). Managers with access and open eye into all supply chain functions can have right conclusions, leading the system to the required level of product availability and better health outcomes. (JSI, 2019).

2.3. SUMMARY OF LITERATURE REVIEW

Currently, the e-LMIS has been fully implemented all over the country. Pharmacists and health care providers in public health are the principal users of e-LMIS. The system links health facilities, district and national medical store and in the control of Ministry of Health, by collecting data and reporting for efficiency and effective health commodities inventory management. However, usefulness and impact on the use e-LMIS has not been previously studied in Rwanda. (GHSC-PSM, 2018)

Due to inadequate oversight for e-LMIS utilization, there has been decentralization of critical decision-making and subsequently resulting in ineffective implementation of decisions. Double reporting (manual and e-LMIS) creates issues of data validity / integrity and significantly slows down e-LMIS utilization rate which impacts its usability. Also, Lack of decision making and follow up on critical e-LMIS actions / issues that affect users by slowing their interest in using the system.

Most SDPs complained about the double work being done, which divides attention and hence renders both systems ineffective, creating data accuracy problems. Most of the sites suggest that the paper-based LMIS be retired, with the exception of the stock card.(RWANDA MOH, 2018). Results of the study revealed that 94% of respondents were convinced with the system, and 90 % had functional system. Even though, there is always need for upgrading, this is a positive reflection of satisfactoriness of the software.(Tiye and Gudeta, 2018)

Eighty-one percent of the requests and requisition are sent electronically, 19 & were not. The root cause was internet connectivity issues in the facilities. The said issues need to be resolved to upgrade system functionality and online at each time of need.(Project, 2017)

Despite the favorable feedback on e-LMIS use, there were sharp areas to be addressed, namely: Inability to use the system in absence of power at the facility, products which are not in the system and codes mismatch between e-LMIS and the paper-based forms. The system does not give alert for products that are expected to expire in coming period.(Mjelva et al, 2017)

2.4. CONCEPTUAL FRAMEWORK

Evaluation of effectiveness on the use of e-LMIS has conceptual framework that describes the pathways through improving health outcomes (USAID, 2014). e-LMIS contribute to optimal supply chain practices by enhancing data capture, reporting, accessibility, transparency, timeliness, and quality. These upgrades direct to the supply chain outcomes, in turn leading to better drugs availability, then increase the service delivery and patient outcome (Louis, 2015, Mjelva, 2017)

Additionally, e-LMIS improve data transparency, quality and data use which leads to effective decision-making for superior supply chain procedures and outcomes (see figure below) (JSI, 2019)

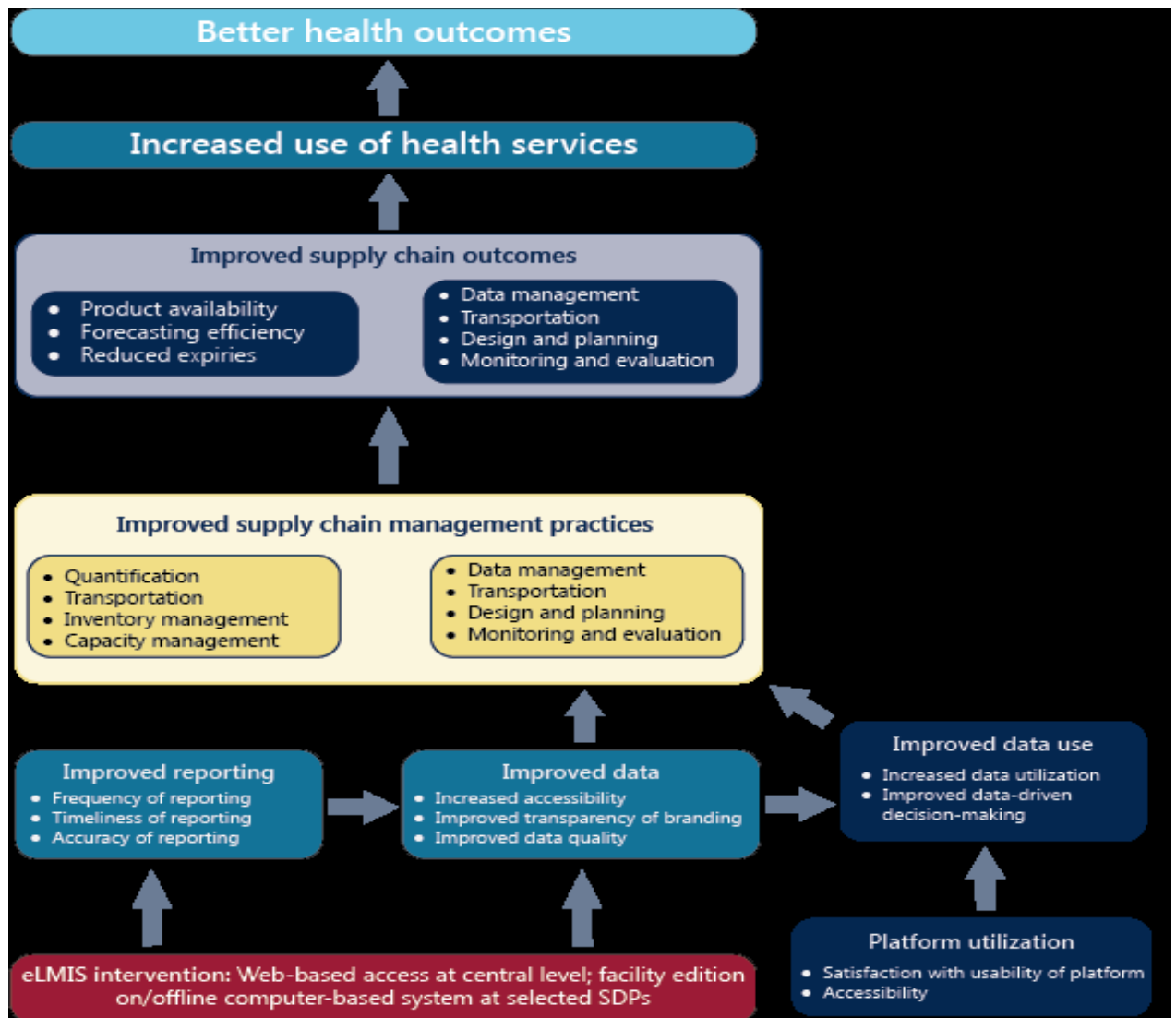


Figure 1. Effects of Improved Supply Chain Management

(AIDS, (PEPFAR) and (USAID), 2018)

CHAPTER III: RESEARCH METHODS

This chapter of the study to evaluate impact of e-LMIS utilization on health supply chain in Rwanda, discusses research design, research approach, research setting population, sampling including sampling strategy and sample size, the tool used, data collection procedure, data analysis, ethical considerations, data management, data dissemination, limitations and challenges.

3.1. RESEARCH DESIGN

Research design were defined by Burns & Grove (2009) as blueprint for doing a study with maximum control over factors which may interfere with the validity of the findings and Polit & Beck (2012) defined a research design as “the researcher’s overall for answering the research question or testing the research hypothesis”.

This study is a descriptive, cross-sectional study design and the research needs various sources of evidence where qualitative approach was used to provide a wide and detailed assessment of the impact in e-LMIS use on health supply chain in Rwanda.

A study is called cross-sectional when researcher conducts all measurements at once upon a time or within a short period of time with aim to study the prevalence of a phenomenon, problem, attitude or issue. (Thisted, 2006)

3.2. STUDY LOCATION

This study was conducted in all 30 District Pharmacies of Rwanda, supplying all public health facilities in the country through e-LMIS with health commodities.

Rwanda Profile



Figure 2. Rwanda Profile

Overview of Rwanda public health care system

A health care system is defined as the organization of peoples, institutions, and resources with the aim of delivering health care services to satisfy health needs of targeted population (WHO, 2017). Rwanda has adopted a primary health care approach for its health system based on the principles of Alma Ata (MOH, 2014). Health Strategic Plan was revised in 1996, and replaced by Vision 2020 map. The plan points on primary health care; decentralization; community engagement health; development of human resources; strengthening of the health information system; and intersectoral approach to health. Rwanda has five referral hospitals, 42 district hospitals, 30 district pharmacies, 5

blood transfusion centers, 466 health centers, 16 prison dispensaries, 60 health posts, about 45,000 Community health workers at household level and 60 private sector health facilities including clinics, 114 dispensaries, laboratories and pharmacies (MoH, 2014, 2016))

3.3. TARGET AND STUDY POPULATION

The total population in this study is 60 respondents from 30 District pharmacies with 2 users of e-LMIS at each District pharmacy (one Pharmacist and one nurse store manager).

3.3.1. Inclusion criteria

This study was conducted at all district pharmacies using e-LMIS users and focusing on District pharmacists and nurse store managers as main users. Users were recruited based on their willingness to participate in this study and were in duty during the period of data collection were invited to be part of participants.

3.3.2 Exclusion criteria

Users without willingness of participating in this study.

3.4. SAMPLE

It is the process of selecting a number of individuals of a study in such way that individuals represent the large group from which they are collected. (Kothari, 1990)

3.4.1. Sampling strategy

In this study, census convenience sampling method was used. All 30 District pharmacies with two respondents who use e-LMIS by each District Pharmacy were invited to involve in this study.

3.4.2. Sample size

Sample size was determined by purposive sampling, chosen based on prior knowledge in e-LMIS use of respondents available. Therefore 60 e-LMIS users, 2 by each District pharmacy were invited to participate in this study.

3.5. DATA COLLECTION TOOL

Questionnaire to evaluate effectiveness on using e-LMIS as tool to improve the quality of services specifically in supply chain management was developed by a researcher, tested prior in 5 district and revised. The questionnaire was used to gather the needed information on how is productive to use e-LMIS in health supply chain management from 21 March 2014 up to 30 July 2019.

The tool was developed in English and translated into French based on available literature on health supply chain web based tools. It has two parts: The first part constitute by demographic data that can influence user's knowledge, skills and experience in adequate use of e-LMIS. In this part, the participants responded about their age, sex, educational level, training received about e-LMIS and working experiences in supply chain management especially in use of e-LMIS.

The second part of questionnaire has 22 questions on the use, simplicity, productivity and benefit of using e-LMIS by persons in charge of health commodities management and encountered challenges. The questionnaire was presented to the panel and the supervisors for guidance before gathering data and it was accepted.

3.6 PRE-TESTING

A brief definition is that a pre-test study is a 'small study for helping to design a further confirmatory study (Burns.k ,2009). The purpose of pre-test study was to test the instrument for inaccuracy, identify potential bias in data collection for collecting them before the main study and gain experience with the methodology and instrument. A pilot study was conducted to determine reliability and validity of the questionnaire as far as possible whether the tool was clearly worked and not containing bias. It gave an idea of

how long it takes to administer questionnaires. The pre test study was conducted on 5 of District Pharmacies two weeks before major study. Participants were explained about the study in order to get voluntary consent then after, unclear questions were modified. Statistical Package for Social Sciences (SPSS) version 21 was used to compute the reliability coefficients (0.85) for each scale in the questionnaire before the overall was computed.

3.7. VALIDITY

Validity of a tool is its ability to measure what is set out to measure. Content validity was assessed through use of literature currently available on utilization of e-LMIS in health supply chain management

3.8. RELIABILITY

In this study, the reliability of tool was obtained by Alpha coefficient method for suitability in which the tool was tested. The investigator administered all the questionnaires himself to avoid bias associated with inter-rater reliability.

3.9. DATA COLLECTION PROCEDURE

Data collection was conducted by researcher. Information was obtained by looking into issues regarding questionnaire (aim of the study, how to approach participants, how to gather the questionnaires in favor of the study). The procedure for data collection was as follow: 1) The investigator received ethical clearance from institution review board (IRB) of the school of Public health, CMHS, University of Rwanda to conduct the research. The researcher was granted permission to collect data and acceptance letter was given by National Health Research Committee (NHRC). 2) The objectives and benefits of the study were explained in English or French to the participants depending on their language of choice. 3) Collection of data was done from 8:00 am to 5:00pm, in working days / hours within one month. 4) The investigator obtained written informed consent from participants before dispatching the questionnaire to ensure their autonomous. 5) The participants received the questionnaire voluntarily and researcher requested them to fill it

individually in private room and there were no names included on the questionnaire, information disclosure to ensure anonymity. Completed questionnaire was coded and kept in locked, secured room during one year. 6) The researcher checked answered questionnaires for incompleteness.

3.10. DATA ANALYSIS

Data was sorted, checked and coded by a researcher. Then, data entry was done using SPSS version 21. Demographic characteristics and the e-LMIS performance scores regarding effectiveness of its utilization in health commodities management were analyzed using descriptive statistic. The benefit and productivity regarding utilization of e-LMIS in health commodities supply chain were categorized and described by SPSS.

3.11. LOGICAL & ETHICAL CONSIDERATION

Ethical clearance was obtained from institution review board (IRB). The researcher has introduced himself and clearly defined the aim of the study to the participants before signing the consent form. The participants were requested to sign consent form for the study. They had right to know the aim of the study, to withdraw without consequences during data collection. Also, they were informed about confidentiality and privacy that have to be maintained. The data from the study will not be used for any other purposes. Questionnaire did not include the names of research participants. All questionnaires were given code numbers.

CHAPTER IV: RESULTS PRESENTATION AND INTERPRETATION

4.0. INTRODUCTION

This study was aimed to describe effectiveness of Electronic Logistic Management Information System utilization (e-LMIS) in Rwanda health supply chain. A descriptive cross- sectional study design was used in this study. Fifty nine out of sixty respondents from all thirty District Pharmacies, two e-LMIS users respondents by district pharmacy have participated; leading to 98.3% responses.

The results of this study are presented as follow:

- Demographic characteristics of respondents
- e-LMIS utilization level regarding reporting and data quality
- Impact of e-LMIS use in health supply chain management
- Challenges and limitations with e-LMIS utilization in health supply chain

4.1 RESPONDENT'S DEMOGRAPHIC CHARACTERISTICS

In this study, the demographic characteristics data that were considered are: age, sex, educational level, working experience, training received in e-LMIS utilization, occupation and challenges faced at work place regarding their routine tasks.

The demographic information of respondents are presented in table 4.1 below. According to the findings, most of respondents fall in category of 30-39 years old (66.1%), none is above 50 years old; most of respondents were male (64.4%),

In this study, most of respondents were pharmacists (50.8%), others were nurses (35.7 %). More than half have working experience of more than 6-10 years (49.2%) but none has reached 20 years of working experience. 96.6% of respondents have received at least one training in e-LMIS and 40.7% of them are administrators (Directors, others are Assistant to the Directors) and store manager (32.2%). The study revealed that 45.8% of

respondents have challenges related to the work overload and (20.3%) have confused tasks in their attributions.

Table 1: Studied e-LMIS users regarding their socio- demographic characteristics

Socio-demographic characteristics	Sample (N=59)	
	N	%
Age group		
20-29	8	13.6
30-39	39	66.1
40-49	12	20.3
Above 50	0	-
TOTAL	59	100.0
Sex		
Male	38	64.4
Female	21	35.6
TOTAL	59	100.0
Educational		
Secondary school (Nurse A ₂)	9	15.3
Diploma in Health Sciences (Nursing)	6	10.2
Bachelor's in nursing	6	10.2
Master of nursing	0	-
Pharmacy A1	1	1.7
Pharmacy Ao	30	50.8

Master's in Pharmacy (any field)	6	10.2
Other (Specify)	1	1.7
TOTAL	59	100.0
Service Experience		
0-5 years	17	28.8
6-10 years	29	49.2
11-15 years	12	20.3
16-20 years	1	1.7
Above 20 years	0	-
TOTAL	59	100.0
Training received in e-LMIS		
NO	2	3.4
YES	57	96.6
TOTAL	59	100
Specific occupation at work place		
Administrator	24	40.7
Ass. Administrator	13	22.0
Store manager	19	32.2
Data manager	3	5.1
Other (Specify)	0	-
TOTAL	59	100.0
Challenges faced in your job		

Confused tasks	13	22.0
Mismatched rewards	6	10.2
Work overload	27	45.8
use of complicated tools	5	8.5
Insufficiency of equipment / infrastructure	1	1.7
Both above stated	5	8.5
Other (Specify)	2	3.4
TOTAL	59	100.0

4.2. E-LMIS UTILIZATION LEVEL

Utilization level of Electronic Logistic Management Information System were assessed through six multiple choice questions and findings are below presented.

4.2.1. Frequency of e-LMIS use

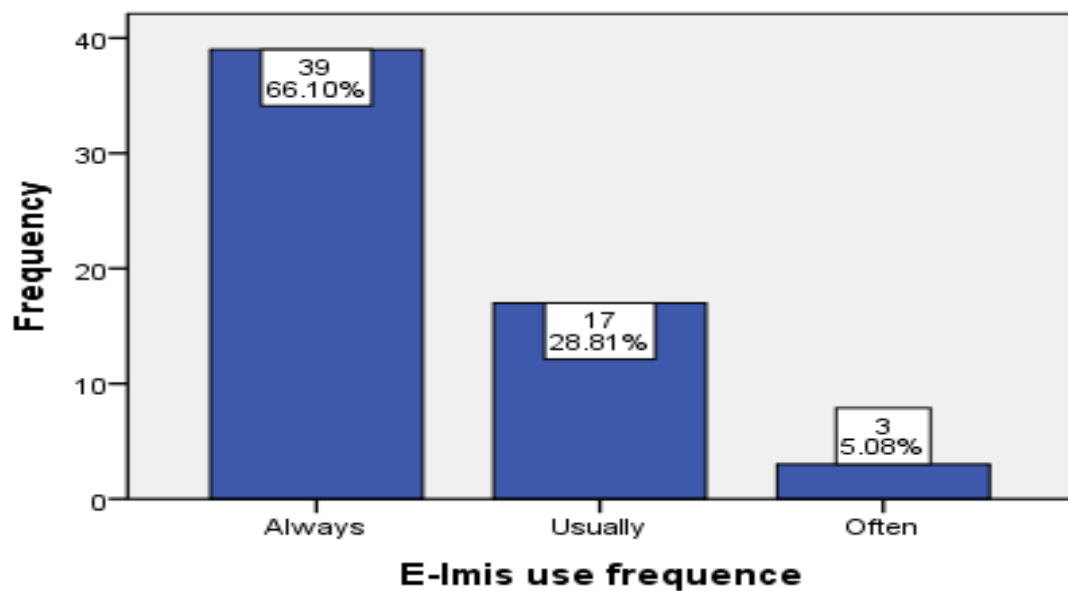


Figure 3. Frequency of e-LMIS use

This study showed that two third of respondents use e-LMIS at always (100%) as part of their job, one fourth of respondents use e-LMIS usually (90% rate) and minority (5%) use it often at 70% rate.

4.2.2. Inventory adjustment through e-LMIS

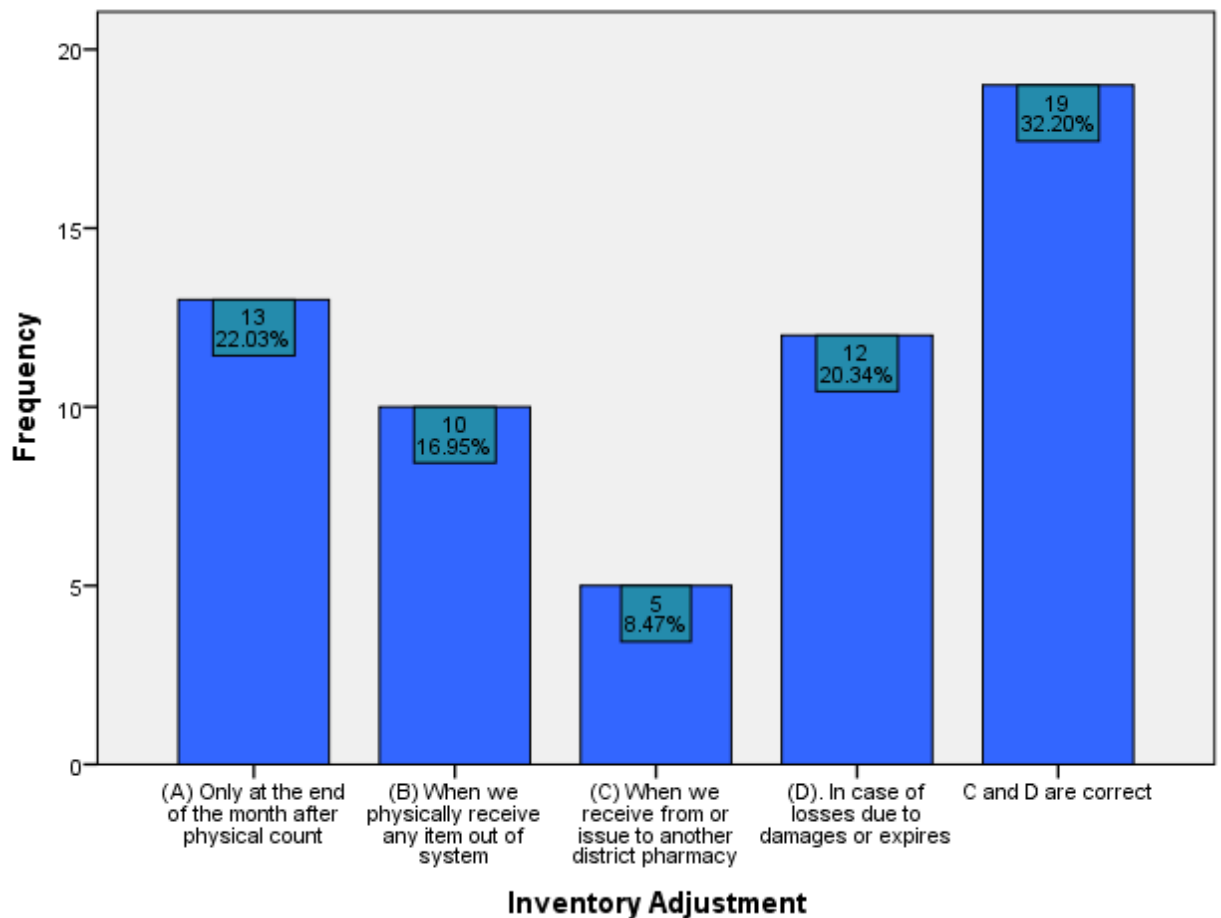


Figure 4. Inventory adjustment through e-LMIS

The study revealed that only a third (32.2%) of the respondents use e-LMIS to make inventory adjustment when they receive from or issue to another district pharmacy and in

case of losses due to damages or expires. Others (67.8%) made adjustments only for other supply chain management transaction reasons .

4.2.3. e-LMIS functions use in health supply chain

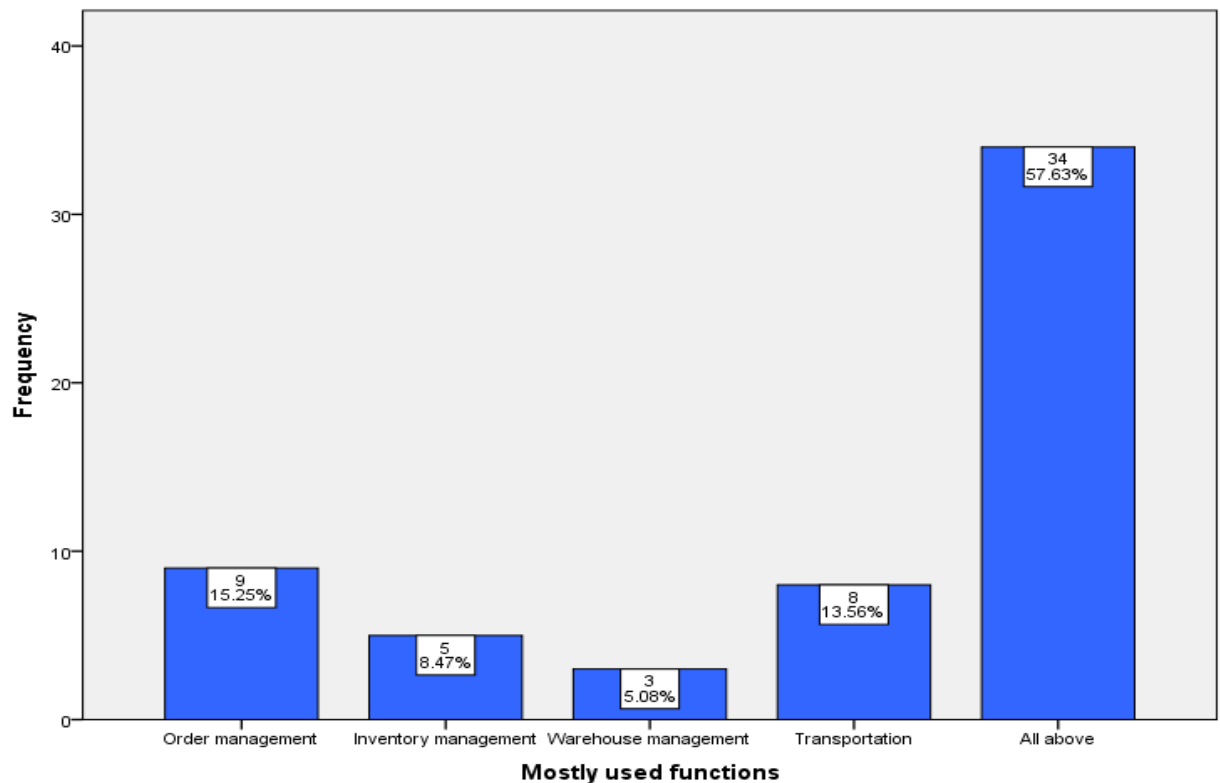


Figure 5. e-LMIS functions use in health supply chain

The study revealed that more than half of respondents (57%) use all e-LMIS functions beside 8.5%, 15% and 13.6% use only e-LMIS respectively for order management, inventory management, warehouse management and transportation.

4.2.4. Quality of information from e_LMIS to be used in decision making

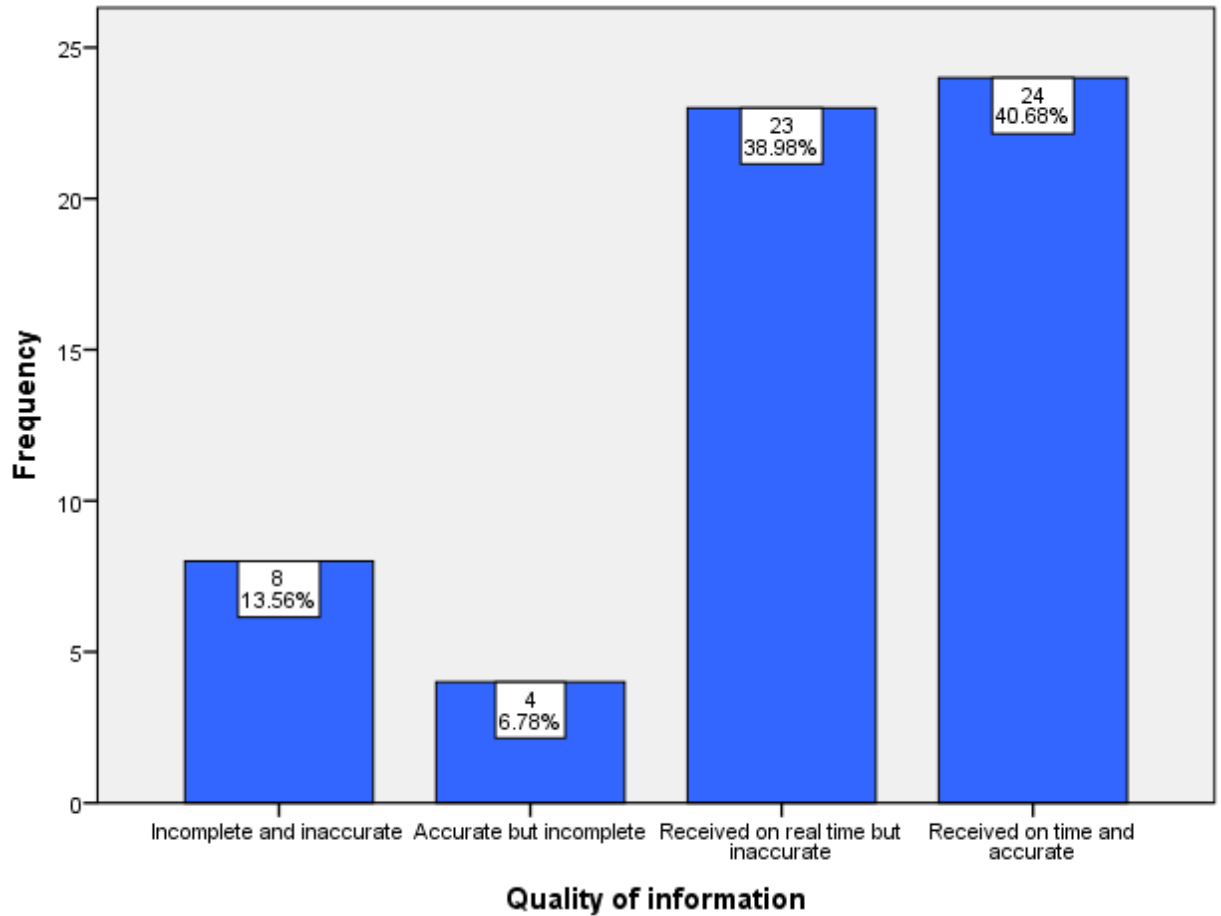


Figure 6. Quality of information from e_LMIS to be used indecision making

The figure above is showing that only 40.7% responded that using e-LMIS, generated information are received on time and accurately and 39% responded that those information are received on time but inaccurate.

4.2.5. Reports that can be generated through e-LMIS information use

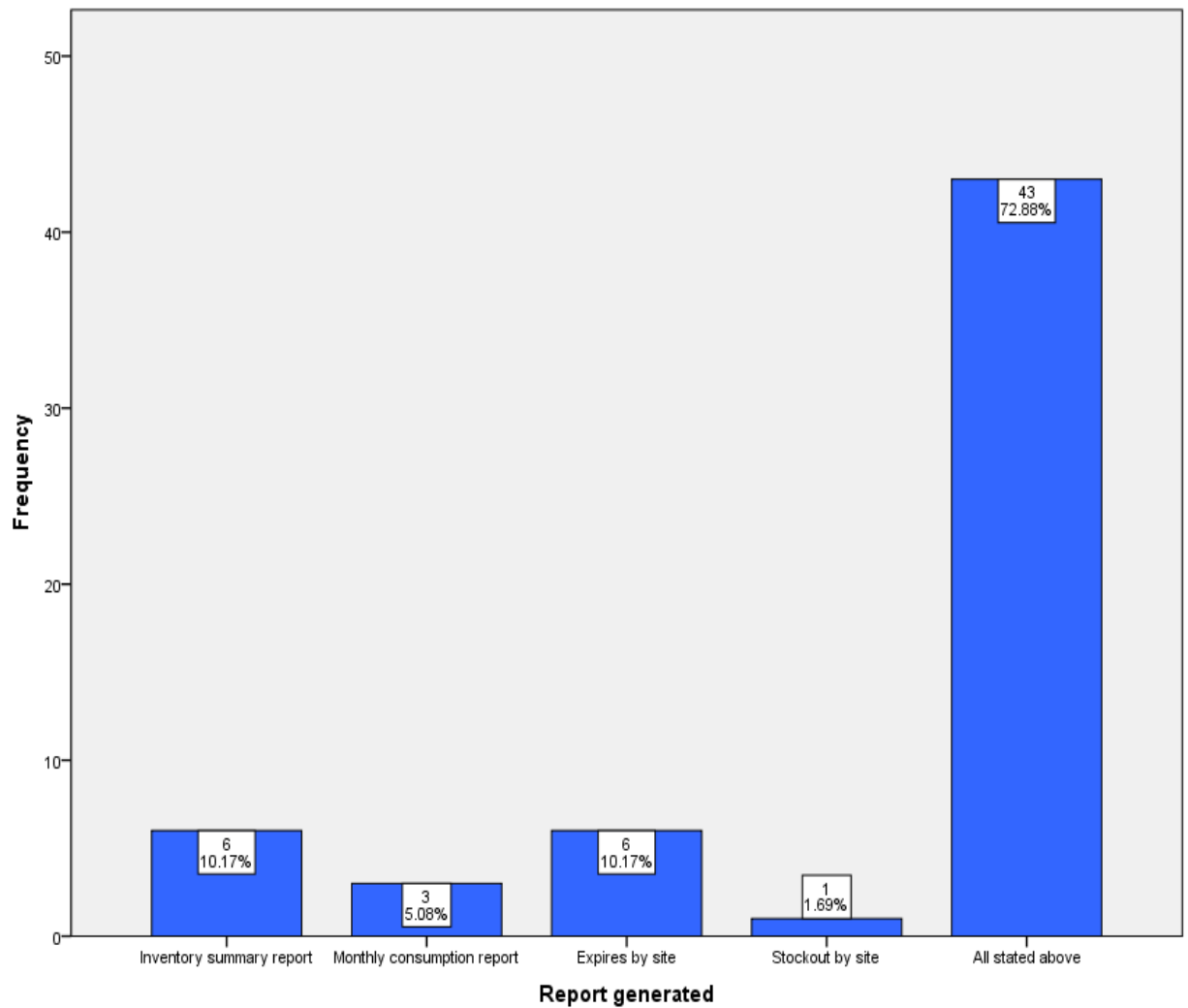


Figure 7. Generated information in reporting or for decision making

The above figure is showing that majority (72.9%) of respondents use e-LMIS information to produce all required reports like inventory summary report, monthly consumption report, expiries by site and stock out by site.

4.2.6. Activities that takes more time in e-LMIS

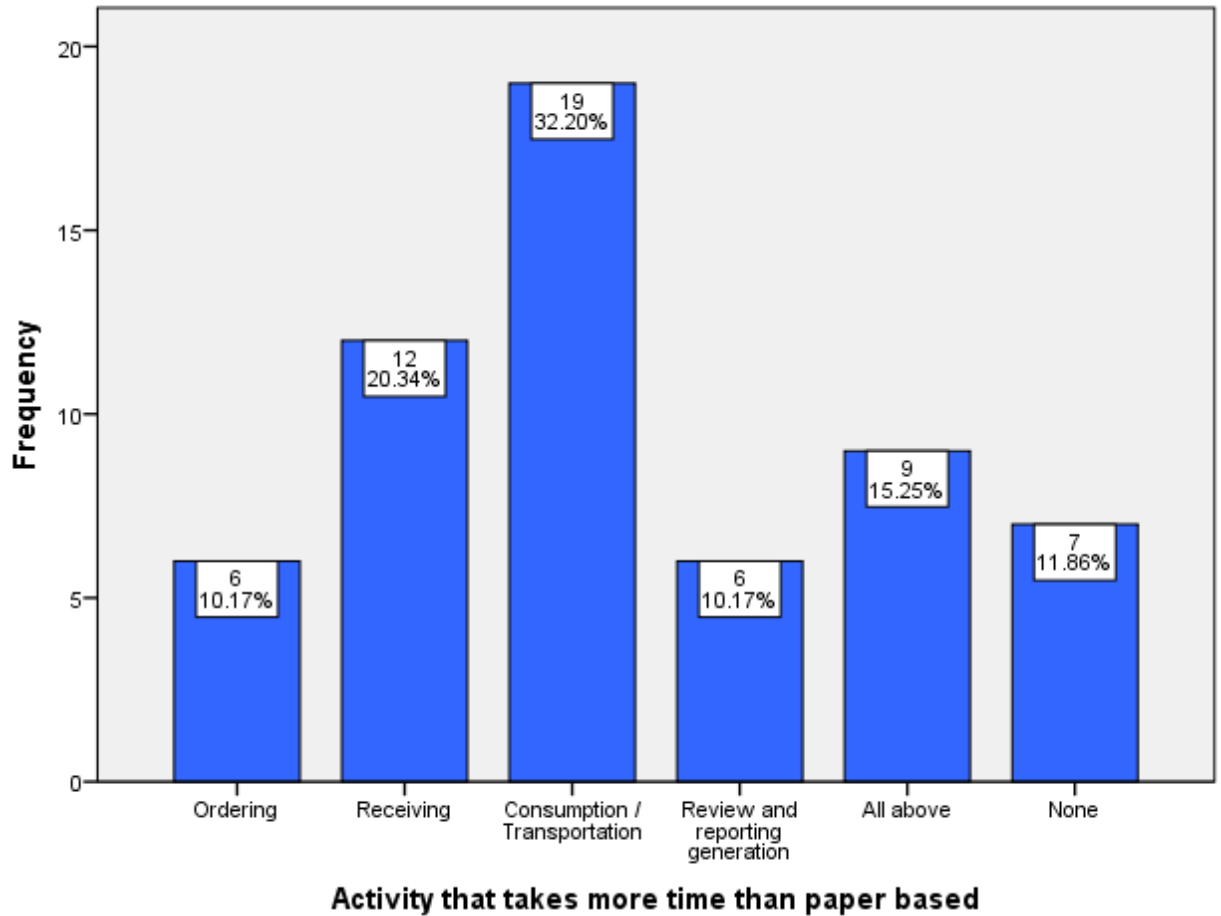


Figure 8. Activities that takes more time in e-LMIS

In this study only 11.9% have responded that e-LMIS does not take more time for ordering, receiving, consumption/Transportation, review and reporting data. One third of respondents said that consumption and transportation take more time than other e-LMIS functions.

4.3. IMPACT OF E-LMIS USE IN HEALTH SUPPLY CHAIN MANAGEMENT

Impacts of e-LMIS use in health supply chain management are presented with below indicators.

4.3.1. Data Accessibility

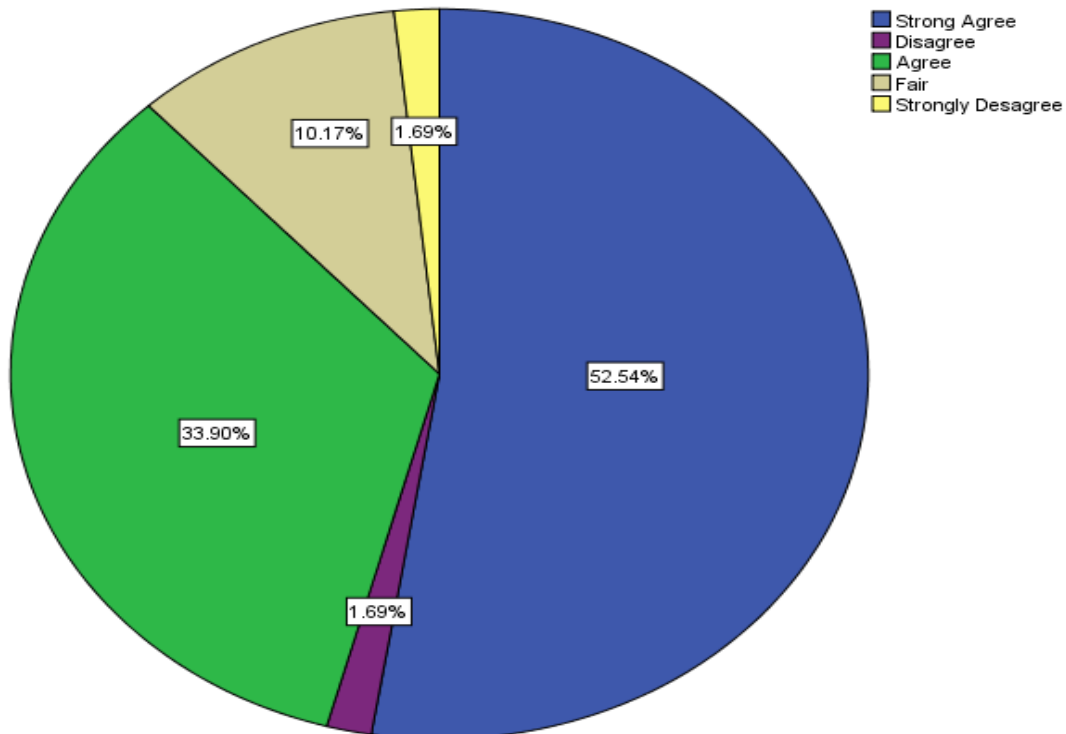


Figure 9. Data Accessibility

The findings of this study showed that the use of e-LMIS contributed to the accessibility on past and current information at any time of need (86.4%).

4.3.2. Data Availability for decision making

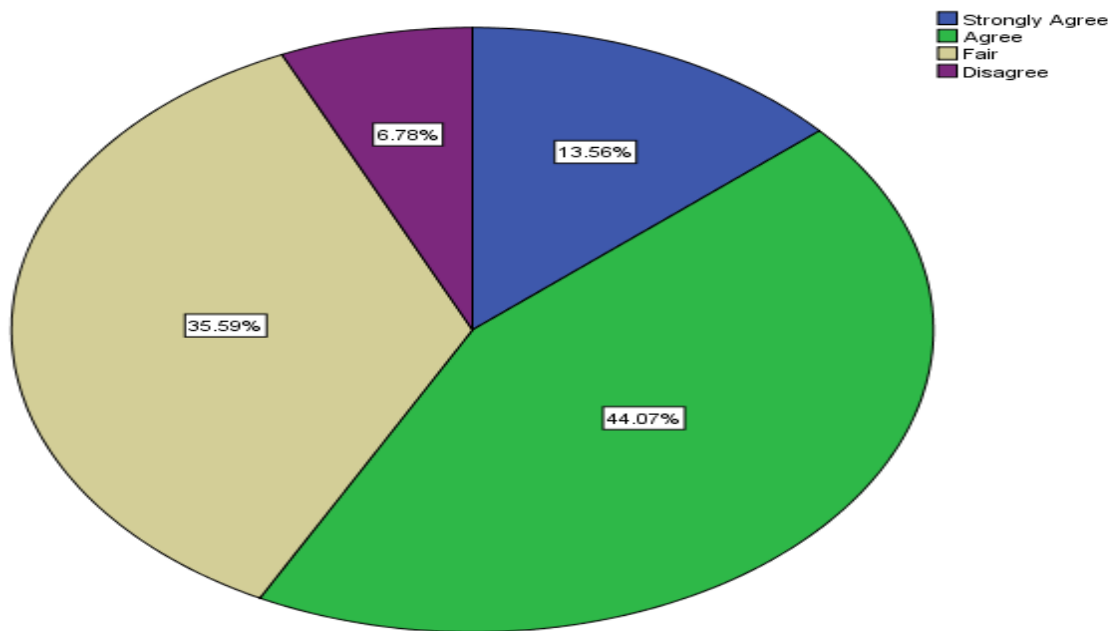


Figure 10. Data Availability for decision making

The findings of this study showed that using e-LMIS has contributed at 57.63% to the data availability and country wide information at a given time as can be needed purposively in decision making.

4.3.3. Reduction of quantification challenges

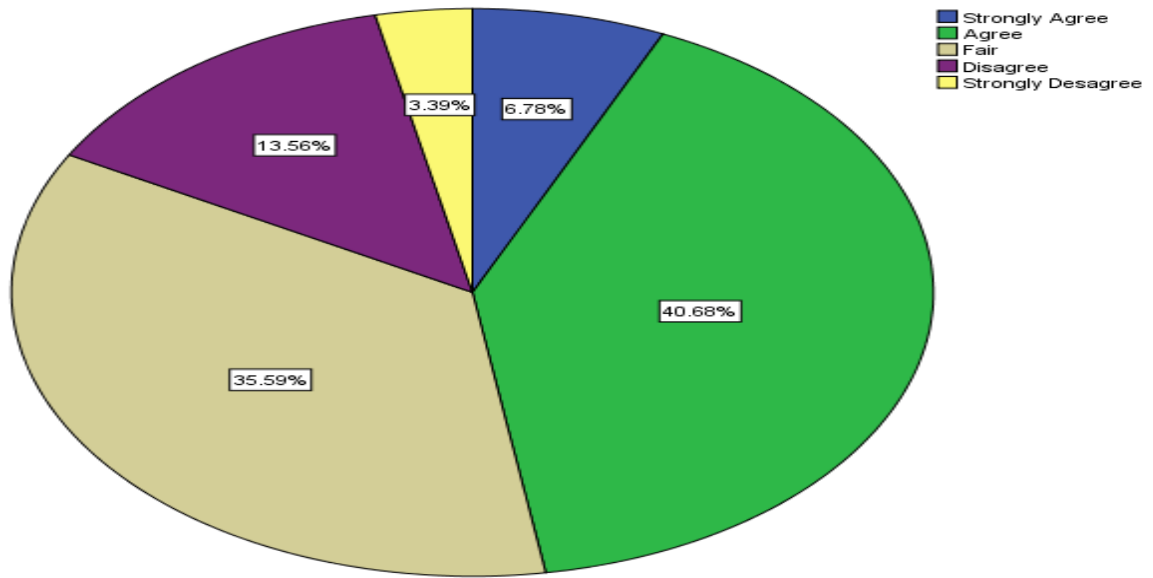


Figure 11. Reduction of quantification challenges

The graphic above generated based on findings showed that 47.46% of respondents agreed that data captured through e-LMIS contributed to the reduction of some quantification challenges like inaccuracy and incompleteness of data.

4.3.4. Stock level control

ITEM NAME	Unit of measure	SOH as at 31/07/2019	AMC	Calculated MOS
Paracetamol 500mg tab	Tablets	305000	98706	3.1
Examination gloves T 7.5	Piece	346800	120000	2.9
COARTEM 6X3, TABLET	BLISTER	3070	1470	2.1
Dolutegravir 50mg tab	B/30 tablets	496	352	1.4
ABC/3TC 600/300mg	B/30	2532	896	2.8

Quinine 300mg tab	Tablet	2100	1400	1.5
Isoniazid 100mg	Tablet	1100	400	2.8
Shisha kibondo Mother 1.5kg/sachet	Sachet	1740	1860	0.9
EFAVIRENZ 600MG	B/30	693	221	3.1
F-100 THERAPEUTIC MILK	B/24	16	2	8.0

Table 2. Stock level control

The findings from this study showed that available stock of eight out ten items (80%) chosen randomly, may last from one to 3 months in normal conditions. And the stock of one item out of ten fall below one month, one out of ten fall above three months. The findings of this study showed that 8 items in 2018-2019 have been redistributed as the way of stock optimization according to the need, shelf life, protocol and consumption rate

4.3.5. Data accuracy

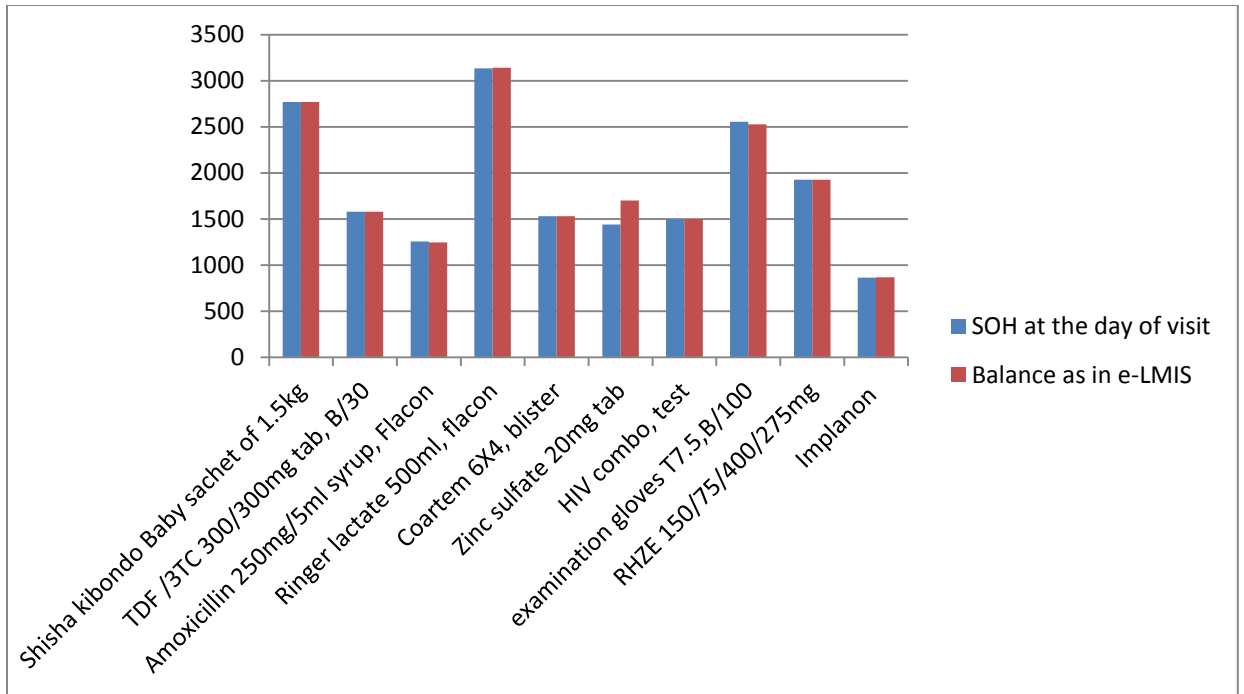


Figure 12. Data accuracy

From the findings of this study, the stock on hand for 7 out of 10 (70%) of items taken randomly match with e-LMIS buffer on hand. Others two showed e-LMIS buffer on hand exceeding physical stock.

4.3.6. Improvement of data quality

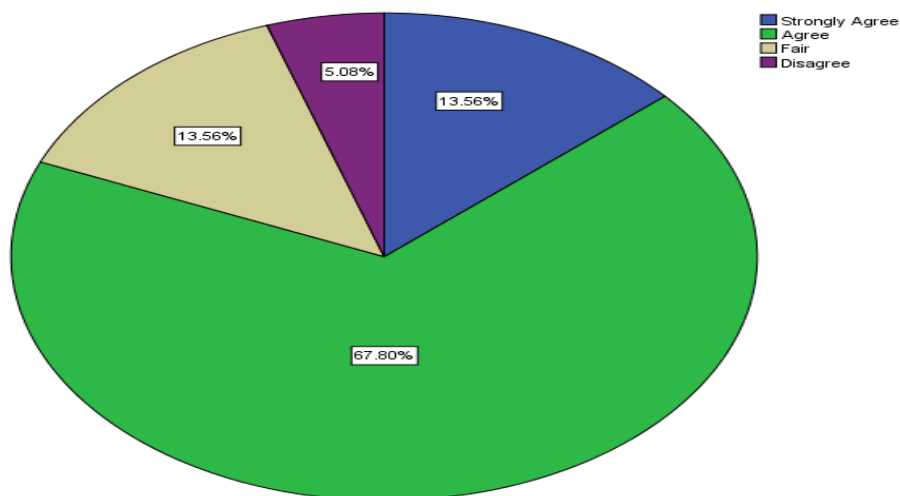


Figure 13. Improvement of data quality

The findings of this study showed that the use of e-LMIS in health supply chain contributed to data quality improvement at 81.36% with 13.56% strongly agree, 67.8% agreed. 13.5% of respondents are fair that utilization of e-LMIS in health supply chain has improved quality of data and 5% of them are disagree on contribution of e-LMIS to the improvement of quality of data statement.

4.3.8. Impact of e-LMIS on Supervision

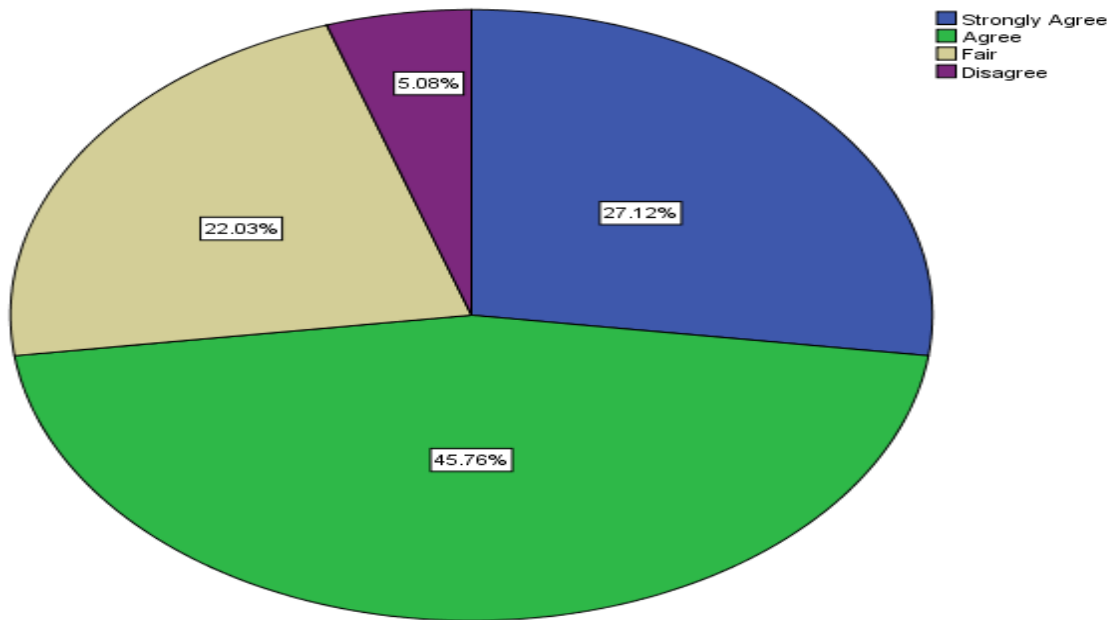


Figure 14. Impact of e-LMIS on Supervision

The finding of this study showed that 27.1% of respondents and users of e-LMIS strongly agreed and 45.8 % agreed that since the introduction of e-LMIS utilization in Rwanda health supply chain has simplified supervision practices and time it takes for conducting supervision. Less than half (22%) are fair on the statement, and small number of respondents (5.1%) disagrees on it.

4.3.9. Contribution of e-LMIS on Workload reduction

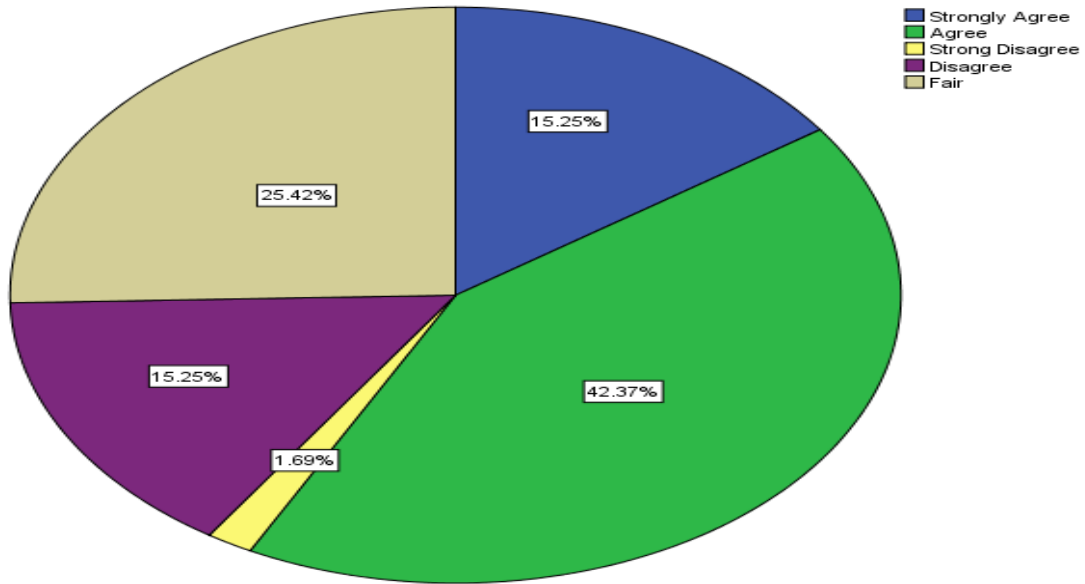


Figure 15. Contribution of e-LMIS on Workload reduction

In this study, more than half of respondents (15.2%) strongly agreed and (42.3%) agreed that use of e-LMIS in health supply chain management may simplify the work whereas less than half of respondents among them (25.4% fair, (15.2) disagree, (1.7%) %strongly disagree that e-LMIS utilization has contributed to the reduction of health supply chain related workload.

4.3.10. Duration of ordering processes through e-LMIS

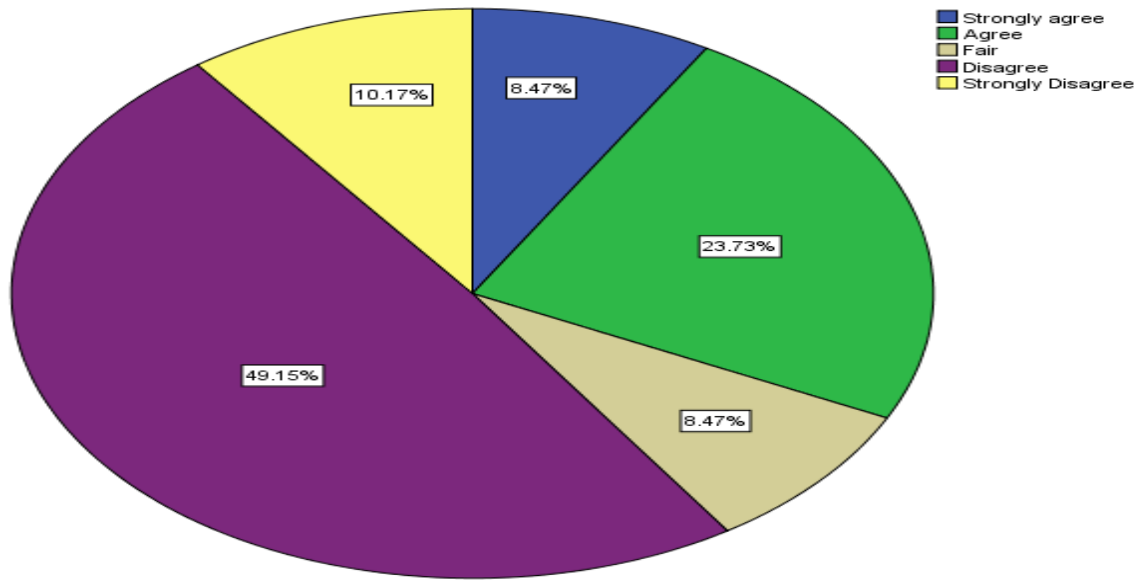


Figure 16. Duration of ordering processes through e-LMIS

The study revealed that about half of respondents (32.2%) do not spent more time ordering through e-LMIS than paper based system, and (10.1%) strongly disagree that ordering through e-LMIS can take more time than paper based.

4.3.11. e-LMIS contribution on health supply chain and reduction of loses

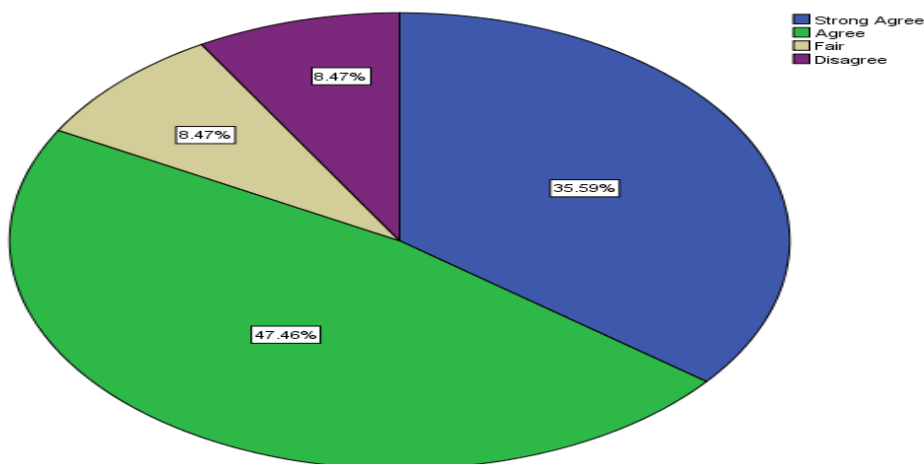


Figure 17. e-LMIS contribution on health supply chain cost -effectiveness

This study revealed that two third of respondents agreed that e-LMIS has contributed to the improvement of health supply chain cost effectiveness where 47.4 % agreed and 35.6% strongly agree on the impact of e-LMIS. Small number of respondents in this study disagreed on contribution of e-LMIS on health supply chain cost effectiveness.

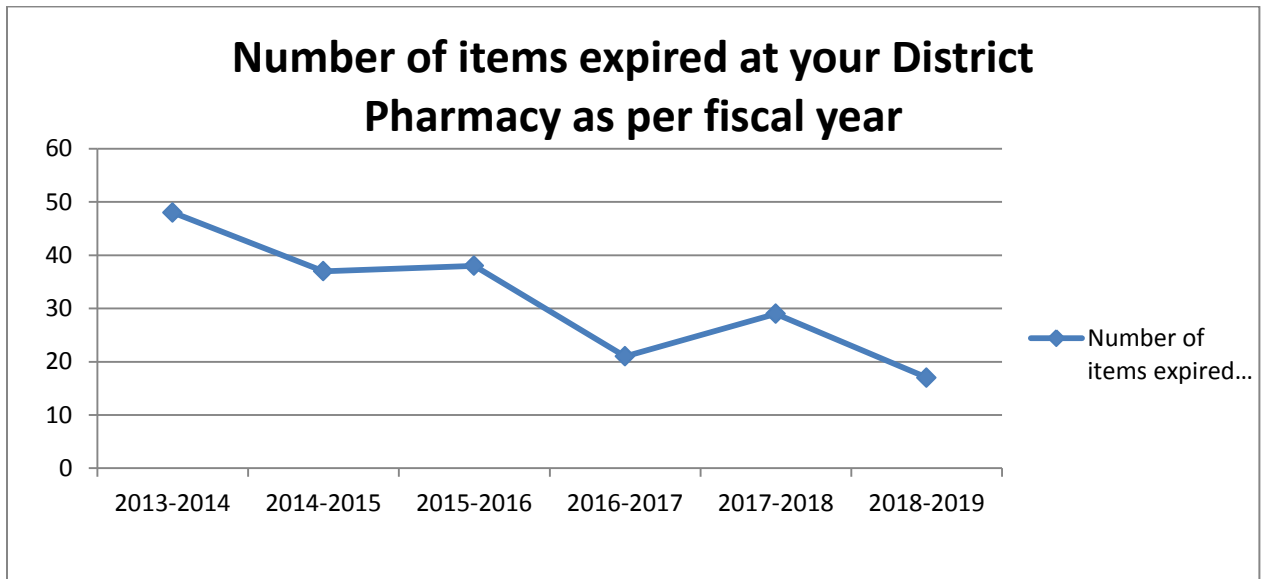


Figure 18. Number of items expired

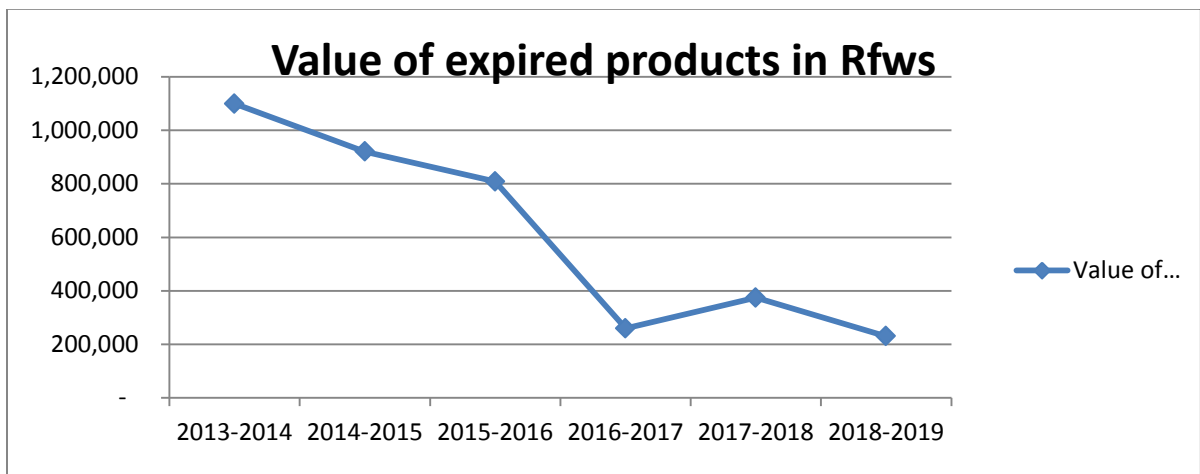


Figure 19. Value of expired products in Rfws

The tables above showed that through the use of e-LMIS, the quantity of expired health commodities as well as corresponding value has been reduced year by year.

4.3.12. Commitment of health facilities' manager regarding commodities and data management through e-LMIS use

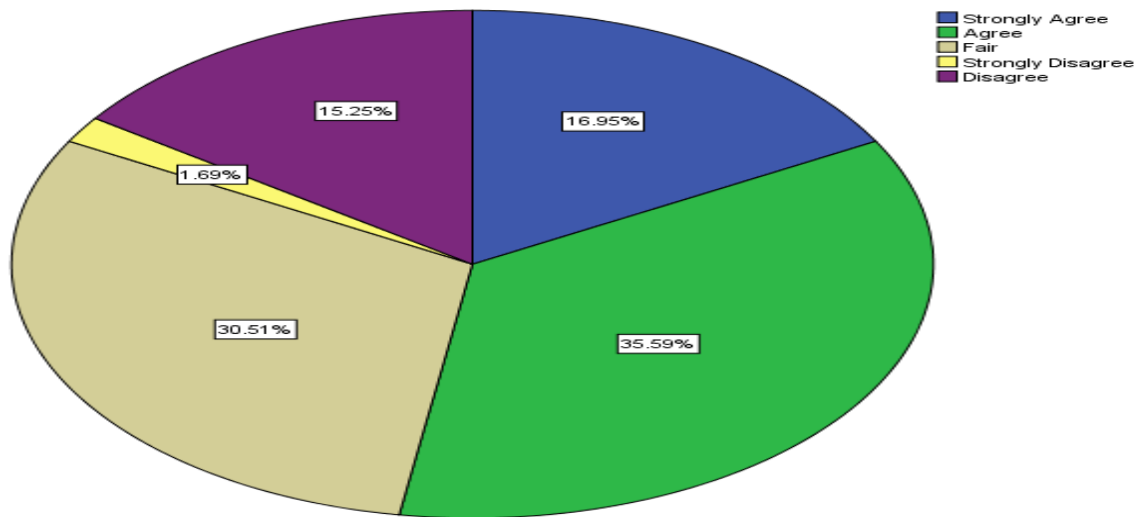


Figure 20. Commitment of health facilities' manager

The finding of the study showed that more than half of respondents (52.5%) agreed that health facility managers became accountable regarding commodities and data management through e-LMIS use. And less than half (30.5%) fairly showed that e-LMIS has contributed to the good practice through commitment of health facilities managers, 1.6% strongly disagreed on that.

The study showed that 44% of respondents agreed and 15.2% strongly agreed that workload that is frequently noted in health commodities management at health facilities level has been simplified through interfaces with other e-tools that are mostly used in Rwanda health system.

4.3.13. Time required to complete task

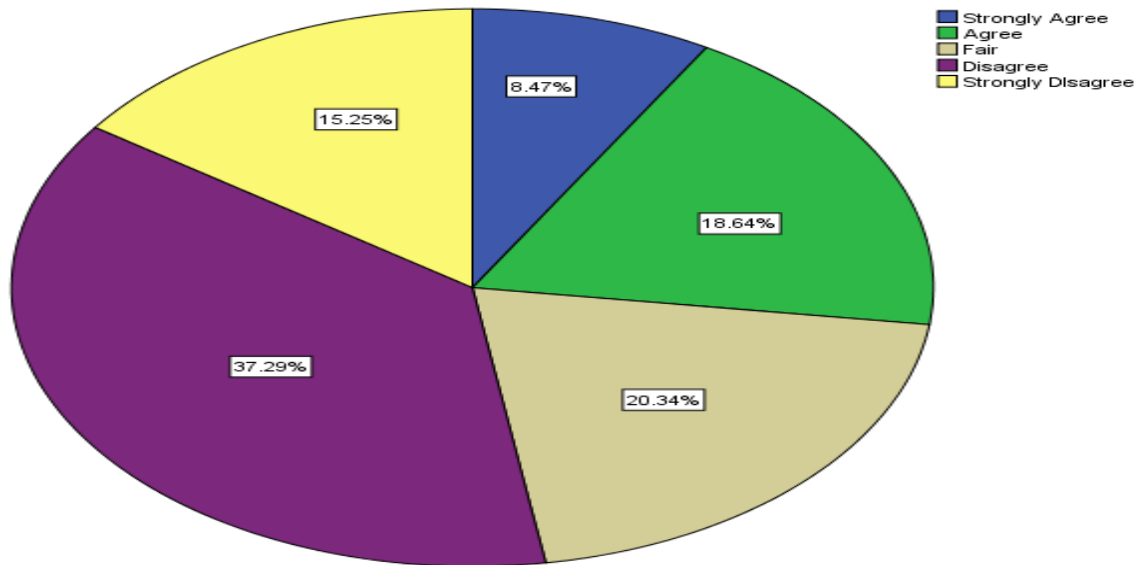


Figure 22. Time required to achieve responsibility

Most respondents in this study (52.5%) disagreed that use of e-LMIS can increase the time to achieve their tasks than other tools.

4.4. CHALLENGES AND LIMITATION WITH E-LMIS UTILIZATION IN HEALTH SUPPLY CHAIN

This part is presenting findings of the study about different limitations of the system, various recommendations and suggestions; and were converged from respondents.

Challenges to e-LMIS utilization

Respondents in this study showed such limitations as Replenishment engine not used for forecasting, e-LMIS is not usable without connectivity to facilitate operations done out of system. And they said that having many codes for one items and health commodities without code in e-LMIS, long process for receiving, picking and transportation functions, lack of stock visibility in time of clients orders validation, pages overloaded, unnecessary columns, most non usable information are other limitations for functionality of e-LMIS.

They continued highlighting some services delivery points (health posts) & suppliers (Bufmar & Private suppliers) are not included, also whole sales private pharmacies do not have role in e-LMIS. In advance, Inaccuracy of data from health facilities, infrastructure (internet and computers), lack of ownership and accountability of health facility managers and district authorities, workload due to insufficiency of personnel and mainly lack of those in charge of stock management as their principal tasks, lack of skilled and enough users at low levels (SDPs) are bottlenecks to the system use.

Suggestions from users to improve e-LMIS utilization

In this study, respondents showed different suggestions and recommendations as follow: To codify all usable items, Appoint specific & qualified and adequate staff in charge of stock management with full use of e-LMIS. And, they requested MOH to integrate all stakeholders in the use of e-LMIS, resolve issues of infrastructures, tools and internet connectivity, resolve all issues related to the complexity of the system, and ensure the full use of e- LMIS at all level.

Also, they suggested display available quantity in time of client's orders validation, refine invoicing, involvement of district authorities and increase accountability of Director General and health center management to the implementation of e-LMIS use in health facilities in order to improve the utilization rate.

Additionally, they recommend stopping the use of other management software to avoid double working, strengthen personnel in charge of stock management, to remove all bottlenecks to the system use, strengthen oversight by management for appropriate use of e-LMIS.

CHAPTER V: RESULTS DISCUSSION

5.1. INTRODUCTION

This chapter discusses results of effectiveness of Electronic Logistic Management Information system utilization in Rwanda health supply chain and on limitations that may hamper proper use with corresponding suggestions and recommendations.

5.2. DEMOGRAPHIC CHARACTERISTICS

The study found that most of respondents were in category of 30-39 years old (66.1%) and were male (64.4%). Study also revealed that two third (71.2%) have working experience of more than 5 years and 28.8 % were less than 5 years. This findings benefit e-LMIS utilization with experienced and productive age workers and positively affect health supply chain optimisation through new health technology.

The findings are differ with the descriptive cross-sectional study conducted by (Tiye and Gudeta, 2018) with purpose of determining program drugs logistics management information system performance in public health facilities of East Wollega Zone, in Ethiopia where they found that the majority of the staff, 57 (93.4%) were male, and the majority (67.2%) of the staff had service year of less than 5.

In this study more than half (62.7%) were working in pharmacy operations and 32.2% were store managers. These results are close similar to the study of (Tiye and Gudeta, 2018), where they found that more than half, 33 (54.1%) of the staff were working in the pharmacy and 23 (37.7%) were serving as storekeepers.

In this study, most of the respondents were pharmacists (62.7%) others were nurses (35.7 %). Results are similar to a cross-sectional descriptive study conducted by Desale *et al.*(2013) with aim of assessing laboratory logistics management information system practice for HIV/AIDS and tuberculosis laboratory commodities in selected public health facilities in Addis Ababa, Ethiopia, they found that a total of 75 (65.8%) pharmacy professionals. Findings of this study demonstrate the reality of the situation from

professional in health supply chain and specific users who deal with e-LMIS in their daily tasks.

The study also revealed that majority of respondents have received at least one training in Electronic Logistic Management Information System (96.6%) which is greater than the findings of Desale *et al.*(2013) where 71(62.3%) from the study were trained in logistics management information system. From that, one can note that any gap in e-LMIS utilization that can be noted has no correlation with skills, knowledge or related training.

The study revealed that most of respondents have challenges related to the work overload (45.8%) and confused tasks (20.3%) in their attributions. This challenge is linked to insufficiency and non professional employees working in health supply chain management especially at health facilities level where the staff to deal with e-LMIS functions is assigned to other different tasks.

5.3. E-LMIS LEVEL OF USE

Rwanda Health system has introduced a national web-based system to support the aggregating, reporting, and visualizing of data collected from the paper-based system.(Ntirenganya, 2017) According to Alpha (2016) the e-LMIS were designed and implemented to solve various supply chain challenges such as strengthen reporting rates, timeliness, data quality & ordering of commodities, reduce the levels of expires and wastage, improve quality of various upstream supply chain practices, commodity availability and management at health facilities, enhance data visibility, analysis and use at all levels of the supply chain.

Based on study findings, two third of respondents do always use e-LMIS. these findings are similar to the findings of (Tiye&Gudeta, 2018), where they had 2/3 the hospitals were using automated recording systems. The other portion of health commodities managers in public health did not use e-LMIS efficiently and this has impact on quality of data and commodities availability.

The study showed that only a third (32.2%) use e-LMIS to make inventory adjustment when they receive from or issue to another district pharmacy and in case of losses due to damages or expires. The findings are contrary to Nielsen&Sæbø(2016) where they stated that a system for health management typically need to collect data related to stock status of commodities. E-LMIS always shows the extent of being a lightweight inventory system (what is received, how much was dispensed and discarded; and what is the end balance of this month).

The study also revealed that more than half of respondents (57%) use all e-LMIS functions beside others use only e-LMIS for order management, inventory management, warehouse management and transportation. From these findings, e-LMIS was not fully used by all users, and this has negative impacts on its intended use.

Also, only 40.7% responded that by using e-LMIS, generated information are received on time and accurately and 39% responded that those information are received on time but inaccurate. Also, majority (72.9%) of respondents use e-LMIS information to produce all required reports. These results are below comparable to the findings of Tiye&Gudeta (2018) where 64.6% were accurate, 69.4% were timely reported and 97.8% of the reports were found to be complete and submitted 97% of the expected reports.

According to World Health Organization (2017), quality and timeliness of the e-LMIS records and reports have a sound impact on the sustainable accessibility of essential medicines. However, late submission and inaccuracy of report could have impact on decision making further to availability of health commodities.

Study also showed that only 11.9% have responded that e-LMIS does not take more time than for ordering processes. The study showed that 37.3% and 50.8% respondents were using e-LMIS good and fairly respectively. The findings showed that e-LMIS is at 88.1% achieving its intended use with the aim to automate the facility-level transactions and logistics reporting timeliness, enhance data quality and commodity availability, and improve order processing turnaround time (AIDS, PEPFAR&USAID, 2018).

Also, according to USAID (2017) the use of e-LMIS cut the time required time to prepare an order from an average of four days to about 45 minutes, and decreased order processing level of effort from three people to one person. In terms of ordering, there was a considerable achievement through e-LMIS utilization leading to the supply chain tasks simplicity and time saving.

5.4. IMPACT OF E-LMIS USE IN HEALTH SUPPLY CHAIN MANAGEMENT

5.4.1. Data accuracy and Reporting timeline

E-LMIS is a tool established to improve accurate of data at real time and to generate reports for decision making. The findings of this study showed that use of e-LMIS has contributed to the accessibility on past and current information at any time of need and have impact on data accessibility at 86.4%.

These findings showed that e-LMIS has not fully contributed to the quality of data and timely reporting. The reason might be the low commitment by higher officials in providing regular supportive supervision and feedback on the facilities performances. Also, the root cause is inappropriate use of system and lack of skilled human resources.

5.4.2. Data accessibility, visibility and transparency

The findings of this study showed that 94.9 % of respondents agreed that using e-LMIS, decision makers have access and use all country wide information at a given time as they are needed purposively. The system has ability to show data from a large geographic area and in real time allows users to make better decisions.

At all level of the supply chain in the country, users were committed to make data available and accessible to all stakeholders involving in health supply chain and be accountable of data entry and recording in e-LMIS because it is more difficult to falsify numbers as long as it has built-in calculations. Similar to the study (AIDS,PEPFAR&USAID (2018) with aims to demonstrate the impact of the e-LMIS on a range of supply chain and business practice outcomes. The study revealed an increase

in accountability because system requires users to quickly account transactions; such as prompting for physical counts before generating data and giving reasons for any adjustment.

However, improved responsibilities from users, facility managers and local authorities, availability of well skilled and trained staff, adequate equipments and elimination of system complexities may effectively improve health supply chain functions through e-LMIS use.

5.4.3. Contribution of e-LMIS use on quantification, inventory management, Supervision and health supply chain cost.

The findings showed that data capture through e-LMIS contributed to the reduction of some quantification challenges like inaccuracy and incompleteness of data at 57.6%. And most of respondents (47.4%) agreed that since the introduction of e-LMIS use, stock of health commodities are most of the time at optimum level (80% range from min to max) without under stock or overstock level. Here, the system allows an accurate representation of stock at each facility, making it possible and easier for users to relocate stock based on facility needs or to place emergency orders. This improves supply chain management and reduces the likelihood of stockout and expired stocks.

Such redistribution has been done on the following items Implanon, Cotrimoxazole 960mg, Dapsone 100mg, Tenofovir/Lamivudine 300/300mg, Efavirenz 600mg tab, Nevirapine 200mg, Sodium chloride 500ml and Ringer lactate 500ml. Redistribution has been done from facilities with overstock to health facilities with need or with stock out or shortage that aimed to optimization of stock level.

Additionally, e-LMIS provides district health management teams with the ability to easily identify overstock and under stock situations and redistribute stock to meet patient needs and reduce losses from an average of 1,099,101Frws to 230,000 Frws per district pharmacy through commodity expiry.

Also, more than half of respondents (15.2%) strongly agreed and (42.3%) agreed e-LMIS utilization has contributed to the reduction of health supply chain related workload through simplified interfaces with other e-tools that are mostly used in Rwanda health system and two third (83%) of respondents agreed the improvement on health supply chain cost effectiveness.

Moreover, The system allow ordering and make ordering process without moving from buyer to vendor by saving the time and related cost. Additionally, with electronic reports, automated approval workflows, and email/SMS notifications to the next reviewer, supply chain managers see significantly faster processing time where previously, issues such as unreliable transportation and manual processes caused delays.(USAID, 2010)

Furthermore, the finding of this study showed that 27.1% of respondents and users of e-LMIS strongly agreed and 45.8 % agreed that since the introduction of e-LMIS utilization in Rwanda health supply chain has simplified supervision practices and time it takes for conducting supervision. Data are visible to authorized users throughout the requisition/order process, allowing for managers to pinpoint where supportive supervision may be necessary to assist their staff.

Lastly, the study showed that respondents believe e-LMIS has good (27.1%) and fair (67.8%) impact on health supply chain management. These are due to absence of trained staff, supportive and programmed supervision and work load are the reasons for poor utilization of e-LMIS and could lead to poor outcomes of the system.

5.5. CHALLENGES, SUGGESTIONS RELATED TO e-LMIS USE

Related to system

The study revealed system limitations due to its complexity; mainly with requirements of available of rapid internet connectivity, unnecessary information, and incapacity to generate needs based on consumption data recorded in the system. Also, respondents

highlighted the lack of stock visibility in time of clients' orders validation, pages overloaded, unnecessary columns are other limitations for functionality of e-LMIS.

These limitations impair effective and friendly utilization of e-LMIS lead to inefficiency performance of supply chain operations through the system use. The suggestions recommended are to avail a rapid internet connectivity, resolve all issues related to the complexity of the system and ensure the full use of e- LMIS at all level of the health supply chain.

Related to System users

Most of respondents converged on workload due to insufficiency of personnel and mainly lack of those in charge of stock management as their principal tasks, lack of skilled and enough users at low levels. There is no dedicated supply chain personnel at most of health facilities and this would be useful for the personnel to use e-LMIS. It is recommended that MOH appoint a dedicated staff to manage supply chain operations at service delivery points.

For Managers and Authorities

They respondents stated the lack of ownership and accountability of health facility managers and district authorities. Also, they said that the lack of follow up on implementations of recommendations for supervision. For improvement of the utilization rate, there is a need of involvement of district authorities and increase accountability of Director General and health center management to the implementation of e-LMIS use in health facilities. Also, assured oversight of the institutions for effective use of e-LMIS.

CHAPTER SIX: CONCLUSION, RECOMMENDATIONS AND LIMITATIONS.

1. SUMMARY OF RESULTS

The results of the study show that 59 out of 60 have responded on Evaluating effectiveness of e-LMIS utilization in Rwanda health supply chain management. This study showed that two third of respondents do always use e-LMIS as part of their job and at least half of respondents (57%) use all e-LMIS functions. The study also revealed that only 40.7% responded that by using e-LMIS, generated information is received on time and accurately, majority (72.9%) of respondents use e-LMIS information to produce all required reports and only 9% have responded that e-LMIS does not take more time than paper based.

Also, the findings of this study showed that 94.9 % of respondents agreed accessibility of data for decision making and 57.6% of respondents agreed that contribution to quantification challenges. And, most of respondents 77.9% have agreed that the use of e-LMIS in health supply chain improved the quality of data.

Moreover, the study showed that more than half of respondents (57.5%) agreed the contribution of e-LMIS to reduce workload and two third (83%) of respondents agreed the improvement on health supply chain cost effectiveness. And, more than half of respondents (55.7%) agreed that they can do redistribution of health commodities based on data taken from e-LMIS, and 72.9% of respondents agreed that e-LMIS has simplified supervision.

The respondents were using e-LMIS good, fairly and poorly on 37.3%, 50.8% and 11.9% respectively. Also, respectively believe e-LMIS good (27.1%) and fair (67.8%) impact on health supply chain management.

2. CONCLUSION

From this study aimed to Evaluate the effectiveness of e-LMIS utilization in Rwanda health supply chain management. Despite e-LMIS have an impact on health supply chain

management but the findings showed most of users do not full use e-LMIS as required. Here, the portion of respondents use partial e-LMIS functions like order management, receipt/consumption and inventory management and transportation. The study highlighted the limitations for proper utilization of e-LMIS and it suggested some interventions needed for better use of the system. These are for staff availability, system complexities and involvement of authorities both local and national.

3. RECOMMENDATIONS

Decision makers

From the study perspective, there is a need of strengthening e-LMIS utilization by availing specific and trained staffs, resolve complexity of e-LMIS, enhance supportive supervision and feedback report for implication on data accuracy.

Also the study recommend decision makers to be accountable and full involved in implementation of findings about e-LMIS utilization from supervisions and researches.

Medical chain management

The study provided an opportunity for the users to evaluate themselves how they use e-LMIS. It recommends them to enhance utilization of e-LMIS and its functions in all daily health commodities processes. Study also recommended the users to be responsible, fully committed for the e-LMIS utilization and might understand its benefits in their attribution performance

Implications in Research

The study will help to generalize the findings from entire health supply chain management in Rwanda. Also, researches for prevalence of how e-LMIS is being utilized in health facilities and the evaluation of factors affecting e-LMIS use in Rwanda are needed for better improvement.

Limitations

The nature of the study design was like self-reports of e-LMIS users especially in part of practice. This did not permit examining the actual practice in relation with e-LMIS processes. Valuable methods of data collection like observation of actual practices and document review were not used because of limited time for the study.

Limitation of this study were amongst lack of similar studies especially in Rwanda which made difficult for comparing results. Also, the sample size was not large enough for some specific indicators.

REFERENCES

1. Desale, A. et al. (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', Pan African Medical Journal, 15, pp. 1–8. doi: 10.11604/pamj.2013.15.46.1969.
2. GHSC-PSM (2018) 'Rwanda e-LMIS OVERVIEW'. available on <https://www.ghsupplychain.org/country-profile/rwanda>, accessed on 21 May 2019
3. Harcourt, J. K. (1992) 'EFFECTIVENESS AND EFFICIENCY', Australian Dental Journal, pp. 317–318. doi: 10.1111/j.1834-7819.1992.tb04749.x.
4. Hare, L. and Snow, J. (2012) 'Logistics Management Information Systems (LMIS) Definition and function', Report, pp. 1–19. Available at: [https://healthmarketinnovations.org/sites/default/files/electronic Logistics Management Information System %28eLMIS%29 Supplementary Information.pdf](https://healthmarketinnovations.org/sites/default/files/electronic%20Logistics%20Management%20Information%20System%20Supplementary%20Information.pdf).
5. Hockings, et al (2000) Evaluating effectiveness: A framework for assessing the management of protected areas, Journal of clinical periodontology. Available at: https://books.google.rw/books?hl=en&lr=&id=nUBBMUMFl8AC&oi=fnd&pg=PR7&dq=Evaluating+effectiveness&ots=LX3eojGOdT&sig=5RZ20A0_huX4t0SwGvDhcs_OvDI&redir_esc=y#v=onepage&q=Evaluating effectiveness&f=false (Accessed: 7 March 2019).
6. JSI (2019) 'Why Invest in e-LMIS?'
7. Kothari, C. R. (1990) RESEARCH METHODOLOGY.
8. Louis, et al (2015) 'Assessment of Essential Medicines Stock-Outs at Health Centers in Burera District in Northern Rwanda', 2(1), pp. 2013–2016.
9. Ministry of Health (2011) 'District-Health-System-Guidelines.pdf', p. 12. Available at: <http://www.moh.gov.rw/fileadmin/templates/Docs/District-Health-System-Guidelines1.pdf>.
10. Mjelva, et al (2017) 'Benefits and Challenges of Integrating Fragmented Health Information Systems A Case Study of the Vaccine Supply Chain in', available on <https://www.duo.uio.no/handle/10852/56892> accessed on 21 August 2019
11. MOH (2014) " Adopted Structure of Minisante 2014". Available at:

http://www.moh.gov.rw/fileadmin/templates/Docs/moh_structure_2014_adopted.pdf

12. MOH (2014) "Health Sector Policy". Available at: http://www.moh.gov.rw/fileadmin/templates/policies/Health_Sector_Policy_2014.pdf.
13. MoH (2016) 'HEALTH SECTOR ANNUAL REPORT July 2015-June 2016', (July 2015).
14. MOH (2018) "Health Supply Chain Management Training Module for Hospitals and Health Centers October 2018", (October), pp. 1–85.
15. Nielsen, P. and Sæbø, J. I. (2016) 'Three Strategies for Functional Architecting: Cases from the Health Systems of Developing Countries', *Information Technology for Development*. Routledge, 22(1), pp. 134–151. doi: 10.1080/02681102.2015.1026304.
16. Ntirenganya, F. (2017) 'Electronic Logistics Management Information System (eLMIS) Refresher eLMIS TRAINING WORKSHOP HELD IN NYANZA Facilitation and Report by Frederic Ntirenganya Data Manager Nyanza District Pharmacy Picture of participants during session', (May). doi: 10.13140/RG.2.2.17958.32326.
17. Omary, et al (2017) 'Assessing Users ' Satisfaction with Tanzania n s ' Public Health Supply Chain Electronic Logistic Management Information System', 11(2).
18. Tiye, K. & Gudeta, T. (2018) 'Logistics management information system performance for program drugs in public health facilities of East Wollega Zone, Oromia regional state, Ethiopia', *BMC Medical Informatics and Decision Making*, 18(1), p. 133. doi: 10.1186/s12911-018-0720-9.
19. USAID & PEPFAR(2018) ELECTRONIC LOGISTICS MANAGEMENT INFORMATION SYSTEM EVALUATION REPORT. Available at: https://aidsfree.usaid.gov/sites/default/files/resources/2018.9.24_af-zam-m%26e-rep-tag.pdf (Accessed: 17 February 2019).
20. USAID (2010) 'eLMIS SELECTION GUIDE'. Available at: [https://healthmarketinnovations.org/sites/default/files/electronic Logistics Management Information System %28eLMIS%29 Overview.pdf](https://healthmarketinnovations.org/sites/default/files/electronic_Logistics_Management_Information_System_%28eLMIS%29_Overview.pdf) (Accessed: 3

February 2019).

21. USAID (2014) eLMIS Selection Guide: Electronically Managing Your Supply Chain Information, October 2015. Available at: https://www.jsi.com/JSIInternet/Inc/Common/_download_pub.cfm?id=16187&lid=3 (Accessed: 21 February 2019).
22. USAID (2015) 'President ' s Malaria Initiative Strategy', (April).
23. USAID (2017) "AIDSFree Success Story. eLMIS: A Supply Chain Becomes a Lifeline". Available at: https://aidsfree.usaid.gov/sites/default/files/resources/2017.10.24_af-zam-elmis-success-story.pdf (Accessed: 23 February 2019).
24. USAID (2017) 'Midterm Performance Evaluation of the Usaid / Rwanda Strengthening the Capacity of the Health Sector To Deliver Quality Health Services (Schs) Project', (September).
25. USAID (2016) 'USAID DELIVER PROJECT Final Country Report, Rwanda', p. Task Order 4 and Task Order 7.
26. Waseem, et al (2019) 'Performance Indicators of E-Logistic System with mediating role of Information Performance Indicators of E-Logistic System with mediating role of Information and Communication Technology (ICT)', (January).
27. World Health Organization (2017) 'Towards Access 2030: WHO Medicines and Health Products Programme Strategic Framework 2016 - 2030', Who/Emp/2017.01. Available at: http://www.who.int/medicines/publications/Towards_Access_2030_Final.pdf?ua=1.
28. Ziken International (Consultants) Ltd (2005) 'HOW TO MANAGE' SERIES FOR HEALTHCARE TECHNOLOGY Guide 4 How to Operate Your Healthcare Technology Effectively and Safely.

CONSENT FORM

My name is SINDAMBIWE Jean Pierre on behalf of university of Rwanda / College of Medicine and Health Sciences / School of Public Health / EAC regional centre of excellence for vaccines, immunization & health supply chain management. I am conducting a study in all District Pharmacies aiming at evaluating effectiveness of e-LMIS utilization in Rwanda health supply chain.

Users of e-LMIS by each District Pharmacy, during the time of data collection will be requested to participate in the study after having explanation about the study. If the request is positively agreed, the participant will be given the questionnaire. You are kindly requested to participate in this study. All information will be kept confidentially and securely. Names are not allowed to be written on questionnaire. Your participation is vital as well as is voluntarily. And, you are allowed to participate freely as you have right to refuse or withdraw at any time even without any effects.

However, your participation is highly demanded and will be appreciated.

Therefore, I have read and understand the aim of this study.

For more information, please contact Chairperson of the CMHS IRB (0788490522) and or the Deputy Chairperson (078334040)

Respondent signature

.....

Investigator signature

.....

Date.....

Date.....

ETHICAL CLEARANCE FOR STUDY

		UNIVERSITY of RWANDA COLLEGE OF MEDICINE AND HEALTH SCIENCES DIRECTORATE OF RESEARCH & INNOVATION		
CMHS INSTITUTIONAL REVIEW BOARD (IRB)				
SINDAMBIWE Jean Pierre School of Medicine and Pharmacy, CMHS, UR		Kigali, 19 th /07/2019		
Approval Notice: No 368/CMHS IRB/2019				
Your Project Title <i>"Evaluating Effectiveness of Electronic Logistic Management Information System In Rwanda Health Supply Chain"</i> has been evaluated by CMHS Institutional Review Board.				
Name of Members	Institute	Involved in the decision		
		Yes	No (Reason)	Withdrawn from the proceeding
Prof Kato J. Njunwa	UR-CMHS	X		
Prof Jean Bosco Gahutu	UR-CMHS	X		
Dr Brenda Asimwe-Kateera	UR-CMHS	X		
Prof Ntaganira Joseph	UR-CMHS	X		
Dr Tumusiime K. David	UR-CMHS	X		
Dr Kayonga N. Egide	UR-CMHS	X		
Mr Kanyoni Maurice	UR-CMHS		X	
Prof Munyanshongore Cyprien	UR-CMHS	X		
Mrs Ruzindana Landrine	Kicukiro district		X	
Dr Gishoma Darius	UR-CMHS	X		
Dr Donatilla Mukamana	UR-CMHS	X		
Prof Kyamanywa Patrick	UR-CMHS		X	
Prof Condo Umutesi Jeannine	UR-CMHS		X	
Dr Nyirazinyoye Laetitia	UR-CMHS	X		
Dr Nkeramihigo Emmanuel	UR-CMHS		X	
Sr Maliboli Marie Josee	CHUK	X		
Dr Mudenge Charles	Centre Psycho-Social	X		

After reviewing your protocol during the IRB meeting of where quorum was met and revisions made on the advice of the CMHS IRB submitted on 19th July 2019, **Approval has been granted to your study.**

Please note that approval of the protocol and consent form is valid for **12 months**.

You are responsible for fulfilling the following requirements:

1. Changes, amendments, and addenda to the protocol or consent form must be submitted to the committee for review and approval, prior to activation of the changes.
2. Only approved consent forms are to be used in the enrolment of participants.
3. All consent forms signed by subjects should be retained on file. The IRB may conduct audits of all study records, and consent documentation may be part of such audits.
4. A continuing review application must be submitted to the IRB in a timely fashion and before expiry of this approval
5. Failure to submit a continuing review application will result in termination of the study
6. Notify the IRB committee once the study is finished

Sincerely,

Date of Approval: The 19th July 2019

Expiration date: The 19th July 2020


Professor GAHUTU Jean Bosco
Chairperson Institutional Review Board,
College of Medicine and Health Sciences, UR



Cc:

- Principal College of Medicine and Health Sciences, UR
- University Director of Research and Postgraduate Studies, UR

FORMULAIRE DE CONSENTEMENT

Je m'appelle SINDAMBIWE Jean Pierre au nom de l'université du Rwanda / Collège de médecine et des sciences de la santé / École de santé publique / Centre d'excellence régional de l'EAC pour les vaccins, la vaccination et la gestion de la chaîne d'approvisionnement de la santé. Je mène une étude dans toutes les pharmacies de District dans le but d'évaluer l'efficacité de l'utilisation de e-LMIS dans la chaîne d'approvisionnement des produits de santé au Rwanda.

Le Personnel utilisant e-LMIS de chaque pharmacie de District va participer à l'étude au moment de la collection de données, après avoir reçu les explications nécessaires à ce sujet. Si la demande est acceptée, le questionnaire sera remis au participant. Vous êtes cordialement invité à participer à cette étude. Toutes les informations seront conservées de manière confidentielle et sécurisées. Les noms ne sont pas autorisés à être écrits sur le questionnaire. Votre participation est vitale et volontaire. Et vous êtes autorisé à participer librement car vous avez le droit de refuser et de vous retirer à tout moment, même sans aucun effet.

Cependant, votre participation est très demandée et sera appréciée.

Par conséquent, j'ai lu et compris l'objet de cet étude.

Pour plus d'information, veuillez contacter le président du CMHS IRB (0788490522) ou le vice-président (078334040)

Signature du répondant(e)

.....

Date

Signature de l'Evaluateur

.....

Date

DATA COLLECTION TOOL

INTRODUCTION.

The purpose of this evaluation is to assess the extent to which the e-LMIS has improved supply chain processes compared to its intended use from prospective. The evaluation will focus on *supply chain performance* , *data quality*, *use*, *impact and acceptability* of the system.

INSTRUCTIONS

- 1.This questionnaire to collect data on effectiveness of e-LMIS utilization in Rwanda health supply chain is composed by two parts.
2. Respondent is requested to answer all questions
3. Answers have to be provided in appropriate, mentioned space
4. You are not allowed to mention your name on this questionnaire

Part 1. Demographic data profile

Please answer the following questions and give mark

(X) On the parenthesis and fill in the blank area

1. Age:

20-29 (.....)

30-39 (.....)

40-49 (.....)

Above 50 (.....)

2. Sex: Male: (.....)

Female: (.....)

3. Educational level:

Secondary school: (.....)

Diploma in Health Sciences: (.....)

Bachelor in nursing: (.....)

Masters of nursing: (.....)

Pharmacy A1 : (.....)

Pharmacy A0: (.....)

Masters in Pharmacy (any field): (.....)

4. Service experience:

0-5 years: (.....)

6-10 years: (.....)

11-15 years: (.....)

16-20 years: (.....)

Above 20years: (.....)

5. Have you ever taken any training regarding management of health products using electronic logistic system?

No: (.....) Yes: (.....)

6. What are some of your occupations at work place?

Administrator (.....)

Ass. Administrator (.....)

Store manager (.....)

Data manager (.....)

Other (.....) Specify

7. What are some of the challenges that you face as part of your job?

Confused task

Mismatched rewards

Work overload

Use of complicated tools

Insufficiency of equipment /infrastructure

Both of them

Other (Specify):

Part II. e-LMIS related Questions

SECTION A: e- LMIS UTILIZATION RATE

Please read the following sentences and Circle preferred answer among which are provided

1. At which frequency do you use e-LMIS as part of your job?

- a. Always
- b. Usually
- c. often
- d. sometimes
- e. Rare

2. With health commodities management using e-LMIS, inventory adjustment is made:

- a. Only at the end of the month after physical count
- b. When we physically receive any item out of system
- c. When we receive from or issue to another District Pharmacy
- d. In case of losses due to damages or expires
- e. C and D are correct

3. Among e- LMIS functions, I most experience using:

- a. Order management
- b. Inventory management

c. Warehouse management

d. Transportation

e. All above

4. With e-LMIS use, generated information for reporting or decision-making are:

a. incomplete and inaccurate

b. Accurate but incomplete

c. Received on real time but inaccurate

d. Received on time and accurate

5. Do you use e-LMIS information to produce any other reports? which of the following:

a. Inventory summary report

b. Monthly consumption report

c. Expiries by site

d. Stock out by site

e. All stated above

6. What activities in e-LMIS takes more time than it was with paper based?

a. ordering

b. Receiving

c. Consumption / Transportation

d. Review and Reporting generation

e. All of them

d. None

SECTION B: Impact / effect of e-LMIS on supply chain operations

1. With the use of e-LMIS, I have access on past and current information at any time I need them

a. Strongly agree

b. Agree

c. Fair

d. Disagree

e. Strongly disagree

2. With the use of e-LMIS, Decision - makers have access on country wide information at any health facility on time of need

a. Strongly agree

b. Agree

c. Fair

d. Disagree

e. Strongly disagree

3. Using data captured through e-LMIS, has contributed to the reduction of some quantification challenges like inaccuracy of data, incompleteness of data.

a. Strongly agree

b. Agree

c. Fair

d. Disagree

e. Strongly disagree

4. Since the introduction of e-LMIS use, our stock of health commodities is most of the time at optimum level without frequent stock out and or expiries

a. Strongly agree

b. Agree

c. Fair

d. Disagree

e. Strongly disagree

5. With health commodities management through e-LMIS,

a. Have you ever noted any stock imbalance (over / under stock level) in your District: Yes or No

b. If yes, for which items did you experienced this case (give 5 items name) ?

c. What did you proposed to do in your responsibility as health supply chain officer?

d. Why did you proposed so (at least three reasons)?

6. Since the introduction of the e-LMIS use in our facility, using logistics data has changed.

a. Strongly agree

b. Agree

c. Fair

d. Disagree

e. Strongly disagree

7. Please fill the table below with physical quantities per item here mentioned

ITEM	Unit of measure	SOH as at 31/07/2019
Shisha kibondo Baby	Sachet of 1.5kg	
TDF /3TC 300/300mg tab	B/30	
Amoxicillin 500mg capsules	Tablet	
Ringer lactate 500ml	Bottle	
Coartem 6X4, blister	blister	

Zinc sulfate 20mg tab	tablet	
HIV combo	B/100	
RTDs, Box of 30	piece	
RHZE 150/75/400/275mg	Tablet	
Implanon	Piece	

8. Supervision practices and time have been simplified since the introduction of e-LMIS in health supply chain indicators in your district

a. Strongly agree

b. Agree

c. Fair

d. Disagree

e. Strongly disagree

9. Since the introduction of e-LMIS use in my job, workload has considerably reduced

a. Strongly agree

b. Agree

c. Fair

d. Disagree

e. Strongly disagree

10. Due to different factors, I spend more time, reporting data with e-LMIS than it was with paper based.

a. Strongly agree

b. Agree

c. Fair

d. Disagree

e. Strongly disagree

11. Read the table below and provide requested information.

FISCAL YEAR	NUMBER OF ITEMS EXPIRED AT YOUR DISTRICT PHARMACY	VALUE OF EXPIRED PRODUCTS IN RFWS
2013-2014	48	
2014-2015	37	
2015-2016	38	
2016-2017	21	

2017-2018	29	
2018-2019	17	

12. Since the introduction of the e-LMIS, health commodities managers become accountable regarding data and commodities management.

a. Strongly agree

b. Agree

c. Fair

d. Disagree

e. Strongly disagree

13. Workload that is frequently noted in health commodities management at health facilities level is simplified through interfaces with other e-tools that are mostly used in Rwanda health system.

a. Strongly agree

b. Agree

c. Fair

d. Disagree

e. Strongly disagree

14. Since the introduction of the e-LMIS, my responsibilities become more time-consuming.

a. Strongly agree

b. Agree

c. Fair

d. Disagree

e. Strongly disagree

SECTION C: Challenges and limitation with e-LMIS utilization in health supply chain

1. With your experience working with the system, what limitations do you feel the system has and what solutions would you recommend for those limitations?

- Limitation: a.
b.
c.
d.
e.

➤ Suggestions for improvement in e-LMIS utilization:

- a.
.....
b.
.....
c.
.....

d.

.....

e.

.....

QUESTIONNAIRE (Version Francais)

INTRODUCTION

Le but de cette étude est d'évaluer dans quelle mesure e-LMIS a amélioré les processus de la chaîne d'approvisionnement par rapport à son utilisation prévue de prospective. L'évaluation portera sur les performances de la chaîne d'approvisionnement, la qualité des données, l'utilisation, l'impact et l'acceptabilité du système.

INSTRUCTIONS

1. Ce questionnaire destiné à collecter des données sur l'efficacité de l'utilisation du e-LMIS dans la chaîne d'approvisionnement des produits de sante au Rwanda, est composé de deux parties.
2. Le e- LMIS utilisateur est prié de répondre à toutes les questions
3. Les réponses doivent être fournies dans l'espace approprié, mentionné
4. Vous n'êtes pas autorisé à mentionner votre nom sur cette questionnaire

Partie 1. Profil de données démographiques

S'il vous plaît répondre aux questions suivantes et donner la note

(X) entre parenthèse et en remplissant la zone vide qui convient.

1. Age:

20-29 (.....)

30-39 (.....)

40-49 (.....)

Au-dessus de 50 (.....)

2. Sexe: masculin: (.....)

Femelle: (.....)

3. Niveau d'éducation:

Ecole secondaire: (.....)

Diplôme dans sciences de la sante : (.....)

Baccalauréat en sciences infirmières: (.....)

Maîtrise en sciences infirmières: (.....)

Pharmacie A1: (.....)

Pharmacie A0: (.....)

Maîtrise en pharmacie (quelque soit le domaine): (.....)

4. Expérience de service:

0-5 ans: (.....)

6-10 ans: (.....)

11-15 ans: (.....)

16-20 ans: (.....)

Au-dessus de 20 ans: (.....)

5. Avez-vous déjà suivi une formation sur la gestion des produits de santé à l'aide d'un système logistique électronique?

Non / Oui: (.....)

6. Quelles sont certaines de vos occupations au lieu de travail?

Administrateur (.....)

Ass- Administrateur (.....)

Gestionnaire de stock (.....)

Gestionnaire de données (.....)

Autre précisez

7. Quels sont certains des défis auxquels vous faites face dans le cadre de votre travail?

Tâche confondue

Récompenses incompatibles

Surcharge de travail

Utilisation d'outils compliqués

Insuffisance d'équipement / infrastructure

Tous haut-cités

(Autre précisez):

Deuxieme Partie: Questions relatives à e-LMIS

SECTION A: Fréquence d'utilisation de e-LMIS

Veuillez lire les phrases suivantes et encercler la lettre correspondante à la réponse préférée parmi celles qui sont données:

1. À quelle fréquence utilisez-vous e-LMIS dans le cadre de votre travail?

- a. Toujours
- b. habituellement
- c. souvent
- d. parfois
- e. Rare

2. Avec la gestion des produits de santé en utilisant e-LMIS, un ajustement des stocks est effectué:

- a. Seulement à la fin du mois après le comptage physique
- b. Lorsque nous recevons physiquement un article hors du système
- c. Lorsque nous recevons ou distribuons dans une autre pharmacie de district
- d. En cas de pertes dues à des dommages ou à une expiration
- e. C et D sont corrects

3. Parmi les fonctions de e-LMIS, j'utilise souvent:

- a. La gestion des commandes
- b. Gestion de l'inventaire
- c. Gestion d'entrepôt
- d. Transportation

e. Tous ci haut cités

4. Avec l'utilisation du système e-LMIS, des informations fournies sont:

a. incomplet et inexact

b. Précis mais incomplet

c. Reçu en temps réel mais inexact

d. Reçu à temps et précis

5. Utilisez-vous les informations e-LMIS pour produire d'autres rapports? lesquels des suivants:

a. Rapport de synthèse d'inventaire

b. Rapport de consommation mensuel

c. Expires par site

d. Rupture de stock par site

e. Tous déclarés ci-dessus

6. Quelles activités dans e-LMIS prennent plus de temps qu'avec du papier?

a. Faire commande de besoins

b. La réception des produits

c. Consommation / Transportation

d. Révision et génération de rapports

e. Tous les 4 ci haut cités

SECTION B: Impact de e-LMIS à la chaîne d'approvisionnement

1. En utilisant e-LMIS, j'ai accès aux informations passées et actuelles à tout moment voulu.

- a. Tout à fait d'accord
- b. D'accord
- c. Juste
- d. Désaccord
- e. Fortement en désaccord

2. Avec l'utilisation du système électronique de gestion de l'information, les décideurs ont accès aux informations de l'ensemble du pays dans n'importe quel établissement de santé en cas de besoin.

- a. Tout à fait d'accord
- b. D'accord
- c. Juste
- d. Désaccord
- e. Fortement en désaccord

3. L'utilisation des données saisies à l'aide du e-LMIS a contribué à réduire certains problèmes liés à la quantification, tels que l'inexactitude des données, leur caractère incomplet.

- a. Tout à fait d'accord
- b. D'accord
- c. Juste
- d. Désaccord

e. Fortement en désaccord

4. Depuis l'introduction de l'utilisation des e-LMIS, notre stock de produits de santé est la plupart du temps à son niveau optimal, sans rupture de stock ni expirations fréquentes.

a. Tout à fait d'accord

b. D'accord

c. Juste

d. Désaccord

e. Fortement en désaccord

5. Avec la gestion des produits de santé via e-LMIS:

a. Avez-vous au moins constaté un déséquilibre de stocks (niveau de stock supérieur ou inférieur au stock optimal) dans votre district: oui ou non

b. Si oui, pour quels articles avez-vous vécu ce cas (indiquez les noms de 5 articles)?

c. Qu'avez-vous proposé de faire en tant que responsable de la chaîne d'approvisionnement sanitaire?

d. Pourquoi l'avez-vous proposé (au moins trois raisons)?

6. Depuis l'introduction de l'utilisation du e-LMIS dans notre établissement, la qualité des données logistiques est améliorée.

a. Tout à fait d'accord

b. D'accord

c. Juste

d. Désaccord

e. Fortement en désaccord

7. Vous êtes priés de remplir le table ci-dessous avec les informations demandées

NOM DU PRODUIT	Unite de mesure	Quantité physique 31/07/2019
Shisha kibondo Baby	Sachet de 1.5kg	
TDF /3TC 300/300mg comprimés	B/30	
Amoxicillin 500mg gélules	comprimé	
Ringer lactate 500ml	Bouteuille	
Coartem 6X4, plaquete	plaquete	
Zinc sulfate 20mg comprimé	comprimé	
HIV combo	B/100	
Malaria Rapid Diagnostic tests (RDTs)	pièce	
RHZE 150/75/400/275mg	Comprime	
Implanon next	Pièce	

8. Les pratiques et le temps de supervision ont été simplifiés depuis l'introduction du e-LMIS dans les indicateurs de la chaîne d'approvisionnement de la santé dans notre District.

- a. Tout à fait d'accord
- b. D'accord
- c. Juste
- d. Désaccord
- e. Fortement en désaccord

9. Depuis l'introduction de l'utilisation des e-LMIS dans mon travail, le surcharge a été considérablement réduit

- a. Tout à fait d'accord
- b. D'accord
- c. Juste
- d. Être en désaccord
- e. Fortement en désaccord

10. En raison de différents facteurs, je passe plus de temps dans la gestion des données avec e-LMIS qu'avec du papier.

- a. Tout à fait d'accord
- b. D'accord
- c. Juste
- d. Désaccord
- e. Fortement en désaccord

11. Veuillez remplir le table ci dessous avec des informations demandées

Annee budgetaire	Nombre d'article expires dans votre stock (DP)	Valeur de produits expires dans votre stock (DP)
2013-2014	48	
2014-2015	37	
2015-2016	38	
2016-2017	21	
2017-2018	29	
2018-2019	17	

12. Depuis l'introduction du système électronique de gestion de l'information, les autorités dans la chaine d'approvisionnement de produits de santé sont devenus de plus responsables de la gestion des données et des produits.

- a. Tout à fait d'accord
- b. D'accord
- c. Juste
- d. Désaccord
- e. Fortement en désaccord

13. La charge de travail fréquemment constatée dans la gestion des produits de santé au niveau des formations sanitaires est simplifiée par d'interfaces avec d'autres outils électroniques principalement utilisés dans le système de santé au Rwandais.

- a. Tout à fait d'accord
- b. D'accord
- c. Juste
- d. Désaccord
- e. Fortement en désaccord

14. Depuis la mise en place du e-LMIS, l'exécution de mes responsabilités prend plus de temps.

- a. Tout à fait d'accord
- b. D'accord
- c. Juste
- d. Désaccord
- e. Fortement en désaccord

SECTION C

1. Avec votre expérience de travail avec le système e-LMIS, quelles limitations pensez-vous que le système a et quelles solutions recommanderiez-vous pour ces limitations?

Limitation: a.

 b.

 c.

 d.

 e.

Suggestions pour l'amélioration d'utilisation de e-LMIS:

- a.
- b.
- c.
- d.
- e.